CONSUMER PAYMENT INNOVATION

IN THE CONNECTED AGE

An International Payments Policy Conference
Sponsored by the Federal Reserve Bank of Kansas City

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Foreword

Since the turn of the century, retail payments systems around the world have undergone dynamic change. In the United States, less than eight years following the implementation of the Check Clearing for the 21st Century Act, virtually all noncash payments are completed electronically, even if initiated by paper check. Nonbank firms are challenging financial institutions in providing consumers and businesses with an increasing range of payment options. Technology is expanding the places and means through which commerce is transacted. These factors motivated the topic for the Federal Reserve Bank of Kansas City's fourth international retail payments conference titled, "Consumer Payment Innovation in the Connected Age," which took place March 29 and 30, 2012, in Kansas City, Mo.

This year's conference was convened to examine the role of public policy in an age in which smartphones and social networks are enabling consumers, businesses and financial institutions to interact with each other more freely and quickly. Conference participants—industry executives, regulatory authorities, central bankers and academics—offered a range of views, valuable perspectives and insights on the likelihood of a consumer payments revolution and the potential for interconnectedness to improve consumer access to payments. Participants addressed the implications for risk and privacy, the potential for changes in payments clearing and settlement to enhance innovation, as well as the potential for public policy to play a role in promoting socially beneficial innovation. This volume includes all of the presentations and papers from the conference and the general audience discussions.

Over the course of this two-day conference, I found striking similarities surrounding the evolution of consumer payments in other countries. Several speakers highlighted innovations in emerging payments that offered significant end user benefits but appeared to be constrained by market forces. In response, central banks have taken various policy approaches to support, encourage and even deliver improvements valued by consumers and businesses. Some participants offered compelling arguments for coordination to address certain market inefficiencies and usher in a more real-time retail payments system. These dynamics present a call to action in my view, particularly for the Federal Reserve System in the United States, to focus

and consider how best to support the innovation occurring in retail payments while ensuring the safety, accessibility and efficiency of the payments system.

We sincerely thank the conference participants for their contributions to advancing our understanding of this important topic.

Esther L. George
President and Chief Executive Officer
Federal Reserve Bank of Kansas City

Contributors

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Mr. Acquisti is an associate professor at the Heinz College at Carnegie Mellon University (CMU), and the co-director of the CMU Center for Behavioral Decision Research. His research focuses on the economics of privacy. He has been the recipient of the PET Award for Outstanding Research in Privacy Enhancing Technologies, the IBM Best Academic Privacy Faculty Award, the Heinz College Award for Teaching Excellence and multiple best paper awards.

He is a member of the National Academies' Committee on Public Response to Alerts and Warnings Using Social Media and Associated Privacy Considerations. He has had visiting positions at Harvard University and the Universities of Rome, Paris and Freiburg, at Microsoft Research in New England, and at Google.

Ross Anderson, *Professor of Security Engineering, University of Cambridge*

Mr. Anderson is the professor of security engineering at Cambridge University. He was one of the founders of the academic discipline, economics of information security. Mr. Anderson was also a seminal contributor to the idea of peer-to-peer systems and an inventor of the Advance Encryption Standard finalist encryption algorithm "Serpent."

He has written publications on other technical security topics, including hardware tamper-resistance, emission security, copyright marking and the robustness of Application Programming Interfaces. He is a fellow of the Royal Society, the Royal Academy of Engineering, the Institution of Engineering and Technology, and the Institute of Mathematics and its Applications. He also wrote the standard textbook, *Security Engineering–A Guide to Building Dependable Distributed Systems.*

Chris Bierbaum, *General Manager, Mobile Commerce, Sprint Nextel Corporation*

Mr. Bierbaum is general manager of mobile commerce at Sprint and has led this group since 2002. He has been involved in the telecommunications industry since 1997, serving in financial, strategy, corporate finance, and innovation and product development positions with Sprint Nextel.

Mr. Bierbaum has served as Sprint's representative to several organizations, including the Massachusetts Institute of Technology Media Lab, and has been on the board of directors of the Mobile Payment Forum and a mobile commerce startup. He currently represents Sprint with the Near Field Communication (NFC) Forum and GlobalPlatform. Mr. Bierbaum led the team that launched two industry-first NFC trials in the United States. Mr. Bierbaum also represented Sprint for three years as the Head of Product & Technology Development and Information Technology for ISIS Mobile. Before joining Sprint, he had senior positions at Koch Industries, ConAgra and several investment banking firms in New York.

Paul Breloff, *Managing Director, Venture Lab, ACCION International*

Mr. Breloff is the managing director of the ACCION Venture Lab, a seed-stage investment fund sponsored by ACCION International. Venture Lab provides capital and management support to identify and jumpstart innovative financial inclusion startups globally, focusing particularly on technology enabled financial services in East Africa and India. He advises on policy and technical issues related to branchless banking for Consultative Group to Assist the Poor, an independent research center focused on financial inclusion and housed at the World Bank. He also has been engaged by Root Capital, Shell Foundation and others on access to finance issues in Latin America, Asia and Africa.

Previously, Mr. Breloff worked with SKS Microfinance, India's largest microfinance institution, leading business development and strategic initiatives. He has also practiced corporate and real estate law with Mayer Brown, worked as a consultant for McKinsey & Company and worked as an advertising account executive for Leo Burnett.

Michael Brown, *Chairman and Chief Executive Officer, Euronet Worldwide*

Mr. Brown is the co-founder, chief executive officer and chairman of the board for Euronet Worldwide, a processor of secure electronic financial transactions. He is actively involved in the day-to-day operations of Euronet through oversight of the company's business strategy, development and financial performance across all markets.

Mr. Brown has 30 years of combined experience in the computer software and electronics payments business. In 1979, he founded Innovative Software, which developed integrated business software, primarily for personal computers. In 1988, Innovative Software merged with Informix, a leading provider of advanced database software technology. During his time at Informix, he served as president and

chief operating officer as well as president of the workstation products division. In 1993, he was a founding investor of Visual Tools, a company that writes and markets component software for the Visual Basic and Visual C++ developer market. Visual Tools was acquired by Sybase Software in 1996. He currently serves on the boards of Nexxus Lighting Inc., Bank of Blue Valley and the Greater Kansas City Community Foundation.

Nicholas Economides, *Professor of Economics,*
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Mr. Economides is professor of economics at the Stern School of Business of New York University and founder and executive director of the NET Institute. He taught at Columbia University from 1981 through 1988 and at Stanford University from 1988 through 1990. He is editor of the *Journal of Economics & Management Strategy, Netnomics, The Quarterly Journal of Electronic Commerce, The Journal of Financial Transformation, The Journal of Network Industries, International Journal of Management and Networks Economics* and *Economics of Networks Abstracts* by the Social Science Research Network (SSRN). He is also a past editor of the *International Journal of Industrial Organization* and is on the advisory board of *Journal of Competition and Regulation in Network Industries* and of the SSRN.

He has advised or is currently advising the U.S. Federal Trade Commission, the governments of Canada, Greece, Ireland, New Zealand and Portugal, the attorneys general of New York and Texas, major telecommunications and high technology companies, a number of the Federal Reserve Banks, the Bank of Greece and major financial exchanges. He serves on the advisory board of the Economist Intelligence Unit and Quadriserv.

Malcolm Edey, *Assistant Governor,*
Reserve Bank of Australia

Mr. Edey was appointed to his current position as assistant governor of the Reserve Bank of Australia (RBA) in April 2009. In this role, he is responsible for the RBA's work on financial stability, including production of the twice-yearly Financial Stability Review, as well as the RBA's oversight of the payments system. He is a member of the RBA's senior policy committees and deputy chairman of the Payments System Board. Prior to his current role, Mr. Edey headed the RBA's Economic Group for seven years and had a number of other senior positions in economic and financial markets groups. In the mid-1990s, he spent three years at the Organisation for Economic Co-operation and Development (OECD) in Paris where he worked as a senior economist in the Money and Finance Division. In December 2010, he was elected chairman of the OECD Committee on Financial Markets. He is a member of the Basel Committee on Banking Supervision.

David S. Evans, *Founder,*
Market Platform Dynamics

Mr. Evans is an economist, business adviser and founder of Market Platform Dynamics. He is an expert on the design and implementation of platform business

strategies. His body of work is captured in *Invisible Engines: How Software Platforms Drive Innovation and Transform Industries*, a book he co-authored with Andrei Hagiu and Richard Schmalensee that won the 2006 American Publishers Association Best Business Book Award.

Mr. Evans is the author of six additional books and more than 100 articles and book chapters. These include two books co-authored with Richard Schmalensee that analyze platform strategies in a variety of industries: *Catalyst Code: The Strategies Behind the World's Most Dynamic Companies* and *Paying with Plastic: The Digital Revolution in Buying and Borrowing*. His recent work, "How Catalysts Ignite: The Economics of Platform-Based Startups," focuses on how new platform businesses solve the "ignition problem," which involves securing a critical mass of customers to generate sustainable growth through positive-feedback effects.

Mr. Evans has deep experience in financial services, Internet-based, online advertising, online and traditional media, payment cards, software platforms and telecommunications industries. He has served as an adviser to a number of the world's largest corporations. He has served as an adviser to more than 20 start-ups and is a member of the board of directors of several, including PYMNTS.com, which is a joint venture between Market Platform Dynamics and Berkshire Hathaway's Business Wire.

Joseph Farrell, *Director, Bureau of Economics, Federal Trade Commission*

Mr. Farrell has been director of the Bureau of Economics at the Federal Trade Commission since June 2009. He was previously deputy assistant attorney general for economics with the U.S. Department of Justice, chief economist at the Federal Communications Commission, a principal member of the technical staff at GTE Laboratories and national fellow at the Hoover Institution. He served on the Computer Science and Telecommunications Board at the National Academies of Science. He was editor of the *Journal of Industrial Economics*, president of the Industrial Organization Society and chair of Berkeley's Competition Policy Center.

He joined the University of California at Berkeley in 1989 as an associate professor and became a full professor in 1991. He was elected a fellow of the Econometric Society in 2002.

Gary Fish, *President and Chief Executive Officer, FishNet Security*

Mr. Fish is the founder, president and chief executive officer of FishNet Security Inc. In 1996, he founded FishNet Security, which under his leadership has become the largest independently owned information security solutions provider in the United States. Mr. Fish has advisory board positions with a number of global technology companies and is an active angel investor. In addition to founding FishNet Security, he is co-founder and chief executive officer of FireMon, a software company.

Mr. Fish has received honors and accolades from industry peers. Among his honors, he was selected one of the Top 25 Executives for the New Millennium in

computer-related fields. Ernst & Young has honored him as the Technology Entrepreneur of the Year for Kansas and Western Missouri, and CRN has honored him as a Security Superstar.

Alan S. Frankel, *Director,*
Coherent Economics, LLC

Mr. Frankel is founder of Coherent Economics, LLC, and a Senior Editor of the Antitrust Law Journal. He also serves as a Senior Advisor to the economic consulting firm Compass Lexecon.

Mr. Frankel has written and spoken extensively about competition in payment systems. Since 1990, he has been involved in many high profile disputes involving network access, interchange and other fee setting practices, and network rules that constrain merchant strategies at the point of sale. Mr. Frankel has been involved in legal or regulatory proceedings relating to these issues on behalf of competition authorizes or merchants in the United States, Canada, the United Kingdom, the European Union, Australia, and New Zealand.

Esther L. George, *President and Chief Executive Officer,*
Federal Reserve Bank of Kansas City

Esther L. George is president and chief executive officer of the Federal Reserve Bank of Kansas City and a member of the Federal Open Market Committee, which has authority over U.S. monetary policy. Before being appointed president on Oct. 1, 2011, she had been the Bank's first vice president and chief operating officer since August 2009, responsible for directing the Bank's operations throughout the Tenth Federal Reserve District. Additionally, she recently served as the acting director of the Federal Reserve's Division of Banking Supervision and Regulation at the Board of Governors of the Federal Reserve System in Washington, D.C.

In January 2009, Ms. George was named executive vice president in charge of the Bank's Division of Supervision and Risk Management, a division she led as senior vice president since 2001. She is a former chair of the Federal Reserve System's Community Banking Organizations Management Group. Beyond the Tenth Federal Reserve District, Ms. George's experience in international central banking issues includes presentations at the Bank for International Settlement's Financial Stability Institute programs in Lima, Peru and Abu Dhabi, U.A.E. She has also served as the Tenth District's lead officer for international partnership programs involving the central banks of Morocco and Iraq. Additionally, she participates in the Federal Reserve Bank of Kansas City's annual economic policy symposium that is attended by central bankers from around the globe.

Gerard B. J. Hartsink, *Chairman,*
European Payments Council

Mr. Hartsink is chairman of the European Payments Council, CLS Group Holdings, CLS Bank International, SWIFT's Dutch National Member Group and ISO Registration Management Group 20022 XML. He is co-chairman of

Coordination Group European Payments Strategy, the European Central Bank's group that addresses issues and developments in the field of payment systems and services that are relevant for the euro area banking industry and for the Eurosystem. He is a board member of LCH.Clearnet and SWIFT. He is a member of Forum Standaardisatie, Coordination Group European Securities Infrastructure and ECB Target2 Securities Advisory Group.

Mr. Hartsink is also senior adviser to the managing board of ABN AMRO Bank. During his career as senior executive vice president of ABN AMRO, he has had managerial roles in sales, product development, information management and operations in several business units. He is currently responsible for the relationship with market infrastructures and industry standards bodies in the securities, payments, forex and cards industries.

Sarah Jane Hughes, *University Scholar and Fellow in Commercial Law, Indiana University Maurer School of Law*

Ms. Hughes is a university scholar and fellow in commercial law at the Indiana University Maurer School of Law. She is a nationally recognized expert on payment systems (domestic, international, Internet banking, smart cards, wire transfers, checks, embezzlement and credit cards); public and private methods to deter, detect and prosecute domestic and international money laundering; and consumer protection and financial privacy.

She received the Maurer School of Law's Leon Wallace Teaching Award in 1993 and the graduating class' Gavel Award in 1996, 1997 and 2000. Her courses include Sales, Negotiable Instruments, Secured Transactions, Regulated Industries—Banking Law, and White Collar Crime.

Ms. Hughes is a member of the American Bar Association's (ABA) Cyberspace Law Committee, where she co-chairs the Working Group in Electronic Payment Services, and the Business Law, Antitrust and International Law Sections. In the ABA Business Law Section, she focuses on the areas of electronic commerce, payments systems and the uniform commercial code.

Michael L. Katz, *Professor of Economics, University of California, Berkeley*

Mr. Katz serves as the Sarin Chair in Strategy and Leadership at the University of California, Berkeley's Haas School of Business, where he is director of the Institute for Business Innovation. Mr. Katz also has an appointment as professor in the Department of Economics. He is a four-time finalist for the Earl F. Cheit Award for outstanding teaching and has won it twice.

Mr. Katz served as deputy assistant attorney general for economic analysis in the Antitrust Division of the U.S. Department of Justice from September 2001 through January 2003. In his work there, he oversaw the analysis of economic issues arising in both merger and non-merger enforcement. He served as chief economist of the Federal Communications Commission from January 1994 through

January 1996. There he participated in the formulation and analysis of policies toward all industries under Commission jurisdiction, including broadcasting, cable, telephone and wireless communications. He has consulted for both governmental and private entities on issues involving strategies of, and public policies toward, payment networks.

Mr. Katz has published numerous articles on the economics of networks industries (particularly telecommunications and payment networks), intellectual property and antitrust enforcement. He is a member of the editorial boards of *Information Economics and Policy*, the *Journal of Economics & Management Strategy* and the *Journal of Industrial Economics*.

Don Kingsborough, *Vice President of Retail and Prepaid, PayPal*

Mr. Kingsborough is the vice president of retail and prepaid products at PayPal. He brings experience in consumer product development, technology, retail, point-of-sale and merchant relationships in oversight of PayPal's market expansion offline and into traditional retail stores.

Prior to joining PayPal, Mr. Kingsborough was president and chief executive officer of Blackhawk Network, a leader in third-party prepaid card products that he founded in 2001. He also founded and served as chief executive officer of toy manufacturer Worlds of Wonder Inc. Before Worlds of Wonder, he was president of the consumer products division at Atari Corporation and led the introduction of Nintendo to America.

Bob Lee, *Chief Technology Officer, Square*

Mr. Lee is the chief technology officer at Square. He leads a team of 90 engineers and oversees all of the company's technical initiatives. He engineers hardware, smartphone clients, highly available payment processing infrastructure and everything in between.

Prior to Square, Mr. Lee was a staff software engineer at Google. There he led the core library development for Google's Android mobile platform, contributed to the design of the Java Programming Language and its APIs, created the Jolt Award-winning Guice framework and led JSR-330 Dependency Injection for Java—the fastest executing Java specification in the history of the Java Community Process (JCP). Mr. Lee also represented Google on the JCP executive committee, which steers the development of Java, and helped open Google's London engineering office.

Prior to Google, Mr. Lee worked for or consulted at D'Arcy, Object Computing Inc., Ernst & Young, MasterCard and SBC (now known as AT&T). He coauthored the book, *Bitter EJB*, and wrote a program that helped defeat the Code Red Worm, which led him to an appearance on TechTV's "The Screen Savers." He is also a board member and leads the technical committee for Life Skills, a St. Louis-based nonprofit.

Richard Mabbott, *Director, Major Projects,*
Faster Payments Scheme Limited

Mr. Mabbott is the director of major projects at the Faster Payments Scheme Limited, one of the contracted payment schemes under the United Kingdom's Payments Council.

He was the program director for Faster Payments from the inception of the program in May 2005 to 2009 when the final phase of the development went live. During that time, Mr. Mabbott managed the designing, building, testing and launching of the faster payments system, the first new payment system in the United Kingdom in more than 20 years. He has in-depth experience with check clearing, ACH, CHAPS/RTGS, SWIFT and both credit and debit card systems as well as Faster Payments. Mr. Mabbott is an information and communications technology professional who has worked in payment systems for nearly 40 years. He has been with the Payments Council and its predecessor, APACS, for 18 years.

Mr. Mabbott is the chairman of the ISO standards committee responsible for card standards—SC17 Cards and Personal Identification—a position he has had for the past 16 years.

Ricardo Medina, *Director of Payment Systems,*
Bank of Mexico

Mr. Medina joined the Bank of Mexico in 1989 and became the director of the Payment Systems department in 2004. His main task is promoting the sound functioning of the payments system in Mexico. Prior to his appointment as director, Mr. Medina's responsibilities related to the management of international reserves and monetary and foreign exchange policies.

He has been a lecturer on statistics, econometrics and finance at the National University of Mexico and at the Technological Institute of Mexico.

M.J. Moltenbrey, *Partner,*
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Ms. Moltenbrey is a partner at Dewey & LeBoeuf LLP where she represents clients through civil and criminal conduct investigations by federal and state antitrust authorities. She has defended clients in federal court cases before the Department of Justice (DOJ) and Federal Trade Commission. She also has helped guide numerous complex mergers through review by federal and state agencies, including Monsanto's acquisition of Delta and Pine Land, Xstrata's acquisition of Falconbridge Ltd. and Expro International Group's acquisition of Power Well Services.

Ms. Moltenbrey was formerly the director of civil nonmerger enforcement in the DOJ's Antitrust Division. In that position, she was the Antitrust Division's senior career officer responsible for civil conduct investigations and litigation. During her 17-year DOJ career, Ms. Moltenbrey also served as chief of the Civil Task Force and as trial attorney in the Transportation Section. Among the matters Ms. Moltenbrey was involved in at the DOJ were: *United States v. Microsoft* (monopolization); *United*

States v. Visa International et al. (anticompetitive agreements in joint venture); and *United States v. Airline Tariff Publishing Co., et al.* (price coordination).

Ms. Moltenbrey has been recognized as a leading U.S. antitrust lawyer by Chambers USA "America's Leading Business Lawyers," Global Competition Review's "International Who's Who of Business Lawyers," and "Washington Super Lawyers."

Kevin Morrison, *Senior Vice President, Prepaid, U.S. Bank*

Mr. Morrison joined U.S. Bank in September 2010 and currently serves as the senior vice president for the prepaid organization, which oversees all government, corporate and consumer based prepaid products. He began his career in the payment industry in 1994 while working at Commerce Bank of Kansas City in the credit card division. In 1996, he moved to First Data, where he spent the first four years on the credit and debit side of the business.

In 2000, Mr. Morrison migrated to the prepaid department within First Data and spent the next six years developing and implementing prepaid programs for some of the largest financial institutions in the United States. In 2006, he joined H&R Block to develop and launch the Emerald Prepaid MasterCard program as well as other prepaid products.

Sean O'Connor, *Adviser, Payments System Development Group, World Bank*

Mr. O'Connor is an adviser in the Payments System Development Group at the World Bank. He was formerly a research adviser at the Bank of Canada, specializing in research and policy for financial infrastructure. He has had various positions as a monetary and financial economist in the private sector, government and the International Monetary Fund, as well as the Bank of Canada. He represented the Bank of Canada on several international and domestic committees and working groups, including the SWIFT Oversight Group and the Bank for International Settlements Committee on Payment and Settlement Systems (CPSS). He also chaired the CPSS Working Group on General Guidance for the Development of Payment Systems.

Mr. O'Connor has also participated as a payments expert in the International Monetary Fund-World Bank Financial Sector Assessment Program and as a consultant to central banks in emerging markets.

Neil Platt, *Senior Vice President and General Manager, Payments, Fiserv/CashEdge*

Mr. Platt is vice president of sales and account manager at CashEdge, a division of Fiserv. He is responsible for providing leadership and oversight of sales, marketing, product strategy, business development and account management for the banking and payments business. He has been with CashEdge for more than 10 years and during that time has had a variety of management roles. Prior to joining CashEdge, Mr. Platt was a consultant with McKinsey & Company.

Louisa Quittman, *Director, Office of Financial Education, U.S. Department of the Treasury*

Ms. Quittman is the director of the Office of Financial Education of the U.S. Department of the Treasury. In this role she is responsible for policy development and coordination related to promoting the financial decision making and well-being of Americans. She plays a lead role in coordinating the interagency Financial Literacy and Education Commission and supports the President's Advisory Council on Financial Capability. Other areas of responsibility include the mymoney.gov website and the National Financial Capability Challenge. Additionally, Ms. Quittman is the director of the U.S. Community Adjustment and Investment Program, which provides capital to small businesses that create and retain jobs in trade-impacted areas of the United States.

Previously, Ms. Quittman was the director of Community Programs of the U.S. Department of the Treasury. In this role she focused on financial access in traditionally underserved communities in order to promote Americans' financial empowerment, including the Bank On USA initiative and the Community Financial Access Pilot. She also oversaw research related to financial education, financial access, consumer lending and other related topics. In addition, Ms. Quittman was program manager at the Community Development Financial Institutions Fund (CDFI) and worked nearly nine years in various positions at the CDFI Fund.

Rachel Schneider, *Vice President, Innovation and Research, Center for Financial Services Innovation*

Ms. Schneider is the vice president of innovation and research for the Center for Financial Services Innovation. She serves as an industry expert on the underbanked, identifying innovations and documenting trends. She coordinates relationships with academic and industry research partners to ensure that the Center for Financial Services Innovation's research is timely, action-oriented and influential. In addition, Ms. Schneider collaborates with financial services companies and others regarding strategy development and product design related to the underbanked market. She began her career as an investment banker at Merrill Lynch & Company. Her interest in the underbanked dates back to her days as a VISTA Volunteer.

Steve Streit, *Chairman and Chief Executive Officer, Green Dot Corporation*

Mr. Streit is the chairman and chief executive officer of Green Dot Corporation, a company he founded in 1999. Green Dot provides a broad base of U.S. consumers with low-cost banking and payment solutions that include general purpose reloadable prepaid cards and Green Dot Financial Network, a cash transfer network. Mr. Streit recently led Green Dot through the acquisition of Bonneville Bancorp, resulting in Green Dot becoming a bank holding company.

Mr. Streit has been recognized with numerous industry awards, including the 2011 Ernst & Young National Entrepreneur of the Year Award in the Financial Services category, the 2011 Technology Leadership Award from Los Angeles

County Technology Week, and the 2005 Ernst & Young Entrepreneur of the Year Award for Southern California.

Bruce J. Summers, *Former Director,*
Federal Reserve Information Technology

Mr. Summers was a career official with the Federal Reserve System until his retirement in 2007. He served as a Reserve Bank economist, banking supervisor and chief financial officer, then most recently as director of the national organization responsible for the Fed's Information Technology architecture and technology operations. He was also national product manager for Fedwire and ACH, and deputy director at the Board of Governors for payment system policy and oversight of the banking services and information technology activities of the 12 Federal Reserve Banks.

Mr. Summers has contributed to the international initiatives of central banks through the Bank for International Settlements, and to the work of the International Monetary Fund and the World Bank. His publications on banking and payment systems include the 1994 book, *The Payment System: Design, Management, and Supervision*, which remains in wide use; his successor book, *Payment Systems: Design, Governance and Oversight*, is scheduled for publication in 2012. He now consults on payment systems and technology management.

Hal R. Varian, *Chief Economist,*
Google

Mr. Varian is the chief economist at Google. He started in May 2002 as a consultant and has been involved in many aspects of the company, including auction design, econometric analysis, finance, corporate strategy and public policy.

He is also an emeritus professor at the University of California at Berkeley in the business, economics and information management departments. He has taught at universities around the world, including the Massachusetts Institute of Technology, Stanford, Oxford and the University of Michigan.

Mr. Varian is a fellow of the Guggenheim Foundation, the Econometric Society and the American Academy of Arts and Sciences. He was co-editor of the *American Economic Review* from 1987 through 1990. He has published numerous papers on economic theory, industrial organization, financial economics, econometrics and information economics.

He is the author of two major economics textbooks that have been translated into 22 languages. He is the co-author of a best-selling book on business strategy, *Information Rules: A Strategic Guide to the Network Economy*. He also wrote a monthly column for *The New York Times* from 2000 to 2007.

Kathy Walker, *Managing Director,*
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Ms. Walker is managing director of OpenAir Equity Partners, a venture capital and private equity firm solely focused on the wireless, communications and

mobile Internet sectors. She has nearly 30 years of carrier and wireless experience and is considered one of the top mobile network experts in the United States.

Prior to joining OpenAir, Ms. Walker served in the dual role of chief information officer and chief network officer of Sprint Nextel. While there, she led the overall planning, design and operations of Sprint Nextel's wireless and wireline networks, including the development and deployment of the first U.S. nationwide 3G wireless network.

In 2008, Ms. Walker was selected to the Fierce Wireless "Top Women in Wireless" list. She is a member of Missouri University of Science and Technology's Women in Science and Engineering Hall of Fame. She also serves on the Trustees' Councils of Missouri University of Science and Technology and South Dakota State University.

Conference Summary

Barbara S. Pacheco

I. Introduction

With the popularity of smartphones and online social networks, consumers are increasingly connected with each other, their banks and the businesses seeking to sell goods and services to them. As a result, consumers and businesses have access to real-time information about the transactions in which they are engaging. In addition, consumers' purchase opportunities can be more closely customized to their financial resources, preferences and location. These two dimensions of connectedness—real-time transaction information and customized purchase opportunities—are likely to drive much of the innovation in consumer payments in the next few years. Some of these innovations will involve payments on social networking sites. Other innovations will occur on mobile platforms, which provide a particularly convenient way for consumers to connect with other consumers, banks and retail businesses as they make payments. Most of these innovations will focus on domestic payments, but some may involve cross-border transactions such as remittances by immigrants and foreign purchases.

These developments are at the foundation of the Federal Reserve Bank of Kansas City's interest in consumer payments innovation: How should central banks and other policymakers consider and respond to the current wave of payments innovations to promote efficiency, and safety and ensure access to the payments system? Excessive government intervention in consumer payments markets could stifle innovation by weakening the profit motive and distorting incentives. On the other hand, unfettered markets could fail to produce the right mix of efficiency, safety and access, because payments participants may not consider all the costs and benefits of their actions to other parties. In such circumstances, central banks and government agencies may have an important role to play in shaping payments innovation. This role could include setting standards for new payments methods to solve coordination problems, ensuring that smaller innovators are not locked out of the new payments platforms, and enabling new payment methods to be cleared

and settled in a safe and efficient manner that maintains or even enhances access to the payments system.

These considerations formed the motivation for the Federal Reserve Bank of Kansas City's fourth international payments conference titled, "Consumer Payment Innovation in the Connected Age," which was hosted on March 29-30, 2012. Over six sessions and a keynote address, leaders from public policy institutions, industry and academia engaged actively to discuss, and sometimes debate, the following key policy questions: "Will increased connectedness revolutionize consumer payments in the next few years, and what roles will various payments participants play to bring about such change?" "What obstacles do private markets pose for payment innovation in the connected age, and what can public authorities do to overcome those obstacles?" "What new risks and privacy concerns will be created by payments innovation, and what changes in regulation are needed to address these problems?" "Will payment innovations increase access of currently underserved consumers to convenient, secure and reasonably priced payment methods?" "To promote socially beneficial payment innovation, what changes should be made in clearing and settlement of consumer payments, and what role should the Federal Reserve and other central banks play in the process?" "What lessons can be learned from governments, regulators and central banks that have been active in facilitating payment innovation?"

The following summarizes the conference on a session-by-session basis. Each session focused on one of the six key questions above. The summary highlights key insights from the experts, areas of agreement and points of contention.

II. Opening Remarks: Views from the Kansas City Fed

Esther George, president and chief executive officer of the Kansas City Fed, opened the conference with her views on the role of the Federal Reserve as an operator and as a catalyst for progress in retail payments. George noted that central bank goals of economic growth and financial stability rely in part on the smooth functioning of a nation's payments system. She emphasized that the public's trust in the payments system is essential for payments system stability, not only for large-value, wholesale payments but also for retail payments on which consumers depend every day. George urged the Federal Reserve to be prepared—as an operator—to facilitate retail payment transactions in good times and to backstop them when the inevitable crisis occurs. While voicing a preference for markets to fill future gaps in consumer payments services, like the absence of a digital replacement for the check, George said that where markets fall short, the Fed can assist in its operator role in those markets, delivering services that its customers value, and competing fairly by setting its prices to recover costs plus a market return in accordance with the requirements of the Monetary Control Act. Finally, George connected the Fed's operator role to its ability to play a catalyst role, leveraging its experience as a market participant to collaborate with the industry and other

authorities to remove barriers to progress and ensure the payments system meets the needs of consumers in the years ahead.

III. Session I: Increasing Connectedness and Consumer Payments: An Overview

Over the years, consumers and businesses have shown considerable inertia in their payments practices, and predictions of seismic changes, such as the disappearance of the check, have proven to be premature. Will this time be different? Social networking sites such as Facebook and Twitter are increasing connectedness in today's society. Consumers are increasing use of these sites for online shopping and other transactions such as charitable giving, and smartphones may increase connectedness in ways that could have an even more profound impact on consumer payments.

Kathy Walker, OpenAir Equity Partners, moderated this opening session to explore the impact of increasing connectedness on the speed of change in consumer payments and on the roles of various players in this market. She introduced session paper author, Michael Katz, Haas School of Business at University of California, Berkeley, and discussants, Don Kingsborough from PayPal and Hal Varian from Google.

Katz predicted that core payment services will not experience revolutionary change but instead will follow an evolutionary path, with capabilities enabled by smartphones likely to be extensions of existing payments services. In building his arguments for this conclusion, Katz emphasized the importance of consumer payment behavior and preferences. He explained that while payment acceptance costs are a factor, merchants' primary interests are served by offering payment types that consumers want to use, so merchant demand is derived from consumer demand. Katz presented a variety of research on consumer payment preferences for features such as universal acceptance, convenience, security, privacy, rewards, credit and ability to monitor accounts. Katz compared how mobile payments features fit these preferences, concluding that while there are some advantages, they are not sufficient to result in rapid adoption. He argued instead that the revolutionary change will be in how businesses market their products and services and deepen relationships with the millions of "always connected" consumers. The addition of "context" to a payment transaction, including a consumer's location, two-way communication capability and storage/memory, provides rich data on which to target offers to consumers in real-time and at places beneficial to merchants.

In assessing the prospects for the various players in the battle to capture value from consumer connectedness, Katz predicted that consumers will maintain relationships with several types of firms—there will not be one winner. Katz concluded that telecommunication companies will not significantly shape the evolution of retail payments nor capture much value, but are essential to the infrastructure. Banks will

maintain an important role in payments with their advantage in consumer trust, account balances and unique skills in offering credit, but will not extend services boldly in new directions. Web service companies such as eBay, Google and Facebook collect the valuable profile and contextual information and maintain the data analytics skills that merchants may pay for, but their success will depend on resolution of privacy issues and regulatory and political forces. Apple has the consumer brand loyalty and vertical integration to be very successful, but may be constrained by its proprietary business model. As for the incumbent card networks, Katz appeared most optimistic about their potential for success in capitalizing on consumer connectedness given advantages of consumer trust, vast data and analytics capabilities, large merchant networks, and the fact that several successful innovators like Square and PayPal leverage the card networks for processing transactions.

PayPal's Kingsborough and Google's Varian suggested that consumer connectedness will have a more revolutionary impact on consumer payments than Katz predicted. Kingsborough argued that a significant shift is already taking place from a bank-centric payments system to a consumer-centric system as evidenced by the increase in multichannel shopping—mixing virtual and in-store capabilities at various points in the purchase process. Kingsborough agrees with Katz that services based on information will be revolutionary and while the players may be the same as in today's payments system, market shares will change with winners being those able to work with the existing infrastructure to get billions of consumer devices in the cloud to connect with them.

Varian raised a variety of points in his discussion of consumer payments innovation. While acknowledging the inertia of consumer behavior, he noted the power of the technology that can completely replace the physical wallet. Varian noted that it is possible that social networks may be a stronger force in consumer payments, citing "Farmville" game-maker Zynga's 12 percent contribution to Facebook revenues, and the potential of information captured by social networks to provide stronger authentication needed for payments. Varian commented on the early success of easy-to-use special-purpose payment systems like those used with Apple's iTunes Store or Amazon Marketplace and the likelihood that general-purpose payments systems will copy these features and eliminate this advantage. Using Square's payments acceptance method as an example, Varian also suggested that innovators need to build on existing infrastructure to avoid the costs of new devices or process changes for consumers and merchants. Finally, he noted that the availability of spectrum for innovations using Wi-Fi technology has been important to innovation in consumer payments.

During the question and answer period, participants debated several issues. Do consumers value deals or simplicity in pricing? Will merchants be able to control and leverage consumer purchase data and profile information or will social networks and payment card networks step in and grab consumers' attention with multimerchant offers and payment capabilities? And what is the interplay and trade-off between innovation and security in this digitally captured and connected world? Varian and Kingsborough agreed that in the connected age, fraudsters may

always be one step ahead of innovators. Technology provides criminals the tools to steal substantial sums by attacking high volumes of lower-value transactions that are under fraud limits. On the other hand, Kingsborough noted that payments providers are using fraud data to quickly identify and close gaps, and using information about consumers and their normal behavior to detect and prevent fraud. Katz added that two-way communication between networks, merchants and consumers enables alerts that can improve authentication of real-time payments.

IV. Session 2: Market Obstacles to Consumer Payment Innovation and Public Policy Responses

A key concern about emerging payment methods such as mobile is that market obstacles may slow adoption and efficient development. It can be difficult to obtain the critical mass of adoption from consumers, merchants and various other providers to make the method viable. Some experts argue that the best way to overcome this coordination problem in private markets is for public authorities to take an active role in setting standards. Others argue that such government intervention could do more harm than good, by locking the payments industry into a technology or set of standards that later proves to be inferior. Chris Bierbaum of Sprint Nextel Corp. moderated a panel that explored the nature of obstacles to consumer payments innovation and how public authorities might respond. Panelists included Nicholas Economides, Stern School of Business at New York University; David Evans, Market Platform Dynamics; Alan Frankel, Coherent Economics; and Bob Lee from Square.

Economides opened the discussion. He posed three scenarios for how mobile payment innovation might develop. For each scenario he discussed potential incentives for entry and innovation, merchant and consumer benefits, and competition authority response. In the first two scenarios, the dominant card networks like Visa and MasterCard or wireless carriers like AT&T and Verizon could enter the market for mobile payments by extending their services vertically. In the third scenario, firms without a current stake, like Google or Square, could enter the market with software. Economides argued that in both the card network and mobile carrier scenarios, network effects and the near-monopolistic market structure create strong incentives for firms to impose incompatible systems to win a dominant position in the new mobile payment market. In the third scenario, new entrants are more likely to design an open and compatible system to produce the highest merchant and consumer benefits and maximize adoption. In answering whether antitrust authorities should intervene in the case of firms that already possess significant market power, Economides predicted that the U.S. Department of Justice (DOJ) is unlikely to intervene because the market is new and the issue is vertical rather than horizontal. But, other public authorities in the United States may potentially intervene in the market because of interests in compatibility.

Evans was highly skeptical of the need for government intervention. He described an intense period of innovation in payments characterized by the spread

of mobile devices, development of sophisticated software platforms and improved data analytics capabilities. New entrants and existing providers are all focused on innovation. Evans noted several serious obstacles to market adoption of innovations: first, current payments systems work really well; second, the chicken-and-egg problem; and third, the massive amounts of investment in current payments systems and processes. He observed that market obstacles are not the same as market failures and suggested that government stay out of the way. Evans concluded by stating that there is no reason to believe the government could identify market failures with any degree of accuracy, and furthermore, governments do not have a good record when it comes to payment innovation.

Frankel took a strong opposing view to Evans, arguing that the conduct of payment market incumbents in pricing and rules creates competitive bottlenecks. He offered the case of the card networks and issuers promoting the more costly and less safe signature authorization over PIN for debit cards as evidence that card networks and issuing banks pursue innovation to preserve monopoly power, not to achieve efficiencies. Frankel noted that recent public authority interventions, including Regulation II on debit card pricing and the DOJ settlement on anti-steering rules, do not go far enough. He recommended that public policy ensure that there is competition for payment methods at the point of sale.

Lee provided a private sector mobile payments innovation example that leverages existing infrastructure to streamline the setup process for payment card acceptance, reduces acceptance costs and better meets the needs of small merchants like taxi drivers and farmers market vendors. Lee noted that because Square's interests are aligned with the card networks, the "self-regulated market" supports the innovation his firm delivers and expansion is only constrained by component supply issues. Lee asked policymakers not to intervene.

In a more restrained reprise of the lively debates at the 2005 Kansas City Fed conference on interchange fees, questions from participants centered on whether there is in fact a market failure to address, whether par pricing or interchange fees are appropriate, and the likely impact of public interventions—to stimulate or stifle competition. Frankel and Economides generally agreed that providing merchants the flexibility to charge for payments based on their costs would stimulate competition among payments methods at the point-of-sale but disagreed on whether par pricing was needed. Offering the opposing view, Evans suggested that granting a benefit to merchants translates into losses for consumers. Instead, networks, not governments, are better positioned to balance the needs of the two sides of the market for payments transactions and interchange fees are the mechanism to accomplish that balance. One area for agreement among the panel was that the effect so far of Regulation II has not had the devastating impact predicted by some card issuing banks.

V. Keynote Address: Mosquitoes, Micropayments and Privacy

Joseph Farrell, Director at the Bureau of Economics, Federal Trade Commission, gave the luncheon speech. Farrell's key message was that lowering the transaction costs of purchases of goods and services would produce significant consumer and societal benefits. He suggested that one opportunity for focus was micropayments, where the ratio of transaction costs to the value of the payment was significant. Farrell suggested that micropayments suffer from the "mosquito problem" in that the transaction costs (or the side effects) of mosquito bites vastly exceed the value (or the small amount of blood transfer) that takes place. Farrell provided various examples of micropayment transaction costs, such as the time spent waiting in line at a cash register or queuing up at a toll booth, or the inconvenience of entering payment information online every time a consumer purchases and downloads a song.

Farrell described several payment innovations that address the micropayment mosquito problem. Bundling similar goods, such as news articles, into one transaction reduces the ratio of the transaction costs to the size of payment by raising the price paid for a transaction. For unbundled goods like song downloads, online merchants like iTunes keep customers' payment information so that customers do not have to reenter it each time they purchase a song. A different mechanism eliminates fee payments and the related transaction costs to the consumer altogether, substituting an advertising revenue model in the case of premium TV programs and news articles. Farrell said ad support is not a bad way to do micropayments, but some forms of ad support that involve tracking consumers as they click through ads on the Internet, may raise privacy and data security public policy concerns.

VI. Session 3: Risk and Privacy Implications of Consumer Payments Innovation in the Connected Age

Consumer payment innovation in the connected age could have both positive and negative implications for the safety and stability of the payments system and consumers' privacy. On the positive side, connecting consumers with their banks via mobile phone during the payment process could improve authorization and authentication, mitigating fraud risk. Payment methods that involve real-time settlement could also reduce the risk to merchants of consumers having insufficient funds in their accounts to cover purchases. On the negative side, fast and final settlement could make it more difficult to prevent and reverse fraudulent or erroneous transactions. The collection and storage of personal information to customize consumers' buying experiences could also lead to an unwelcome erosion of privacy and increased risk of payments fraud using stolen personal data. Of concern to central banks, the payment system could become more vulnerable to a sudden loss of confidence from data breaches or misuse of personal information, with adverse consequences for the economy as a whole. Gary Fish of FishNet Security

introduced session paper author Ross Anderson of the University of Cambridge, and discussants Alessandro Acquisti, Carnegie Mellon University, and Sarah Jane Hughes, Indiana University Maurer School of Law.

Anderson began with two examples of consumer payments innovation that highlighted the issues and provided context for recommendations he later would make. The first example was a service offered by Germany's Sofort Bank to online merchants, through which consumers give the service access to their bank accounts, essentially an authorized "man-in-the-middle" attack, to initiate a credit transfer to the online merchant. The service's low merchant fees and waiver of consumer fees have sparked its growth, despite nervousness on the part of the banks holding the consumers' accounts. In the second example, Anderson described a service offered by U.K. banks that enables consumers to send mobile person-to-person (P2P) payments with immediate and final settlement. The rapid settlement feature exposes the service to potential fraud loss from malware compromises of the sender's banking credentials and criminal account takeover with no ability to reverse the transaction before funds are stolen. Anderson predicted that innovation in consumer payments will lead to an increase in fraud and privacy issues as well as complexity. He noted several contributing trends—the accumulation of consumer data, the entrepreneurial spirit of cybercriminals, and more prevalent outsourcing by payments participants. Anderson recommended that regulators extend consumer protections to new services and focus on monitoring and reporting fraud statistics across all payments channels to spot issues timely. He also advocated that regulators attempt to enable competition within a market, but observed that "it is quite normal for firms competing in two-sided markets to offer insecure products in the race for market share and then lock things down later." Although clearly concerned with innovation's impact on fraud, Anderson urged regulators to consider the risks in the context of sizable social benefits of innovations like online commerce.

Acquisti offered several possible views on whether innovation will increase fraud and privacy concerns. Based on his research of usability of security systems, Acquisti first reinforced Anderson's prediction of more fraud and complexity in payments. He noted that users may believe they have enabled security features in mobile applications when, in fact, they have not. Moreover, mobile applications are more vulnerable to social engineering attacks because they work invisibly and thus hide evidence of corruption. Acquisti said innovation has produced many new payment systems and there is no guarantee that the few that survive in the market will be the most secure. Acquisti then posed an alternative view. He noted that social networks are driving much of the mobile application innovation and that the successful network will produce large amounts of user data that then can be used to detect behavior that indicates payment fraud. In the case of a dominant social network provider of payments services, payments may be less complex and less risky but at the cost of users losing their privacy.

Hughes began by noting that the development of mobile payment applications is concentrated in unregulated institutions. Lack of involvement by regulated institutions may indicate higher risk in the mobile payment application and thus hinder adoption by older users. In addition, if a prominent mobile payment system experienced a massive failure, users would most likely switch to traditional payments rather than to another mobile payment application. Hughes went on to raise a number of payment law questions that the design of mobile payment applications should address. How are records of mobile payments stored and accessed if a need arises to prove a payment? Are balances on mobile payments accounts insured, or if not, are providers required to have a performance bond? Do the payments have adequate authentication, and data integrity? How are problems resolved, such as in cases of failure to complete a payment? Answers to these questions are important from two perspectives: one, to understand how consequences of problems in payments are distributed across providers, consumers, developers, banks and others; and two, to remove uncertainty that may be an obstacle to consumer adoption of new payment methods.

In response to the discussants' comments, Anderson noted that the security challenge is in managing complexity of the mobile payment system. The main issue is whether the development environment is controlled by concentrated and effective stakeholders. The legal environment (regulation, contracts, tort law) will also help to determine whether there is an appropriate balance between features and security.

The audience asked questions on four topics. First, how should businesses protect themselves when personal devices are used in the workplace? Panelists recommended several possible strategies including dedicating devices, subject to high degrees of control, to sensitive tasks or outsourcing them to organizations with security expertise. Second, how has the U.K. approached the collection and reporting of fraud loss statistics? Panelists noted that the U.K. data relies on participation of financial institutions. Participation is possible in part because statistics are aggregated to protect individual institutions from bad publicity. Panelists encouraged U.S. regulators to promise data aggregation and pursue voluntary disclosure by banks and nonbanks instead of the more time-consuming legislative mandate approach. Third, could a hardware solution, such as a properly implemented computer-chip-based card, reduce payment fraud and reduce the need for personal information in the payment approval process? Panelists expressed concern that the EMV standard suffered from both poor implementation and complexity. More secure technology is available for payments but research has shown that only a minority of consumers are willing to bear added expense of better security. Fourth, is there evidence that the U.K.'s Faster Payments Service is being used for fraudulent payments and what can be learned from that experience? Although an industry concern, fraud statistics from the U.K.'s Faster Payments Service are not yet available. Risk could be mitigated in a U.S. system by allowing faster settlement only on accounts that are unlikely to be compromised and for domestic transactions, thus making them less attractive for money laundering.

VII. Session 4: Ensuring Consumer Access to the Payments System in the Connected Age

A well-functioning payments system should provide consumers from all regions and socioeconomic groups with access to convenient, secure and reasonably priced payments methods. Payments innovations sometimes have the unintended effect of excluding certain groups of consumers; more recent payment innovations, such as prepaid cards and mobile payments, however, have the potential to expand access of the unbanked population to efficient payments methods. Rachel Schneider, Center for Financial Services Innovation, moderated a panel of experts to provide insight on the extent to which new payment methods increase consumer access and insights on which groups of consumers might benefit.

Schneider began by defining the unbanked and underbanked U.S. population as being from 30 million to 40 million households, a third of which have no relationship with banks; the rest using check cashing, money orders, prepaid cards or other alternatives in addition to banking services. She dispelled myths about this segment of consumers, such as that their wealth is insufficient to be a policy concern and that they are not technologically enabled. Schneider pointed out that smartphone adoption and interest in mobile financial services is high relative to the population as a whole because of a convenience differential. Most unbanked and underbanked consumers are managing their cash flows dollar-by-dollar, making services such as real-time balance information, immediate funds transfer and financial planning tools valuable.

U.S. Bank's Kevin Morrison explained how prepaid products serve as an entry point into the mainstream banking system for unbanked and underbanked consumers. Distributed through its branch network, U.S. Bank's reloadable prepaid card establishes a banking relationship that can lead to more traditional products such as checking and savings accounts, and even credit. He pointed out that retail banks are in a good position to serve this segment of the population, as they have the necessary infrastructure, such as ATMs, branch distribution networks and fraud monitoring systems, in place. Morrison agreed with Schneider that smartphone utilization is high among this segment and that mobility and communication capabilities are valuable to them.

Steve Streit from Green Dot Corp. offered a different perspective on prepaid debit cards, not as a transition for the unbanked to banking products, but as a separate financial product distributed conveniently in retail stores where consumers visit frequently. In addition to convenient access, Streit emphasized that most prepaid products have features similar to bank accounts, including FDIC insurance and Regulation E protections that make them good alternatives for consumers who have not been well-served by banks.

Louisa M. Quittman from the U.S. Department of the Treasury brought a public policy perspective on financial inclusion and discussed government benefit

payments initiatives that improve and rely on broad access to the payments system. For example, to achieve the efficiencies promised by its "all electronic payments" initiative, the U.S. Treasury offered a prepaid debit card as a low-cost option to receive federal benefits payments and a first step into the financial system. Quittman also highlighted payments features valued by the underbanked, including being quick, simple, controllable and safe, with transparent fees and personal data protections. She noted room for improvement in certain aspects of payments products to promote savings and help consumers build reasonable credit. Quittman stressed the importance of financial education and consumers' ability to access their own data to aid in financial decisions. Quittman referred to the importance of consumer research and pilots to ensure Treasury's payment products meet the needs of consumers and concluded by urging industry, academia and others to contribute their research and data to encourage further innovation.

Paul Breloff of ACCION International's Venture Lab offered a perspective on consumer payments innovation in developing markets. First, he distinguished payments innovation in developing countries as transformational, providing the initial access to financial services. In countries without payments infrastructure, cell phones connect people to basic financial services and serve as a gateway to more advanced products and services such as credit, funds transfers—which are very important in developing markets—and government payments. Breloff contrasted the challenges in developed markets of coordinating the various players in the payments value chain with the challenges in developing markets of building a complete digital payments infrastructure with a distribution system for cash withdrawals. He noted that successful innovations in developed countries must solve a specific need, such as P2P payments for families that are split. Other challenges include marketing, trust, capacity of users and uncertainty of regulation.

In responding to how prepaid card products fit into the overall product suite and customer relationship strategy, Morrison noted that they are important to establish a relationship with a new client, build the relationship and "graduate them" into more mainstream financial products like checking, savings, and eventually, credit. Streit disagreed that this segment of consumers is looking for an entry point into traditional banking services; instead they view prepaid cards as an alternative to banking services. Morrison agreed but predicted that as mobile payments mature, consumers will chose the product that best fits their needs. In response to a question about progress on the transition from checks to electronic payments, Quittman explained that one factor impacting adoption of electronic payments is generational, as many benefit recipients are over age 60. Research also shows that financial exclusion strongly correlates with low-income communities and minorities, for whom past experience with banks impacts their trust in traditional financial service providers. Schneider commented that the uncertainty of how easily an individual can get cash in and out of an electronic system is another issue. Morrison added that the transparency of fees at check cashers is an advantage over banks, where fees are not visible upfront. He called on financial institutions to make efforts to educate consumers and provide more transparency.

Other topics included prepaid reload fee disclosures and pricing structures. Streit asserted that reload fees are disclosed at purchase by merchants and tests are under way to see whether fee structures impact reload behavior. Morrison noted that reloads for U.S. Bank's prepaid product are free as consumers view prepaid as a financial account, similar to a traditional bank account.

The panel discussed whether consumers have options for international remittance transfers to relatives who may be using mobile wallets. Streit, Morrison and Quittman said their prepaid products are designed for domestic transfers only. Breloff mentioned that money transfer organizations are currently tackling international remittances, adding that mobile wallets, however, are not very popular in developing countries. Asked whether foreign central banks or regulatory authorities are moving to allow cash out from international remittance via mobile channels, Breloff mentioned that most of the focus is on domestic transfers but there are certainly efforts being made. Typically, after a domestic distribution network is built, Western Union or MoneyGram will take over, benefiting consumers in the short run, but making it difficult for new entrants.

Panelists also addressed confusion surrounding the government's policy with respect to payments innovations like prepaid. On the one hand, the U.S. Treasury encourages consumers to use prepaid cards to receive benefit payments and at the same time, it is holding hearings on fraud in IRS tax refunds that are being loaded onto prepaid cards. This discussion pointed to the multiple roles governments play in payments and the complexity that presents for public policy.

VIII. Session 5: Facilitating Consumer Payments Innovation Through Changes in Clearing and Settlement

Consumers and merchants appear to be placing a higher value on real-time payments, suggesting that innovation is likely to involve this feature. But delivery of real-time payments requires significant changes in the "back end" of the payments process—the sequence of steps following authorization of payment and ending with final transfer of funds between banks. With most current payment methods, the final funds transfer occurs with a lag of at least one day. Furthermore, except for payments with PIN debit cards, consumers are generally unable to monitor their finances in real time because their bank accounts are not debited at the same time the payment is authorized. In the United States, a proposal to settle automated clearinghouse (ACH) payments on the same day the payments are submitted rather than the next day is being considered. However, some experts argue that same-day ACH payments would not provide sufficient immediacy. Mike Brown of Euronet Worldwide served as moderator for this session and introduced paper author Bruce Summers, who discussed a possible model for real-time payments in the United States and governance issues that may prevent its implementation. Discussants were Richard Mabbott of the U.K.'s Faster Payments Scheme Limited and Neil Platt from Fiserv/CashEdge.

Summers began by setting out some key assumptions for payments system features that are valued by consumers, who he defined broadly to include individuals, businesses and governments. Summers contended that in this digital age, consumers now expect immediate completion of transactions they engage in online and their expectation for payments is no different. In addition, he noted that consumers value both versatility and universality, the ability to pay anyone for anything, which are unique elements of the check. Summers observed that while methods to make immediate digital payments are being introduced in the United States, they lack the universal clearing and settlement infrastructure and can connect only consumers participating in closed networks.

Based on his study of clearing and settlement systems in other countries, Summers described a model for immediate funds transfer (IFT) in the United States that would offer consumers real-time notification and final settlement of payments in commercial bank money (i.e., digital records in commercial bank accounts). Sending and receiving banks would settle for those payments in central bank money later, in intervals they choose, using either a private clearinghouse or directly with the central bank. Summers compared this model to U.K.'s Faster Payments Service and the real-time payments scheme in South Africa. He observed that market acceptance, technology and the cost to operate all appear to support implementation of an IFT system for consumer payments in the United States. However, Summers argued that the United States lacks strong payments system governance needed to coordinate the planning and development of the clearing and settlement infrastructure and to overcome the friction caused by the threat to participants' existing business models.

Summers concluded with several recommendations, including a challenge to the Federal Reserve Board to clarify its role and that of the Reserve Banks in the evolution of consumer payments in the digital age. He encouraged policymakers to leverage the Reserve Banks' payments operations and technology expertise to perform a technical and cost assessment of implementing an IFT-like payment system. In the end, Summers was pessimistic that either the Federal Reserve or the payments industry would take the lead and suggested that Congress establish a national commission to review the issue as it had in 1974. Finally, he recommended that the Federal Reserve Board develop a special-purpose bank charter for nonbank payments service providers to encourage competition with banks on a level playing field.

Mabbott offered lessons learned from the U.K.'s experience in the transition to and implementation of an IFT system. Mabbott characterized Summers' vision for IFT as "eminently doable" and stated that the Faster Payments Service would not have come about without regulatory intervention. He reviewed the history beginning with the Cruickshank Report in 2000, which led to the formation of the Payments Task Force in May 2005. The Task Force was chaired by the Office of Fair Trading and charged with reducing clearing and settlement times for telephone- and

Internet- initiated payments, with recommendations due in six months and a solution ready for mass market implementation within two years. Two alternatives were considered: 1) speed up the existing batch processing system to achieve same-day settlement, meeting regulators' minimum requirements, or 2) develop a mostly new infrastructure for a "near real-time" system, meaning that the payer knows within seconds that the payment was completed, meeting longer term market needs. The Task Force agreed to pursue the second path with the scheme owned by 10 financial institutions and operated by a third-party processor. It leveraged proven settlement concepts (deferred multilateral net settlement with net debit caps) and existing components (ATM switching) where possible. The Faster Payments Service went live in May 2008 and has processed nearly 1.5 billion transactions through February 2012. Mabbott closed by noting several issues to improve upon, including the complexity of access for smaller financial institutions and a collateral or pre-funding process for second-tier participants.

Platt offered a private sector market perspective on the need for a digital replacement for the check and whether IFT is necessary to meet that need. Platt runs Popmoney, formed from the merger of Fiserv's ZashPay with CashEdge's Popmoney network, a digital P2P payment service available to customers of nearly 1,500 financial institutions in the United States. Platt began by noting the deficiencies of the check payment process that Popmoney was designed to overcome—slow, inconvenient delivery and deposit for payers and receivers, prone to fraud, and provisional credit to the depositor. Platt's consumer research shows that for most P2P needs, delayed settlement is sufficient, but that "immediate is better" in that it opens up cash replacement use cases and provides a better user experience. As a result, Fiserv is working to move volume from ACH settlement to the credit and debit card/ATM networks. However, Platt noted that this transition will be slow in that there is no universal network that can provide both real-time payments and reach all consumer accounts.

In commenting on the role of government in solving this problem, Platt said he was open, but concerned about unintended consequences. In the meantime, private sector innovation will continue to make progress. Summers followed Platt with a clarification on his views that the role of government and public policy is to serve as a "light touch overseer" to set objectives for payments system improvements that are in the public interest and encourage cooperation among private sector participants to achieve them.

Questions from the audience prompted additional insights on whether directories containing account holder information serve to protect consumer account details or offer criminals "a honey pot" of banking credential information. Both Platt and Mabbott emphasized that financial institutions ensure a "strong front door" for authentication of the sender of the payment. Turning to the industry incentives for adoption of an IFT system, the audience questioned whether there was an economic case for investment without some government mandate. Summers characterized the role of government as a catalyst to begin the process of

replacing antiquated back-office infrastructure that needs to occur to benefit from new technology. Finally, the audience discussed the fact that universal reach is somewhat elusive with smaller banks holding out; however, moving forward with a solution that reaches the vast majority of consumers with a service that meets their needs represents progress.

IX. Session 6: Perspectives on the Role of Public Policy in Facilitating Payment Innovation

Governments, regulators and central banks could potentially play a number of roles in promoting socially beneficial innovation in consumer payments. These roles include guaranteeing access of all innovators to mobile platforms, helping the industry develop standards for mobile technology, ensuring that low-income consumers and consumers in remote areas enjoy continued or even expanded access to the payments system, and facilitating efficient payment innovation through changes in clearing and settlement. This concluding session, moderated by Sean O'Connor of the World Bank, assembled an international panel of policymakers and advisers to continue the discussion of payment infrastructure and the role of public policy in consumer payment innovation. Panelists included Ricardo Medina from the Bank of Mexico, Gerard B.J. Hartsink with the European Payments Council, Malcolm Edey from the Reserve Bank of Australia (RBA) and M.J. Moltenbrey, a competition and antitrust litigator.

Medina discussed the role of the Bank of Mexico in the development and operation of SPEI, the interbank electronic payment system. The central bank has broad regulatory powers to promote an efficient payments system, in Mexico. Traditionally, its focus was on its large-value payments system but recently the focus has shifted to retail payments. Medina explained that SPEI launched in 2004 principally to handle clearing and settlement of large-value payments among 88 bank and nonbank financial firms. Today, 90 percent of payments SPEI processes are retail payments of less than $8,000 each. He reviewed the key features of SPEI, including near-continuous multilateral netting of payments among participants with no extension of intraday credit. Recognizing that SPEI was well-suited to meet the needs of customers for real-time retail payments, Medina explained that the Mexican central bank worked with participants on rules to ensure a consistent, high quality experience for end-users. For example, a rule sets the limit of processing time from end-to-end. The limit has been reduced from 30 minutes to 10 minutes and from 10 minutes to 30 seconds, with plans to reduce it further. Another rule restricts participants' pricing to their customers: beneficiaries are not charged, and the senders cannot be charged a fee that varies with the value of the payment. The Bank of Mexico is also involved in other aspects of SPEI, including setting standards for message formats, advertising the scheme and providing electronic receipts directly to originators as proof of receipt by beneficiaries.

Hartsink explained the role of public authorities in Europe, including the European Central Bank (ECB) and European Commission, to set the vision for

the Single Euro Payment Area "in which all payments are domestic, where the current differentiation between national and cross-border payments no longer exists." Hartsink noted the complexity of Europe's diverse payments landscape among countries where the line between where competition occurs and where cooperation is needed differs. Ultimately, there was agreement between the public and private sectors on a three-layer approach toward an integrated European market for card, Internet and mobile payments. At the scheme level, participants would cooperate on rules and standards, but compete for services to customers. Competition would also be the model for payment clearing and settlement services between banks. Hartsink described the cooperative governance model as the public authorities leading with the vision; representatives of consumers, businesses, and government administrators representing the "buy" side; and banks and other payments providers representing the "supply" side. While the suppliers have a pan-European focus and a more homogeneous view, the buy side and public authorities can have very different views, complicating the agreement process. In the end, Hartsink was optimistic about achieving the single payments vision in Europe, acknowledging the failure of the market to meet the objectives but suggesting public policy inconsistencies also have impeded progress.

Edey gave his views as to why socially beneficial payments system improvements are difficult to achieve in private markets. In contrast to a proprietary innovation, where a company invests to achieve a competitive advantage and derives a return on that investment, a systemwide improvement, like faster settlement, requires all participants to invest with no resulting competitive advantage. In addition, the cost to each participant will vary based on size, investment cycle and business model, making it difficult to gain agreement on timing of implementation and pricing. Edey argued that a coordination mechanism is necessary to overcome this inertia. While industry associations are effective to gain agreement on technical or routine changes, Edey suggested that leadership from a regulator may be needed where the innovation is complicated and conflicting incentives are strong. The payments system in Australia is regulated by the RBA with a mandate to promote stability and efficiency. Edey referenced a 2010 RBA study titled "Strategic Review of Innovation in the Payments System," developed with extensive consultation of payments service providers and endusers. The review captured gaps resulting from coordination failures, including real-time retail payments, and described various governance approaches currently under consideration to close the gaps. In addition, the review considered the benefits of payments hubs as a way to improve competition and innovation compared with the system of bilateral arrangements that are prevalent today in Australia. In conclusion, Edey suggested that given central banks' public interest orientation, they may be natural coordinators, but encouraged them to seek the expertise of payments participants to determine feasibility and most efficient means of delivery.

Moltenbrey, the panel's final speaker, brought her experience at the DOJ to shed light upon the question of whether antitrust enforcement can promote innovation and competition in payments markets. She spoke at length about the

challenges of applying antitrust principles to the payments industry, which is a two-sided market, and referenced examples of investigations and court challenges involving collective or collusive actions by payments participants (e.g., setting of interchange fees and exclusivity rules by card associations) to illustrate her points. Moltenbrey noted that courts generally decline to intervene in new markets, waiting to see how innovation evolves. In addition, courts are focused on very narrow questions, so solutions that promote competition on one side of the two-sided market can have negative consequences for the other side. With respect to the effects of incumbents seeking to introduce innovation, the question is whether they are using innovation to entrench their market power by expanding into other markets. Moltenbrey noted that this is a particular challenge for antitrust enforcers—to know when to intervene in a new market. Finally, Moltenbrey concluded by saying that while it is easier for competition authorities to challenge collective action, the risk to payment market competition from a dominant incumbent may be equally significant.

During the question and answer period, panelists addressed several topics including private sector versus government-run payments systems, interchange fees, card security standards and authentication for real-time payments. Medina explained the difficulty in collaborating with private sector participants who have a lot of conflicts of interests to construct and operate the centralized system like SPEI. Although the Bank of Mexico operates SPEI and sets rules that participating banks need to comply with, it leaves customer relationship—authentication, security and all the issues regarding the clients—to the banks. Hartsink provided his perspective on interchange fees: Because interchange fees will come down, an important issue is who should pay the bill for payments from an efficiency perspective. Hartsink also responded to coordination problems in payment card security. He explained the ECB's policy of facilitating issuance of EMV chip cards without magnetic stripes and the difficulty in coordinating security standards with countries outside the Euro areas, such as the United States where magnetic stripe cards are still the majority.

X. Conclusion

Regardless of whether revolutionary or evolutionary, increasing connectedness will bring changes in consumer payments. Many consumer payment innovations introduced by private sector participants offer the potential for enhanced efficiency, safety and accessibility of the retail payments systems around the world. The United States is no exception. However, the United States lags behind other countries in adoption of more advanced security standards for payments or a real or near-real time electronic funds transfer system. Experiences in those countries suggest that strong leadership on the part of central banks or other public entities is critical for adoption of such standards and systems. Whether the United States should take a similar approach to those countries was debated during the conference. The range of views and insights exchanged during the conference will help central banks and other policymakers make informed decisions about their approaches.

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Opening Remarks

Esther L. George

Good morning, everyone. It is my pleasure to welcome you to Kansas City, to welcome you to the Federal Reserve Bank of Kansas City, and to our payments conference today where we will focus on consumer payments, innovation, and what we are calling the connected age. This is our fourth such conference on payments that we have hosted. It has certainly proven to be an important forum for policymakers, for industry leaders, and financial institutions—both in the United States and abroad as we talk about emerging issues facing the payments system. I expect this year's event, which focuses on the role of the consumer, is going to continue in that tradition.

Certainly we live in an increasingly connected world. Smartphones and social networks are allowing us to exchange information with each other more freely, more quickly, and from a wider variety of locations. This increased connectedness has important implications for our society and for our economy. So we have designed this conference to focus on the questions of how these developments will affect the consumer in the days ahead.

The Federal Reserve, I believe, should take a strong interest in these developments in consumer payments. As part of its mission to promote economic growth and financial stability, the Federal Reserve has a mandate to foster the efficiency, safety, and accessibility of the payments system. Most people agree these are important and appropriate goals for the Federal Reserve.

Yet, as the payments system becomes more electronic, views will differ on how the Federal Reserve should go about achieving these goals. My own view is the central bank has a clear and compelling role in assuring the financial stability of the payments system. This responsibility has always and understandably included both wholesale and retail payments. Their safety and reliability, including reliability of access, are essential to the smooth functioning of the nation's payments and therefore its economy. Each involves significant volumes. Each involves the

efficient movement of goods and services, large and small, among individuals and businesses here and abroad. And importantly each involves trust.

Arguments that defend the Federal Reserve's role in wholesale payments apply equally to retail. Of course, wholesale payments involve clearing and settling trillions of dollars daily and while the dollar value of retail payments is substantially smaller, consumers and businesses are involved in a billion retail payment transactions every day. An interruption in the flow of this volume can easily affect the public's perception of the safety, reliability, and access of such payments.

Throughout its history, the Federal Reserve has played an important role as a retail payments operator, enabling it to bring about socially beneficial changes. In its early days, the Federal Reserve was deeply involved in standardizing check clearing practices across the country. The practice of non-par payment of checks resulted in tremendous inefficiencies. To avoid the charges imposed by some banks, checks would be sent on a meandering route through numerous institutions, resulting in delays of up to several weeks before final settlement. By offering par check clearing as one of its services to member banks, Reserve Banks address this problem, providing significant cost savings for commercial banks, fostering the development of the personal check as a popular payment method, and eventually achieving a truly national check system. This achievement led to a more efficient and accessible payments system by eliminating the circuitous routing of checks that had become a burden to both consumers and financial institutions.

Later the Federal Reserve's role as an operator helped it bring about other beneficial changes in check clearing, such as the adoption of high-speed check sorting equipment and the development of electronic check imaging that resulted in a more cost-effective, fully electronic clearing system for checks. As with its earlier check clearing efforts, the gains in efficiency provided by these innovations were obvious.

Today the Federal Reserve is developing applications to further streamline electronic check clearing. These new systems will allow the Federal Reserve to continue to meet its mandate under the Monetary Control Act, by enabling us to price services at levels competitive with the private sector.

We are also working with the United States Treasury to develop and implement technologies that improve the efficiency of the government's payment processes, producing important public benefits.

Even the proponents of a narrow role for the Federal Reserve in the payments system acknowledge that the central bank has played a critical role in the development of the automated clearinghouse—the first end-to-end electronic retail payment method. The ACH has become an important payments network, representing some 18 percent of noncash payments, according to one of our recent studies.

The Federal Reserve's operator role also has helped keep the payments system running smoothly in times of crisis. This was not only evident during the grounding of airplanes during terrorist attacks of 9/11, but also during banking crises over the past 30 years when the failure of financial institutions disrupted correspondent relationships.

Today the payments system is evolving in ways that further strengthen the case for the central bank to continue to play a key operator role in retail payments. A skeptical person might say there will not be agreement on the Federal Reserve's role until there is a crisis. Unfortunately, as history has demonstrated, we cannot avoid crisis situations.

The question is, How will the central bank be positioned to respond? I believe the Federal Reserve is obligated to be prepared as an operator, to facilitate payments in good times, and to backstop payments in times of crisis. Changes in commerce and technology are creating new risks to the payments system by providing criminals with novel ways to commit fraud quickly and on a large scale. In this environment, consumers and businesses could quickly lose confidence in the payment methods operated largely outside the banking system. To limit the economic damage from such events, the Federal Reserve could serve to ensure there is always a trusted way for consumers and businesses to pay each other through their banks. That backup payment method used to be checks. As checks decline, the need remains for a safe, efficient, and accessible alternative.

Increased fraud and privacy risk are not the only reason for the Federal Reserve to maintain its operator role in retail payments, though. Many new payment methods have appeared in the last few years and others are likely to emerge in the years ahead. As we look at person-to-person payments, for example, we see a fragmented market that limits the benefits consumers enjoy from the pay-anyone-anywhere ubiquity of the check instrument.

As network economies allow one of the new P2P methods to dominate, a concentrated market may deliver higher prices, restricted access, and slower innovation. By staying involved in retail payments as an operator and by offering a competitively priced end-to-end product, the Federal Reserve may help avoid these adverse outcomes.

Finally, of the various roles the central bank can play in retail payments, my view is the role of regulator should be limited. My strong preference is for market forces to guide the evolution of retail payments. However, where the market falls short in achieving safety, efficiency, or access goals, the Federal Reserve can aid these forces in its role as an operator, identifying services that are valued by its customers, and competing fairly and pricing its services to recover its costs, as we do under the Monetary Control Act.

As an operator, the Federal Reserve is also well-positioned to serve as an industry catalyst, such as by hosting this conference in order to bring together and collaborate with market participants and industry experts to ensure the retail payments system continues to meet the needs of consumers and ultimately to support economic growth.

Again, I welcome you to today's conference. I thank you for being part of this program, and I certainly look forward to our upcoming discussions. Thank you.

Author's note: The views expressed by the author are her own and do not necessarily reflect those of the Federal Reserve System, its governors, officers or representatives.

Increasing Connectedness and Consumer Payments: An Overview

Michael L. Katz

Introduction and Overview

This paper presents a view of the future of consumer payments. Specifically, I opine on two questions. First, will the broad trends of consumers' increasingly being connected via mobile access devices and engaging in social networking be likely to revolutionize consumer payments? Second, if so, what roles will be played by the various payment participants (e.g., consumers, merchants, banks, mobile network operators, and nonbank intermediaries)?

This is a rather daunting task. Fortunately (for me, at least) confidently making sweeping predictions that fail to materialize is something of a mobile payments industry tradition. In that spirit, I will use the occasion to make my own sweeping and, possibly, far-fetched predictions.

In short, I believe that, in the United States and other advanced economies, the ubiquity of always-connected individuals with access to computing power, coupled with the near-total loss of privacy due to social and technological factors, will lead to evolutionary developments in core payment services but revolutionary changes in services that are built on the information collected through payment services.[1] Moreover, I think that core payment services will become only one component of broader constellations of services that: (a) provide consumers an integrated user experience when dealing with merchants, and (b) provide merchants with customer relationship management and marketing services, in addition to payment services.

The evolutionary changes in payments will come in the form of additional payment options that largely are extensions of existing payment options (e.g., the extension of credit card networks to mobile-commerce transactions, and the use

of smartphones as smarter smart cards through the use of near field communication (NFC)). In the short term, we may see new mobile payment products that are complementary to, and offered separately from, existing payment products. In the long term, I predict that successful payment products will provide consumers the convenience of one-stop shopping. That is, these payment mechanisms will be useful for mobile commerce, e-commerce, and traditional bricks-and-mortar commerce, and they will be so whether the consumer is buying virtual or tangible goods and services. Widely useable payment services will also have the advantage of allowing the service providers to collect more comprehensive information about any given consumer.

I believe this latter advantage will be an important one because the revolutionary services building on mobile, connected computing and social networking will be those services that allow merchants to target their customers based on the information collected through payment and social networks. Both of the trends identified in the opening of this essay will help incite revolution. First, connected individuals can be identified and tracked so that detailed information about their environment and actions can be collected, analyzed, and used to generate personalized, context-specific communication that can be delivered in real time. Second, social networks can allow the identification of an individual's revealed preferences, demographic characteristics, sources of influence, and influencer value. The ability to predict consumer behavior, know the consumer's context, and send personalized messages can give merchants very powerful marketing tools, worth tens of billions of dollars annually.[2]

Technological and social trends will lead to the convergence of three sectors around payment systems: telecommunications, banking, and web services. The communications sector will provide fixed and mobile Internet access services that will serve as bases on which innovative services will be built. Entities in the banking sector will extend credit and provide trusted brands. Lastly, a wide range of firms from the web-service sector may be involved, with particularly important roles played by social-networking, search, and online-advertising providers.

Any given mobile payment service requires the tacit or explicit cooperation of a wide range of parties to succeed, including mobile operating system (OS) providers, app developers, mobile access device original equipment manufacturers (OEMs), wireless telecommunications carriers, financial institutions (e.g., credit-issuing banks and merchant-acquiring banks), payment network operators, and possibly others. All of these parties are also potential rivals seeking to appropriate profits for themselves. Hence, although these parties must cooperate with one another to create value, they compete to capture that value. Similar forces arise with respect to the customer-relationship-management and targeted-marketing services that are based on the data collected through payment services and social networks.

The battles to capture value will occur on several fronts. First, there may be standards wars and compatibility battles. I believe that merchant demand for

standardization of point-of-sale (POS) transaction-capture devices will lead to the standardization of those devices, but that these devices will be flexible enough to interact with consumer devices in a variety of ways. Second, there will be struggles to control the customer relationship. However, I do not expect there to be one firm or one type of firm that controls "the" customer relationship in this area. Rather, a given consumer may have business relationships with several members of the relevant value net simultaneously.

The most important battles for control will be over information ownership. Revolutionary services will be based on the unprecedented amounts of information collected about consumers, and this information will be extremely valuable. Many firms will adopt business models predicated on monetizing the information that they collect about their users. Consequently, there will be struggles among social networks, other app providers, payment network operators, mobile network operators, and even mobile access device OEMs (at least in the case of Apple Inc.) over the ownership and control of this information. In the United States, regulatory and political pressures will have significant influences on industry evolution and who captures value. The convergence of three different sectors is going to lead to complex regulatory convergence as well. The interplay of economywide competition policy and privacy regulation with the sector-specific regulatory regimes for banking and telecommunications is going to be problematical for the industry. Given the importance of information and the complexity of the issues involved in regulating the collection and handling of it, public-policy concerns regarding privacy will loom large for years to come.

An examination of the broad forces affecting the industry gives rise to several specific predictions about the roles likely to be played by various industry participants:

- *The roles of firms in the telecommunications sector will change little*. With the possible exception of Apple, I do not see wireless telecommunications carriers and mobile access device OEMs playing significant roles in mobile payments beyond offering generic infrastructure on which payments services offered by other providers ride.

- *The roles of banks will change little.* Banks will continue to be an important part of the payment ecosystem as providers of credit, for which they possess unique expertise based on extensive experience. In addition, in the light of consumer concerns about privacy and security, banks may play an important role in reassuring consumers of the integrity of mobile payment systems.

- *Current payment card networks will play a central role if they can successfully innovate.* Traditional payment card networks, such as American Express, MasterCard, Visa, and—to a lesser extent—Discover have powerful competitive advantages in form of trusted brands and large networks of consumers and merchant users. A critical question is whether they possess the organizational capabilities to innovate to take advantage of the new possibilities created by pervasive consumer connectedness.

- *Web services firms will play significant roles as information collectors and processors.* Web services firms, such as Amazon, Facebook, and Google, are largely information collection-and-processing companies. To varying degrees, these companies have valuable competitive assets that include massive amounts of consumer data and the ability efficiently to collect, store, and analyze those data to model consumer behavior. Given these assets, I expect a few of these firms to be very successful in this area.

The remainder of this paper is organized as follows. Section I examines whether consumers and merchants are likely to derive significant new benefits from the types of payment services and features enabled by increasing consumer connectedness. The presence or absence of such benefits will have a significant impact on the likelihood that mobile payments and social-network-based payment services are likely to be widely adopted. Section II discusses the potential uses of the consumer information that would be collected by these payment services. It also discusses the likely struggle for control of that information. Section III then discusses some of the possible reasons why these payment services have not been widely adopted to date, and it identifies some of the strategies that may overcome these barriers to adoption. These first three substantive sections set the stage for Section IV to offer a predictive analysis of the likely winners and losers among the various types of firms that will be involved in providing new payment services. A very brief summary section closes the paper.

I. Does Anyone want Mobile Payments (Other Than Mobile Payment Providers)?

"Mobile" payment services already are offered by cash, checks, and various payment cards. These payment instruments are lightweight, compact, widely accepted, and easy to use. Rightly or wrongly, American consumers are also very comfortable with these payment instruments with respect to privacy and security. Moreover, most consumers already have established relationships with payment service providers, and merchants have made significant investments in POS transaction-capture devices (e.g., card readers and cash registers), employee training, and supporting information technology systems to utilize these payment instruments. These facts raise the question: do merchants and consumers want new payment options based on mobile access devices and/or social networks? The answer to this question is important because, if merchants and consumers do not see value in a new payment service, then that service is very unlikely to succeed. Cool technology alone is not enough.

What Do Users Want from Payment Products?

New payment services will be successful only if they offer merchants and consumers additional value sufficient to induce them to change payment methods or service providers. What are the sources of value to these users?

Merchants' Desiderata

Logically, the ideal payment service from a merchant's perspective is one that imposes low costs on the merchant and is used by a large number of consumers to make purchases in high volumes. And, indeed, in their empirical examination of merchant behavior with respect to mobile payment services, Mallat and Tuunainen (2008) found "that the main adoption drivers are related to the means of increasing sales or reducing the costs of payment processing."[3]

Merchants care about the complete set of costs that they incur to utilize a payment service. These costs include: (a) the fees, if any, charged by the payment service provider (e.g., the merchant discounts charged by a credit card network); (b) expenditures on activities that must be undertaken by the merchant to utilize the payment service (e.g., employee training and the wages and real-estate costs associated with using the payment service at checkout); (c) payments to third-parties for activities related to using the payment service; and (d) costs incurred to detect and prevent fraud by consumers, the merchant's employees, or other members of the relevant payment service value net.

Most merchants feel the need to accept payment services that consumers would like to use. Hence, merchant demand for payment services is derived in large part from consumer demand. Indirectly at least, merchants want what consumers want. In general, a merchant will be especially interested in a payment instrument that allows the merchant to attract customers who would not patronize the merchant absent the ability to utilize that payment service. Indeed, a rational merchant will accept a high-cost payment service if doing so allows the merchant to attract customers who would otherwise not patronize it.

Consumers' Desiderata

Because merchant demands are largely derived from consumer demands, it is particularly important to understand what consumers want from a payment service and whether they are likely to adopt mobile payment solutions.[4] The research literature has identified several factors that influence consumer demand for mobile payments. In their survey of American consumers, Dewan and Chen (2005) interpreted the results as suggesting "that consumers realize the potential benefits (e.g. improved transaction speed and convenience) of mPayment, but at the same time, consumers are expressing grave security and privacy concerns."[5] Based on their survey of New Zealanders, Viehland and Leong (2007) found that convenience was a key reason for consumers to choose mobile payments, while being less convenient than cash, and concerns about security—particularly confidentiality—were prominent barriers to adoption.[6] In addition, the authors found that an aversion to paying service fees was the single reason most often stated for not using mobile payments.[7] In a more recent study, Andreev et al. (2011) found "empirical evidence that trust, willingness to transact, and perceived ease of use are key factors in explaining [a] consumer's willingness to make an m-payment, with trust having the largest explanatory power."[8]

It is useful to examine several different dimensions of consumer preferences in turn.

Convenience and ease of use: It seems to be intuitively clear that consumers want mobile payments to be quick, easy, and not require a lot of knowledge specific to a particular payment service. However, Andreev et al. (2011, p. 122) found that while causation exists between perceived ease of use and willingness to make an m-payment, the association is relatively weak. This illustrates that perceived ease of use of the technology is not a key determinant of consumers' willingness to make an m-payment using a smartphone.

Similarly, Schierz et al. (2010) found that perceived ease of use was much less important for intention to use than was "perceived compatibility," where perceived compatibility was measured by the answers to questions regarding whether the respondent agreed that mobile payment services fit well with his or her lifestyle and the way in which he or she likes to purchase products and services.[9]

Ubiquity: Consumers generally want a payment instrument that they can use to make payments at their preferred merchants. Hence, all else equal, the greater the number and variety of merchants accepting a given payment service, the more attractive one would expect that service to be to consumers. Although he is careful not to assert that he has established causation, in his empirical study of credit card usage, Marc Rysman (2007) found that a consumer's choice of card network as his or her favorite is positively correlated with the degree of local merchant acceptance of that network, which suggests a positive feedback loop between merchant card acceptance and consumer card usage.[10]

Security and privacy: As noted above, studies have found that consumers are reluctant to use payment services that they do not trust. Similarly, Mallat (2007) found that consumers were more willing to transact with trustworthy parties.[11] Security and privacy are two critical elements of trust.[12]

Credit: At the start of 2012, American consumers had approximately $800 billion of revolving-credit debt.[13] Manifestly, many American consumers desire the provision of credit by some—although by no means all—payment services.

Rewards: Many consumers are more willing to use a payment service if they are paid to do so.[14] Indeed, regulators in several nations (most notably, Australia) have expressed concern that credit-card rewards programs have led to consumers' using credit cards to a greater extent than is efficient. The use of rewards programs to motivate consumer use of mobile payment services may be a particularly important factor if it turns out that these services do not offer significant additional value for consumers but do generate significant benefits for merchants or for payment service providers in some other way (e.g., the monetization of the information they collect about consumer behavior).

Account management tools: Clearly, consumers desire the ability to monitor their accounts to at least some degree in order to check their balances, review the transactions charged against their accounts, and keep tabs on the finance charges levied on them.

Will Increasing Connectedness Enable Payment Services that Better Satisfy User Desires?

What difference does it make for payment services that consumers are increasingly connected through mobile access devices and social networks? Consider first the effects of pervasive social networking. I, at least, lack the imagination to see social networking having a huge influence on payment services narrowly defined. One could imagine embedding a payment service within a social network to facilitate online shopping or to transfer money among friends, but this strikes me as being a modest extension of the scope of existing services rather than a breakthrough new service.

Turning to connectedness through mobile access devices, the widespread adoption of smartphones and wireless tablets gives rise to several capabilities, including:[15]

- Consumers almost always have the ability to establish two-way communication links with merchants and/or payment networks.
- Consumers almost always have memory and processing power easily accessible to them.
- Consumers almost always have sensors with them, which may detect and report information such as location and temperature, or capture video images.[16]

In order to predict whether these capabilities will enable successful new payment services, one must examine if and how these capabilities enhance the ability of payment services to offer value to consumers and merchants.

Merchant Perspective

As discussed above, merchants will value payment services that make use of increasing consumer connectedness if those services either lower merchants' costs of completing existing transactions or attract additional consumer patronage.

Mobile payment services might lower merchants' costs by charging lower fees than current services. In theory, lower fees could arise because: (a) mobile infrastructure is less costly than existing infrastructure, which seems unlikely in practice; (b) other features of mobile payments facilitate new entry, which leads to increased competition in the provision of payment services; or (c) mobile payments services have other revenue streams (e.g., the sale of consumer information), which create incentives to charge lower prices to merchants and consumers in order to generate additional use. Mobile payment services might also lower merchants' costs in other ways, such as reducing the length of time it takes a consumer to check out

of a store or restaurant.[17] For example, Starbucks offers a mobile app to its customers that draws funds from Starbucks prepaid loyalty-card accounts and generates two-dimensional barcodes that customers can use to pay for purchases by having the codes scanned at the point of sale. The president of Starbucks' U.S. operations stated that a primary benefit of the application is the ability to speed up the checkout process.[18]

In terms of attracting additional customers, mobile payment services clearly are valuable to merchants that rely on online shopping channels; many consumers do online commerce via smartphones and, especially, tablets. Mobile payment services will also be valuable to merchants if there are other reasons that consumers value using mobile payment services even when not engaging in online shopping.

Consumer Perspective

So why would a consumer want to use a mobile phone or other wireless access device to pay for something? Consider how the new capabilities identified above affect the ability to satisfy the consumer wants identified above:

Ubiquity: At least initially, mobile payment services might serve as complements to traditional payment services by extending the reach of their merchant acceptance networks. E-commerce transactions require Internet access. Many people's first choice for an Internet connection is their phone or tablet. This is especially likely to be true for consumers purchasing apps or content for their phones or who are traveling, but it is also true for many consumers ordering tangible goods online from home, such as when watching television in their living rooms.

Convenience and Ease of Use: Eventually, people may stop carrying wallets to hold cash and various identification cards, such as drivers' licenses and insurance cards. If all of this information were stored in a smartphone, then storing payment-service information there, too, would be a benefit. But in the short run, people will continue to carry traditional wallets. This fact raises the questions: How hard is it to swipe a traditional credit or debit card, and why is it better to swipe a smartphone than swipe a traditional wallet with a contactless smart card in it?

The only advantage I can see is the following. If you are one of those annoying people who talks on your mobile phone when you should be handing your credit card to the cashier, now the cashier can simply grab your phone, swipe it, and send you on your way. In other words, I don't see much of a benefit from swiping a phone instead of swiping a card. But then again, I am the sort of person who would rather talk to my dinner companion than spend my time in the restaurant checking in on Facebook to tell people I am having dinner.

There are services that go beyond being a smarter smart card and eliminate the need for even contactless swiping. For example, Square has a service that does not require the consumer to touch his or her phone or a payment card in order to be billed.[19] Such services are manifestly more convenient, but they raise issues

of consumer trust. One can imagine it taking a long time for consumers to adopt this payment method anywhere other than merchants at which they shop regularly (e.g., to get their morning coffee or quick-service lunch).

Security and Privacy: Consumers might be induced to use a mobile payment service if they thought it were more secure and/or offered greater privacy protections than other payment options. Existing studies, however, indicate that many consumers hold the opposite view. For example, Dewan and Chen (2005) found that over half of the consumers responding to their survey felt that mobile payment systems were either "not secure" or "not secure at all," while just under half felt these systems posed either a "high risk" or "very high risk" to privacy.[20] The biggest concerns regarding security were whether the transactions would be properly authenticated and whether the data exchanged during the transactions would be available to unintended users.[21] In terms of privacy concerns, Dewan and Chen (2005) found that almost half of the consumers responding to their survey expressed concern about mobile payment companies' collecting too much personal information; over a quarter of respondents were concerned that personal information in the companies' databases would be used for purposes consumers had not authorized; and over a quarter of respondents were concerned that their personal information in the companies' databases was not protected.[22] The consumers surveyed expressed much less concern about errors in the information contained in the databases.[23] More recently, a consumer survey conducted in late 2011 found that the vast majority of consumers considered their personal computers to be more secure means of online shopping than their mobile phones or tablets.[24]

Will technological developments make mobile payments more secure? Some observers credit mobile payment services with having authentication based on devices (i.e., mobile phones) that are identified with particular individuals. But existing payment cards already possess this property. One might argue that mobile access devices are superior to payment cards as authentication tokens because the former can provide biometric authentication capabilities. However, those capabilities could more reliably be delivered by merchant-controlled POS devices that could check a consumer's claimed identity against a network database of biometric information.[25]

Although personal devices and biometrics do not distinguish mobile payment systems, consumers' having the ability to establish two-way communication links with merchants and/or payment networks does. Specifically, an always-connected buyer can direct payment to a merchant via communication with a payment network, without relying on the merchant's facilities.[26] This means that a consumer could communicate solely with a trusted partner when dealing with potentially untrustworthy merchants. This makes the system much safer in terms of certain types of merchant fraud, such as card skimming. In addition, an always-connected consumer can be provided real-time fraud alerts and as well as the ability to engage in real-time tracking of transactions. For example, with Pay with Square, a consumer gets a notification on his or her mobile device confirming the payment.[27]

Mobile systems also have vulnerabilities. Overall, the use of wireless might well be expected to weaken security because there are more points of vulnerability (e.g., the radio network) at which to hack a smartphone-based system than a smart-card-based one. Moreover, through the use of malicious code downloaded through apps or web browsing, a smartphone can be compromised without the attacker having to attain physical proximity.

New payment services, mobile or otherwise, may have to make tradeoffs between ease of use and privacy. For example, in a message to merchants, Square states:[28]

> After a customer elects to receive a receipt via email or text message, our system links the entered email address or phone number to their payment card. This way, the next time they pay with Square their information automatically populates, making the process much faster.
>
> Because of this feature, if you happen to enter your own information for your customers' receipts, you'll receive their receipts any time they pay another Square user with the same card.

Although this process may be convenient, one cannot say that it provides state-of-the-art privacy.

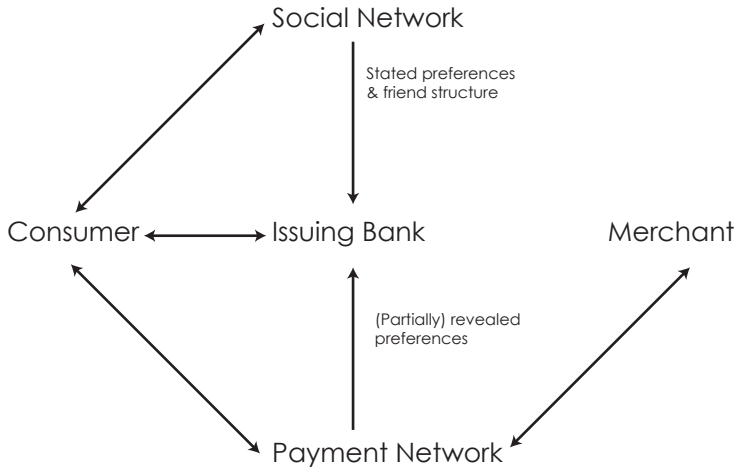
This example brings up a broader point. American consumers have a history of saying that they care deeply about privacy and security (especially with respect to new technologies) but then acting as if they care little. To the extent that mobile payments services are less trustworthy, consumers ultimately may not be troubled. And there may turn out to be limited demand for the additional security features that mobile payments systems can provide. For example, an e-commerce solution in which people handle payment transactions on a web page that is not accessed through the merchant's web page would be easy to create, yet to my knowledge consumers typically get to services such as those offered by PayPal by being redirected by the merchant's web site, and many customers are very comfortable with the security of those services.

Credit. Mobile payment services and social networks generate information on a consumer's context and transaction histories. Figure 1 presents a schematic view of important potential information flows.[29] As illustrated by the figure, this information could serve as additional input into credit scoring models (for example, if other members of your social network have poor credit histories, then you might receive a lower credit score than otherwise).

Rewards: As also illustrated by Figure 1, the information collected by mobile payment networks and social networks could be used to improve payment-service rewards programs, such as airline mileage points offered for credit card use. Although card issuers collect considerable information about consumer transactions, to my knowledge no issuer today offers real-time, context-sensitive rewards.

Figure 1

Using Additional Information to Improve Credit Offers and Rewards Offerings



Consumer connectedness could change that. Sophisticated, real-time, context-sensitive payment-service rewards programs are enabled by the presence of consumer mobile access devices with form factors that allow the display of graphics. I will say more on this point when discussing the broader uses of consumer information in Section II below.

Account management and customer service: One drawback (at least from the consumer's perspective) of many if not most stored-value cards in use today is that they are not readily auditable by the user. In principle, a smartphone-based stored value card could also store a transaction history that was easily reviewable by the consumer. In addition, such a card could take advantage of consumer connectedness to allow remote recharging. More broadly, real-time communication with relevant financial institutions enables the provision of more sophisticated and up-to-date account management services, such as checking a credit account balance while in a store considering a purchase.

In summary, the analysis of this section suggests that the changes in pure payment services due to pervasive mobile connectivity and social networking will be evolutionary, not revolutionary. Pervasive mobile connectivity and social networking will facilitate payment service features that offer additional value to consumers and merchants. In many respects, however, mobile payments primarily will be an extension of various existing e-commerce payment options to a new set of Internet access devices. I also think that consumers will want the extension to be linked closely to existing systems. I suspect that many consumers do not want to have to

use one payment instrument for online purchases made using a traditional personal computer and another payment instrument for online purchases made using a smartphone or tablet computer.[30]

II. It's All About the Benjamins, and the Benjamins Are All About the Information

If pervasive mobile connectively and social networking are not going to revolutionize payment services, then why are so many people so excited about mobile payments? I believe some are excited because they are mistaken. But others are properly excited by the potential of mobile payment services (and social networks) to generate vast amounts of information about consumer behavior, which can then be sold for tens of billions of dollars annually. Indeed, it may turn out to be a profitable business model for a payment network to pay consumers and merchants to use its service so that the network can collect information that it then sells to advertisers and other businesses.

I Saw What You Did, I Know Who You Are

Connected individuals can be identified and tracked. Mobile payment transactions generate valuable information regarding current context and transaction histories.[31] As others have observed, context can include a wide variety of information, including "the location of the user, surrounding weather, user's current yearn, social relations with nearby users, bandwidth of the user's mobile device, screen size of the mobile device."[32] Transaction histories may themselves include the contexts in which payment transactions were made and, potentially, even information about situations in which consumers shopped but did not complete purchases. In addition, consumers' participation in social networks can allow the identification of an individual's revealed preferences (e.g., what commercial postings he or she clicks on), stated preferences (e.g., what approval or "like" buttons he or she clicks on and what recommendations he or she makes to others), demographic characteristics, sources of influence, and influencer value.

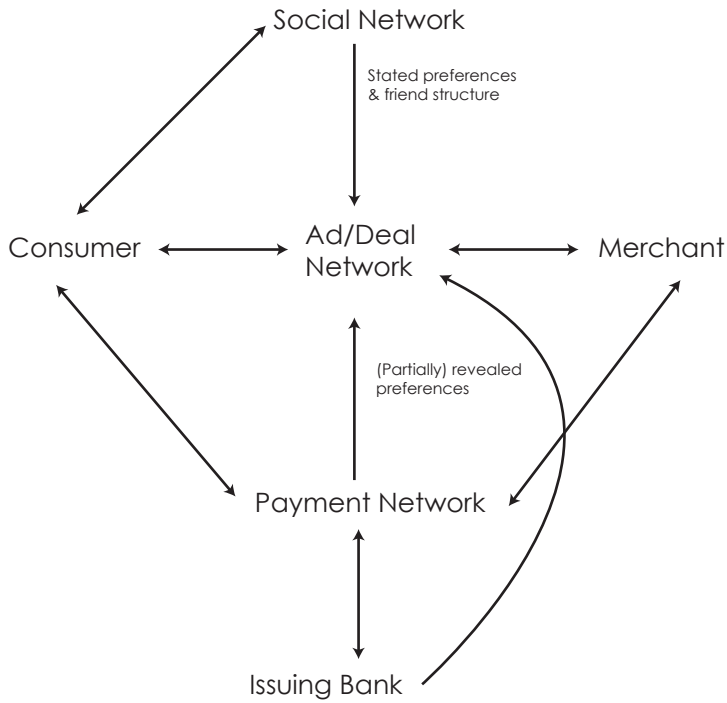
It is important to note that Figure 2 identifies different conceptually distinct functional roles. In practice, a single enterprise might serve as the social network, ad/deal network, and payment network.

The information collected through mobile payments and social-network based payments could be valuable in multiple uses. As discussed above, some uses are directly rated to payment services, particularly the offering of consumer credit. But the far greater value will come from uses outside of the traditional payments sector. Once connected individuals have been identified and tracked, and their behavior analyzed, they can be sent personalized, context-specific communications from merchants as part of broader relationship-management strategies.

The context on which the communications are customized can include elements of the consumer's current status (e.g., whether he or she is near a

Figure 2

The Art of the Deal



particular coffee retailer, the time of day, and evidence whether he or she has recently purchased coffee) and also certain aspects of the merchant's current status (e.g., whether the restaurant is crowded or empty, or whether the retailer has an excess stock of certain products). In terms of relationship management, sales histories can play a large role and can allow a merchant to reward its "loyal" customers with special deals.[33] A merchant could even offer social loyalty programs, whereby the deals offered to a set of consumers are related to the consumers' collective actions.[34]

Consumers' current contexts and transaction histories could, in theory, be used to: (a) support programs of personalized pricing and customized offers or deals; (b) improve the targeting of advertising (including direct mail, robo-calls, and various forms of online ads); and (c) improve the quality of Internet search. For example, Facebook allows advertisers to target their audience with reference to users' location, language, education, work, age, sex, birthday, relationship status, likes and interests, whether they are fans of the advertiser's Facebook page, and whether they are friends of fans of the advertiser's Facebook page.[35] Moreover, if it could be aggregated, the information from social networks combined with that from payment networks could create powerful measures of a consumer's influence on other consumers, and many

businesses are willing to pay to identify major influencers.

Searching Near or Far for a Value Proposition

As were several earlier years, 2012 is supposed to be the year general-purpose payment products based on NFC take off. I am doubtful.[36] This doubtfulness springs from the fact that other wireless technologies, such as Wi-Fi and traditional cellular networks, offer a broader range of possibilities and greater potential for value creation.

NFC can provide some incremental benefits in the form of added convenience and functionality at checkout. For example, some consumers would very likely prefer to waive their phones in the air rather than swipe their payment cards in a traditional reader, and NFC could support additional promotional activity at checkout, similar to existing instant coupons generated at checkout. Hence, NFC may make sense for the established payment networks, such as MasterCard and Visa, because it provides their users one more option and may be a particularly useful alternative for merchants with high volumes of low-value transactions.

The really exciting possibilities, however, come from communication between the consumer and merchant *before* the consumer gets to the checkout line.[37] The widespread adoption of smartphones and other mobile devices with increasing capabilities is making possible new services and products that will revolutionize the interactions between consumers and merchants.

The potential for mobile communications between a merchant and a consumer not next to the POS transaction-capture device (what might be termed "far field communication") has long been recognized. One example is a service known as SmartRestaurant, which was tested over eight years ago. This service allowed a customer to use his or her mobile access device to view a menu, place an order, pay for the order, and set a pick-up time.[38] In comparison with in-establishment ordering, the consumer benefited from being able to order and pay from a convenient location and then go through a much quicker pick-up process. The merchant benefited from having additional time to plan and adjust food preparation.[39]

One aspect of the service that was critical to enabling these consumer and merchant benefits was that the service made use of communication *before* the consumer reached the checkout counter. Indeed, the consumer and merchant communicated with one another before the consumer was even at the merchant's site. Of course, people have been faxing lunch orders for many years. And now, people can submit orders using a fixed-line Internet or mobile connection. In that respect, these are evolutionary changes.

With the rise of location-aware devices, the possibilities for communication between merchants and nearby consumers become far greater and the nature of the communication can fundamentally change. For instance, several vendors are making use of geo-fencing technologies, whereby a potential customer is sent promotional messages if he or she comes in proximity to a designated retail outlet.[40]

In October 2010, for example, Starbucks teamed with the wireless network operator O2 to offer a geo-fencing program promoting Starbucks' Via instant coffee. When a participating consumer was sufficiently near a Starbucks store or a grocery store that sold Via, a discount coupon was issued via SMS.[41] More generally, the message sent to a consumer as part of a geo-fencing program can contain: special pricing; information about the retail location's address, contact information, and operating hours; and information about the availability of specific products.[42]

The Pay with Square service described above also relies on geo-fencing, in this case 100-meter geo-fences based on Wi-Fi.[43] The geo-fencing allows the consumer to "set up Square to automatically open your tab when you walk in the door" of a merchant.[44] According to Square, there is no need for the consumer to touch his or her phone or wallet.[45]

One could easily imagine other micro-fencing applications along these lines. For instance, a consumer might visit a bricks-and-mortar retailer, pick up the desired items, and then simply walk out of the store. RFID tags on the items, coupled with identification of the consumer's mobile access device, could be used to generate an automatic charge to the relevant payment account. Clearly many other opportunities for innovative new services exist.

Who will Control Consumer Information?

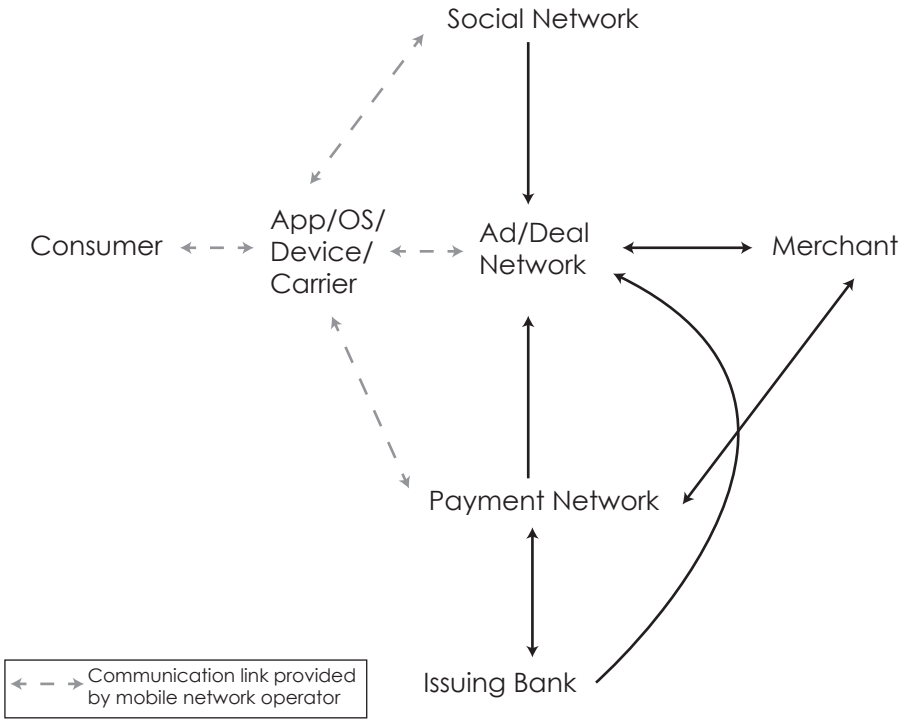
If information is where all the money will be, then intense battles to own and control access to that information can be expected. Figure 3 illustrates the information channels that may be wireless, and it provides a finer breakdown than does Figure 2. As Figure 3 illustrates, potentially one or more of the following groups might control important pieces of consumer information: wireless carriers, mobile access device manufacturers, mobile OS developers, app developers, consumer banks, and payment networks. Consequently, there may be struggles for control that cut across the telecommunications, financial services, and web services sectors. There may also be struggles within each sector. For example, app developers, mobile access device OEMS, mobile OS providers, and wireless carriers all may lay claim to consumer information related to mobile payments.

Within the financial sector, MasterCard and Visa may have disagreements with card-issuing banks with respect to who has the rights to use transaction information. At least for now, both Visa and its issuing banks appear to be able to use the information:[46]

> Gap and Visa began a pilot of a real-time text message system in November [2010]. Customers enrolled via a secure website and were sent Gap offers when they used their Visa cards to complete transactions that met certain criteria—for example, they may have had to buy something at a store in a specified ZIP code, or shop during a certain time period. Once the offers appeared on their phones, the customers took advantage of

Figure 3

Who Will Control Consumer Information?



them by showing the text messages to Gap sales clerks.

This pilot is notable because it is my understanding that this relationship between Visa, Gap, and consumers was not mediated by either a card-issuing bank or a merchant-acquiring one.[47]

One could even imagine consumers controlling their own information. For example, a consumer might have a low-cost app that allowed him or her to control who had access to his or her personal information, with the possibility of demanding compensation for the right to use this information. Here, pervasive social network poses some interesting difficulties. Would your friends be allowed to sell or give away what they know about you even if you refused to provide the information yourself? In any event, I believe that it is implausible that American consumers will go to the trouble of managing their information to this degree unless it is made very easy to do so.

"Ownership" of "the" customer relationship is often seen as critical point of strategic control in economic ecosystems and might be seen as a way to control

access to consumer information. However, there may be multiple customer relationships that come into play simultaneously in the area of mobile payments. A consumer may perceive herself as having one relationship with a mobile carrier, another with a mobile access device OEM, and a third relationship with a financial institution. Moreover, depending on public policy and private contracts, a firm might have access to a consumer's information even if that consumer does not perceive herself as having a meaningful commercial relationship.

Regulation, Regulation, Regulation

Legal and regulatory decisions regarding privacy and antitrust will very likely be critical determinants of who controls consumer information. For instance, as discussed below, the only way that I can see mobile network operators' being able to capture a large part of the value created by mobile payments services is if they could successfully limit the set of access devices operating on their mobile networks and the applications that run on those devices (i.e., if wireless carriers could control who offered mobile payment services over their networks). Hence, telecommunications-specific and economywide antitrust regulation will play important roles in shaping industry evolution.

The public-policy treatment of privacy and information ownership are likely to play very significant roles in the *creation*, as well as capture, of value from new services based on payment products enable by pervasive connectedness.[48] For example, a study of European privacy regulation found that it substantially reduced the effectiveness of targeted advertising.[49]

The convergence of three economic sectors is also going to involve the convergence (or collision) of three or more regulatory regimes. For example, telecommunications carriers and financial institutions are subject to distinct, sector-specific privacy regulation and antitrust enforcement regimes. And web services companies have been drawing attention from the FTC. Thus, the use of information about a consumer's mobile payment transactions could be subject to oversight from three or more different agencies.

In addition to creating the potential for regulatory conflict, the presence of multiple regimes may lead to consumer confusion. Consider, for example, direct carrier billing, which allows a consumer to make a purchase (e.g., buy a smartphone app) and have the charges posted on his or her wireless service billing account. According to ConsumerReports.org,[50]

> Federal law currently offers protection to consumers in the event that their credit card or debit card is lost, stolen or misused… If mobile payment transactions are linked to credit cards or debit cards, then consumers are entitled to the same guaranteed federal protections that apply when a credit card or debit card is used directly in a transaction.
>
> Mobile charges linked to other forms of payment don't enjoy any of these legal protections. If the mobile payment charge appears on

> the customer's cell phone bill, the product might escape consumer protections entirely unless the contract provides them.

Given how few consumers read contracts, it would seem unlikely that consumers know the extent of their protections with direct carrier billing.

Although industry members often are adverse to regulation, it should be noted that certain forms of regulation may make an important contribution to the success of mobile payments. In their recent study of consumers, Andreev et al. (2011, p. 123) found

> conclusive evidence of the association between trust and consumer's willingness to make an m-payment using a smartphone. By exploring trust in detail, our analysis illustrates that consumer's (sic) perceptions of legal frameworks and the regulation of these frameworks are integral parts of trust.

In addition to refusing to adopt mobile payments, consumers may engage in self-help to deal with privacy concerns by providing only limited or false information about themselves.51 From the industry's perspective, regulation may be preferable to any of these outcomes.

III. Getting from Here to There

It sometimes seems that each year begins with the prediction that it will be the year mobile payment services take off (with or without NFC) and ends with the prediction that the next year will be the one in which the takeoff will occur. If mobile payments services are so great, what is holding them back? One possibility is that, even when one accounts for the value of the information generated by mobile payment services, the benefits are always going to be less than the costs. I think the more likely answer is that, although the benefits outweigh the costs in the long term, there are difficult start-up issues that must be overcome to realize the potential benefits.[52]

On the merchant side, Mallat and Tuunainen (2008, p. 24) found that "the barriers to adoption include complexity of the systems, unfavorable revenue sharing models, lack of critical mass, and lack of standardization." On the consumer side, Mallat (2007, § 5.6) found that the lack of widespread adoption by merchants was a deterrent to adoption by consumers. And, as discussed in Section II above, Dewan and Chen (2005), Viehland and Leong (2007), and Andreev et al. (2011), among others, found that consumer concerns about security and privacy were significant obstacles.

Consumer Trust

Consumers' security and privacy concerns have been identified as barriers to the adoption of mobile payments. However, as noted above, American consumers have a history of saying that they care more deeply about privacy and security than

their actual behavior suggests. I believe that people will continue to express concern about security and privacy but in the long run they will act as if they are unconcerned. In the short run, however, the lack of trust in mobile payment systems can be an impediment to adoption.

One solution is to have mobile payments offered by established firms that have already have good reputations and are trusted by consumers. In their survey of consumers, Andreev et al. (2011, p. 117) found "that respondents considered using a secure and trusted third-party payment company as the preferred method of making an m-payment for products/services." Similarly, Mallat (2007, p. 424) concluded that focus group participants were "more willing to conduct payments with trustworthy transaction parties and regarded established banks, credit card companies, and telecom operators as reliable mobile payment service providers. Banks were slightly preferred to other providers."

Network Effects and the Chicken-and-Egg Problem

Network effects arise when, the greater the number of users on a system, the more valuable the system is to an individual user.[53] Network effects are prevalent in payment services. An increase in the number of consumers making use of a given payment service will—if the costs are not too high relative to the benefits—make acceptance of that payment service more attractive to merchants. And, all else equal, a consumer will more highly value a payment service the more extensive is the merchant acceptance network for that payment instrument. These positive relationships between the number of one type of payment-service user and the other are examples of what economists refer to as cross-platform network effects because they involve two different groups of platform users each of which values the presence of members of the other group.[54] Although the most obvious network effects are those associated with merchants and consumers, there are also cross-platform network effects in the supply of complementary products, such as smartphones and merchant POS devices that can communicate with one another.[55]

An important implication of network effects is that a payment network can suffer from a "chicken-and-egg problem." In short, a chicken-and-egg problem arises when no one wants to belong to a network unless lots of other parties belong to the network first. Specifically, a merchant will not want to bear the expenses of changing its checkout process to accommodate a new payment service if there are few consumers who would potentially use that service. Similarly, a consumer will not want to sign up for the payment service if there are few merchants who accept it. Of course, if everyone waits for lots of other parties to join the service, then the service will never get off of the ground.

There are several potential solutions to the chicken-and-egg problem. One is to begin with smaller groups that have strong cross-platform network effects among themselves. One of the most successful examples of mobile payments to date is the mobile app version of Starbucks prepaid store cards. The CEO of the developer of the Starbucks application attributed this success to "factors like Star-

bucks' complete control over the point of sale, the use of a closed-loop system, and smartphone-toting customers who are loyal and often make daily visits to the brand."[56] In addition, approximately 20-percent of Starbucks customers' in-store purchases were made using Starbucks' loyalty card before the app was launched.[57]

Another approach is to adopt pricing strategies that make joining a service attractive even if, at present, it offers relatively few benefits. One such strategy is penetration pricing, whereby prices are initially set at low (possibly below-cost) levels in order to attract users to the service. As the service becomes established, prices can be increased. A variant of across-the-board penetration pricing is to offer special deals solely to key early adopters. Specific parties may be particularly important early adopters for at least three reasons. Early adopters can: create valuable positive network effects (e.g., a popular merchant will attract buyers to the payment service); help the network achieve an efficient scale of operation; and, in some cases, add credibility.

A payment service could also offer users subsidies to cover fixed costs of participation. For example, a merchant typically has to incur fixed costs (e.g., the costs of modifying online shopping cart software) to participate in a payment service. If the merchant later determines that it is undesirable to participate in the service, then these costs will be lost. Hence, these costs represent a risk of participating and create an incentive to wait until other parties have joined a new service and shown it to be viable. Development subsidies are one way to reduce the risks of membership and thus lessen the chicken-and-egg problem. Offering free applications to consumers has a similar effect.

In market with strong network effects, the degree to which different services are interoperable, or compatible, can also affect adoption decisions, as well as industry performance generally. Compatibility can reduce costs by allowing different service providers to share some elements of infrastructure (e.g., POS transaction-capture devices). Users may also be more likely to adopt new payment services because there is less threat of lock-in or stranding when a given piece of user equipment (e.g., a smartphone) can operate with multiple services. Hence, the chicken-and-egg problem is less severe.

But compatibility can also reduce or eliminate network size as a source of competitive advantage. Consequently, firms that have large installed bases—or firms that users generally *expect* to be particularly successful under incompatibility—may oppose compatibility.[58] Moreover, particular standards may favor some service providers over others. Hence, it is not a foregone conclusion that widespread standards will be adopted and compatibility achieved simply because network effects are present.

That said, I believe there will be standardization of merchants' POS transaction-capture devices. Merchants will likely exhibit very strong preferences for compatible POS transaction-capture devices, as we have today with different credit, charge, and

debit card readers. Most merchants have limited space at checkout, and what space they do have could better be used to display products rather than house multiple payment terminals.[59] Because the demand for compatibility among POS transaction-capture devices will be so strong, I expect that the most widely adopted devices will work with multiple payment services and will drive consumer mobile access devices to have similarly standardized interfaces. Although these devices will be standardized, there will still be significant opportunities for the payment services making use of these devices to differentiate themselves from one another.[60]

In addition to issues regarding standardization across competing mobile payment services, there are also issues regarding standardization across mobile payment services and existing payment services. Compatibility with existing services can reduce the chicken-and-egg problem for new services. These considerations arise with respect to NFC. Here, the desires of at least some parties to maintain compatibility are evident:[61]

> Visa has played a leadership role in establishing global standards for mobile payments, making sure that they are aligned with existing technology and security standards for chip payment cards and can easily be integrated into the existing payments ecosystem. For example: Visa payWave on mobile devices is compatible with existing contactless (NFC) payment terminals already installed at retail outlets worldwide, enabling Visa account holders to simply wave their enabled phone in front of a payment terminal in order to pay.

Compatibility with existing systems is also valuable because, even if most consumers rely on their mobile phones to serve as smart cards, merchants will still have to deal with non-phone-enabled consumers for a significant period of time. Thus, compatibility will allow merchants avoid the costs of having to operate two systems simultaneously.

The chicken-and-egg problem faced by payment services is not limited to consumers and merchants. These effects also apply to financial institutions and other potential complementors, such as mobile access device OEMs which must choose whether to install special features such as NFC chips on their devices. One solution to the complementor version of the chicken-and-egg problem is for the payment service either to subsidize the production of the complements or to purchase them on behalf of users.

Several years ago, Wells Fargo tested a service that allowed users to make payments using a phone rather than a bankcard. Wells Fargo chose not to offer the service to its customers, in part because there was only one handset that could be used to offer the service.[62] Even today, most smartphones do not have built-in capabilities to communicate with merchant POS devices. Recently, however, Wells and other potential payment providers have experimented with microSD cards that can add these capabilities to existing phones,[63] and DeviceFidelity and Spring Card

Systems announced a micoSD card that can be inserted into an Android phone and used to make payments over MasterCard's PayPass NFC system.[64] These developments highlight the need for complementary investments at various points in the value net. They also illustrate how some parties may be able to internalize complements effects by offering the complementary products to their customers rather than waiting for independent suppliers to offer them directly to users.

IV. Who will Do what?

Having discussed many of the forces that will shape competition, I next examine what roles will be played by the various payments industry participants, including banks, wireless telecommunications service providers, financial institutions, traditional card payment networks, and web services companies.

Don't Get Carried Away with Carriers

Wireless carriers will unquestionably provide important communication links that will enable both mobile payment services and mobile advertising-and-deal services. Figure 3 above illustrates the fact that wireless carriers will provide communication links between consumers and payment networks, deal-and-advertising networks, social networks, and—directly or indirectly—merchants. Despite the importance of these links, it does not follow that wireless carriers will be successful in capturing the value created by these services.

Indeed, there is a wide variety of opinions regarding whether wireless network operators are likely to succeed in capturing value, ranging from extreme optimism:[65]

> There is a game-changing opportunity here for the operators to effectively displace credit cards and banks.

to strong pessimism:[66]

> Operators will continue to attempt to insinuate themselves into the process at a premium rather than simply accepting their long-term fate of being minimum-margin bit pipes for the masses.

Other commentators fall in the middle, seeing mobile network operators as playing critical roles but doing so by partnering with financial institutions rather than displacing them.[67]

In my opinion, the pessimistic view is very likely the correct one: telecommunications providers will neither significantly shape the evolution of general purpose payments in the United States nor will they capture significant value. Instead, they will provide essential but undifferentiated infrastructure.[68] The term "undifferentiated" is critical here. It will prevent almost all access device OEMs and telecommunications carriers from having powerful positions within the mobile payments value net (the one exception may be Apple). There is little or no need to have wireless network operators involved in planning payment services, and there is relatively little benefit to other parties from forming alliances with mobile

network operators except in their roles as distributors of mobile access devices.[69] In addition, wireless carriers and access device manufacturers generally lack strong business relationships with merchants.

Mobile network operators do not want to be commoditized, "dumb pipes." But to avoid this fate, network operators have to provide something that cannot better be provided at the edge (either for technological reasons or because network operators have locked out rivals).

Experience with fixed-line access to the Internet does not bode well for mobile network operators and access device OEMs. Personal computer manufacturers, operating system developers, and Internet service providers play no role in online payments today beyond providing generic infrastructure over which online payment applications run. And there is no reason to expect that situation to change. I don't know of anyone who expects fixed-line broadband Internet service providers to dominate online payments. Why should one expect mobile broadband providers be any different?

There are a few possible reasons. For one, mobile broadband service providers in the United States have been able to keep much greater control over how their services are used than have fixed-line providers. For example, wireless carriers can limit the set of devices used to access their networks and have some degree of control over the applications that run on those devices. But blocking competing payments services would be very difficult.

It would be relatively easy to work around bottlenecks in mobile access devices that took the form of proprietary chips or capabilities. Even if there were proprietary NFC chips installed in smartphones by OEMs or carriers, there are add-on chips and software solutions that can be utilized instead. And, of course, Wi-Fi and cellular-based systems need not rely on NFC at all. In order to keep competing payment services from reaching its customers, a mobile network operator would have to rely on more actions specifically designed and targeted to block those applications. I question whether excluding mobile payment applications in that way is a feasible long-term strategy either commercially or politically.

The two earlier discussions of the Starbucks app and banks' use of microSD cards to run an over-the-top payment application illustrate some of the difficulties that mobile network operators and access device OEMs face. There is no need for wireless carriers, wireless OS providers, or mobile access device manufacturers to provide any features or functions specifically tailored to the Starbucks app. Although banks consider microSD cards to be a transition technology,[70] these cards demonstrate the existence of a simple work-around of any device manufacturer and carrier that attempted to go a different route (as long as the devices had non-proprietary expansion slots; once again, Apple may be different than the rest of the industry).

The other way to avoid becoming "dumb pipes" is for mobile networks to provide something that is cannot—or at least is not today—better provided at the

edge. For example, network operators may be able to provide some information that, although edge devices could provide, many do not. Locaid Technologies Inc., and Placecast offer geo-fencing services that use mobile network information to determine a subscriber's location.[71] Consequently, these services are available to consumers who do not have GPS-enabled phones. Although this approach may be valuable in the short run, it seems likely that, in the long run, a very high percentage of mobile access devices will be location aware, whether by using GPS, triangulation based on Wi-Fi networks, or some other means. Moreover, in the long run, those devices that are not location-aware may be feature phones that lack the ability to provide rich graphics and, hence, will rely on SMS messages that are much less powerful marketing tools than those that can be provided to smartphone and mobile tablet users. I am unaware of any other services or features relevant to payment systems that can be offered by the core of mobile networks but not edge devices.

There may be certain niches (albeit multibillion-dollar niches) in which mobile network operators play deeper roles. For example, carrier-based billing is convenient for purchasing apps, ringtones, and similar digital goods for use on mobile devices. And SMS-based and carrier-based-billing solutions might have a place for low-value, spontaneous transactions (e.g., to pay for online voting related to a television broadcast). For mainstream mobile payments, however, mobile network operators' roles are likely to be limited.

Similar considerations arise with respect to mobile operating system providers and access device OEMs. Although, in at least some instances, these parties may be more differentiated along other dimensions, they still will serve as relatively undifferentiated infrastructure for over-the-top payment services unless they are able actively to lock out such competitors. With the possible exception of Apple, such a strategy seems infeasible for access device manufacturers given the high degree of competition they face. And such a strategy seems unlikely for Microsoft and RIM given their weak market positions, and Android given its open strategy.

Give Banks Credit

My analysis suggests that the roles of financial institutions play in payment systems will not change very much as the result of increasing consumer connectedness. There are two dimensions to this prediction: (a) banks will not branch out to play significant new roles; and (b) other types of institutions will not displace banks as sources of credit and stores of wealth.

My basis for prediction (a) is twofold. First, with the exception of the bank controlled by American Express, few if any banks have a broad enough customer bases to attract merchants to a proprietary network based on a single bank's consumer customers. Second, I expect banks to be able successfully and profitably to extend their traditional roles of providing credit and serving as stores of wealth to mobile payments by partnering with other parties that are better positioned to

develop merchant networks and the other aspects of new payment systems.

Given the existence of various regulatory constraints, prediction (b) might almost be true by definition: enterprises taking over banks' roles will have to become banks themselves. The more interesting version of this prediction is that mobile payments will not allow significant entry of new firms as suppliers of credit, at least in the short run.

This prediction is based on the fact that issuing credit is hard work. Just ask AT&T or American Express. AT&T believed that the core competence needed to issue credit cards was the ability to process large numbers of transactions efficiently and reliably. Given its experience in large-scale, highly complex telephone billing, AT&T thought it had this competence. AT&T entered the card-issuing business and amassed a large portfolio. However, the credit card industry evolved so that a critical—or, perhaps, the critical—skill is the ability to process information to predict what card offers will appeal to consumers and which consumers will be profitable. AT&T lacked this skill and exited the industry by selling its credit card portfolio to Citibank.

American Express also serves as an instructive example of the difficulties of issuing credit cards without experience or an existing customer base. American Express initially had significant difficulties when it first issued a credit (as opposed to charge card). When it began offering its Optima credit card in 1987, American Express dramatically misjudged the market and the risks that it faced.[72] Consequently, American Express ended up suffering loan losses of hundreds of millions of dollars per year between 1988 and 1994, despite being an experienced charge card issuer and having account histories for millions of charge card holders.[73] Since becoming an experienced credit card issuer, American Express has become more successful.

Banks have another competitive advantage in addition to their experience issuing credit. As discussed in Section III above, some researchers have found that consumers place greater trust in established payment companies and banks. This factor speaks well to a continuing, central role for banks and the existing bankcard payment networks.

Lastly, it should be observed that there is a further connection between parts (a) and (b) of this prediction: because banks have an important and profitable role to play as a complementary piece, they do not have large incentives to try to create proprietary systems of their own.

Wither Incumbent Payment Card Networks?

Many people see the developments discussed in this paper as very significant threats to incumbent payment card networks. It is important to recognize that many of these developments also represent opportunities for incumbent networks. These developments extend the reach and increase the utility of the services

offered by these networks. Incumbent payment card networks may be able to take advantage of these opportunities directly. These networks have several competitive advantages including: reputations with consumers for trustworthiness; large merchant acceptance networks; and lots of data, including data generated by nonmobile transactions. For incumbent payment card networks, the biggest question is whether they have the organizational capabilities to innovate successfully to build on their current strengths.

Even if incumbent networks do not take advantage of the opportunities created by pervasive consumer connectedness directly, many of the services offered by companies such as PayPal and Square are built on top of the services of incumbent card networks. That said, there is a risk that some of these complementary service providers may evolve into competitors.

Web-Services Companies

The rise of Internet payments has brought web-services companies such eBay, Google, and Facebook into the payment arena. Many of these companies are essentially information collection-and-processing companies, with valuable competitive assets that include: massive amounts of consumer data; experience efficiently collecting, storing, and processing that data at scale; high degrees of skill at processing the data to model consumer behavior (e.g., determining for what consumers are looking when submitting Internet search queries).

The role of web-services companies will depend on how a variety of political and regulatory issues shake out (e.g., whether privacy regulations limit their business models), but I expect a few of these firms to be very successful in this area. Companies that sell advertising based on Internet search and social networks can be expected to make effective use of their ability to help merchants target their advertising in ways that pervasive consumer connectedness will enable. I also believe that web-services providers will extend their success to the business of facilitating targeted offers and customized, context-specific pricing.

Will web-services companies be able to use their information as well as their information-collection-and-analysis skills to compete with banks by customizing credit products and conducting superior credit analyses? One issue is whether these companies would be better off selling the information to existing credit card issuers. Another issue is that there is more to life (and success in the payments marketplace) than information processing. As discussed at several points above, at least in the short run trust is a big issue. In my view, at present consumers can be expected to trust several of the largest web-services companies less than they trust their banks and traditional payment card networks.

What about Apple?

At several points in the discussion above, Apple has been singled out as a possible exception to statements made about broad groups of firms. The future role

of Apple is a big question mark for at least two reasons. First, Apple is uniquely positioned in the mobile economic ecosystem. It has by far the most powerful consumer brand, and it is the most vertically integrated of any company. Today, Apple is the most successful mobile access device OEM, one of the two most successful mobile OS developers, a web-services company, one of the most innovative and successful bricks-and-mortar retailers, and an online payment company (albeit one that generally rides on top of existing credit and charge card networks).[74] And, in 2006, Apple even filed a patent application for a system under which Apple would be a mobile virtual network operator.[75] Second, Apple has a history of operating closed systems that offer high levels of user convenience coupled with high levels of Apple control.

Apple has been conducting research on various wireless payments solutions and has implemented some of them in its retail outlets (e.g., Apple EasyPay, which allows a consumer to use his or her iPhone's camera to scan an item's barcode and then pay using the credit card associated with the user's iTunes account).[76] Will Apple be able to use its powerful brand and vertical integration to create a payment system that it dominates? Or will Apple be driven to be more open in this arena because even Apple will need to work with other enterprises (merchants, if no one else), and these enterprises can see how big a share Apple has taken for digital goods to date?

Conclusion

I believe that consumers' increasing connectedness via mobile access devices and social networks will lead to evolutionary developments in core payment services but revolutionary changes in services that are built on the information collected through mobile payment services and social networks. I also believe that firms in the telecommunications sector will play a smaller role in payment services than they would like, while traditional payments services providers will play a larger role than many expect. The role of web-services companies will depend on how a variety of political and regulatory issues shake out, but I expect a few of these firms to be very successful in this area. For incumbent payment card networks, the biggest question is whether they have the organizational capabilities to innovate successfully to build on their current strengths of trusted brands and large networks of consumers and merchants. Only time will tell.

Author's note: Two discussants, Don Kingsborough and Hal Varian, provided helpful comments on an early draft. I gratefully acknowledge Nokia Corporation's financial support for Berkeley's Program in Business Model Innovation.

Endnotes

[1]Throughout, when talking about either fixed or mobile access devices, I will be agnostic as to whether the computing power lies in the access device itself or the cloud.

[2]As discussed below, the increased understanding of consumer behavior may also have benefits for payment products themselves in terms of improved customization of credit terms and more-effective fraud detection and control.

[3]Niina Mallat and Virpi Kristiina Tuunainen (2008). "Exploring Merchant Adoption of Mobile Payment Systems: An Empirical Study," e-Service Journal 6(2): 24-57 (hereinafter, Mallat and Tuunainen (2008)) at 24.

[4]For purposes of this paper, it is sufficient to examine the drivers of consumer adoption at a broad level. In practice, consumer payment decisions are typically made at the transaction level, and the choice of payment instrument can vary with consumer characteristics, transaction characteristics, and payment-service characteristics.

[5]Sunil Dewan and Lei-da Chen (2005). "Mobile Payment Adoption in the US: A Cross-Industry, Cross-Platform Solution," *Journal of Information Privacy and Security*, 1(2): 4-28, available at *http://www.sunildewan.com/uploads/mpayment_Journal_of_Information_Privacy_and_Security.pdf*, site visited April 23, 2012 (hereinafter, Dewan and Chen (2005)), at 23. Page cites made to this document correspond to the version available at URL above.

[6]Dennis Viehland and Roslyn Siu Yoong Leong (2007). "Acceptance and Use of Mobile Payments," ACIS 2007 Proceedings, Paper 16, Tables 4 and 5.

[7]*Id.*, Table 5.

[8]Pavel Andreev, Aidan Duane, Philip O'Reilly (2011). "Conceptualizing Consumer Perceptions of Making M-Payments Using Smartphones in Ireland," in *Researching the Future in Information Systems*, Chiasson, Henfridsson, Karsten, and DeGross (ed.s). Springer: Boston (hereinafter Andreev et al. (2011)) at 122.

[9]The correlation between perceived compatibility and perceived ease of use was only 0.25. (Paul Gerhardt Schierz, Oliver Schilke, and Bernd W. Wirtz (2010). "Understanding consumer acceptance of mobile payment services: An empirical analysis," *Electronic Commerce Research and Applications*, 9(3): 209-216 at 215. Other authors have also examined the effects of compatibility on adoption. Because of its somewhat amorphous nature, I do not discuss it further in the present paper, except to note two points. First, because consumers' notions of compatibility can vary by transaction type (e.g., quick service restaurant purchases versus major appliance purchases), these notions can have important effects on the types of transactions for which consumers will use mobile payments. Second, I fully expect the population of users obsessed with their iPhones to find any Apple mobile payment service to be compatible with their lifestyles.

[10]Marc Rysman (2007). "An Empirical Analysis of Payment Card Usage," *The Journal of Industrial Economics*, 55(1): 1-36.

[11]Niina Mallat (2007). "Exploring consumer adoption of mobile payments – A qualitative study," *Journal of Strategic Information Systems*, 16: 413–432 (hereinafter, Mallat (2007) at 424.

[12]For example, Andreev et al. (2011, p. 123) found that "that consumer's [sic] perceptions of the privacy controls employed by smart phone service providers is [sic] a critical element of trust."

[13]Federal Reserve Bank, Consumer Credit—G.19, released April 6, 2012, available at *http://www.federalreserve.gov/releases/g19/current/default.htm*, site visited April 27, 2012.

[14]See Andrew Ching and Fumiko Hayashi (2010). "Payment card rewards programs and consumer payment choice," *Journal of Banking & Finance*, 34(8): 1773-1787, and the references cited therein for empirical estimates of the sensitivity of consumers' choices of payment instruments to the presence of reward programs.

[15]Although tablets are generally more capable than smartphones, consumers are less likely to have tablets with them and readily accessible at all times. Hence, tablets may be the preferred means of engaging in e-commerce transactions at home but smartphones will be used while at bricks-and-mortar retailers.

[16]I will not discuss them further, but it is worth noting in passing that there are also new features and services enabled by the form factors of mobile access devices compared to traditional payment cards. Even the smartest smart card cannot change its look and logo in real time. But a smartphone or tablet can. This fact opens new possibilities for co-branding. For example, a mobile payment account might be co-branded with a petroleum company when used to buy gas and a department store when used to purchase clothing.

[17]There might be potential cost savings for very small merchants from using smartphones or tablets as their primary POS, transaction-capture devices (one of Square's principal services offers these benefits, among others).

[18]Kate Fitzgerald, "Starbucks in National Push for Mobile Payments," *American Banker*, Dec. 3, 2010, available at *http://www.americanbanker.com/issues/175_232/starbucks-mobile-payments-1029437-1.html*, site visited March 12, 2012.

[19]*https://squareup.com/pay-with-square*, site visited April 20, 2012.

[20]Dewan and Chen (2005) at 14.

[21]*Id.* at 15 and 16.

[22]*Id.* at 17 and 18.

[23] *Id.*

[24]Ann Carrns, "Consumers Leery of Online Shopping with Tablets and Phones," *The New York Times*, Jan. 27, 2012, available at *http://bucks.blogs.nytimes.com/2012/01/27/consumers-leery-of-online-shopping-with-tablets-and-phones/*, site visited April 30, 2012.

[25]The identity claim might be made by a consumer orally, by swiping his or her payment card, or by a message sent by his or her mobile phone to the merchant.

[26]With an NFC-based service, the consumer's mobile access device would still communicate with a POS terminal controlled by the merchant. But in other cases, such as the use of Wi-Fi or traditional cellular services, the consumer's mobile access device could communicate with the payment network "directly." The Pay with Square service allows this to be done. (*https://squareup.com/pay-with-square*, site visited April 20, 2012.) In contrast, Square's innovative mobile card reader reportedly can easily be used to skim credit card information. Square's defense is that all credit cards can be skimmed. ("Square answers VeriFone's accusations on security of mobile credit card reader," *Los Angeles Times*, March 10, 2011, available at *http://latimesblogs.latimes.com/technology/2011/03/square-answers-verifones-accusations-on-security-of-mobile-credit-card-reader.html* , site visited April 20, 2012.)

[27] *https://help.squareup.com/customer/portal/articles/108037-pay-with-square-where-can-i-find-my-receipts-and-payment-history-* , site visited April 20, 2012.

[28] *https://help.squareup.com/customer/portal/articles/197741*, site visited April 12, 2012.

[29]There could also be flows in addition to those illustrated in this simplified diagram. For example, some merchants might interact with the issuing bank directly, and merchants and social networks might also exchange information.

[30]There may be limits to consumers' desire for one-stop shopping. For example, one interpretation of PayPal's success is that consumers want to have a limited account when transacting with merchants in whom consumers have less trust (this is my interpretation of PayPal's apparent appeal from hiding a consumer's credit card information from a merchant while potentially exposing the user's PayPal password. Of course, such preferences could be accomplished by a single payment mechanism that had different transaction and liability limits for different classes of merchants.

[31]As discussed below, consumers may also be connected through the facilities of the payment network itself.

[32]Janne Lukkari, Jani Korhonen, and Timo Ojala (2004). "SmartRestaurant: mobile payments in context-aware environment," ICEC '04 Proceedings of the

6th International Conference on Electronic Commerce, Janssen, Sol, and Wagenaar (ed.s), 575-582 (hereinafter Lukkari et al. (2004)), at 576.

[33]I place the word loyal within quotation marks because one might argue that truly loyal customers do not require special deals to be induced to patronize the merchant.

[34]By way of comparison, Groupon currently facilitates offers that are sensitive only to the merchant's context (and not in real time) and that are very crude in terms of relationship management. Although in at least some cases intended to serve as introductory offers that begin longer-term relationships, the big discounts associated with Groupon deals may encourage an adversarial attitude of consumers toward merchants. Groupon has what some observers label a "social" element, but it is among strangers and is not—in my view—properly viewed as a loyalty program.

[35]See *http://www.facebook.com/business/ads*, site visited April 20, 2012.

[36]I believe that NFC is more likely ultimately to be remembered as "never fulfilled claims." Those readers with telecommunications backgrounds will recognize this prediction as a tribute to the person who first observed that ISDN stood for "it still does nothing," rather than "integrated services digital network."

[37]Like a dog taught to walk on two legs, NFC could do other things. NFC swiping stations could be set up in the store aisles or showrooms so that consumers could seek information on the products and available deals.

[38]Lukkari et al. (2004) at 576.

[39]*Id.*

[40]See, for example, Chantal Tode, "Will wide-scale adoption of geofencing happen this year?" *Mobile Commerce Daily*, April 16, 2012, available at *http://www.mobilecommercedaily.com/2012/04/16/geofencing-strategies-on-the-rise-but-challenges-remain*, site visited April 20, 2012.

[41]Placecast, "O2 Case Study," available at *http://placecast.net/research/case_study_o2.pdf*, site visited April 20, 2012, at 01.

[42]For a description of one such service, see *http://placecast.net/shopalerts/operators.html*, site visited April 20, 2012.

[43]*https://help.squareup.com/customer/portal/articles/223248-new-how-do-i-set-up-auto-open-in-card-case-* , site visited April 20, 2012.

[44]https://squareup.com/pay-with-square, site visited April 20, 2012.

[45]*Id.*

[46]Matt Hamblen, "Visa, Gap use text messages to mobile phones for promotions," *Computerworld*, April 21, 2011, available at *http://www.computerworld.com/s/article/9216060/Visa_Gap_use_text_messages_to_mobile_phones_for_promotions*, site visited April 28, 2012. See also, Sarah Perez, "Visa Launches Real-Time, Location-Based Discounts for Gap Customers," ReadWriteWeb, April 21, 2011, available at *http://www.readwriteweb.com/archives/Visa_launches_real_time_location_based_discounts_for_gap_customers.php*, site visited April 28, 2012.

[47]It is also notable in that it uses Visa's network to provide the location service and uses wireless networks solely for SMS messages, so that smartphones are not required and wireless carriers play a very limited role in providing the service.

[48]To the extent that privacy regulation distinguishes uses of information within an enterprise from uses that cross enterprise boundaries, regulation could affect enterprise's choices of their boundaries. For instance, public policies that are more lenient toward within-enterprise transactions are likely to promote greater enterprise scope. Similar issues can arise with respect to antitrust policy when two divisions of a given enterprise are permitted to engage in practices (e.g., exclusive contracting) that might be found to be antitrust violations if practiced by two separate enterprises.

[49]Avi Goldfarb and Catherine Tucker (2010). "Privacy Regulation and Online Advertising," available at *http://ssrn.com/abstract=1600259*, site visited May 1, 2012.

[50]ConsumerReports.org, "T-Mobile's "Direct Carrier Billing" Program Could Leave Consumers Vulnerable," Aug. 8, 2011, available at *http://pressroom.consumerreports.org/pressroom/2011/08/t-mobiles-direct-carrier-billing-program-could-leave-consumers-vulnerable.html*, site visited Jan. 25, 2012.

[51]Peter O'Connor (2005) "Comparative Analysis of International Approaches to the Protection of Online Privacy," in S. Krishnamurthy, ed., *Contemporary Research in E-Marketing*, Vol. 2. Hershey, Pa.: Idea Group Publishing, as summarized by Evelyne Beatrix Cleff, (2007) "Implementing the Legal Criteria of Meaningful Consent in the Concept of Mobile Advertising," *Computer Law and Security Report*, 23(3): 262–269, at 265.

[52]I don't subscribe to the conspiracy theories of the sort put forth by several of the people interviewed in a recent Pew Research Center survey. (Aaron Smith, Janna Anderson, Lee Rainie, "The Future of Money: Smartphone Swiping in the Mobile Age," Pew Research Center, April 17, 2012, available at *http://www.pewinternet.org/Reports/2012/Future-of-Money.aspx?src=prc-headline*, site visited April 28, 2012 (hereinafter, Smith et al. (2012)) at 5, 16, and 17.)

[53]For a survey of the economics of network effects, see Michael L. Katz and Carl Shapiro (1994) "Systems Competition and Network Effects," *Journal of Economic Perspectives*, 8 (Spring): 93-115 (hereinafter, Katz and Shapiro (1994)).

[54]For survey of cross-platform network effects, also known as two-sided markets, see Roberto Roson (2005) "Two-Sided Markets: A Tentative Survey," *Review of Network Economics*, 4(2): 142-160.

[55]In addition, positive-feedback effects may arise with respect to the provision of targeted-marketing services to merchants. Specifically, the larger a payment-service's merchant-acceptance network, the greater the depth of information that service will be able to collect about its consumer users because the payment service will likely capture a greater percentage of any given consumer's transactions. Hence, the greater the number of merchants using a payment service, the higher the value of the targeted marketing services that platform can offer to merchants.

[56]"POS Gets Smart," *QSR*, June 24, 2011, available at *http://www.qsrmagazine.com/news/pos-gets-smart*, site visited March 11, 2012. (The quotation in the text is of the cited article's paraphrase of what the executive said.)

[57]*Id.*

[58]See, for example, Katz and Shapiro (1994).

[59]Note that this issue need not arise in this exact form for certain payment services based on Wi-Fi and cellular networks. However, these technologies, too, will require at least some equipment located on the merchant's premises.

[60]Economic theory suggests that widespread compatibility that allows product differentiation would very likely maximize the joint profits of competing payment-service providers. Consumers and merchants might be reluctant to adopt a monopoly service, thus exacerbating the chicken-and-egg problem, while a lack of differentiation could lead to intense payment-service competition that eroded profits. From a social welfare perspective, a structure that allows service providers to differentiate themselves can spur innovation and long-run competition.

[61]Rebecca Robinson, "Smartphones for Use as Visa Mobile Payment Devices," *CardGuide*, Feb. 21, 2012, available at *http://www.card-guide-international.com/201202211911/Visa-Certifies-Smartphones-for-Use-as-Visa-Mobile-Payment-Devices.html*, site visited March 11, 2012.

[62]Rachael King, "Wells Fargo tests smart-phone mobile payments," SFGate, Jan. 5, 2011, available at *http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2011/01/04/BUBT1H3TO3.DTL*, site visited March 11, 2012.

[63]*Id.* See also Andrew Johnson, "In Mobile Payments, Lack of Interoperability Threatens Adoption, *American Banker*," Dec. 9, 2010, available at *http://www.americanbanker.com/issues/175_235/lack-of-interoperability-1029690-1.html,* site visited March 11, 2012.

[64]Mat Smith, "Moneto NFC microSD to bring contactless features to any Android phone," *engadget*, posted Jan. 11, 2012, available at *http://www.engadget.*

com/2012/01/11/moneto-nfc-microsd-contactless-payment-Android-iPhone/, site visited April 28, 2012.

[65]Dan Hays of PRTM as quoted by Leila Abboud, "Telcos battle tech, bank titans for mobile payments," *The Globe and Mail*, Feb. 14, 2011, available at *http://m.theglobeandmail.com/news/technology/mobile-technology/telcos-battle-tech-bank-titans-for-mobile-payments/article1905892/?service=mobile,* site visited April 28, 2012.

[66]Rob Scott of Nokia as quoted by Smith et al. (2012) at 14.

[67]See, for example, Jan Ondrus and Kalle Lyytinen (2011). "Mobile Payments Market: Towards Another Clash of the Titans?" *Proceedings of the 10th International Conference on Mobile Business*, Como, Italy.

[68]Telecommunications firms may play much more significant roles in developing economies (*Id.*, §I.):

Some local success stories have been observed in developing countries… However, these systems have been well adapted for the financial markets of the developing world (e.g., high penetration of mobile phones, low bank service penetration, lack of alternative solutions, clear economic value propositions for the users). Those contexts are highly specific and far from the ones encountered in the developed world.

[69]That said, several such parties apparently disagree with my assessment and have formed alliances with wireless carriers.

[70]Rachael King, "Wells Fargo tests smart-phone mobile payments," *SFGate*, Jan. 5, 2011, available at *http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2011/01/04/BUBT1H3TO3.DTL*, site visited March 11, 2012.

[71]*http://www.loc-aid.com/about-us*, site visited April 20, 2012; Ryan Kim, "O2 Turns on Geo-fencing for Starbucks, L'Oreal in UK," GigaOm, Oct. 14, 2010, available at *http://gigaom.com/2010/10/14/o2-turns-on-geo-fencing-for-starbucks-loreal-in-uk/*, site visited April 20, 2012.

[72]According to Bernstein Research, once American Express launched the Optima card, "Disaster followed. The list of what went wrong is almost unbearably long. The credit assumptions were flawed to begin with,…" ("The Future of the Credit Card Industry: Part II—Company Outlook," Bernstein Research, January 1996, at 30.)

[73]*Id.*, Exhibit 18 and accompanying text.

[74]See *http://support.apple.com/kb/HT2001*, site visited April 23, 2012.

[75]AppleInsider Staff, "Filing: Apple conceptualized smart MVNO system ahead of iPhone," *AppleInsider,* April 10, 2008, available at *http://www.appleinsider.com/articles/08/04/10/filing_apple_conceptualized_smart_mvno_system_ahead_of_iphone.html,* site visited May 1, 2012.

[76]See, for example, "Apple Gearing Up for the Coming NFC- iPhone Revolution," *Patently Apple*, April 8, 2010, available at *http://www.patentlyapple.com/patently-apple/2010/04/apple-gearing-up-for-the-coming-nfc--iphone-revolution.html*, and Lance Whitney, Apple Store's new self-checkout: Nice, but not flawless," CNET, Nov. 14, 2011, available at *http://news.cnet.com/8301-13579_3-57324198-37/apple-stores-new-self-checkout-nice-but-not-flawless/*, sites visited Jan.18, 2012.

Increasing Connectedness and Consumer Payments: An Overview
Commentary

Don Kingsborough

Good morning. It seems that I am always standing in front of an audience and telling them I think it is ***not*** going to be an evolution, but instead, that we are at the beginning of a revolution. So I am here today to say that.

This has happened to me three times now. In the 1970s, I was president of a company called Atari. I got up in front of an audience with a game called Pong and said it was going to lead us to a brand new entertainment network.

In the 1980s, I invented a new talking toy called Teddy Ruxpin that changed the way kids got electronic toys. In 2000, I got an idea that paper could be changed to plastic and we could put branded gift cards in other retail stores and create a new way for people to get products.

I am here today to tell you I think we are at the beginning of a revolution. During Dr. Katz's remarks, he suggested that when the bank is in the center of an ecosystem, the ecosystem will not change very much and the change that does occur will be evolutionary in nature. If this stays the same, we agree with him. But we think there is a small, but significant difference.

This view of the future is limited only by the status quo and incumbents trying to maintain their position in market share. We believe the balance of power is shifting and the technology is the facilitator of the shift. In our view, the consumer is at the core of the ecosystem. Consumers are the ones who are going to drive this change. We think the revolution has already started.

In just the few short years since the iPhone was invented, multichannel shopping accounts for almost 50 percent of all retail sales. It is the consumer who says they want to buy anytime, anyplace, and in anyway. It is this type of shopping and buying that will drive this revolution. Consumers will determine the new payment types, as they encounter new options for how and when to pay.

In his paper, Dr. Katz talks about multichannel shopping. Let me bring it to life for you by showing a brief video of how PayPal is helping to make that happen. Millions of people can now live, shop, and buy anytime, anywhere, anyway, because they have PayPal. It is innovation you can use and share with friends today, no matter where you are. Innovation that finds exactly what you are looking for. It's putting advantages at your fingertips. It's your money moving with you, listening to you, following your lead. It's all on you—the power of information. Rewarding you in a meaningful way and saving you time when it really counts. It's meeting the need for a whole new kind of convenience. And it's letting you decide how to pay…long after you've checked out. So if you have PayPal, you have it good.

Dr. Katz says revolutionary changes can come from services. On this we agree. It is a consumer-driven revolution. It is no longer about location, location, location. The new commerce is about access to the consumer and you get access when you bring value. You can save them time, you can save them money, or you can provide critical information. It is about consumers who get value and trade information for that value. And it is based on their needs and their choices.

The digitization and virtualization of currency and payments have shifted control from financial institutions. Instead of an existing channel today to the consumer, the digital wallet is a channel for the consumer. Consumers now choose information to pull and information to share. The proliferation of apps enables consumers to build relationships when they benefit and to disengage when there is no more value. This is not a revolution about tapping or swiping. New commerce is about frictionless payments. It is about adding value. These are the things that are going to determine how the consumer decides to pay.

Consumers will share this information only when it benefits them. The ecosystem and the technology that knit this together will be shaped by new players and who are able to do this when they bring value to the consumer. It is about an opt-in world, where consumers are connected to the cloud at will—to do their shopping, to do their buying, when and wherever they want to.

We think these changes are a continuum of technology and consumer needs. In Dr. Katz's paper, he says he does not think there will be any real winners. And we think a lot of the players today will still be the players of tomorrow, but we think the batting order may change. And, for sure, we think the market share will change.

It is who satisfies the needs of the consumer and gets them to connect that wins. There will not be one device for all people; it will be 50 billion devices connected to the cloud with many different payment systems. But it will have to work with the existing infrastructure.

It will not be just your iPhone that you touch and pay; it will be the screen that is closest to you when you decide to buy. We believe the change will occur when you move the consumer to the center of the ecosystem.

Increasing Connectedness and Consumer Payments: An Overview
Commentary

Hal R. Varian

I have a series of more or less unrelated comments about Dr. Katz's paper. Since I am from Silicon Valley, I think Dr. Katz is a little too conservative. He is from that conservative part of the country—the East Bay. In Silicon Valley, we think of ourselves as much more forward-looking than those conservative people in Berkeley.

Let's start out by looking in our pockets: What is in your pocket? You have your wallet and what does your wallet have in it? Well it has some measures of persistent identity—like your driver's license, maybe your AAA card, maybe a faculty ID, an auto insurance card, a medical insurance card. These verify persistent identity. They say that I am a member of some group of people licensed to drive or to use certain facilities.

My wallet also has temporary identities. I might have a boarding pass or a ticket to a play stuck in my wallet and that shows that I have a right or access to certain facilities.

Of course, there are general purpose payment mechanisms such as credit and debit cards.

Then there are a lot of specific payment mechanisms. I have a card for the Bay Area Rapid Transit system and receipts that show what I paid for lunch in the airport.

Finally, there are those personal things—your photos, your notes, your reminders, and so on. But then you also have keys, not in your wallet but in your pocket, that are also a form of identity verification and access control—permanent keys for your car and your home and temporary keys for your hotel room and rental car. Airbnb, is a company that allows people to rent out in-law units or apartments to

temporary visitors. They have a system where you can just go up to the door of the apartment, punch a number in your smartphone, and the door will unlock. You can use your smartphone as a key. That is a very attractive mechanism.

Of course, all of these payment systems, identity systems, access systems and so on can be replaced by a phone. That is, replacing these capabilities with a phone is *technologically* feasible. Dr. Katz is absolutely right that there are a lot of institutional and inertia reasons why they may not be replaced in the near-term future. But the fact you can do all those things from one device is something that is potentially quite exciting.

Also, one thing that has not been mentioned very much in the discussion is the idea of payments within a social system. It amazes me that Zynga generates about 12 percent of Facebook revenues—12 percent. Remember this is the hot company in Silicon Valley these days. The Zynga revenue comes from virtual currencies, which are used to buy animals in FarmVille and other types of virtual goods in online games. It is remarkable to me that you have this whole virtual currency system generating such a large part of Facebook's revenue.

And you think about how social networks are evolving, they certainly intend to be part of an identity verification system. And as soon as you have identity verification, you have a good chunk of the payments mechanism problem licked, because I have some way to verify that I am who I am, some way to verify the merchant is who he is, and the rest of it is just accounting, making some transactions that move from one side of the ledger to another. That identity verification business is going to be a really key role. It is possible—I will only say it is *possible*—that social networks will play a role in that identity verification,

Clearly, the password authentication we use now is very, very primitive. There are much more secure systems easily available. Google offers, for example, two-factor authentication to everybody for free. By that I mean you have a mobile device and it will generate one-time passwords for you to use to get into different services. So there are plenty of systems available now. It is really just social acceptance and the hassle of using them that prevented people from having much more secure authentication.

Another thing that is worth mentioning, and Dr. Katz alluded to this in passing, but it would be good to say a little bit more about it, is that controlling the payments system can confer a significant competitive advantage. For example, Amazon and Amazon Prime have your credit card on file, so you have one-click shopping. It is very easy to buy things on Amazon, once you have enrolled in their payment system. Of course, that is why merchants are very eager to join the Amazon Marketplace. They view this as a really important place to be, because Amazon has basically internalized the whole payment system. They have a private payment system within Amazon that gives them a strong competitive advantage against other players.

The same thing occurs with Apple iTunes. They have 150 million credit card numbers on file; this allows consumers to buy content on iTunes very quickly and easily. This is a major reason why content providers want to put their content on iTunes. So just building a special-purpose payments system is really a huge source of competitive advantage.

Conversely, I would say, if you have a general-purpose payment system, which is as easy to use as a special-purpose payment system, then it makes it a lot easier for new entrants to start selling things.

Talking a little bit about the industry dynamics for these private payment systems would be interesting. Of course, multihoming is perfectly feasible. I can be a member of Amazon and on iTunes and other systems, but only up to some limit. I probably do not want to be the member of 15 or 16 or 20 different private payment systems. A few of them, however, can easily coexist.

With regards to ISPs and payments, Dr. Katz is a little bit too pessimistic there. There are examples where ISPs provide payment systems now. So with Comcast and On Demand, I can buy movies and pay-for-view TV shows and buy other sorts of services. And of course I can buy subscriptions to premium channels like Home Box Office through my ISP/cable provider. It is absolutely true there is no good reason why competitors cannot do this as well, so iTunes can use my ISP and collect payments from me and Netflix and so on. But the network providers do some kind of nascent payment processing system that shows up on your cable bill.

If you look at other countries, it is much more common to see the mobile carriers offering you services, adding them onto your mobile bills—as a value-added service—or processing other third-party payments. It seems strange and you see this mostly in developing countries that have a very primitive infrastructure, but also in very highly advanced countries like Sweden, Japan, Finland, and Korea where you can buy services from third parties that then show up on your mobile phone bill. We do not see much of this happening in America, but we do see some of it.

I want to say a couple words about other approaches or what I would call creative approaches to payments systems. We are going to hear later from Square. I do not want to steal their thunder here, but I will give an endorsement to the system as I think it is a very clever and innovative way to manage payments. One is this little device you can get from Square for free, plug it into your iPhone, and then handle credit card payments. In the Bay Area, if you go to the farmers markets or the art shows, it is very common to see this mechanism being used. So it lowers a barrier to entry to use credit cards. It is quite a nice idea. They also have another system, which is quite ingenious. I do not know if this will take over the world, but it shows there are lots of possibilities for creative approaches here.

What are the key issues for success of a new system? You do not want to have a new device for consumers. That is one of the setup costs. You do not want to have a new device for the merchants. You do not want to have a new communications

network. And you do not want to have a new payment system. Those are all costs; these are all barriers to entry.

What you would like to do if you are trying to get a new system that you add on top of the existing systems, which after all work pretty well, you really have to have very, very low cost for all parties provided. The Pay by Square system is a good example of this. Here is how it works. The idea is you use the phone location system to keep track of your location. Your carrier knows where you are to a block or so, because it has to know that. So, you can find a merchant using this system, if you want. The first time you visit the merchant, you click "open a tab" when you walk in the door and you only have to do that once. Now it has a connection between you and the merchant: you are in the same general area. Once I buy my latte I go to the checkout counter and say, "Just charge it to Hal."

The nice lady at the checkout counter types "Hal" into her laptop computer and up pops a photograph of me. She looks at me; she looks at the picture, and says, "Thanks, Hal. Here is your latte."

That is it. That is the whole system. If you want to do it privately, you can use a PIN, or some made-up name, or something like that. You get the receipt on your phone showing this charge has been made. The only thing you use to verify the transaction is your face. If you want to get fancy about it, say, use biometric identification, but after all we have had a million years of evolution to try to recognize other people. By now we are pretty good at it. If you think about it, what is the difference between having this series of numbers embossed on a card and showing that to a person or showing your face to a person? It is still a way of connecting your financial identity with your personal identity with your agreement to engage in this particular transaction. It is a clever mechanism and there are a lot of other variations on it one could imagine.

Ironically, it brings us back to the Downton Abbey days when everybody maintained a tab with the merchants and was billed every few months. That is just the global village in action.

Finally, I do want to say a word about a part of the payments system that we have not really discussed that much. Who is the biggest wireless data carrier? It is a trick question, because my answer is Wi-Fi. Wi-Fi is a technology, not an organization but, if you look at the data, it carries at least half of all wireless data. And, if you throw in laptops, it is very substantially more than half. Wi-Fi was built on junk spectrum that nobody wanted. Some technologists got together and said, "Let's use this for local area communication."

All of these new innovations—the iPad, the iPhone, tablets, smartphones—they could not exist without Wi-Fi. They could not exist without Wi-Fi since the cellular network couldn't carry all that data.

Right now, there is a battle shaping up in D.C. over these spectrum auctions, where they would like to repurpose some TV spectrum to mobile device use.

But telecommunication carriers and the technology industry are very concerned that there should be some *unlicensed* spectrum available for the same kind of experimentation and innovation we have seen in Wi-Fi. It is an "iffy" thing. Because given the budget situation, people say, "Why should we set aside some piece of this for unlicensed spectrum? Why don't we sell it all off to the highest bidder?"

Our view is you need this wireless spectrum to really encourage the same kind of innovation we have seen in Wi-Fi. It can make a very big deal for all of us in this industry in particular. It is something that is quite important to pay attention to.

General Discussion

Session 1

Mr. Katz: I just want to thank both discussants and to say a couple of things very quickly. I am going to stay away from the last thing Hal said, although I am quite happy to debate him about spectrum policy another time.

Just a couple of things. On Hal's point about controlling the payments system as a source of competitive advantage: From what I understand of the examples he brought up, I would say they are important but they are illustrating a slightly different point, which is this one that if people are doing online commerce, and they are going to log in and identify themselves, such as you do with Amazon, then the fact that Amazon can make it costless to use particular payment mechanisms once you have gotten on Amazon, it seems to me that is a big deal. But it is slightly different than saying Amazon is offering its own payment system. They are offering a particular form of one-stop shopping to people. I certainly agree with the point that that can have a powerful effect on competition.

On the ISPs, I would disagree that Comcast is a counterexample to what I have said. Comcast is charging in their role as proprietary content owner for premium channels, not in their role as provider of broadband services.

Finally, we want to throw it open to questions. On the carrier billing, I agree that in economies outside the United States it is not obvious what the difference is from the U.S. economy. Carrier billing is a big deal. (I think I said this in the paper.) Carrier billing will be a niche in the United States, although it could be a niche worth billions of dollars and that could be a big niche.

I thought about this a little bit as it relates to Japan. Americans' use of credit cards in particular, but also payment cards generally, is off-the-charts compared with most other countries. At least in the case of Japan, it is—at least until very recently and I do not know now—much more of a cash-based society. That is one

of the reasons that mobile carriers play a bigger role there. Plus their mobile carriers are more innovative than ours.

Mr. Drechny: I have a couple of observations and then a question.

First, in Dr. Katz's diagram, I thought that it was really interesting that the connection that was missing, and nobody talked about, was between merchants and social networks. That you discount the fact merchants could use social networks themselves. Seeing as merchants already own all of the data that everybody else wants to get to, you could have that infrastructure built by merchants to consumers, which would be the most efficient way for that system to be built instead of adding people in the middle.

The other observation I will make is when we talked about revolutionary, the revolutionary side already happened and it was around getting rid of offers. There is a small retailer out of Arkansas that did a pretty good job of creating a large infrastructure around getting offers out of the system and making the system more simplistic for customers to be able to complete purchases.

It is quite interesting as we talk about the idea that the system is going to allow for consumers to get more offers, I would argue consumers do not want more offers. Consumers want simplification. We have recently seen a lot of announcements by retailers who have started to realize that customers want simplification—JC Penney, being one of them. Supervalu is about out of the marketplace, talking about how they are going to back down the amount of offers they have in the marketplace as well. I thought those were all interesting insights added.

My question centers around the fact that, How can you have a revolution and have mobile phones used to pay, ***if*** the basis for all that payment is still the current system that is in place today? So when you look at the basis of PayPal, a majority of the way that money is getting into PayPal is based on the networks that already exist today, those that already have a stranglehold on the marketplace and control that pricing in the marketplace. That has not changed.

My question is, How do you change that? Until you change that, there is no revolution. There is just a perpetuation and a change of the face of how it looks.

Mr. Katz: I will provide the uninteresting answer first. I will defend my diagram, but I will agree with you that my description of it was wrong. One interpretation of what you are saying is the "ad deal" network could be the social network, but I think you are right. The merchant could run that as well.

Your point about simplification: I take it that little retailer has been quite successful with its approach. But I also think we will see a bifurcation of it, because there are consumers—I am not one of them—who live for their deals and feeling like they are special. One of the things we will see, though, in evolution of a lot of this is away from—this Groupon model is the wrong one in a lot of ways. But the particular way I mean is this notion that it is almost adversarial. "OK, I am going

to get this really good deal—the merchant's screwed—I am going to take advantage of this deal and then I am off to the next one."

The way we are going to see this stuff used is to try to build up relationships between merchants and their customers. The idea that it really is an ongoing relationship and the deals can build is much more like a rewards program and ***that*** is something a lot of consumers do want.

I will turn it over to Don to give a much more interesting answer about breaking the stranglehold.

Mr. Kingsborough: I think you are right. What you have to do is get other types of currency into the account where you have a lower overall cost of funds. That has to be part of the solution, relative to what retailers are doing. Retailers will be a critical part of this, because I have never been to a retailer who, in the first five minutes, is not talking about how we lower their cost of payments.

This is not simply about offers. This revolution is not about offers. What has occurred in the last 12 years is the consumer has decided they are going to be smart. They want to be a master shopper. Everyone in this room has a friend who gets a hotel room in Hawaii for $200 a night when you are paying $400 a night. Or they have someone they know that gets that $199 airfare and they are paying $500 for the airfare.

It is about information that empowers people to do things and they are not going to make these buying decisions without that information. The information is going to be moved from simply being online to being in-store where, while they are in-store, the "scan and scramming" is going to stop and "scan and buying" is going to start when the consumer gets enough information so they then can save time at that moment in time that they are doing the scan.

So it is not simply about offers. It is about information and the transmission of that information whenever the consumer wants it and wherever they want, whether it is at a price discounter like your chain or it is at another one that is more promotionally oriented. Without information, the consumer is going to find some other place to shop.

Mr. Varian: Let me weigh in on this complexity versus offers debate. They will coexist, because it is quite clear there are people who are shoppers who want the best deal, just as you said. The offers are a way to attract that segment of the population. Then, there are other people—and of course the same people are discussed—who at different times, want to buy it, get the thing done with, and do not want to go through all this offer stuff.

There is an interesting dynamic here. Because when you think about something like coupons, the fact you are willing to take the time to clip the coupon indicates you are a price-sensitive shopper and so you get a better deal, because you signaled to the merchant that you are a price-sensitive shopper. You cannot

make clipping coupons too easy if you want this form of price discrimination to work. If 100 percent of the people clip coupons, then you might as well have the lower price to begin with. The hassle of clipping the coupons is what makes the market segmentation for you work, so a lot of these other offer deals inevitably have to have complexity. If you take the complexity away, then you have removed the whole point of the marketing effort. There is always going to be that dynamic throughout the whole system.

Mr. Tomasofsky: Thank you very much for a great panel. I see a lot of gray hairs in here. Many of us have been around the business for a few years. Every innovation, every new payment product that has come out in the last 30 years—at least from my perspective—has always had to make the trade-off between getting to mass production or whatever segment you want to penetrate, getting the right numbers, and being secure enough, especially in today's world with interconnectedness and social media, we know that the system today is broken when it comes to security authentication. We have built the fraud number into the product, hopefully, and it has not blown up in our faces yet.

The question I have is, To what extent should security-related questions and security and fraud mitigation, etc., be focused on when we talk about new products, new innovation, and all the things many of you showed us today? How does that work into your equation and where do we go from there?

Mr. Varian: I will say a word about that. Sometimes you hear people say, "Well, my system is only designed to deal with small payments, so it is not really much of a security risk."

But, as soon as you get computers into the equation, that defense goes away. There was a very interesting fraud committed on Medicare a few years ago, where people got hold of a doctor's account number. They would file reimbursement claims for some procedure that tried $200, $190, $180, $170 and then find out the point where the claim was not questioned. If it was below $120, it would be approved. Then you file a million reimbursement claims for $120. As soon as you have computers able to take advantage of any threshold you use for security purposes, you can get a lot of money out of small payments. It is always going to be a cat-and-mouse game. There is never going to be a final solution for this fraud problem.

Mr. Kingsborough: What we think is that fraud, as you said, is a part of every one of these systems. The fraudsters are generally ahead of us and you have to constantly catch up. At the beginning of these new payment technologies, you have to let enough fraud in so you can see exactly what is going on, so you can make the changes.

The other thing that is occurring, though, is as you start to see the consumer in a monolithic way, when you see them online, when you see them using a mobile phone, you see them in brick-and-mortar stores, and you use the technology that allows you to know more about them that they have invited you in and opted in to

allow you to know more about them, then it is in the combination of these things, as opposed to having isolated events. It is the combination of these things that you know who the consumer is, what they normally do, and where they are by geo location. It is these things that a secondary and tertiary authentication will start to give you a better handle on reducing fraud. It is only in that combination of letting it in at the beginning, then analyzing it, and bringing other layers of authentication into the mix that you can gain this under control, in our opinion.

Mr. Tomasofsky: That is a good point, but that information you have now collected is a really nice honey pot for a fraudster to go after to help defeat everyone the second and third authentication tertiary stuff.

Mr. Katz: Knowing nothing about this, I will just make something up. (People become rich doing that.)

One of the things, it seems to me, you would think about doing if people are really concerned about it, given the possibilities of the communication, is you could have the payment network contact you in real time every time you were paying for something. There is always the question of how you stop somebody from changing the phone number, but there are things you can do to make it extremely difficult to change the phone number. That is something people would have to do. You could have it set once, then if you want to change it you are going to be sorry. That way, it would alert you every time you were making payments. And, if you were actually making the payment, it would not make any difference to you at all. You might think it is inconvenient if I am in the middle of a conference and you ask why is my phone ringing but some consumers might be willing to put up with that for security reasons. So there are things where you could try to make use of the communications capabilities to also improve it. But I agree with you. This is going to be a big issue and I also predict it will be a big issue generationally. People my age will be much more likely to be scared off from some of this stuff because of security concerns. People my children's age just do not care.

Mr. Varian: I am going to add one more point to that. It is very important to look at the decision of where the liability ends up in the exceptional cases, because it could be with the merchant, with the intermediary, with the consumer. These different liability systems can lead to different patterns for adoption.

Given the system is so competitive at the moment, you are going to see the intermediaries taking on the liability in an effort to get their technology adopted by the other parties. That can potentially be a systemic stability problem, the kind of thing we are talking about here. Where merchants take on excessive liability, there could be a problem.

Mr. Ramamurthi: I know Google has tremendous positive information. What I wanted to ask you is, What have you seen change, because Google literally sees even what I am trying to buy sometimes? Those data are visible to Google in

real time across the world. What have you seen change in the last few years? Have you seen more mobile devices, more people accessing from mobile? If they are, is their search behavior changing to where it is more transactional oriented behavior? What is it you are seeing at Google now from your vantage point?

Mr. Varian: Well, certainly we are seeing a huge increase in mobile queries. One interesting fact is the pattern of mobile queries is not so different than the pattern of desktop queries. Obviously there are more location-aware queries. There are a few more adult queries on mobile devices, I think because they are more personal.

One interesting thing that is not sufficiently appreciated is that many mobile queries—you are supposed to hear the quotation marks on that "mobile"—are made in front of your television. So we call these the "immobile" users, because of their remarkably large number.

You have your cell phone with you when you are sitting in front of the TV because you might get a call. You see an ad on the television for a new car or a movie or something like that. Then people will follow up by just doing a query on their mobile device and getting a little more information on that particular product or that particular ad.

We've done a number of postings about the kind of queries people do during the Oscars and during the Super Bowl and during similar events. It is interesting to look at, because it is quite a significant part of the query stream. So the immobile users are a pretty big deal.

Ms. Benson: Michael, I have a question for you. We spent a lot of time thinking about how technology might enable changes in consumer payment behavior. You talked about ubiquity and I agree that is important. In today's world, that pretty much means you want a card that is going to work in a lot of places. But today also I have a Starbucks app on my phone, which is automatically topped off from my bank account. Tomorrow I could have a Wal-Mart app on my phone, an IKEA app on my phone. And I could get ubiquity just because it is all on my phone, not because it is all the same card that is good in each one of those payment relationships; it might be unique to the merchant. Do you see this as a technology that could be changing consumer behavior?

Mr. Katz: Some people would disagree with the dichotomy I drew between the evolutionaries and revolutionaries. Whether or not we count the Starbucks card as being about a payment instrument versus whether you should count separately the fact there is a rewards program. It is useful to think about them separately, even though obviously consumers want to see them together.

I agree. There is clearly the possibility that you will see all these merchant-customized programs, although it is not clear to me in that sense whether you should see that as the merchant actually delivering it. For example, you could easily imagine an intermediary…I was partially joking around with somebody last

night that you could imagine bringing back store cards, but in the following way: It could be run by a bank using Visa infrastructure and it is actually one bank. The way it works is it is based on your phone and when you go into a Macy's, your Visa card shows up as a Macy's card. And it may have particular terms, either credit terms or store terms or whatever associated with it. If you were to go into Penney's, it would show up as a Penney's card, even though underlying it is the same card and same account.

There are a lot of different possibilities for how you could do this, either one card looking like many or it could be many cards all on one device. With that last one, though, it then becomes a question of at some point consumers are going to want things to narrow down to one-stop shopping, say, for the payments. So you have all these different things, but ultimately they all charge to the same credit card, I could see that happening. I do not see the notion of people having to pay 20 bills. Not that it is that hard if you do it electronically, but it does get harder to monitor them. What I guess I am saying is, technology opens up a lot of possibilities where we are going to see a lot of different things tried.

Mr. Kingsborough: We actually did some research on this specific subject. Our take was there could be a few retailers who could pull it off, but the consumer is not going to have 40 different apps in their phone to pay 40 different ways. It has to do with trust. They like retailers. There are a few they will trust, but there are many they will not trust. It is the level of trust that will determine who could do this and who could not do this. At the end of the day, consumers generally voted—I will give you the ranking—but when they ranked how they did it, retailers did not rank in the top four or five, even though they were well-thought-of retailers.

Mr. Anderson: Michael, I am slightly skeptical of the idea that you could have a multifunction store loyalty card. And the reason for this is that over the past 20 years, smartcard vendors in Europe tried that again and again and again and there were few takers. We struggled with various things, like cards that would work for electricity as well as banking.

The killer was very often marketing stuff, like whose logo goes on the front and who controls the address list. It was not whether you could get enough RAM in the card or figure out the application IDs so we would not interfere with each other. There is a real commercial reason why we have 40 different cards in our wallet and it is about branding and loyalty and stuff like that. It is not altogether clear how technology makes that go away.

Mr. Katz: At least on the branding, it ***can*** make it go away. That was what I was mentioning. If you think instead of a smartcard you are using a phone with a screen, I am saying you have a locational device. When you walk into Macy's, it would show up the branding and would be Macy's on the screen. And, when you are at a Starbucks the branding would be Starbucks, even if it is the same underlying, overall account.

There are some things the technology could solve. I agree with you, though, issues like who is going to control the information could be huge. But even that, you could have infrastructure service that divided that up and it would say: "You can sign up to be in our virtual store card program and you retain ownership for the information."

Obviously, they would rather NOT do that; they would rather centralize the information. The current technologies give you a lot more flexibility to try to make an end run around some of those issues.

Mr. Williams: I like your approach, Michael, to go right back to basics to try to take a very high-level view. At the end of the day, when we are trying to make payments, we are trying to pay a person or a merchant. We are trying to transfer some sort of value. Hal made a very good point about wallets currently containing mostly things which are around identity or payment mechanisms. I would contend most credit cards are, in fact, alternative methods of authentication. We certainly use them as such when we are checking in at electronic kiosks for airlines. A couple of us are taking an approach looking at identity, like NIST (National Institute of Standards and Technology) in the United States or Identity Assurance in the U.K., to try to link identity back to attributes on our individuals. That is one of the key things. In the U.K., we have recently launched something called Pingit at Barclays Bank, which has the ability to empower a mobile phone number but using an ACH transfer. It seems to be very successful so far.

My question is, Is identity the key thing behind this for all of these transactions we have talked about, what you can say about the consumer, what you can say about the merchant, how you can set the trust between those two for prevention of fraud? So is identity key? How do we keep anonymous transactions, which we are currently doing using cash, in that environment?

Mr. Katz: I will say this about anonymous transactions. We will all agree that identity and being able to authenticate yourself is critical to all of these. It is certainly the case, even if you do not go as far as anonymous payments, there are going to be a lot of issues about how much control over your information you have and how widely it is used. So that would be one of the extremes.

It seems to me a big issue with anonymity is going to be whether you believe the people are not actually tracking this stuff. I understand there are various ways you can do digital cash and it could be anonymous. There would be a question whether people believe it actually is anonymous. I defer to the experts on this.

Mr. Varian: I guess the question is anonymous to whom? You could be anonymous with a merchant. You could be anonymous to the payments system. There are lots of different levels there that the system I described—the Square system—I said you could come in and say, "Charge it to Hal" or you could say, "Charge it to XYZ192" and use a code. Then you are anonymous in that respect. Well, I do not know. Obviously there is a demand for anonymous payments from

some segments of the economy.

The question is, Are those segments of the economy that we really want to support? You always see this debate where on the one hand anonymity might be considered a right and on the other hand it is also a possibility for abuse. So we are going to see this fought out for the near-term future.

Mr. Katz: Let me just say one thing on that, because there is always this thing about we need to make sure we have a currency for drug dealers. It is a lot more than that. You think about this thing currently going on with Facebook and employers saying they want access to employees' Facebook accounts and their passwords. It does start raising issues. There is a lot of stuff you would not want employers seeing. For example, some pharmaceuticals, people would rather remain anonymous when paying. Now a lot of people want anonymous and then they pay with credit cards and do not realize it is not anonymous. It does seem to me these questions of privacy do cut across things beyond illicit transactions.

Mr. Varian: If my insurer really knew how much butter I consume, he would be very unhappy.

Mr. Wallgren: My question is, How can I show off my black card panache and my status in the future of mobile?

Mr. Katz: Actually you will have to return to history. The first touch screen mobile phone, at least that I know of, was a Prada phone. You are just going to have more garish cases, although that is going to lead to some interesting intellectual property issues, because then people will start making wraps to put around the phones to make them look like the expensive ones. So, I think the answer is you need to hire a good IT lawyer and a fashion designer. I don't know if Don and Hal have thought about high-status accounts?

Mr. Varian: Call it PayPrince, rather than PayPal.

Mr. Kingsborough: I think we will leave it there.

Mr. Katz: One thing on this: You will not be able to show it to other people, but certainly, there are a lot of possibilities for creating tiers of service and having people who get the super high level of things. In that sense, it opens up way more possibilities for creating differential cards. You can automate it all. It is easier to have multiple levels of service. You are losing this thing about other people not saying they will be able see that. Certainly in terms of communications with the consumer and saying, "you get a package of service that nobody else gets," there are way more possibilities for that.

Mr. Kingsborough: You can put anything in the digital wallet and you can display it if you so choose to. All the things consumers want—which is loyalty, loyalty points, rewards, those kinds of things that are associated with the things that go

into the digital wallet—will still be there. You do not lose the less obvious things that are important when you move to a digital world. You do not lose it at all.

Mr. Hansen: Dr. Katz, you mentioned earlier regulation, regulation, regulation. As a lawyer who practices in this area, I would agree there are many regulations as you converge different industries—between the telecom industry with the banking industry, for instance, or interactive entertainment. But I would ask this panel, What is new that needs to be regulated? Right, I admit it is more complex. But to me the question is, Where is the gap?

Mr. Katz: I do not know enough about the details of regulation to know if there is a specific gap. My concern would be that you will see multiple regulations potentially covering the same transaction. What is going to be the need to figure out which regime is the one that governs it? That is the thing that concerns me the most. There could also be things that are new in the sense that communications networks might want to start using customer information in ways they had not before. Then there would be a question if a regulation needs to adapt to it. My guess is the problem is more so that things are covered that are not covered in the right way ***rather than*** there are things that are not uncovered.

Mr. Varian: I guess I was going to say the question is somewhat hypothetical, because we do not really know how the industry is going to shake out. But given the very strong network effects and the strong complementarities, it is ***possible*** some player would gain a position which gave them monopoly power and then there would certainly be cries from everybody else in the system that there should be regulation on the behavior of that player. I do not think that has really occurred yet. Of course, there was the American Express suit and the investigation of Visa-MasterCard about the payment mechanism. That is the kind of thing people are concerned about. There could be a player who locks in a privileged position and that is going to bring calls for regulation.

Mr. Kingsborough: At the beginning of any revolution, there has to be a period of time to let these things grow and to foster these things first. Then start to look at regulation after you start to see clearly the direction in which these new payment types, these new marketplaces are going. We always think you should hold off on regulation for awhile and then only use regulation when something is abused.

Ms. Walker: I will take the last question here. One of the questions I had was, You are all very well-connected in the space we are talking about today. It seems there is an opportunity for new incumbents, new participants in this particular activity. I am curious if any of you have seen any startup or entrepreneurial ideas you find have promise to help us move in this direction and play a growing role in that area. Michael.

Mr. Katz: I am sure PayPal and Google will. I will defer to the industry.

Mr. Varian: I have already mentioned Square. There are people who are

working on currencies in social networks and trying to do aggregation of virtual currencies—that kind of thing. There is an amount of interest there.

Mr. Kingsborough: I gave a speech the other day and I said, "This is the first time financial services were really sexy."

I think that there are a lot of startup companies that look at the world totally differently than probably most of us in this room. They are not obligated to follow the rules. So we see companies all the time that take small niches and start to innovate on those niches. There is a tremendous amount of innovation going on. Both new companies and you will see some companies of size—like Google or like PayPal—that actually are innovating. The industry will see lots in the coming 24 months.

Ms. Walker: Thank you all for your attention. This wraps up our panel this morning. Please join me in a round of applause for Michael and our discussants.

Market Obstacles to Consumer Payment Innovation and Public Policy Responses

Moderator: Chris Bierbaum

Mr. Bierbaum: It is a pleasure to be here this morning to moderate such a distinguished panel. This session is "Market Obstacles to Consumer Payment Innovation and Public Policy Responses." That is a mouthful. The panel will discuss whether emerging payment methods, whether those are extensions to existing products or new entrants, like mobile, face market obstacles from scale, profitability, or even the regulatory environment.

This panel will talk about the balance between adoption of emerging products and the regulatory environment and how they have to counterbalance each other. Some say there should be pretty light regulatory and public policies. And others say there should be more heavy-handed regulatory public policies. There will likely be debate as to whether regulatory policy does more harm than good.

A couple of examples: A few years ago AT&T, T-Mobile, and Verizon created a joint venture—Isis—and their initial charter was to create a new payment network that would literally compete with Visa, MasterCard, Amex, and Discover. The venture quickly found out through the obstacles it encountered, it would not be able to compete with those incumbents. It since has taken a path of partnership with those associations in partnership with banks as well.

Meanwhile, Google has come out with Google Wallet, which Sprint supports. They, as well, have an open approach that any consumer that wants to load their Visa, MasterCard, Amex, Discover, or other cards, can do so. The other side of both of these coins as it relates to the consumer, and what we heard about from the previous panel, was you could use the Google Wallet that is opened with any card or the Isis wallet that is opened with any card, so long as you can only use those wallets. You would not be able to use other wallets or applications with other cards that have access to specifically near field communication (NFC), in this case.

So it is a matter of—Will the consumers prevail? What do the regulatory environments think of this and how will they interact?—which comes down to one of the key questions—What obstacles do private markets pose for payment innovation in a connected age? What can public authorities do to overcome these obstacles?

Our distinguished panel is comprised of Nicholas Economides, David Evans, Alan Frankel and Bob Lee. We will begin with Mr. Economides.

Mr. Economides: I am very glad to be here. But first, let me offer two disclaimers. First, I am not a consultant in any related suit of which you might have heard. Second, I am not responsible for Greece. I have advised them and so on, but it is up to the politicians to take the advice seriously.

I have created the NET Institute, which is involved in network issues, such as payments issues. We support relatively young researchers, typically assistant professors, in work that has to do with different network industries, including some new ones like search and advertising, but also on operating systems and applications, as well as on payments systems.

What are the issues we are dealing with in this session? I will begin with very introductory stuff. Bank cards facilitate transactions. The market is dominated by two large networks—Visa and MasterCard. The U.S. market share numbers are approximately Visa, 42 percent; MasterCard, 29 percent; American Express, 24 percent; Discover, 5 percent. Visa and MasterCard, as you know, are organized in a very particular way, where American Express and Discover are in a sense standalone.

There are significant fees collected from merchants. The networks are facilitating the transactions. There is some evidence that these fees are significantly above costs and that these costs are relatively small, compared with the revenue. There are some numbers—not from me but I have read numbers—of $30 billion to $48 billion per year in fees in the United States.

That means there is a significant markup of price above cost. Although the consumers, the users, do get additional benefits from the networks—like they get miles, sometimes gas and so on—it is unlikely that the value of these benefits approaches the fee levels that are charged to the merchants. So the networks are actually doing very well. They have high profit rates, comparable with profit rates of Microsoft and Intel, even though Microsoft and Intel have a monopoly position in the PC market, while MasterCard and Visa do not in payment systems. At first glance, it looks like these networks have significant market power.

Now let me talk about an issue that is more specific to this session. Figure 1 is a diagram of the traditional way that card payments are made. The consumer is on one side, the merchant on the other side. You have a network (let's call it the Visa network, although it could be another network). The consumer has a card, the merchant has a card reader, there is the physical connection of swiping the card, and that is how the transaction gets done.

Figure 1

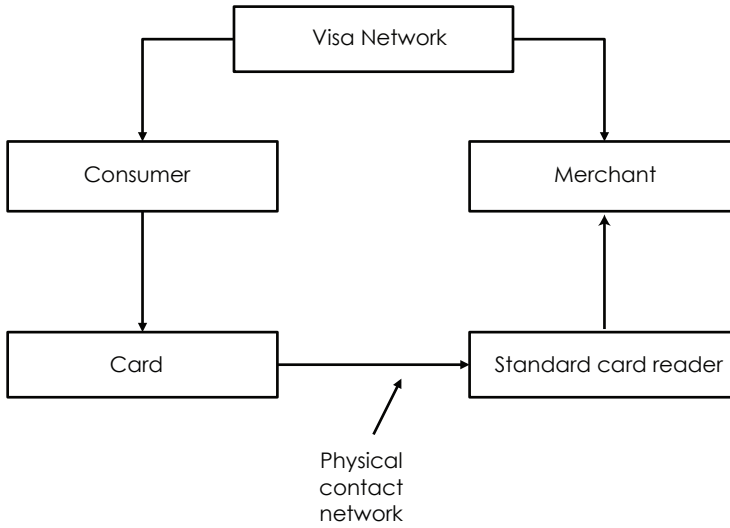
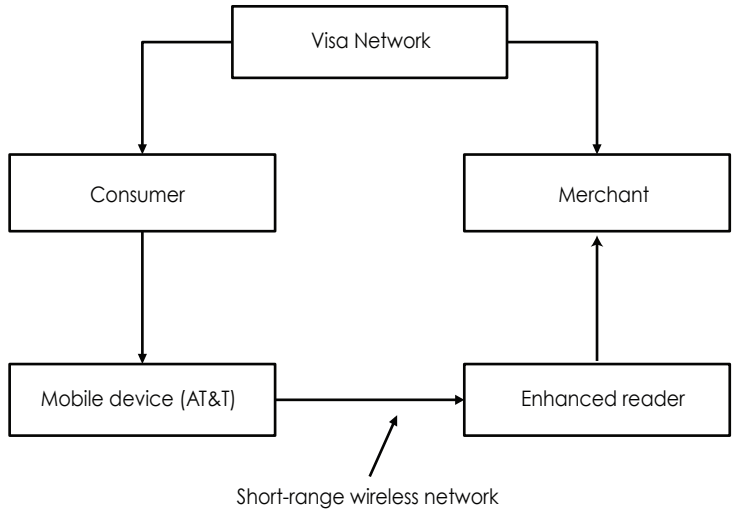


Figure 2 depicts a proposed alternative in which, instead of having the card, there will be some mobile device—for example, AT&T's mobile phone (but it could be any other company's mobile phone). On the merchant's side, instead of the standard card reader there is something else (I call it an enhanced reader), which makes near-range or short-range communication possible. But you still have the connection between the consumer's mobile device and the merchant's enhanced reader being on the same Visa network. It is just that the last part—the horizontal connection on the diagram—is going to be different.

The interesting thing here is that there is a possibility of an innovator, the firm that is going to provide the horizontal connection, getting into this process to establish a relationship with the consumer and the merchant. It allows for a multitude of marketing possibilities, as other speakers have already said, because now this intervener, this new company that is going to provide this link, will know some specific attributes of the transaction—not only the amount of the transaction but also the location of the consumer (Is he in the mall? Is he in this particular store? Or where exactly are these things are happening?), and it will create possibilities for new types of marketing.

In terms of how this might be done, I can think rather quickly of three possibilities. One is that it is done by the existing networks, like Visa and MasterCard. They come in, they say, "We used to give you this way to swipe, but now we are going to give you a new way. We are going to set up applications in the mobile phones that will be able to do the near-range communication to a card reader for

Figure 2



you and we are going to provide the merchants with the appropriate technology, enhanced reader."

A second possibility is it will be provided by the mobile carriers, like the joint venture Isis that was mentioned earlier. A third possibility is it will be provided by a third party—"third party" meaning not the networks, not mobile carriers, but somebody who creates an application such as Google Wallet, PayPal, Square, and so on.

How is this going to be done? That might not be crucial, but it might make a difference. It could be done through the proprietary network of the wireless carrier, since wireless carriers have their own frequencies used to communicate with cells and so on. Or it could be done through some of the public spectrum available through smartphones, for example, using Bluetooth or Wi-Fi.

What about the incentives now—the incentives for entry and innovation? For the networks themselves, the incentives are relatively low to get into this business. Why? It's because they already own the present setup. So they are always, to some extent, on the defensive, making sure they do not lose anything through this technological change. The incentives for mobile carriers and third parties are high, because they are not part of this business. They want to get in and they want to make money through that.

Different systems will come into existence. Are they going to become compatible with each other or incompatible with each other? What do we mean by compatible and incompatible? For example, Microsoft's operating system is incompatible with Apple's operating system on PCs. You cannot immediately run

applications written for one operating system in the other operating system. So, when a new system is set up in near range payments facilitation, there is a possibility that this new system will have compatibility with all providers and it is also possible there will be incompatibility—that is, there is going to be System 1 incompatible with System 2, which is incompatible with System 3, and so on. Under incompatibility, we know from economic theory, that there are very significant inequalities in prices, market shares, and profits. The market is what I would call "a winner takes most market." You can see when we have incompatibility, for example, in the operating systems for PCs, that incompatibility is very, very significant. Apple has a 5 percent market share there, while Microsoft has a market share of over 90 percent.

In this setup, with incompatibility and strong network effects, we have limited competition among the firms in the market, winner takes most, big market share for the biggest guy, three times smaller for the second guy, three times smaller for the third guy, and so on. Competition is essentially not in the market, among the market participants, but for the market. "For the market" means to be able to be the top guy, who is going to get a big market share. There is a very big incentive for a company to grab a large market share and impose incompatibility.

The setups are most likely going to be proprietary and we should take into consideration two things: First, the networks have significant concentration, but the mobile carriers also have significant concentration. And the network neutrality rules that were passed in 2010 essentially do not apply to the mobile market, so the carriers would be able to do a lot of things that they cannot do in the fixed lines telecommunications market. Now the networks and the mobile carriers most likely will have proprietary setups. The third parties are likely to have an open setup.

Let me show you how these things vary. Table 1 illustrates three provider options on the left side—networks, mobile carriers, third party—and across the top four columns illustrate the provider's incentive to get into the market; second, the incentive to chose compatibility; third, the consumer benefit; and fourth, antitrust and public policy concerns. Going down, the incentive for a company to enter into the market, as I said before, for the networks is relatively low, because of a defensive incentive; for the other two categories—the mobile carriers and the third party, it is high. The incentive for the innovator to choose compatibility again is low for the networks and the mobile carriers, but it is high for the third party. The consumer benefits are higher and higher as we go from top to bottom, so they are relatively low for the networks, medium for the mobile carriers, and high for the third parties.

What about the antitrust concerns or public policy concerns? If entry is done as a vertical extension of the networks, which as we said before have significant market power, there could be very significant antitrust concerns, but they are vertical concerns. For the mobile carriers, there are significant antitrust concerns, but again they are vertical. For the third parties, there are insignificant antitrust concerns.

Table 1
Short-range Wireless Transactions Facilitation by Mobile Smartphones

Provided by	Incentive by company to enter the market	Incentive by innovator for compatibility	Likely consumer and merchant benefit	Antitrust and public policy concerns
Networks (Visa, MasterCard, etc.)	Incentive by company to enter the market	Low	Low	Incentive by innovator for compatibility
Mobile carriers (AT&T, Verizon, etc.)	High, new entrant	Low	Medium	Significant vertical extension concerns
A third party application provider	High, new entrant	High	High	None

Should the antitrust authorities intervene? This is a setup in which obviously full compatibility is the optimal solution. Still, it is very unlikely the antitrust authorities are going to intervene for two reasons: First, the antitrust authorities typically do not intervene in new markets, except under exceptional circumstances; second, this is a vertical issue, and to a large extent the U.S. government these days does not intervene much in vertical issues—not never, but not so much.

But, in the European Union, it is much more likely that the competition authorities will intervene. Why? First of all, in the EU, they are more aggressive, as they have shown, in vertical issues. Second, they did not mind imposing stricter interoperability and compatibility conditions on Microsoft between its software clients and servers a couple of years ago.

What about other public policy concerns? Should we be concerned about imposing some kind of regulation in this industry besides antitrust? Then the question to ask is, first, is this industry essential? Is it as important as telecommunications and electricity, in which we can make a case for public policy intervention? Second, is this the right time to do it? Do not forget that many times compatibility and interconnection and interoperability have been imposed, for example, in telecommunications, many years after the industry started. So there is an industry maturity issue as well.

To summarize: The crucial thing is the customer relationship and customer information in real time that a new firm in this space might be able to acquire. This

is a very valuable piece of information. It is valuable not just to the card networks and to mobile networks and third-party entrants, but it is also valuable to people we did not really discuss much before, like the search, advertising, and social network firms—people like Google, Microsoft, Facebook, and even Apple.

What I see in this setup is that it is a pretty open battlefield, there is the big prize in the middle, and there are a lot of heavyweight participants. Therefore, I would not venture to say who is going to win. This is a hard battle. This is an open battle. People come with different capabilities from different sides. And I am not sure who is going to win. Thank you very much.

Mr. Evans: I am going to take things from a slightly different point of view. I am going to make just three points.

First, we are going through—you have heard a lot of this today—one of the most intense periods of innovation that we have seen in the payments industry for a very, very long time and perhaps forever.

My second point is a lot of the things people call "innovation" would not actually make consumers and merchants better off and often they do not solve a real problem. They cannot, and really should not, get traction in the marketplace in that sense. They aren't really innovations, even though they are called that.

And the third point, which goes to what the government should do, is that this industry is very complicated, and decentralized markets are actually pretty efficient at discovering the optimal path of innovation in the payments industry. The government really does not have a very good track record when it comes to payments innovation.

Let me take the first point. We really are in a period of creative destruction, which we see in a whole variety of different ways. We have a lot of new technologies and business models that are being introduced. For example, LevelUp, a mobile payments system. It is tying payments to sophisticated loyalty programs. A lot of the innovation we are seeing is blurring the lines between online and offline commerce—PayPal, for example. You have heard something about that this morning.

Much of the innovation we are seeing is coming from major players that are outside of the traditional payments industry—such as from Google, Facebook, Intuit, and Groupon. Venture capital is pouring into payments. Every day, millions and millions of dollars are going into new payments companies, who are potentially rivals to some of the existing players.

The big guys—Visa, MasterCard, American Express—are all acquiring some of these innovative players. Visa, for example, in the midpart of last year, bought Fundamo, which is a mobile payments platform for lesser developed countries. Just about everyone in the payments industry and in related ecosystems are focused on innovation. If you do not think Visa and MasterCard and the banks are thinking about, worrying about, or doing innovation, you are wrong. They are. They may

not be doing it as well as you would like, but they are actively doing it. Take a look at American Express. We have Dan Schulman, who runs basically the innovation operation at American Express.

Finally, all the traditional players in this business are very, very worried. You can see that by just listening to the nervous chatter over PayPal. So Visa, MasterCard, and everyone is taking potshots at PayPal and some of the things they are doing. A lot of that is really a reflection of nervousness of the existing players.

And they ought to be nervous, because a lot of the innovation that we are seeing in this business has the prospect of commoditizing the networks and the issuers. This is the point: if you are using a mobile wallet or using your phone for payment, basically you are not really seeing, not really connected to the network or to the card issuer very much at all.

There are several reasons for why creative destruction is happening now and I disagree a little bit with Michael. There is the spread of mobile devices—and, yes, I am a diehard iPhone user—there are 100 million smartphones in the United States as of January. While I have not done the actual calculation, my guess, based on the demographics of the people who have iPhones and Android devices, is they account for the majority of the spending in the country. These are very high-spending people under the age of 45 that have these devices. So that is a very important development.

The second thing is the development of sophisticated software platforms on mobile phones and in the cloud that empower entrepreneurs all around the world to engage in payments innovation. Think iPhone, think PayPal X, which is a tremendous platform that is driving innovation in the payments industry now. And think about another player that you maybe have not heard of, IP Commerce, which is also a software platform for payments. Many of these new schemes, like Square and LevelUp, are using data in very creative ways to provide value to both merchants and to consumers.

So there is lots going on in this business today. Just because someone says there is an innovation—and this turns to my second point—does not mean it can or should succeed in the marketplace. As a result, we need to be very careful about this word, "market obstacle," which is the subject of this panel.

To begin with, there are some serious obstacles to market adoption. The most important one is that payments currently work really, really, really well. You swipe your card or you click online, it all happens in a second. Merchants get paid. Everyone knows what to do. A lot of the mobile phone solutions we have seen that have not done very well have failed because they are just too complicated.

I remember an entrepreneur a couple years ago, when he pulled out his phone and tried to give me a demo on how it works. Lots of clicks and movement. Five minutes later you are able to do the transaction. I am exaggerating a little bit, but the problem with a lot of these solutions is, frankly, they are not very good.

The next most important problem is the chicken-and-egg problem. A lot of the innovations we are seeing can only succeed if you get merchants and consumers to agree they are good ideas or there is some kind of a side payment to get both sides onboard. That is a really hard business problem. But it is especially hard if the innovation does not make merchants and consumers better off. So Revolution Money, Pay By Touch, a whole bunch of other ones like that failed because of this.

Then there is the massive amount of sunk cost that is already tied up in the payments industry, from the rails to the processing, software platforms for FDC and TSYS and so forth and all the learning that the clerks and consumer have done. And that leads to massive inertia in the business.

Entrepreneurs may encounter lots of market obstacles. But market obstacles are not the same as a market failure. A lot of the ideas are not going to gain traction, because at the end of the day they do not really generate incremental benefits that exceed the incremental costs. That has really been the problem with the adoption of NFC.

Waving contactless cards at the point of sale seemed liked a great idea to executives at MasterCard and Visa, but as it turns out it, it did not work out that way. Maybe it will in the future, but at least at the moment all the effort that has gone into contactless over the last five or seven years seems like it was at least too much too soon.

When it comes to payments innovation, I guess my view in terms of what the government should be doing, is the short answer is they should probably stay out of the way. Which is not to say "never," but by and large I am not particularly a fan of the government getting intimately involved in this business.

First, we can talk more about Nick's presentation in the comment period, but there is really no evidence there are market failures in the adoption of payments innovation at this point in time. A market failure would be a situation where innovation that really does increase social value does not get adopted in the marketplace. Maybe someone could provide some evidence of such a market failure but I do not believe anyone has.

Second, there is no reason to believe the government could identify market failures with any great degree of accuracy. Even people who are deeply knowledgeable about payments are not very good at predicting what consumers and merchants really want. That, I think, is one of the lessons from the mass hysteria over NFC.

Third and finally, governments do not have a particularly good record when it comes to payments innovation. I know this is probably a controversial statement here at the Kansas City Fed. Let me give the government credit. Three millenniums ago, a government actually invented the first metal coin and that was really

great. But there has not been a lot of innovation since then.

I do not know what your feeling is about the plastic money that was just introduced in Canada. But by and large, there has not been a lot of innovation coming out of governments—and even coins. After the Lydians introduced the coins, what did they do with it? The next thing the governments did—remember, payments is always a bundle of payments and something else. So what are coins? Coins soon became a bundle of a payment instrument and a way to impose taxes on the economy by depreciating the value of the currency.

Then, of course, there is the huge bet the Federal Reserve System in the United States put on paper checks. I know we heard a lot of great things about paper checks this morning. I take the point the Federal Reserve is very proud of their record with paper checks, but there is at least an argument the Federal Reserve System went quite a bit overboard in the 20th century supporting a relatively inefficient payments system in the United States. So I do not think the government has a particularly good track record when it comes to innovation.

Yes, there are market obstacles to the adoption of innovation, but there are not market failures, at least that I can see. It is implausible and certainly unproven that regulators could make the right calls, on average. If I have a few minutes during the discussion, there are some additional comments that I would like to make on the presentation that Nick gave. Thank you very much.

Mr. Frankel: Poor checks, always getting a bad rap. The thing about paper checks is that they were turned into an electronic version called debit cards, which was a superior, lower cost product, yet it cost eventually orders of magnitude more to merchants to accept debit cards than checks. So, there is something wrong in the market; I would disagree with David about the lack of market failures.

I have spent a lot of time over the past decade analyzing and debating with David and others how the current generation of retail payment technologies has, at least in my view, been characterized by inefficiency and market power that have denied the public of some of the benefits which would have been generated had card payment systems operated in a more competitive marketplace.

There are some lessons we can learn. As David just explained, successful entry by new payment systems is hard. It would be hard in any case due to our familiar chicken-and-egg, but it was made even harder by the conduct of incumbents that, among other things, made it difficult for entrants to gain a foothold.

Unlike banks and card networks, merchants historically have been poorly organized. Even the largest merchants together account for only a small fraction of U.S. retail sales. The top 10 banks, on the other hand, account for around 90 percent of credit card volume. Merchants tend to take all of the major cards, while network rules have created a marketplace in which merchants have been unable to shift volume from a high-cost card or network to a lower-cost card, once both are accepted. The result is a set of competitive bottlenecks, each of which has been able

to exercise substantial and long-lived market power.

So, while there is a lot of excitement about innovation, it is prudent to evaluate how the market is designed now, and when considering new entrants and technologies, to consider whether innovation is designed to result in a new set of bottleneck monopolists or truly unleash a more competitive environment in which providers that reduce costs and prices actually gain market share.

In the existing card payment systems, the race has been over which of the networks can exercise the most market power—on behalf of itself or its bank clients. Fee revenues have been pursued not to achieve efficiencies but in spite of resulting inefficiency. The clearest example is, again, debit cards. Issuing banks went to great lengths to encourage customers to use signature authorization rather than PIN authorization, because they made more money and higher fees on signature, and despite the fact that it was a more expensive, less safe network.

One of the lures of payment markets for providers—when merchants do not or cannot effectively influence payment choice, or choose network routing when they are paying the fees—is that providers can in effect not only tax transactions that use their own systems, but also tax other transactions and essentially all retail sales. Unlike debit cards, network rules have meant that a credit card can access only a single network to post a transaction to the customer's account. For any customer, there is in effect only a single pipe connecting the merchant to the customer's account. There may be front ends that compete over convenient access to the credit card network. But networks, banks, and maybe some others have acted on an incentive for there to be only single account or network accessible easily by a particular phone or digital wallet app or device.

But it would be interesting if consumers could instead opt into a system in which multiple cards or accounts can be detected by merchants due to a different kind of interface at the point of sale, so that merchants could see what kinds of payment options the consumer has and tailor payment offers. We heard about tailored marketing offers, what about tailored payment offerings? To save 200 or 300 basis points, maybe a merchant would give you something right there at the point of sale. In my view, an interface should be designed so at least the merchant can have the option to display payment options alongside perks, discounts, surcharges, rebates, and whatever else it wants to offer.

MasterCard's rule stated, and in some places still states, that a merchant could not "discourage the use of a MasterCard card in favor of a competing brand." American Express prohibits a merchant that accepts Amex cards from "trying to persuade or prompt their customer to use any other charge, credit, debit, stored-value, or other account access device instead of American Express cards." Such restraints eliminate potential strategies that could be used by merchants and payment innovators to give a boost to new, more efficient, or lower cost payments. An example would be a merchant wants to give an incentive at the point of sale to use a new PayPal credit card that is funded through the ACH rails. Under the Amex

rule, it would not be allowed to do it, as I understand it.

In fact, both merchants and the Department of Justice (DOJ) have sought to eliminate some of these restraints through litigation. Statutory and regulatory changes have also been brought to bear to unleash some previously prohibited competitive forces in retail markets. But merchants continue to litigate over other card network restraints. And, while DOJ obtained some relief from Visa and MasterCard, it has not reached a settlement with American Express. The nature of the competitive playing field will shape the types of outcomes that flow from the competitive process with both existing and new providers of payments services.

I sometimes hear questions, predictions, or both about who is going to be the next Visa, MasterCard, or Amex. Will it be Verizon, AT&T, and Sprint? Will it be Square and PayPal? Will it be Chase and Citi, or Google and… Google? Or will Visa, MasterCard, and Amex continue to be Visa, MasterCard, and Amex and continue to collect their sales taxes into the future, despite the possible proliferation of new technologies? I would like to think with a well-operating, competitive, innovative marketplace, the answer could be "nobody." It does not have to be a new bottleneck monopolist. To go to Nick's point, you do not have to have that kind of incompatibility that gives somebody long-lived market power.

The goal of the competitive process in payments should not be to replace one set of monopolistic networks with a new set or, even worse, multiple successive layers of uncompetitive bottleneck monopolies sitting on top of one another. Public policy should be alert in a way it was not in the last generation to ensure there is at least the possibility of multiple, competing pipes over which to route transactions with the parties paying the fees having the choices, and that any technologies, standards, or rules permit innovations that facilitate competition at the point of sale.

As Michael Katz pointed out in Australia, merchants have commercial relationships with their customers, permitting them the possibility of internalizing each other's costs and benefits. In fact, merchants' interests typically are aligned with those of their customers. Merchants should be free to be innovative to encourage or discourage the use of any existing or new payments as part of the competitive process and use to price and other economic signals to their customers with respect to payments in the same way they can steer, promote, or charge different prices for Coke or Pepsi.

But merchants are fragmented. And one role of public authorities, then, is to ensure merchants, not just technology providers, have a free field to innovate with respect to payments.

Mr. Lee: Good morning. Unlike my esteemed fellow panelists, I am not an economist. But I did stay in a Holiday Inn Express last night.

Seriously though, while I may not be an economist, I am a hands-on technical leader with a wide and deep breadth of engineering knowledge. At Square, I worked on everything from our mobile clients to our highly available payment

processing system, all the way down to the embedded firmware that runs in our reader. So I have a lot of versatility.

Suffice it to say, that as an engineer, I am comfortable talking about the latest programming language or data structure more than I am about matters of public policy. I think I stand to learn more from you all today than you do from me. So thank you for having me.

I understand this session is about market obstacles to payments innovation but, as evidenced by Square's rapid growth—we are currently accepted by more than a million merchants and processing greater than $4 billion annually—we have yet to encounter what I would call insurmountable market obstacles.

From my perspective, Square's ability to deliver innovation has been limited far more by resource constraints than by the market itself. In other words, I could use an unlimited supply of H1B visas; but when it comes to the payments market, I am pretty happy with the status quo.

I cannot offer a lot in the way of policy recommendations beyond "Please do not change anything," which was echoed by a lot of the other panelists here. I can tell you how Square has innovated so far and how the market conditions allowed for, or enabled, that innovation.

Hal already introduced you to our products. Thank you, Hal, very much. That was very kind. I will just take this moment to add a little more color.

The first thing you should know is, while Square's products are recognized for their simplicity, our applications are just the tip of a very sophisticated iceberg. Our success stems largely from our ability to take on this entire payment experience end to end, payer to merchant and build an integrated platform that shields the users—both the payers and the merchants—from these inherent complexities.

Square was founded three years ago by two guys, Jack Dorsey and Jim McKelvey, both of whom are St. Louis natives like myself. They came up with the idea for Square when Jim, a glass blower, lost an important sale because he could not accept a customer's credit card.

Jack and Jim started off with the seemingly simple goal of accepting card payments on iPhones and Androids. Their first step was to try to sign up for a traditional merchant account. The existing merchant onboarding process was far from the simple, fast user experience we wanted to deliver. They quickly realized getting there would require far more than a simple smartphone app, so they expanded Square's scope accordingly.

Before Square, I am sure plenty of you are familiar with the current state of merchant accounts. If a merchant wanted to accept card payments, they would have to sign up for a merchant account. This takes several weeks and requires

a credit check. If the merchant is approved to accept cards, many are not, they have to pay for hardware, sign-up fees, interchange fees, assessment fees, processor markup fees, monthly fees, cancellation fees, settlement fees, and—worst of all, in my opinion—variable rates based on the card types.

For example, some Visa cards cost merchants more than American Express, but the merchants do not really know this. And, from what I have seen, and there have obviously been several articles about this, the processors go out of their way to hide the true costs of accepting certain types of cards, because they do not want the merchants to favor one type of card over another. This is one of the things we really sought to fix.

Most merchants have no idea what they actually pay. And, as I saw with my mom's antique shop firsthand, card processing fees can make it nearly impossible for a small business to turn a profit. Indeed, the majority of card processing fees are paid by small businesses in America.

We at Square addressed these problems and more with our first product, which is the Square card reader. Hal already told you a little bit about it. This Square card reader incorporates the Square dongle, the card reading dongle, a terminal app which runs on the phone, and it is coupled with a custom payment gateway, which we implemented that supports the back-end processing. Anyone can download our app, sign up, and starting accepting cards in about two minutes. Contrast that with three or four weeks that it takes with a merchant account. You receive a reader in the mail in about one or two days. And we charge one simple rate, regardless of the card type and that is 2.75 percent of the transaction.

Something else new that we did is we do not even charge a per transaction fee. A lot of merchant accounts will charge 15 cents to 30 cents per transaction and, if you are selling a coffee for $3, that really increases the percentage you are paying to the card companies. We do not charge that. There is no fine print. We do not require a contract and even the hardware is free. To me, this is really the special part about Square, not necessarily the app or the cool little card reader. It is that we are really providing a good service to small merchants, like my mom.

Getting here required us to work closely with our acquiring banks and the card networks. We had to reinvent the merchant onboarding process, so we could go from four weeks and a credit check down to two minutes and no credit check. We had to reinvent it to make it move faster and be more permissive, but all the while mitigating risks. The reason it takes four weeks is because there is a lot of risk checking and the like that we had to supplant with different checks.

Today, Square's card reader meets the needs of everyone from the sole proprietor at a farmers market to a taxi driver all the way up to—I do not know if you guys noticed over the holidays, but the Salvation Army used the Square—and today both the Obama and Romney presidential campaigns are using Square too for political donations. I think this is a pretty exciting change.

From there we have our next product, which is called Square Register. This couples card processing with traditional point-of-sale features like you might need for a more brick-and-mortar shop. The idea here is we are bringing these features that were formally only enjoyed by big box merchants—like that "small" merchant out of Arkansas—to small businesses and leveling the playing field for small merchants.

For example, a small merchant can use our analytics product that we provide them for free that is all included with the transaction fee to drive supply chain and staffing decisions. A coffee shop or bar could see that they are doing twice as much business on Wednesdays and staff up accordingly or they could buy enough milk and coffee so they do not run out.

Finally, a little more than a year ago, we successfully tackled the payer side of the equation with "Pay with Square" formerly called Card Case. A customer can find Square merchants around them and then pay those merchants. You can pull up the app and see a list of merchants that are around you. They can be ranked based on various criteria we provide. You do not have to take your phone or your wallet out of your pocket and this is really huge, I think.

So the first time a payer visits a merchant they open a tab. Then at the check-out, the payer tells the merchant their name. The merchant will see the payer's name and the photo on their screen and they simply tap it to finish the payment. They just have to open that tab mainly on the first visit to a merchant.

From there, the payer can opt into Living Square and open a tab automatically any time the payer visits that merchant. In that case, unlike NFC, with Square the payer does not even have to take their phone out of their pocket anymore.

So when I go to my favorite coffee shop that I go to every day, I just walk in, I order my latte, and then I walk out. They already know who I am. The merchant knows me by name. I do not even have to tell them my name anymore. It is really cool. I think it is very close to the ideal experience.

To deal with Square is, I think without a doubt, the most effortless and enjoyable payment experience in the market. It is also one of the most secure. In contrast to NFC solutions I have seen, with Pay with Square, no card details pass through the merchant's device. The merchant's and payer's devices both talk directly to Square servers. If a payer loses their phone, they can simply reset their Square password. They do not need to call the card company or wait for another card to come in the mail.

It is safe to say we have accomplished things few would have imagined just a few years ago. You can rest assured that you can expect even more of this kind of innovation from Square in the future or an equal level of it.

So back to the topic of the panel, market obstacles and public policy responses. Market self-regulation has worked pretty well for Square so far. PCI and the other card network rules are not always abstract enough to allow for our products;

maybe sometimes they are a little too prescriptive. But since these are not laws, the card networks can waive the rules when it makes sense and allow companies like Square to keep operating until the standards have a chance to catch up, standards which we are participating in.

This works because the credit card network's motivations are very aligned with Square's—that is, we both want to increase acceptance, reduce risk, and provide a great user experience. My simple descriptions cannot really do our apps justice, so I urge you to download them and try them out for yourself. All you have to do is search for Square in the App Store or on Google Play. If anyone wants to stay in contact with me, always please feel free to reach out. I am happy to help with any questions you have regarding Square, even Android devices, or the mobile industry. You can find me at @crazybob on Twitter. Thank you very much.

General Discussion

Session 2

Mr. Bierbaum: Thank you. Now we are going to start with the Q&A portion of the session.

I might start with a question of my own—maybe for Alan, but for the entire panel. We talked about consumer value proposition, merchant value proposition, and a little about the steering. My question would be, Is there an argument there should be public policy that would limit the associations, Visa and MasterCard rules, that they cannot impose this steering requirement on merchants to give merchants more say in the cards and solutions they adopt, therefore, giving them a little bit more flexibility in the marketplace to use some of these emerging solutions?

Mr. Frankel: There already have been public policy efforts along those lines. Legislatively, part of the Durbin Amendment addressed, as I recall, the ability to give discounts by payment type. The DOJ achieved a settlement with Visa and MasterCard that liberalized some of their steering policies. Not all of them: merchants still cannot surcharge any particular cards. American Express has not settled. Although now you can give a discount for debit cards, Amex would not let you give a discount for a cheaper credit card, for example; whereas Visa and MasterCard have agreed to let that happen. Until Amex also relents, it is unlikely that is going to be occurring. I think there is a role for public policy to allow price signals to work at the point of sale.

Mr. Bierbaum: Any others like to comment on that?

Mr. Evans: I would like to make a comment on a couple of things on the networks. I just want to go back to the comment Bob made and maybe tie back to Nick. One of the things we need to be cognizant of here is that a lot of the innovation we are talking about in this business that is actually happening now in the marketplace is actually riding on the existing payment structure. It is using Visa,

MasterCard, Amex, and all the stuff that is out there. Before we beat up on Visa or MasterCard too much, we really do need to recognize that they are enablers of an awful lot of innovation that is happening in this business, including Square and LevelUp and, for that matter, PayPal, which is obviously using Visa or MasterCards in its wallets.

In terms of Alan's comment, the other thing we need to recognize about the networks, which is really true about any platform business, is any platform business is serving two masters. If you take payments, it is serving merchants, but it is also serving consumers. The platform has to be in a position where it can balance the needs of consumers and merchants. So, yes, merchants would like more stuff. They would like to have pure restrictions from the networks, but on the other hand once you do that you tip the balance against the consumer.

I would be surprised first of all, Alan, whether any of the things you talked about are actually going to have any material impact on the markets. So I suspect they are not really all that important. But to the extent they have any impact, they also have an impact on consumers. We need to be very careful when we talk about public policy here that we are taking into account both the needs of the merchant but also the needs of the consumer. And the networks are in a particularly good position, unlike regulators and courts, to design that balance in the right way.

Mr. Economides: If I can comment on that issue as well. It is very important for the merchants to be able to charge according to costs. Consider the position that Visa and MasterCard traditionally have taken, compared with a position that maybe two other producers of substitutes might have taken, think of Coca-Cola and Pepsi. Coke says, "You cannot sell Coke at a different price than Pepsi." And Pepsi says, "Oh, you cannot sell Pepsi at a different price than Coke."

What would you think if the merchants were forced into that situation on physical products? You would think something is wrong. But they have been forced in that position on these payment services products. That is the problem. The merchants need to be able to have the flexibility, if the costs are different, to be able to charge differently. That is obvious, I think. It is kind of side-stepped in this debate.

I also wanted to comment on something David Evans said about market failure. He said essentially that the government should not intervene, because it is not obvious there is a market failure from non-adoption of innovation. If innovation has not been adopted, how would we know that in fact if we have non-adoption because of market failure or for another reason? That is impossible to prove and therefore impossible for the government to do the right thing. I am not saying the government always does the right thing or anything like that. I am just saying, in the absence of something being adopted, it is practically impossible to say, "This is because of market failure" or "this is because of dominance of the market by the network operators."

Mr. Salmon: I have a question about interchange. David, I am interested that

you think the interest of merchants and consumers are sort of against each other. It seems to me that some of the most interesting innovation right now is especially in the P2P space, where the distinction between merchants and consumers basically disappears. I think that where merchants and consumers are very much aligned, is that they both want lower interchange. I think that Esther George's point this morning about checks clearing at par is incredibly important. The reason why checks and the reason why cash have been so incredibly ubiquitous and powerful are precisely because they clear at par. I worry that all of this talk, basically this whole panel and what Bob was saying about his interests being aligned with Visa and MasterCard, maybe I am just being stupid here, but I do not see it. It seems to me Visa, MasterCard, and Amex are sort of rentiers and everyone else is aligned against them. The rest of us do have a strong interest in things clearing at par. That is not happening and it does not seem close to happening. If there is a public policy response we need, it would be to try to make that happen. That would drive a huge amount of innovation, not just in the merchant-to-consumer space, but also in the consumer-to-consumer, P2P space.

Mr. Evans: There is an awful lot to unpack there. I will try not to talk for more than a minute or so because I am sure a lot of other people would like to talk.

The interests of the consumer and the merchant, in a lot of instances, are aligned, but there are some instances in which they are not. Any platform, whether it is Visa or whether it is Google or whether it is Facebook, is making trade-offs between the different participants in the platform. That is just a simple point.

In terms of on par somehow being the optimal interchange fee and the nirvana, a couple of points: The reason we have a massive, massive private-sector payments industry is for a simple reason. And the simple reason is the government failed. The check system and the monetary system did not provide enough value to consumers and merchants. As a result of that, in 1950 we started a general-purpose payment industry and a lot of things have happened as a result of that. The card industry and a lot of the other payments solutions we have nowadays are a response to the need on the part of both merchants and consumers for things the public-sector payments system was not providing—a public payments system that operated with this at-par mechanism you think is so important. Maybe I should just stop at that point and let the other people contribute.

Mr. Frankel: I cannot fully respond to David unless you give me another four hours. But I would make a couple of simple points. One is the main incentive here for payment providers—the gold mine, the treasure trove at the end of the rainbow—is the ability to tax retail sales. If you have the bottleneck monopoly or one of the bottleneck monopolies, you can impose a private sales tax and be just like the state of Illinois or California or Missouri and skim something between the buyer and the seller. That is what this is all about.

In general—sure they are going to be exceptions, and there are some theoretical

exceptions—but, by and large, consumers and merchants have an interest to keep the spread between what the buyer pays and what the seller gets as small as possible. I disagree with David and we have debated this at great length at other times.

There is separation really. All of the innovation you are talking about here—Square and the others—they take the level of interchange fees, whether it is par or 200 basis points, as a given. All of their value-added rides on top of that. I think that if interchange fees were lower, they would continue to innovate.

Mr. Economides: I was going to say one thing adding to what Alan Frankel said. In my opinion, the crucial thing is not if we are at par or at this particular price or at that particular price. The crucial thing for public policy is to create the right conditions so normal competitive forces that work in other industries also work in this industry.

So the problem is relatively simple. We are not going to have a magical number—zero or 5 percent or 2 percent or 0.5 percent—the thing is to create the right conditions so merchants will be able to pay different fees to different credit card networks and pass these savings along appropriately to the customers. If we manage to get there, then that is a giant step forward. At least that is my point of view.

Mr. Evans: I just remembered my final point I wanted to make over here. We have gotten ubiquity with positive interchange fees for credit and debit cards. So, it cannot be you need "on par" to get ubiquity.

Mr. Summers: I am an independent thinker and consultant on these matters. I would like to ask the panel, maybe starting with David Evans, to explore a little bit more broadly and deeply this proposition or assertion that the government has failed the payments system. By the government, I presume you mean the Federal Reserve System. But the Federal Reserve Banks are bankers' banks. You and I do not hold accounts or get services from the Federal Reserve. So is that an intended and complete statement that the government has failed or is it something different—maybe the banking system has failed?

Mr. Evans: No, and I was obviously too flippant on this point in my remarks. I do not mean to suggest the Federal Reserve System has failed. Obviously, the Federal Reserve System is a great institution and has done wonderful things both for currency and for checks. I do not want to suggest anything differently.

My real point, though, is really two things. One, the reason why you have these alternative forms of payments, the reason why you have credit cards, debit cards, and this private-sector system of payments is because consumers and merchants have reached the collective judgment over the last 50 years that there are forms of payments they would like to use that the government does not provide. So it is a market response to that. It is not that the government has failed; it is that the private sector was really the source of a lot of innovation when it comes to payments. That was really the only point I wanted to make.

Two, the related point—and this really would be a long discussion that you would see Alan and me debating for the next eight hours—is whether we needed the Federal Reserve System to go on par for checking and whether there was actually a market failure there. I actually think there is virtually no evidence of that, just based on a couple of anecdotes from the early 20th century on the circuitous routing of checks. There is very little evidence the Federal Reserve was needed to solve that particular problem.

Mr. Greene: One thing emerging this morning is whether we are going to see a shift in power among the different players in the ecosystem that Michael Katz showed us. We heard about consumer-centric payment models. We heard from Square about technology-centric models. I am curious on the back of Alan's comments about the power or powerlessness of merchants, whether merchants might not emerge. We saw a recent announcement from Wal-Mart and Target that two dozen merchants are pooling on a merchant-centric payment system. Perhaps some of those participants here this morning could comment on their work in that area.

Mr. Frankel: Well, I have worked with merchants and I probably should have given a disclaimer at the beginning. I have done a lot of work for competition authorities and merchant associations in litigation matters.

My thinking about a merchant-run payment system is that it is an interesting possibility. The problem has always been the market has evolved with the interchange system, as a commercial bribery system. Consumers are bribed to use the higher cost payment methods. The merchant would have to undo that. One of the intriguing ways they can undo that is with point-of-sale incentives, as opposed to backend end-of-the-month, end-of-the-year incentives, miles that you see later. But point-of-sale incentives might be effective.

When Visa was set up, they had to corral hundreds of bankers and it was a hard problem. With merchants, it is a much bigger problem. It is a very decentralized marketplace. Merchants have to think really big and, if they are going to be successful, my advice to them would be to not try to own it in a small clique of a few merchants, but to create a new open-payments system that any merchant could participate in.

Ms. Haskin: I think the reason that customers are so willing to accept a lot of this new technology and readily use it is because they feel a sense of security in our payments system that has resulted from banking. The consumer bears very little loss in our system currently and that is due to regulation in the banking system.

So my question is, What happens if one of these new startups fails and both merchants and consumers lose money?

Mr. Economides: Fannie Mae failed; what happened? Do you feel it? I am not so sure. I would not worry so much about that. We have had failures in recent memory and we didn't feel them that much, because of the various corrective actions of the same regulators.

Mr. Frankel: For small-value payments, if you could imagine a stored-value function on an iPhone, where you have Square Cash, an idea I just invented. But we will see. If Square were to die—God forbid—people are going to be out relatively modest amounts of money. We are not talking about someone's bank account being depleted. So, as a practical matter, it might not be of enough concern to deter consumers from embracing it and taking some risk that, if this company dies suddenly, they are left with some unusable value on their phone.

There also may be things that a provider can do to provide a guarantee that, that even if it were to die, you would still be able to go to an ATM and withdraw the remaining cash value.

Mr. Henry: A question for the panel: What is your opinion of the success or failure of the Durbin Amendment and the downstream ramifications of this well-intended public policy legislation?

Mr. Frankel: I do not know. David may have filed something on the Durbin Amendment. I worked on this for an amicus in the TCF litigation. There were many predictions of catastrophic effects of the Durbin Amendment. We have seen these stories before—death-spiral arguments. TCF said it could not possibly provide the services and the status quo was the only way they could possibly offer free transaction accounts. I looked up TCF. It had been offering free checking accounts to its customers eight or 10 years before they offered their first debit card. So why do banks give you free payment services? It is because they want to attract your deposits so they can lend them out and make money. That is why there are free checking accounts.

Debit cards reduce costs relative to checks. It would be insane if a bank gave you a free checkbook, but charged you for debit cards. A lot of the predictions, I thought, did not have much credibility and I still think they do not have much credibility.

Mr. Evans: I think Alan and I agree probably on the TCF case, which is a little bit of a stretch. I made a number of filings to the Federal Reserve in the course of the Durbin proceedings and the basic thrust of those was that the effect of sharply reducing debit card interchange fees would result in basically a loss to consumers as banks increased fees or reduced services. And that is more or less what we have seen in the marketplace.

By and large, free checking has substantially declined and fees have increased for consumers. That is what you would expect. It remains to be seen how much money consumers will get back at the merchant end. That is a harder thing to analyze. My analysis for the Fed indicated the view we have documented pretty extensively that the amount of additional money consumers would pay as a result of increased fees to the banks would vastly exceed the amount they would get back from merchants. I suspect that is what happened.

Ms. Wells: My question is for Bob, although I would be interested in hearing from others as well.

After you spoke, I went to download Square on my iPhone, because it sounded really cool. And I do not mean to put you on the spot or to be sarcastic, but the reviews all said, "No merchants accept this."

They gave it one star and a few of them said it is great, but most of them said that you cannot use this at very many merchants. It raises an interesting point—your point about letting regulations stay away. The merchant acceptance piece is difficult. You would basically need a massive sales force, right, or something to sign up merchants to Square and the same could be said for any other cool innovation. If the market were to sort that out, you might not get the adoption, right? Is there some need for something to help along these cool innovations?

Mr. Lee: That is a great point. She is talking about Pay with Square, that is the payer-side product. While we have a million merchants that can accept Square payments today, last time I checked we have 75,000 merchants you can pay with Square. Definitely in some areas it is a little harder to find people to pay, but it is actually growing extremely fast and, to me, Square Card Reader is the product of today and then Pay with Square is the product of tomorrow. It does not have to hit critical mass today. I do think it is going to grow very quickly. In a couple years, you will see a lot more density.

Mr. Evans: So, in Boston, I could pay with my iPhone, using LevelUp or Pay with Square (I call it Card Case) at probably somewhere between 500 and 750 merchants in Boston now and it is growing very quickly.

Mr. Lee: I just want to add one more point to that, too. One of the key things that is going to make it successful in the long term is it does add a lot of value. It makes the payment experience a lot easier. We also couple it with loyalty programs, so the merchant can automatically recognize when you have come back so he can give you a 10 percent discount. So there will be lots of motivation for people to keep using it.

Mr. Segendorf: My question concerns surcharging. I agree it would be very nice, but there is also an incentive problem with surcharging. For most, it is easier to charge customers through a hidden margin on their prices than on an explicit surcharge. When I talked with a merchant, they usually said, "Well, we tried this and we got so much bad will that we would never, ever do it again."

How do we change the norms? It is not sufficient to allow surcharging. We must also change norms so that people accept them. How do we do that?

Mr. Frankel: There have been some different experiences with that. In the United States, we had ATM surcharging. When it first started, there was a lot of outrage. The people were paying an additional fee at the point of using an ATM, but over time they became accustomed to it. Now they have adapted their behavior.

In Australia, they ran an ATM experiment and found the same thing. People adapted and changed their behavior and ended up spending less overall for ATM withdrawals.

For credit card surcharges, the kind of messaging matters. The word "surcharge" is horrible. It was designed to be horrible. No one likes to pay a surcharge. If you think of it as differential pricing depending on what kind of service you select, that is really the concept.

In Australia again, which is our favorite experiment lab, the Governor of the Reserve Bank went out of his way to say, "We like surcharging. We think it is good. We think payments should reflect differential cost at the point of sale."

Messaging that this was an OK and desired practice was helpful. Still it has taken 10 years and surcharging is still gradually ramping up there. Not all merchants do it, but it is taking a lot of time.

Mr. Evans: So we have a whole bunch of countries that allow surcharging and have for a number of years. In those cases, merchants do not avail themselves, as you point out, of the ability to surcharge. This is probably one of the biggest red herrings in the payments industry. I do not think it was an important rule for the card networks to have. And I do not think it has turned out to be terribly important for merchants. It has generated an enormous amount of income for economists and lawyers. So it is good in that sense.

Mr. Economides: Well, first of all, at least in gas stations in the New York area, many of them have two different prices—a cash price and a credit price. It has been used there.

But I would say, practically speaking, it is just a matter of terminology and what the actual level of prices is. Any surcharge rule you would purpose is equivalent to a discount rule, in which the price is set at some higher price and then consumers get discounts. If people have psychological impediments to the word "surcharge," I am sure they do not have psychological impediments to the word "discount." So there is a way to implement this in a pretty straightforward way.

Ms. Benson: I have a question. It is about Square, but it is for the economists. So I live in a small town and several small merchants—my hairdresser and some people like that I talk to through the years about payments—have been paying 5 percent or 6 percent for card acceptance to their acquirers. Several of them are now delightedly starting to accept Square at a very much lower cost. Why did it take Square to bring those prices to those merchants? Was this a failure of our market before that? What was going on that made that happen?

Mr. Frankel: Five percent to 6 percent sounds like they just did not shop. They probably could have gotten a better deal. But what do you think, David?

Mr. Evans: For a small merchant? Yes, 5 percent to 6 percent is probably pretty common.

Mr. Frankel: It cycles me right back to the main point, which is it is insane that 400 basis points to 600 basis points, even from a small merchant transaction, would be going into the payment. That tells you something is not happening that should be happening.

Mr. Evans: You can listen to the economists. My guess is Bob is probably in a better position to answer this than we are. These guys have identified a massive transaction problem in the payments industry and they innovated.

Mr. Lee: I talked a little bit about this, but the key to Square is our sophisticated backend. Typically, a small merchant had to go through multiple layers before they actually got to the credit card company. They also had the ISOs, which take their cut. Whereas with Square, there is nobody in between. We are going directly to our back-end processor. That took a lot of work to do that level of integration. As we scale, our rates will continue to go down and will be able to continue to pass that along to merchants.

Mr. Tomasofsky: This is not a backhanded or another way to get around this question. I have no hidden agenda here. We should not call it Durbin anymore, of course, because once it became a law then the amendment did not matter and now that we have Regulation II it does not matter, so that is a personal peeve.

Under Regulation II, the price that has been set for financial institutions over $10 billion for debit interchange—again, this question is not to debate that process—but from the title is that type of thing that is going on, a regulated price, is that something that impedes or encourages innovation (the title of this topic)?

Mr. Frankel: If debit cards were still clearing and settling at par like they once did and they still do in Canada, innovation would be just as attractive for the sort of applications that we are mostly talking about here—the innovative front-end interfaces. The kind of marketing innovations, the reward programs, and incentives to get you to use a more expensive card, those sorts of innovations will decrease with lower interchange rates.

I just disagree with David about how that all nets out for the public. If you are really getting at the difference between the $10 billion, the difference between credit unions, I really have not thought about if that causes innovation problems.

But, in general, setting lower interchange rates, I think par debit cards would work just fine and innovation would proceed apace. Going from a high interchange rate to a lower interchange rate would also be OK. What you are not going to see, though, are the innovations designed to compete to get the interchange fees.

Mr. Evans: The answer is it probably alters the nature of innovation. As you change the rates, you are going to have different kinds of innovation in the marketplace. There is an argument that price fixing for debit cards has reduced innovation but, for the purposes of the conference today, maybe it alters things a little bit.

Mr. Drechny: So when I look at it, the problem we see in the marketplace today is a matter of transparency. The problem is the consumers do not see the pricing signals that are related to the expense being incurred by the merchant. Merchants and consumers are generally aligned. They want the cheapest transaction that happens for them to be able to complete it. But, when you are giving 100,000 miles free to a consumer and that consumer does not see any cost associated with that, then the consumer sees no fault or no harm in using that product. Without creating those pricing signals, we will always have this problem that exists in the marketplace today, which is that consumers do not see the price that is associated with the products they are using. So that would be similar to your Coke and Pepsi example at Wal-Mart that we did not tell you what the price was and we just charged your card and you never saw it.

It is similar to what the argument is around gas tax, right? It is very similar to a hidden tax. People do not know what gas tax is. They have no idea, because it is charged into the price of the product, the gallon that is used, and that is to me where the market breakdown is. And we don't solve that. It used to be it did not matter as much, because there was fairness in the marketplace.

When debit cards first came out, I argued the opposite. As merchants, we were actually getting paid for those debit cards. People were giving us money to take them, because it was creating such efficiency in the marketplace for the other players. What happened over time is market volume, market share, and power grew and the courts had determined Visa and MasterCard had market power in the check card case. They then use that to extract more and more money and because that fee is transparent, it never changes what is happening in the marketplace. It is at the point now where you can have somebody increase their fees by 30 percent and not lose a single customer. Where else in the marketplace can that happen besides in the card industry?

Mr. Evans: So how many people use OpenTable? I can spend just a minute digressing from the card industry to OpenTable. OpenTable is this incredible business to solve this massive problem in making reservations. Remember the old days when you had to make reservations? You called up the restaurant and hoped you would get someone on the phone, then you make a reservation, it took five or so minutes of your time, and the restaurant had all this difficulty.

So OpenTable comes in and they develop this reservation system for consumers and for restaurants. How does it work? The restaurants have to pay for software. When you make a reservation on OpenTable, how much do you pay? You do not pay anything. How much do you think the restaurant pays? Well, the restaurant

actually pays something. When you make a reservation on OpenTable, the restaurant pays $1 per reservation being made. At first, when OpenTable introduced the service and lots of restaurants signed on, restaurants just absolutely loved it. It saved them cost. Consumers were happy. It was just great.

Now that OpenTable has solved this problem, you have all these restaurants on board, and all these consumers using OpenTable, what do restaurants start saying? Well, gee, when consumers make a reservation, I have to pay a fee. This is horrible. That consumer would probably come to me anyway. Why do I have to pay a fee?

It is perfectly analogous to the card industry. OpenTable comes in. They solve a problem. It is free to the consumer. There is a charge to the restaurant. The charge eventually is passed on to the consumer. The consumer does not know this. It is perfectly analogous. It is a simple situation where merchants are getting a very, very valuable service, and they are business people and they like to pay less.

Mr. Drechny: What about the savings the bank experiences from not having to process checks anymore? That is different than that OpenTable system that you mentioned.

Mr. Lee: I would also add, at least with OpenTable, the merchant knows upfront how much they are paying; whereas with cards, most merchants have no clue and the processors go out of their way to hide that.

Mr. Evans: There is a lack of transparency issue on the pricing.

Mr. Economides: There is a problem with credit cards. It is not comparable with the OpenTable in my opinion.

I have in my wallet five credit cards. One of them pays me 2 percent back in cash. That is the one I use. It is the most expensive to the merchants, but why do I care?

So this is a real market failure, if I can use David's words. Somehow I have incentive to use the product that is best to me and worst to the merchants. If we had a different system and the merchants could charge me according to their costs on credit cards, then I would use a different credit card. No doubt about it!

Mr. Williams: Alan made a point about merchants not typically being organized. So I was trying to rack my brain to think of a good example where they have been organized. I thought of one, which was Germany, where the merchants got together and created a system called the LV by which they, instead of taking debit card transactions, initiate direct debits. That would obviously save them quite a large amount of money. I was wondering what we could learn from Germany. Obviously the creation of that system does not appear to be a market obstacle. What is it about Germany that would not work anywhere else?

Mr. Evans: I think if you want the at-par world, you should move to Germany.

Mr. Frankel: It is a good question. The American retail marketplace is incredibly fragmented. I do not know what concentration is like or what organization is like. I think merchants probably wish they had done this 20 or 30 years ago, gotten in at the ground floor, and created a system. It is very hard to enter now and compete when, as people have been pointing out, I get bribed to use my most expensive card. I can get benefits that people who are using cheaper cards and cash payments are funding.

Keynote Address

Joseph Farrell

The female mosquito will bite you and take your blood, but not much of it—perhaps less than 1/100th of a milliliter. For comparison, the Red Cross takes a pint, which is over 400 milliliters. I don't particularly begrudge the mosquito her tiny droplet of my blood. But I do resent the side effects, or in economic jargon, the transaction costs.

The World Health Organization estimates that malaria annually causes hundreds of millions of illnesses, and more than half a million deaths. Surely these transaction costs of mosquito bites vastly exceed the value of the blood actually taken. In payment instruments, of course, a major goal is to reduce transaction costs, and intuitively cutting those costs seems especially urgent when they are large relative to the transfer made. Transaction costs include time, and for small payments the time cost can dwarf the payment, as at some toll booths, or small cash register transactions with a long line.

The ratio of transaction cost to value transferred can be high if transaction costs are large, or if the value transferred is small. Getting that ratio down in the latter circumstance is, I think, what people mean by the problem of micropayments. Metaphorically, I'll call this the mosquito problem.

By that definition perhaps the micropayment problem can never be solved, because however low your transaction costs, they will be large compared to some payments you might like to make. Andrew Odlyzko has argued that micropayments will continue to disappoint. I suggest a more optimistic view. First, I think micropayments are a problem on which we can make progress, though not one we can solve: in fact, progress on micropayments is closely aligned with progress on payment instruments generally. Second, I argue that explicit micropayments in the sense of stand-alone small money transfers are not the only way to pay for small transactions: business creativity can work around the difficulties of doing that (as indeed Odlyzko has noted). However, qualifying my optimism, I point out that one widely used such work-around, namely advertising, raises privacy concerns.

We see a lot of experimentation, competition, and innovation in how we pay for things. Businesses experiment and optimize in search of more business, and customers choose the best offer open to them. This doesn't work perfectly, but it can work pretty well. Here, I will present a relatively optimistic view of the business side, and a mostly but not completely optimistic view of the consumer side.

If explicit micropayments systems are challenging, business arrangements can sometimes substitute. One arcane pleasure of economics is seeing how business creativity can handle such problems. I'll mention several broad strategies for the mosquito problem: that is, strategies to bring under control those pesky transaction costs for small transactions.

One strategy is the bundling of transactions to spread transaction cost. The ratio of transaction cost to value transferred is usually much lower when more value is transferred. Thus one can address the mosquito problem by bundling small transactions into bigger ones.

As one example, phone cards control pay-per-call transaction costs by bundling many calls. Following an upfront payment in money, you can draw on your credit with the phone card company. A privately created stored-value system, your account on the phone card, lets you skip some of the transaction cost of paying for a single phone call (though there is a transaction cost of using the phone card); and then you bundle those together in such a way that buying a phone card is a tolerably efficient transaction. Still on phone calls, a further step toward bundling is the prevalence of all-you-can-eat calling plans, saving on keeping track of calls made.

Newspapers are another example of this bundling strategy (as well as illustrating another technique below). A newspaper or a news magazine bundles dozens of news items into something valuable enough to justify newsstands and cash transactions; subscriptions of course further bundle these bundles over time.

Similarly, music albums bundle together different songs; one payment transaction cost is spread over multiple songs. But many consumers rather like to buy songs individually. To make unbundling small-value items work, you need to get the transaction cost down in nonbundling ways. One way that iTunes does that is by leveraging other payment instruments.

iTunes is trusted enough that many consumers are willing to have them store credit card information—this involves both trust about not abusing the information, and a password or other authentication system to control access to your iTunes account. This enables them to leverage off other payment mechanisms: when I buy a song on iTunes, they charge my credit card, which is paid by automatic payment from my bank account, which in turn is topped up by my employer.

But the central "mosquito control" strategy that I want to focus on hinges on economic complementarities, a key tool for indirectly processing payments.

In a two-sided market, or more generally with complements, cutting price on one side raises the demand curve on the other side, and a seller can profit with a higher price and/or more sales there. That added profit can be viewed as an indirect payment from the first customer, either in addition to, or in lieu of, explicit payment. An extreme form is to make one side free, which is particularly useful if transaction costs would be high on that side.

We see this in many contexts, notably newspapers and broadcasting, and in "free Internet content." In those cases, the paying side has often been advertising. Ad support involves an indirect micropayment from consumer to content provider; willingness to be exposed to ads is a way for consumers to transfer value to advertisers and hence indirectly to the content provider. In many cases this value transfer is quite small; advertising thus serves as an indirect micropayment mechanism.

In that role, it has some real advantages. It works through payments and negotiations between commercial entities—no individual consumers fumbling in their pockets, and fewer security issues than many alternatives. People often say that "free" is a particularly convenient price; perhaps a better way to say it is that two-sided pricing with one side of the market being "free" may lower total transaction costs. And the transaction-cost gap between free and cheap might be even bigger in the Internet environment.

One example: newspapers. Some print publications don't ask for money directly from the reader: they get all of their money—instead of the traditional roughly 80 percent of their money—from advertisers. As a result their newsstands don't need an attendant or a coin box, and it's quick and easy for a reader to grab a copy.

Another example is broadcasting. Traditionally both television and radio used the free (to the consumer) approach and were supported by ads. This was perhaps less of a choice and more a reflection of a constraint: they were perceived as non-excludable goods on the consumer side, so there was little possibility of implementing a subscription or direct-payment mechanism.

But once the possibility of charging consumers opened up, technologically or in regulatory terms, the question arose whether "free to the consumer" with advertising support was the best pricing model. Do you really want your visual entertainment interrupted multiple times per hour, as a way for you to contribute a few cents to the content creator? How much is your time worth? Perhaps this was not a very efficient payment mechanism after all.

Thus in television, and to some extent in radio, excludable forms of program distribution (principally cable and satellite), with subscriptions, were introduced. Ad financing was then partly supplanted by bundling-and-subscription, and partly supplemented by it: there are plenty of ads on cable. That slightly surprises me, as someone who finds repeated short ads distracting—but there seems to be a reasonable market test in there.

This brings us to the customer side. Often customer choice works pretty well, although sometimes it takes analysis and perhaps even a little faith to see this. For instance, sometimes a cash register transaction is delayed because a customer ahead of one in line is using a time-consuming coupon. I admit that I often vent about coupons and standing in line, but I also recognize it can lead us to an important economic point. The consumer can learn how long a particular supermarket's lines are. If a coupon scheme slows down the line, and the merchant doesn't add enough checkout counters, then some customers may no longer walk in the door. The merchant will take that into account. It's not perfect, but an only mildly over-optimistic view is that the merchant will weigh those effects pretty well. Similarly, the consumer facing part of newspaper or broadcast ads doesn't raise a lot of problems. Those ads are easy to ignore if you do not like them, and if you dislike them, you will likely know right away.

But, at this point in the development of our market institutions, customer choice is much less informed and not so reliably effective when it comes to privacy issues in targeted advertising. This was a substantial focus of the FTC's recent privacy framework report. From a payments system viewpoint, the issue is that ongoing changes in the ad-support micropayment model—changes that make it more effective, in some respects, by more tightly targeting ads — also weaken the presumption that consumers choose the best offer facing them. That presumption was a key to the market-mechanism argument that payment system evolution will lead to good outcomes. In other words, tighter targeting of internet ads may not fit the model that says the merchant—or the creator of content in this case—has an incentive to properly take into account any consumer harm. As a good deal of public policy discussion, including the recent FTC privacy framework, indicates, that remains a public policy concern.

In other words, what if the consumer cost of ads includes potential compromises to privacy and data security, rather than the simple annoyance of ads interrupting your programming? From an economic point of view, a key difference is the real risk that consumers are much less able to evaluate it and respond to it through their demand for the content.

Alternative (non-advertising) forms of micropayments could help. The "free content" versus privacy trade-off might be defused if we can make progress on paying through some alternative means—perhaps money, perhaps another indirect form of payment—in a way that reduces the pressure to serve targeted ads. We could get then a better market test of the efficiency and innocence of such ads; and if they are problematic, an alternative. If privacy concerns about targeted advertising can be assuaged through progress on other means for micropayments, perhaps the perceived trade-off between privacy and ready access to the long tail of Internet content can be relaxed. In other words, by working on payment systems, you may be protecting both privacy and the lively ecosystem of speech on the Internet.

ENDNOTES

[1] *http://www.mosquitoworld.net/mosquitofaqs.php*

[2] *http://www.redcrossblood.org/donating-blood/donation-faqs*

[3]See e.g., *http://www.who.int/mediacentre/factsheets/fs094/en/*; malaria is by no means the only mosquito-borne disease: see for instance *http://www.who.int/mediacentre/factsheets/fs117/en/*

[4]See Andrew Odlyzko, "The Case Against Micropayments," *http://www.dtc.umn.edu/~odlyzko/doc/case.against.micropayments.pdf*

[5]An added benefit, for the phone card company and the user jointly, is often much better negotiating ability in dealing with the telecom company that supplies the actual telephone connection.

[6]This can of course go wrong if the user thinks he is in the all-you-can-eat zone and belatedly learns that he has ventured outside it. The FCC has expressed concern with this "bill shock" problem.

[7]For instance, I'm told that advertising rates, in ballpark terms, for a 30-second spot on over-the-air television are in the ballpark of $5 to $50 CPM: that is, per thousand viewers. That means somewhere between a half cent and a nickel per viewer exposed to the ad.

[8]See for instance Catherine Tucker, "The Economics of Advertising and Privacy," working paper 2011, MIT.

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General Discussion

Mr. Tomasofsky: That was very thought-provoking. I had a question on how you were talking about things. What would happen in the television subscription model where we are paying by watching commercials, if the technology comes along where we can press a button and fast forward through the commercials, what does that do to the rest of everything else?

Mr. Farrell: If you can very easily evade payment, then that can threaten the payment model. You might have thought that might contribute to the shift in payment mechanism toward subscription content—especially now remote controls make fast-forwarding even easier. But, after all these years of progress in fast-forwarding through ads, we still see quite a lot of ad financing of video content. Apparently, it was not a devastating problem.

As a side note, I've read that the initial response from the studios to the development of recording and potentially fast-forwarding devices was not so much they were worried about fast-forwarding. They were more worried about time shifting—you would watch the ad, but perhaps a day or a week later. They feared that some of their advertisers would worry about when—rather than whether—you would watch the ad. It puzzles me a bit, because my general sense is that with most television ads it would not matter that much if you viewed them a day or a week later.

Mr. Sullivan: Your mosquito problem is a very useful construct to understand this. I do think it focuses mostly on the transaction costs side. I wonder if you have had any thoughts about the risk side of this as well? When you look at, for example, the iTunes transaction, you buy a song, you get a 99 cent charge on your credit card. You buy another song and you have another 99 cent transaction fee. So they manage to deal with the mosquito problem with each of the 99 cent transactions.

What I am wondering is, Now they are getting that transaction charge for each one of those payments, why do they not just accumulate those over the course

of a month and then maybe put a $10 charge on it? Maybe there is some risk side to that and there may be other issues that make the decisions to do this bundling more tied to some other aspects of risk.

Mr. Farrell: I do not know anything about Apple's relationship with its credit-card acquirers. In principle they might or might not have a per-transaction fee that would encourage them to accumulate charges. You could even imagine that they do accumulate charges but make it look otherwise to the end user. The key thing about the payment model is not what it does to Apple's relationship with its acquirers, but the effect on what the consumer has to do: he doesn't have to type in a credit card number and a billing address every time he wants to download a song. As I commented about advertising, the back-office operations between large commercial entities can often be made a lot more cost-efficient than can be done at the consumer end of things where there is a lot of literal or metaphorical fumbling in the wallet.

Mr. Morrison: I did have a question about your take and understanding of the pay-for-view ad, where there has been some very interesting innovation of where people are going to an ATM. Instead of paying an ATM fee, they watch an ad for a specific merchant or advertiser and, instead of paying that fee, the ATM pays for it itself. The other piece of that, there is a company called Jingit that does the same thing, except they actually pay people to watch ads. So it has a very directed focus on the ad and then they pay people to watch it.

Mr. Farrell: It might depend when the ad is selected. Some people might see a privacy problem if the ad is targeted to you once you have already identified yourself. I think that would be different if it were simply the ad that is shown at this ATM today and you press a button first to watch the ad, rather than pay the ATM fee.

Other than that, I would say it is an experimental business model. It might work, it might not. I recall back when long-distance telephone calls were a little bit expensive, there was a company that tried providing free long distance in return for listening to an ad on the telephone before they put you through. I don't think that particularly went anywhere, but it was an interesting experiment worth trying.

Ms. Hughes: The report that came out on Monday spends a good deal of time talking about not tracking. There is also a significant impulse coming out of the European Union to not tracking or even opting in. What are your thoughts about not tracking or opting in for an audience that is going to be doing payments providing in a variety of different spaces? It is not just Internet. It is lots of things.

Mr. Farrell: Probably I should stress again here that I am not speaking for the FTC. The Commission's report said what it believes. The report specifically said that it is applicable offline, as well as online. I think it also was not intended to get

at tracking of the kind that you might need for audit and security purposes. What the report is intended to do is to say the default should be "Do not track a consumer around the Internet, so as to be able to send more targeted ads or otherwise make money off the consumer, without appropriate consent or in the context of the transaction's circumstances." So it is a somewhat nuanced message, but basically the idea is this is a practice that is threatening to privacy and people should not do it, without proper consent.

Mr. Salmon: I completely agree with you about the positive externalities of bringing down transactions costs. Can you talk a little bit about what you have seen in terms of where transactions costs have gone over the past years or decades? It seems to me they actually have been going up rather than down. Also, can you tell us whether you think there is any real hope for them to be coming down in the future and, if so, where that hope might be coming from.

Mr. Farrell: I do not have a particularly privileged window on those questions. My sense is that transactions costs have been coming down, in part through innovation. Yet certainly dealing with a retailer online that you have not dealt with before or that has not hung on to your information involves a good deal of typing in information. That, in itself, takes longer and is more hassle than presenting a card, or for that matter cash, in a bricks-and-mortar establishment—where there has also been transaction-cost innovation. Of course, getting to the bricks-and-mortar establishment is part of the transactions cost too.

But I think the basic point remains: there is a really important agenda of getting those costs down further and that is what you payment industry guys, I hope, are doing.

Ms. Garner: Back in June 2011, Consumer Reports came out with an article that talked about fraud pretty significantly and mentioned the cost for the issuing community in the United States to move to chip and PIN was somewhere around $2.85 billion, compared with $2.4 billion in fraud losses. What implications does that have for the security of card payments going forward? In particular, as we look at mobile and we look to move some of these products we have today, a credit card as we know it, in the mobile wallet?

Mr. Farrell: On the mobile aspect, I will defer comment, because the FTC is having its workshop in the near future. In general terms, why not chip and PIN in the United States? I don't know a lot about this; there have been conflicting accounts. As long as the industry, rather than final consumers, is bearing the costs for fraud, you would think they would have an incentive to introduce a fraud-prevention technology if it made sense. But there is always the possibility of incentive failures at various points along the line.

Risk and Privacy Implications of Consumer Payment Innovation in the Connected Age

Ross Anderson

I. Introduction—Sofort or Surcharge?

One might think that innovation in consumer payment systems is hard because payment networks tend to be slow-moving cartels with high barriers to entry, thanks to two-sided market effects and other externalities. And if innovation is hard, then surely new security and privacy risks should be moderate?

Then consider the case of Sofortüberweisung, a controversial entrant to the payment market in Germany. Its name means "instant payment," and its service has taken off rapidly in the past 2-3 years. Branded as Sofort (Instant), this service provides merchants with a low-cost payment service for online shopping. It is promoted by some large sites (such as airlines) by exempting users from the surcharges normally made for credit card payments. So far so good. What might be of interest to regulators is how Sofort managed to break the payment-card cartel. When a German bank customer clicks to pay at a website, Sofort asks for her bank account number, then goes to her bank's website and impersonates her. The bank asks for a PIN and a TAN (a one-time code, typically mailed to the customer); Sofort in turn questions the customer. If her responses lead to a successful logon, Sofort checks her available funds and uses her funds transfer facility to pay for the purchase directly from her account. In effect, Sofort is doing a middleman attack on her bank account in order to deprive the bank of card transaction fees. The merchant typically pays 75 basis points plus 10 cents per transaction rather than 250 or more for online credit card payment. Analysts estimate that Sofort had 1.2 billion euros of the 20-billion euro market for online payments in 2009.

One might think that Germany's 300 banks would object to this, and indeed they did. There was a technical arms race; the banks tried one security measure after another, from CAPTCHAs to IP address blocking. Sofort generally won that race. The banks' payment cooperative sued Sofort for unfair competition and for inciting customers to breach bank terms of service by entering their credentials at

Sofort's website. The case was suspended after the intervention of the German Federal Antitrust Office, which argued that the banks' harmonized terms of service hindered competition and were designed to exclude new business models like Sofort's.

The banks do make clear via their public relations machinery that any customer who gives their PIN and TAN to any third party breaches their terms and conditions and is on their own. Yet while geeks denounce Sofort in blog posts, the consumer-protection issue is far from salient to Sofort's many happy users. The company's own information on system security is reassuring: "Shopping-glück oder Geld Zurück" (Happy shopping or your money back); your banking is protected by your PIN and TAN (not pointing out that it's the PIN and TAN issued by your bank and used against its wishes); and their data protection is approved by the local standards body (whatever that means).

What lessons might be drawn from this? First, while a geek would consider it imprudent to enter bank credentials into the website of a low-cost airline, banks worldwide have trained their users to do just this through the Verified by Visa/MasterCard SecureCode (VbV/MSC) program. In (Anderson, Murdoch 2010) we discussed how VbV/MSC has become perhaps the most successful authentication protocol ever despite poor technical design, because of strong adoption incentives on merchants (who get cardholder-present fees and liability rules). In practice this means that in many countries, transaction disputes are being charged to the cardholder rather than to the merchant. The explanation: "Your password was used so you must have been negligent." So banks trained their cardholders to enter bank credentials into merchant sites, and trained merchants to adopt insecure systems in return for low fees. They sowed the wind with VbV/MSC, and reaped the whirlwind with Sofort.

Second, German banks had already introduced a Giropay system, which they had planned to extend to SEPA e-mandates (Anderson, Murdoch 2010). Such payments have much the same look and feel as Sofort: a customer making a payment at a website is redirected to their bank's logon page to authenticate it. By sending the customer to the bank directly, this mechanism does not have the same potential single point of failure provided by an active middleman such as Sofort, but is still vulnerable to many of the problems with VbV/MSC such as phishing.

Third, the payment-system innovation provided by Sofort may facilitate innovation elsewhere in the economy. The main alternative in Germany, which historically has had low credit-card usage, is direct debit. Tech-savvy Germans may have direct debits set up with large online businesses such as Amazon, but may be reluctant to trust small startups, who as a result might have to operate through Amazon or other portals that charge much higher fees than the card payment system.

Fourth, it is quite normal for firms competing in two-sided markets to offer insecure products in the race for market share and then lock things down later (Anderson 2002). This pattern has been seen in operating systems, mobile phones and social networking systems; there is no reason for payment systems to be any different.

Fifth, if Sofort becomes the dominant player in its market then there will be systemic consequences. It will be a natural destination of an investigator with a

warrant; some will consider this a privacy risk (but then so is Visa). Others may see it as a control point where governments could interfere with trade (as Visa blocked WikiLeaks). A compromise of its systems could be expensive, leading to large-scale credential reissue (but the same can be said of Visa, and of firms like Cyota that provide VbV service).

II. Might Mobile Compete on Cost?

The Sofort model is spreading. Not only is Sofort Bank expanding its operations to Austria, Switzerland and Belgium. We now see the beginnings of payment service competition along similar lines in the U.K. This time, it comes from an insider. Barclays Bank has recently piloted a service called Pingit for small payments on mobile phones. In the initial phase, the bank's own customers can make payments up to £300 via a mobile phone app to other individuals and to businesses; the innovation is that the mobile phone numbers of the payer and the payee act as names in the system, as more familiar proxies for bank code and account number. Now that the usability issues have been debugged, the second phase will enable anyone with a U.K. bank account to make payments. The payer will make a single authorization for direct debits to be made to her account; thereafter whenever she presses the "pay" button, Barclays will direct-debit her and send money to the payee directly. This service has the potential, like Sofort, of breaking the payment card cartel (of which Barclays is a prominent member). In the short term, consumers and merchants will win as costs fall. There are already calls for regulation: industry people complain that Pingit will break money-laundering traceability (which is nonsense; if we end up with one interbank payment service provider the police can just subpoena them for everything). But in the medium term, consumer advocates may worry that pressure on margins may erode fraud protection still further.

So can mobile and online payments challenge the existing payment-card cartel? This is a fascinating question. Handling cash costs merchants 2.5 percent to 3 percent of turnover, and credit-card merchant discounts are set to be just competitive with this at 2.5 percent. The case for using cards rather than cash rests on factors such as convenience, credit and marketing rather than cost (Garcia-Schwartz and others 2006). In their history of the credit card industry, Evans and Schmalensee describe the vigorous competition between both issuers and acquirers within the framework set by Visa/MasterCard, which they describe as "co-opetition"; they recount how it drove merchant discounts down from the higher levels in the days of go-it-alone operators such as Diners and American Express. But the industry has largely resisted attempts to make electronic payments substantially cheaper than cash. PIN debit does cost about 1.5 percent but U.S. banks have been resisting attempts by retailers to move their customers to this—for example, MasterCard prevents the U.S. version of EMV (and mobile-wallet versions of PayPass) from supporting PIN debit.

Could a U.S. bank or an "outsider" like Barclays, break the U.S. payment-card cartel by offering a mobile payment service such as Pingit? An instant peer-to-peer

payment service, delivered over a mobile channel, could be transformational. If consumers could pay for purchases not just online but also in-store, and merchants benefit from a discount of under 1 percent, then it could give the payment card cartel a real challenge. Merchants might offer triple air miles to entice customers, and even install femtocells at checkouts so that mobile phones would work there. Alternatively, a scheme operator could offer a contactless Pingit card for use in wireless dead zones. Competition of this kind could be economically significant; an efficiency gain of about 1 percent of retail sales would bring real benefits. And the incentives are certainly right for retailers: Wal-Mart processes $200 billion in credit-card transactions in the United States alone.

What might be the lessons for U.S. regulators? If the payment-card cartel is to be seriously challenged then a mobile system backed by ACH might be the way to do it. At present ACH-based consumer payment services are mostly niche players, with the largest being probably PayPal (we suspect most people top up their PayPal account from their credit card rather than using the ACH option, though we're not aware of any data). Mobile platforms might just possibly provide the opportunity to shake up the industry.

Three words of warning though. First, many people have predicted a mobile payment revolution; since about 2002 we've repeatedly been told that within five years m-payment will be big time with a billion users and a trillion a year in turnover, yet it hasn't happened. It is instructive to read and compare the Innopay market analyses for 2010 and 2012 to see how expectations are subsiding (Innopay 2010, 2012). Mobile has taken off in less developed countries that have no alternatives, rather than in developed ones with mature payment ecosystems: they account for 3.3 percent of GDP in Kenya but only 0.05 percent in Japan, the developed country with the highest uptake (IFC 2011). The U.S. market has multiple mobile offerings, some well-established (Obopay was founded in 2005) and some backed by large players (Obopay by Nokia, PayPal X by PayPal, Google Wallet by Google). Yet these remain niche players. The Innopay view is that to prevail they will have to offer speed and security of functionality. To these we might add cost; if mobile payments become cheaper than debit cards, we might see real change.

Second, there will be continuing pressures to reduce, undermine or circumvent the relatively strong consumer protection that U.S. account holders enjoy, and this will be especially the case if mobile succeeds as a low-cost payment channel. We will return to this later. Meantime, it makes sense to regulate Sofort or Barclays in the same way as Visa or MasterCard. In fact, Sofort now has a company in its group with a full banking license, so if the German government had acted against it on security grounds, rather than backing it on antitrust grounds, that would probably have led to a suboptimal outcome. There are outstanding issues around liability, dispute resolution and truth in advertising, but the same can be said for the banking industry as a whole.

Third, a large-scale move to mobile payment platforms will introduce new privacy and security tussles. Customer tracking via cookies is well-established online but has still led to an EU Directive whose implementation is controversial with both businesses and privacy advocates. The tracking of mobile platforms is even more likely to lead to conflict. A consumer's cell site location history is sensitive data, as is her address book; both are collected surreptitiously by mobile companies, which has led to a class action against path.com and congressional investigations into the privacy policies of Apple and of mobile apps generally. Even the late Steve Jobs publicly criticized mobile analytics in 2010 after he found that flurry.com's apps were monitoring devices on the Apple campus (Tofel 2010). There are also issues of security as malware writers turn their attention from the desktop to the handset, now that there's money to be stolen. (I'll discuss malware in more detail below.)

III. Regulation and Risk—130 Years on the Treadmill

The social objectives of payment system regulation may be some combination of efficiency, access (the absence of unlawful discrimination), consumer protection against fraud, rip-offs and liability dumping), privacy protection, and finally the avoidance or management of systemic risk. It is natural for supervisors to pay most attention to whatever aspects currently generate the most controversy, such as the interchange fee issue in recent years (Rochet, Tirole 2006; Chakravorti 2010). But neglected issues can move rapidly up the agenda—so we might perhaps pay more attention to operational risks, consumer protection, privacy and systemic risk.

There is a long history of payment system supervisors acting to protect consumers, only to find that the protection was only partial, and that eventually technological changes allow service providers to wriggle out. An early consumer-protection measure was the Bills of Exchange Act 1882. This responded to fraud as checks became widely used by ordinary citizens as well as by sophisticated merchants. The Act made a forged signature "wholly inoperative," so that a bank in the British Empire could not make its customers liable for a forged check by means of its terms and conditions (unlike in Switzerland where banks did just that). The responsibility for signature verification now fell on the relying party, as it should. But nothing was done about stolen checks. If a thief could open a bank account in the payee's name and cash the check, the drawer had no recourse. This shifted the tussle to the conditions under which a check could be negotiated by endorsement. When the thief of a check payable to "J. Bloggs" found it hard to open an account in that name, he could try to negotiate it by endorsing it with a forged signature and passing it through an account in a different name. Banks responded by overprinting check stock "not negotiable," and the arms race continued when courts in some countries found circumstances in which checks crossed in this way were in fact negotiable after all, leading to more fussy local detail about prudent check crossings.

The pace picked up in the 20th century. The introduction of payment cards into elite markets in the 1960s, followed by their spread into mass markets in the 1980s, made available a new payment instrument in the form of the credit card, with generally good consumer protection worldwide. From the late 1960s banks also started to deploy ATMs, leading to debit cards, which have had a more mixed history and were driven initially by a desire to save staff costs rather than to provide elite service (Batiz-Lazo 2010).

The treatment of specific payment instruments can vary across jurisdictions. In the United States, the signal ATM case was Judd vs Citibank. Dorothy Judd claimed $800 from Citi in disputed ATM transactions; Citi said that as its systems were secure, she must be responsible. The judge ruled that he was "not prepared to go so far as to rule that where a credible witness is faced with the adverse 'testimony' of a machine, he is as a matter of law faced also with an unmeetable burden of proof" and found in her favor (Judd 1980). Regs E and Z now entrench that view in the U.S. regulatory system. In the U.K., the first serious case was McConville and others v Barclays and others, where 2,000 plaintiffs sued 13 financial institutions for £2 million in disputed transactions. The banks' lawyers persuaded the court to split it up into separate small-claims cases, arguing that they would all be too different for a class action to make sense. Two years later, it turned out that the judge had got it wrong: Andrew Stone was sent to prison for 6.5 years for leading this crime wave. (The McConvilles, however, never got their money back.)

The banks introduced a Banking Code under which customers are supposedly only blamed for fraud if they were grossly negligent; but once the media fuss had died down, banks started claiming that cardholders whose card details and PINs were used in fraud were grossly negligent. Online banking was the scene of the next tussle as the dotcom boom in the late 1990s saw banks rush to offer services via the Web. The effects were documented by Bohm, Brown and Gladman: after some vacillation, banks harmonized their terms and conditions to the effect that a customer who accepted a password for Internet banking would be held liable for any transaction that the bank claimed had been authorized using it (Bohm, Brown, Gladman 2000). So as passwords replaced signatures, the protection introduced by Gladstone was quietly sidelined. People who complain of fraud are routinely told, "Your password was used, so you're liable."

The *danse macabre* of banks and regulators in the U.K. continued with the Financial Services Act 2000, which established the Financial Ombudsman Service, an arbitration system for dispute resolution between banks and customers, but which appears to have been largely captured by the banks (Anderson, Bohm 2008). The European Union's Payment Services Directive of 2007 brought in various provisions for consumer protection. This was advertised as stopping banks dumping fraud liability on customers, yet seems to have had little effect on national practices.

The situation across Europe is variable, but generally better than in Britain. The 2010 Eurostat crime survey ranks all 27 EU countries by online users'

concerns and finds that the U.K. is second worst after Latvia for fear of online payment card fraud, fear of phishing attacks on online bank accounts, and fear of privacy violations; it's also fourth for spam and sixth for virus infections (Eurostat 2012). In a report to ENISA in 2008 we recommended that comparable bank fraud statistics be recorded for all EU member states (Anderson and others 2008); such figures will be collected from 2012 for all seven eurozone countries. There will also be a further Eurostat survey of citizens' experiences of cybercrime in 2014. We will be interested to see whether fraud is higher in countries with good consumer protection, such as Finland and the Netherlands, or in countries with weak protection such as Britain, Latvia and Spain. It is noteworthy that the United States does not have central fraud reporting, a topic we'll revisit later.

Another variable that may bear watching is finality of settlement. In a previous study, we observed that fraudsters preferred to attack payment mechanisms with rapid final settlement, and to avoid those that permitted stolen funds to be clawed back for an extended time period (Anderson 2007). The Payment Services Directive imposed a uniform 48-hour settlement deadline for electronic transactions in the Single European Payment Area. Yet there are still variations. The U.K. government, for example, prodded banks to introduce a Faster Payments Service, which reduces the delay in electronic payments from one customer account to another from three days (under the old BACS system) to near real time. It will be interesting to see what this does for fraud; anecdotally, industry insiders suggest losses are on the uptick. We're not aware of any published data, but Faster Payments limits vary so widely from one bank to another (from £5,000 to £100,000) that we expect some interesting data in due course.

IV. Cybercrime Patterns

In order to put the likely risk evolution in context, it may be useful to consider the overall cybercrime picture. A recent study for the U.K. Ministry of Defense (Anderson and others 2012) classifies cybercrime into four categories:

1. Traditional offenses such as tax fraud and welfare fraud that are now classed as "cyber" by virtue of the fact that tax returns and welfare claims are filed online, but where the substance is much the same as a generation ago (in the case of tax and welfare fraud, misrepresentation of income/capital/relationships);

2. Offenses such as card fraud that have been around for a generation, but where both the modus operandi and the main countermeasures are changing rapidly with technology. The report calls these "transitional" offenses;

3. "Pure" cybercrimes against individual victims of a kind that did not exist offline, such as extortion using fake antivirus software;

4. "Platform" cybercrimes that provide illegal services to criminals committing offenses of types 2 and 3, such as the provision of botnets and cashout services.

The big picture is that in traditional frauds, the direct losses are much greater than either the costs in anticipation (such as security measures) and the costs in consequence (such as law enforcement); in pure cybercrimes, the reverse holds, with cybercriminals imposing billions of dollars of costs on the world economy while managing to steal only a few hundred million. Payment systems are a microcosm: the direct costs of card fraud ($9.2 billion) exceed the indirect ones ($2.4 billion) while for online bank fraud, the indirect costs are greater ($1 billion versus $690 million). In short, the more "modern" or "cyber" a payment system is, the harder it seems to be to defend it efficiently. This may be partly a learning effect, but externalities surely play a role, too.[1]

There is a further rider: if we include in the indirect costs an estimate of the opportunity costs—the value of business foregone, by both customers and merchants, because of the fear of fraud—then these numbers may be several times higher. The actual amounts are uncertain, but we can perhaps get defensible order-of-magnitude estimates from survey data. One Visa merchant survey, for example, suggested that merchants turn away $4 in business for every $1 they suffer in fraud (Khan, Hunt 2012). Yet it is not clear that all these $4 were lost to the economy; people who fail to shop at one website may shop at another or at a physical store. As a reasonable guess, we might end up with global indirect costs on the order of $10 billion for users and $20 billion for firms. (For a more detailed discussion, see Anderson et al. 2012.)

The takeaway message is that payment fraud is a large business. It's worth on the order of $10 billion a year to the bad guys—bigger than Facebook's turnover, but not as big as Google's. Specific defenses against fraud, and generic defenses against cybercrime, are worth maybe $3 billion each, while the indirect costs of cleanup and of lost business and confidence might be in the low tens of billions each. So if we include the indirect costs too, payment fraud might lie somewhere between Google and Microsoft in turnover. As for the growth prospects, fraud accounts for about 5 basis points of cardholder-present transactions but 30 basis points for cardholder-not-present. So if a further 10 percent of world GDP moves online over the next 10 years, we might see fraud increase by 0.025 percent of world GDP, which is $15.7 billion (though we'd hope we'd get better at fraud prevention and perhaps limit the rise to half that). It's important to realize that the move online is associated with real improvements in social welfare because of efficiency gains, and the same will almost certainly be true of mobile. Becker pointed out in the 1960s that the socially-optimal level of crime is not zero (Becker 1968), and that certainly holds for payments.

What's more, this isn't just a macro effect, of decreases in transaction costs improving welfare despite higher fraud; there are micro effects, too. The United States, for example, accounts for 47 percent of all card fraud despite generating only 27 percent of the transaction volume. This is partly because of much greater competition between issuers; they are reluctant to decline transactions as customers will just start using a different card (Business Wire2011). Yet no sane lawgiver

would want the United States issuing market to be as concentrated as the typical European one is. And if reasonably open mobile wallets take off, then there should be the same issuer competition as with cards; combined with the technological novelty and the strong externalities, this should lead us to expect a significant increase in fraud.[2]

V. Trends in Mobile Payment Systems

Mobile payment systems have been around for about a decade and are now widely used in less developed countries. A typical system, such as Kenya's M-PESA, lets a user access a bank account from a mobile phone, authenticating herself using a PIN that is encrypted in the SIM card and verified using standard banking technology. Payments can be made from one account to another by encrypted SMS messages. Such phone payment systems are expanding from phone-to-phone to phone-to-agent and even agent-to-agent; M-PESA does this, and Easypaisa is doing it in Pakistan. A phone payment system can thus grow into a physical network that looks somewhat like a bank branch system or a network of Western Union franchisees. The establishment of such systems in countries with poor banking systems leads to significant social gains; philanthropists such as the Gates Foundation have invested in supporting them (The Economist 2011).

A different technology, near-field communication (NFC) payment, was pioneered in Japan and introduced to the U.S. market in 2011. NFC is a radio communications standard designed to communicate with RFID (radio frequency identifier) tags, contactless smart cards and similar low-cost devices over a range of an inch or so. Contactless cards are already used in ticketing applications such as London's "Oyster" card for public transport. NFC technology allows a suitably equipped mobile phone or tablet to act as either the payment card, or the terminal, or both. Contactless payment used to involve dedicated tickets or cards talking to dedicated terminals; now it can become a software platform at one end or both, and this can support innovation in all sorts of new ways not just for payment but for apps such as transport and event ticketing, marketing coupons and loyalty programs.

An interesting general example is the Google Wallet.[3] This is a software app for the new NFC Android phones that supports NFC payments and enables other phone apps to interface to the payment system. Such phones contain a Secure Element (SE), a smart card chip mounted in a tamper-resistant package with an NFC chip and antenna. A bank can load a payment card into the SE chip in the form of a signed Java card applet; the user can then select it using the phone's screen and use it to pay, whether by tapping it against a payment terminal in a physical store, or by an online transaction. The wallet and its associated infrastructure deal with the tedious problems such as provisioning the phone with the right cards, revoking them should the phone be lost or stolen, and logging transactions to resolve disputes. (This is a simplified description; see Anderson 2011 for more detail.)

Mobile wallets will in future mediate access to the payment mechanism by other apps, which are assumed to be untrusted. Without this, an evil app could phish the user by saying "please enter your PIN to pay $2.50 to play this online game" while actually kicking off a large transaction elsewhere. By providing a trustworthy user interface and logging, the wallet can create a payment platform that supports innovation by other businesses. As Google is an advertising firm, their wallet is designed to support coupons and offers; platforms offered by other firms might have a different flavor. For example, Isis is a venture backed by Verizon, AT&T and others, working on standards for phone banking, prepaid cards and charge cards.[4] This will no doubt reflect the mobile operators' view of the world, as tends to be the case with the SIM-based payment platforms offered by operators in many less developed countries. And then there are the disruptive small entrants, such as Square, a company started by the founder of Twitter; its product line is aimed at challenging not just Google on wallets but VeriFone on terminals.

Darin Contini and others report a 2010 Federal Reserve meeting whose participants advocated an open platform for NFC payments, envisaging collaboration between financial regulators, the FCC, the FTC and bodies such as NACHA (Contini et al. 2011). They envisaged a single platform supporting multiple payment channels, from ACH to carrier billing, and common technical standards including dynamic data authentication (DDA) and for certification. They held out the hope that with the mobile phone used as a security tool for authentication at the point of sale and over the Internet, as well as in new NFC and peer-to-peer payment channels, there is a prospect of significant fraud reduction. Furthermore, eliminating physical cards would cut issuer costs, while removing magstripe data from merchant systems would cut the cost of PCI compliance. This vision helped guide industry players in the development of mobile wallets.

There are certainly cost savings to be aimed at, and the early experience of Google, Isis and others should help quantify them. But DDA is no panacea, and certification is hard, too. Europe rolled out EMV first, and has had many failures of hardware, software, protocol design and certification. Once the PIN entry devices (PEDs) used in EMV (chip and PIN) transactions were fielded at scale, terminal-tampering attacks turned out to be trivial, despite a much-trumpeted evaluation scheme (Drimer, Murdoch, Anderson 2008). We then discovered that a thief can use a stolen card (for which he does not know the PIN) by using an electronic device to manipulate communications between the card and the PED. The card believes it's doing a signature transaction while the PED believes that the card accepted an entered PIN; and this works regardless of whether DDA is used (Murdoch et al. 2010). The flaws in the DDA payment protocol design are simple enough but fixing them appears to be intractable because of the incentives facing different actors. Governance is hard in a payment system involving hundreds of vendors, tens of thousands of banks and millions of merchants. Everyone wants to cut costs and customize systems, both of which undermine security; and when a systemic vulnerability emerges, no one will step up to the plate. More complex value chains involving more diverse stakeholders will make governance even harder.

The killer is Wilkes' law. Imagine there's a sudden problem with relay attacks. At present, it's possible to connect a false EMV terminal remotely to a false card, so that when the victim buys coffee from a vending machine on which the false terminal has been fixed, a crook can take money from an ATM hundreds of miles away using the false card. With conventional EMV this requires specialist equipment, so it's not been industrialized at any scale (suspected losses are only in the hundreds of thousands). But once mobile phones do NFC, a crook can program one phone to act as a false terminal, and another to act as a false card. An attack that used to require serious engineering is now just a software app. This is Wilkes' law: "everything becomes software in the end." It applies to crime, too; while pick pocketing used to take long and arduous training, a pervasive mobile platform can reduce it to a piece of software that might take real skill to write, but can then be copied infinitely. Crimes can be pirated just as easily as music. Once a card cloning scam gets into widespread use, who's going to stop it, and how?

There are problems with carrier billing, whose viability is threatened by fraud according to some industry sources. First, there's a problem with malicious smartphone apps: most bad apps being removed from the Android app store in 2011 were dialers that called premium-rate numbers. Second, there's sharp growth in PBX fraud, where bad guys acquire accounts on corporate switchboards (often by exploiting default passwords) and use them to call premium-rate numbers. Third, enforcement against premium-rate fraud is poor; while victims are too dispersed to shout loudly, the telcos share the proceeds and so have no real incentive to crack down. Finally, no one really knows how much is being stolen, with estimates ranging from the low billions per annum globally right up into the tens of billions. If payments migrate to carrier billing on a large scale, this might become a big deal for financial regulators. But the fees for carrier billing are so high (typically 30 percent) that this channel competes mostly for virtual goods that sustain large markups, for poor customers and for tied services. And with chargebacks in some countries now over 20 percent, even these markets may become unviable. As phone malware spreads from China to the United States, we may see some interesting times.

The payment services associated with cybercrime also bear watching. At present the payment system of choice for scamsters is Western Union, as it enables scam victims to make irrevocable payments that can be collected immediately overseas in cash. Other payment systems are favored for internal use by the online criminal underworld—the people who herd botnets, operate pay-per-install services and trade financial credentials. For them, both irrevocability and untraceability are at a premium (Anderson 2007). A popular service was eGold, but after it was raided by the FBI the action appears to have moved to services based in Russia such as WebMoney. Other payment systems feed "High Yield Investment Programs," also known as postmodern Ponzi schemes. There's an ecosystem of such schemes which pay very high yields to early investors and then stop paying, supported by ratings agencies which track on a daily basis which schemes are paying and which aren't. Many "investors" seem aware they're Ponzi schemes, and hope to get in and out of a scheme quickly before it stops paying (Moore et al. 2012). We know little about

this ecosystem—we don't even know how many real principals lie behind it, let alone who they are. Perhaps the combination of phone payment networks with new international remittance services will open up new channels for laundering the proceeds of crime. The cautious regulator may prefer to tread carefully because of the net social gains from a more competitive remittance system; but those payment systems which serve only Ponzi schemes appear to break laws and merit investigation.

Pornography is big business online too, but rating firms such as FICO and Google are reluctant to try to tell the good from the bad and the ugly. Google, for example, will serve porn to those who ask for it, but won't optimize its search services for porn as it does in other sectors. There have been firms offering payment gateway services for pay sites but, as anyone familiar with the literature on adverse selection and moral hazard might expect, they have a bad history (Campbell 2005). The alternative to paid-for porn is free porn, but most pay-per-install services—villains who will install your choice of malware on thousands of machines in return for a modest payment—are linked to porn sites. The cost of free porn is often getting your machine infected (Wondracek et al. 2010). These problems will no doubt migrate to mobile platforms too as they become more pervasive.

The strategic risk with mobile payments generally is of an attack that makes fraud so easy that a platform or channel becomes unviable. The nightmare scenario of the wallet engineer is that malware on the mobile phone might take it over so comprehensively that a remote software attack becomes possible. If I can infect your phone, go into a shop, buy diamonds and bill the transaction to your phone while it sits quietly in your pocket, then its viability as a platform is at stake. Hardware security devices such as the Secure Element are designed to reduce such risks, but it's always possible that design error or governance failure could lead to catastrophe.

An optimist will take the view that disasters have been localized in the past. It's always been easy for a smart crook to loot a few accounts with a few million in them, but that doesn't threaten the system; and if someone invents a mass-pillage attack that can book a large volume of low-value debits, the problem is finding somewhere to send them without being caught. So far no one's managed to do that. Even the no-PIN attack has not been industrialized at any scale, and if the carrier billing mechanism breaks down because of fraud from mobile malware, it won't be the end of the world.

A pessimist will take the view that once all the authentication tokens we use in our lives—our credit cards, passports and car keys—become NFC apps on our mobile phones, we are creating a huge target and at the same time a serious governance problem. He will also argue that a constant low level of fraud can undermine confidence, dumping large opportunity costs elsewhere. (But then, that's already happened in countries with poor consumer protection like the U.K. and Latvia, and the world continues to turn; and phone vendors may be more motivated to fight malware than Microsoft used to be.)

VI. Where Else Might Competition Come From?

A large niche that may drive payment innovation is retail marketing. In the past, store loyalty cards have mutated into credit cards; the U.K. retailer Tesco launched a bank as a branding operation for the Royal Bank of Scotland (RBS) which handled its card issuance and ATM operations, then bought RBS out and set up a proper bank when RBS ran out of money in 2008. We already mentioned Facebook Payments; there is currently an explosion of interest in social marketing, with Groupon creating some excitement in the run-up to its IPO. There have also been rumblings from large retailers in some countries about setting up their own captive acquirers in order to cut card-processing fees. There are enough incentives here; the question is whether anyone capable will make a go of it.

Another possible source of new competition is managing merchants' risk. At present the heavyweight fraud-risk management is done by card issuers, as acquirers tend to be concentrated. Yet as more and more business goes online, merchants face an increasing share of the risk. The leading U.S. acquirer, First Data, is starting to offer risk management, but the industry perception is that the acquirer-side services are not yet as competitive as the issuer side.

Peer-to-peer payments are another source of competition. Some countries, like Germany, have almost abolished checks. U.K. banks said they would like to, but were stopped by the government, which worried about what might happen if the 9 million adults who do not currently bank online were suddenly forced to. But if I can no longer send my mum a check for the wool when she knits me a jersey, what am I to do? A number of startups have begun offering peer-to-peer payments, such as ZashPay and Popmoney. So far, they have tended to be bought by established players; these two firms were bought by Fiserv, whose model appears to be to buy payment service providers in many different niches, then industrialize them by improving the fraud detection and marketing.

Another class of financial-industry mold breaker is the low-cost remittance service. An example is oanda.com, a Canadian company that competes with high-street banks, Western Union and Hawala operators to help send money internationally at low cost. Oanda is a member of SWIFT; unlike traditional operators whose Forex rates include a bid-offer spread of 3 perecent to 10 percent, they offer interbank rates and a fixed fee of $25. According to Western Union's 2010 financial report, the main competitive factors in consumer remittances are brand, trust and distribution; building a direct competitor to their many thousands of franchisees in shops worldwide would be expensive. But with phone payment operators emerging in most LDC markets, a modern global payments business only has to link up to local or regional networks. The main problem now facing new payment market entrants, according to an executive of one of them, is the overenthusiastic interpretation of anti-money-laundering regulations, especially in the United States, which can lead to payments being blocked for days with no explanation or recourse.

A novel and controversial payment service is Bitcoin. This is a currency invented by "Satoshi Nakamoto," the pseudonym of an unknown cryptographer. People mine bitcoins by solving cryptographic puzzles and can then trade them; they are converted to and from U.S. dollars on a market run by several small firms. Bitcoins, being digital, have a number of features attractive to techies; there is a scripting language that enables you to make payments subject to time locks or other computational conditions. But their price depends entirely on demand in a small and not very efficient market; it peaked in June 2011 at almost $30, fell to under $3 by October 2011, and currently trades just over $5. It might be more accurate to think of them as bearer securities rather than currency: they are a store of value (of sorts) but not a medium of exchange except in that they can be traceless transferred from one holder to another. There is a concern that criminals with large botnets have been using their computational resources to mint bitcoin, and that they are used in Silk Road, an anonymous black market. This has led to U.S. senators calling for Bitcoin to be investigated by the U.S. Attorney General, and to bitcoin exchanges calling for the currency to be regulated (Bitcoin 2012).

The world of credit can also give us some pointers to possible future innovations in payments. Social credit has been established for some years, with the Grameen Bank earning its founder a Nobel Prize; there are now numerous online social lending systems such as zopa.com, prosper.com, lendingclub.com and smaba.de. These have a number of operational models; the "social" aspect can involve using social pressure to ensure payment or having individual lenders decide whether to offer loans. There may be privacy issues here as credit data can be disclosed to many potential lenders, and poorer borrowers are pushed to expose the private data of relatives (Böhme, Pötzsch 2010).

A recent development, from firms like Telrock, is to use a consumer's transaction stream for credit risk management. Cardholders who miss payments are encouraged to opt in to surveillance in order to escape aggressive calls, but get constant nagging and nudging instead: "How come you just spent $372 at Macy's when you need to make a card payment of $590?" This might conceivably be welfare-enhancing for people with poor self-control but also raises the question whether more "efficient" debt-collection mechanisms will be used to help the poor manage their finances better, or to get them deeper into debt, keep them there for longer and charge them even more. There is growing controversy in both the United States and the U.K. about payday lenders, with a new generation of online firms like wonga.com grabbing market share from old-fashioned pawnbrokers and check cashers despite interest and fees which can amount to thousands of percent per annum. Without regulation, we may see the emergence of a new underclass of digital sharecroppers, held in debt bondage by ever more sophisticated online and social tools. (In the United States, the concerns raised here may be more within the remit of the CFPB than the Fed but should still not be ignored.)

So far, we have not seen social mechanisms extending much into payment products. There are payments in social networks such as Facebook Credits, but

Facebook Credits is a centralized system used to levy a tax on user payments to game operators and other merchants operating within the Facebook ecosystem. (As Facebook takes 30 percent of all money spent via Facebook Credits, it's unlikely their system will spread beyond their tied services, digital goods and other niches unless the business model changes.)

We do know that more information sharing between banks helps cut risk of defaults (Jappelli, Pagano 2002) and could cut exposure to cybercrime (Moore, Clayton 2008). The FS-ISAC has existed for over a decade, and some banks are starting to get keen (Kapner 2012). But the most likely near-term future large-scale use of social data is by fraud analytics firms such as FICO that use dynamic profiles of cardholders to screen transactions on behalf of issuers; such firms do indeed see this as a hot opportunity (Zoldi 2012). Their systems cut fraud in cardholder-present transactions from 18 basis points in 1992 to 5 basis points now; if social data can be used to cut cardholder-not-present fraud from its current level of about 30 basis points, this could be a real benefit. Mobile data might also help: transaction location is already an input to some fraud engines. But the use of social and mobile data in fraud profiling might bring real problems of privacy and access.

VII. What Way Forward for Regulators?

The modern world demands ever more (and more complex) public goods—from a clean environment, through dependable critical infrastructure, to financial sustainability. Humanity's struggles to meet this challenge might be the defining story of the 21st century (Wolf 2012). The costs raise questions about the sustainable borders of the state, especially in post-industrial and post-credit-boom states with falling populations (Helm 2012). The upshot is that policymakers have to prioritize. But prioritize what?

Culture matters. In a recent review of the nuclear industry, *The Economist* wrote, "safety requires more than good engineering. It takes independent regulation and a meticulous, self-critical safety culture that endlessly searches for risks it might have missed" (*The Economist* 2012). Regulators can help shape culture over time. But which organizational cultures should be targeted, and with what interventions?

In the absence of a clear and present danger, the strategic priority of a smart regulator should be better information, so that when events suddenly demand action it has some hope of being effective. So let's summarize what we know about payment systems innovation. First, as the world moves online, fraud is likely to increase, as online card fraud is typically six times the level seen in face-to-face transactions. The net social welfare gains could still be considerable though. The same is happening with mobile payments, which are bringing huge social gains to countries like Kenya, Pakistan and South Africa, and will benefit the developed world too (though the revolution promised 10 years ago hasn't materialized yet).

Second, innovation in developed markets is likely to be driven by the high

costs of the existing core cartel. Competition can come from either insiders who break ranks, or external challengers—whether new platforms like mobile or social, niche services such as global remittances or consumer credit, or maybe even off-the-wall ideas like Bitcoin.

Third, cost pressures will push innovators to circumvent consumer protection if they can. This may cause governance failures and erode the incentives on industry players to fight fraud, leading not just to higher costs for consumers but overall. There may be real tensions between competition and security; monopolies may be better at managing the costs of crime in the short run but impose large social costs in the long run. Fourth, there is a small risk of a large-scale technical failure, whether a sudden catastrophic compromise, or a rolling governance failure of a payment ecology where no single player has the incentive to step into the breach.

Fifth, there is a risk of a confidence failure if ever more people experience fraud losses against which they could not have taken effective precautions. The uptake of e-commerce is already slower than it should be, and worse in countries with poor consumer protection (though opportunity costs are hard to measure with any precision).

Sixth, given that both technology and business models are changing rapidly, it makes little sense to regulate technical details such as whether consumer logons to electronic payment systems should use cryptographic challenge-response mechanisms rather than passwords. The important thing is to regulate desired outcomes, which boil down to an optimal combination of innovation, competition and traditional consumer protection (against fraud and privacy compromise). In fact one can see the regulator's job as the protection of consumers, defined slightly more broadly: it's about preventing not just the fraud and embarrassment of operational security failures, but also the high costs and lost innovation that follow failures of competition, and the asset losses that flow from institutional collapse.

Under the circumstances, the immediate priority for payment system regulators must be to get better information about what's happening. Some countries are taking steps towards this; Singapore tightened regulation post-Leeson, bringing technical experts into its discussions with bankers, while the Banque de France has set up an Observatory to measure fraud.[5] In work done for ENISA in 2008, we recommended that the EU collect comparable statistics on fraud across member states; from this year this will happen within the eurozone.

What I suggest for discussion is that the Federal Reserve set up a fraud analysis center, whose mission will be to collect fraud statistics not just for cards but for mobile and all other payment channels. There are several possible models to consider.

One option would be a pure public-sector body, centrally funded (as is the Banque de France's Observatory) and given the power by Congress to demand reports from all payment service providers. Another might use as a model the

National Cyber-Forensics & Training Alliance (NCFTA), the hub of America's cybercrime effort, which has a substantial public-sector input in the form of agents seconded from the FBI and the Secret Service, but which also works with the big service firms and with academics to turn data into both actionable intelligence and a strategic picture. A third model could be the private-sector firms that accumulate information for the benefit of subscribers; they include both for-profit firms like FICO and Nilson, and nonprofits such as the U.K. Card Association, which collects fraud statistics in Britain and shares them with member banks. It may be simplest to try voluntary pooling of information to begin with.

A good start might perhaps be made by collecting what's available publicly and asking both banks and other system operators politely for the data, giving overall estimates to the public and sharing better data with providers who cooperate and bona fide researchers. Links to academic researchers and to cybercrime bodies like NCFTA could add real value. Finally, no regulator should neglect payment system architecture, as this can define the platform for innovation and set the parameters within which consumer protection and competition are traded.

VIII. Conclusions

The world of payments is getting more complex, fast. Fraud is quite likely to rise as more and more transactions go online, and consumer protection is likely to be eroded as new payment systems fall outside the traditional frameworks. This could give rise to problems of access, consumer protection and privacy protection; if new monopolies emerge, or old governance structures fail, it might increase systemic risk. Regulators will face new challenges, and it's hard to predict what they will be.

Technical security is getting harder. Each new technology evolution starts up the arms race of attack and defense once more, and mobile is no exception. It also expands the circle of stakeholders in the payments system. The nonbank players used to be specialist service firms like First Data and FICO; now they include Microsoft, Google, Apple, hundreds of mobile network operators and thousands of app developers. The governance issues of dealing with compromises are going to be seriously difficult. (Privacy may be harder still, but is likely to be driven by European data protection law more than by U.S. regulatory action.)

Yet America needs better data on fraud, as do we all. Defensible statistics for card payments will not be enough. Analysts need to be able to watch what's happening with mobile, with other new competitors, with telcos, with Facebook and with niche channels too. Financial supervisors have a vital role here. Eventually the Fed may decide to ask Congress for the regulatory power to collect data from all payment service providers; meanwhile a start can be made by building links, sharing data on a voluntary basis and growing the capability organically. Others, such as NCFTA and NACHA, may look for actionable intelligence; someone should be analyzing data for the strategic picture, and that might well be a role for the Fed.

Finally, although sharing information helps, compelling sharing could be difficult. The stakeholders are many and diverse, and mobile payments touch the turf of many government agencies. An appeal to providers' enlightened self-interest may be quicker than legislation, and a multistakeholder approach may work better anyway.

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Endnotes

[1]These figures give no more than order-of-magnitude indications; Nilson puts global card fraud at $7.6 billion (Business Wire 2011). There is also an open question about the proportion of general "cyber" defense costs to apportion to the prevention of online payment fraud (these costs include $3.4 billion expenditure on antivirus software and similar measures, and a whopping $20 billion for the costs to users and firms of cleaning up infected machines).

[2]The mobile value chain is also more complex. The processor designer may invent a new access control mechanism, but has to sell it to the chip designer, get it supported by the operating system vendor and then promote it to wallet designers. An operating system upgrade is only rolled out if both the handset vendor and the mobile network operator agree. As a result, most smartphone handsets have exploitable vulnerabilities.

[3]Full disclosure: I worked on the design of the Google Wallet in January-February 2011 while on sabbatical as a visiting scientist at Google.

[4]See *http://www.paywithisis.com.*

[5]See *http://www.banque-france.fr/observatoire/home.htm.* The Observatory was set up by a specific law with representatives from issuers, merchants, consumers and experts.

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Risk and Privacy Implications of Consumer Payment Innovation in the Connected Age
Commentary

Alessandro Acquisti

It is always a pleasure to read a new paper by Professor Anderson. There is always something new to learn. Especially in this case. Mobile payments are not my research focus. My research focus is the economics and behavior economics of privacy. When you have a hammer, everything looks like a nail. So, I will focus my remarks on the privacy angle in Professor Anderson's arguments. First, however, I will briefly summarize what I thought were the main key points in the paper.

There exist dominant players in the payments industry—no doubt. But there are many challengers, too. Therefore, complexity is growing and governance is becoming more difficult. Innovation in this area may increase fraud—but that may be a price worth paying, considering the welfare benefits that more mobile technologies can bring.

Therefore, Professor Anderson's recommendation is: "Do not be afraid of innovation. In fact, foster innovation. Try indeed to create some formal central reporting of fraud, as has been happening in other countries."

Among these points, perhaps the conclusions which I found most interesting were the predictions Professor Anderson makes—and I find them reasonable predictions: with mobile payments, we probably will see an uptick in fraud and an uptick in complexity. I found that reasonable to expect; I am in fact going to push the envelope here, and consider other cases where fraud may become more common and other reasons why complexity could cause more fraud. But then, I will also try to invert the cards, and discuss an alternative scenario where, in fact, these technologies are going to bring less fraud and less complexity. Then, I will twist the cards once more, to suggest that less fraud and less complexity are not necessarily always a good thing.

Bear with me. Hopefully, I will get there, and hopefully I will be clear.

So, let me start with more fraud. There is a stream of academic research which combines computer science, psychology, cognitive research and usability studies, and which focuses on the security and the usability of security systems—for instance, how people respond to security warnings. It is a fairly recent literature—the first paper in this area was from 1999. Alma Whitten, at the time at Carnegie Mellon University (she now is director of privacy at Google), wrote a paper with a very catchy title, "Why Johnny Can't Encrypt." She ran some experiments with smart students—of course, they were CMU students—giving them encryption technologies to protect their data, only to find out that the students believed they had protected their data, but in fact they had not. This is the worst-case scenario—people believing they are protecting themselves and therefore acting under that belief—when in fact they are not protecting themselves.

This stream of research is recent, only 10 years or so old. There is an even more recent stream of research, which focuses on usability of security and privacy on mobile devices. Security and privacy on mobile devices represent a worst-case scenario, in the sense it is already hard to properly display security information on desktops (many security signals are hard to comprehend unless you have a computer science background. Figure 1 is a typical message telling the consumer or the Internet user: "Aw, there is something not so good about the website where you are about to go." It then proposes a number of choices the average Internet user may not be equipped to choose among. Well, when you translate these signals into the mobile world, you have a seemingly different problem. You now have messages which succeed in being simultaneously very terse and ominous.

Figure 2 is an example of another—PhotoSpy, which wants to access your photos. You do not know exactly what PhotoSpy will do with your photos. But you are there, using your device, probably doing something else under a state of cognitive load (because maybe you are driving, maybe you are in a store, and you are not paying much attention). The "OK" button, which is the one highlighted, is big. So you click on it—maybe even when the messages are even more ominous. I would say that, in this sense, the more we will be using mobile payments, the more we will face these kinds of challenges.

The good thing about mobile payments is that they should be really easy to use—seamless to use. Otherwise, why not use credit cards? But the more seamless and invisible they become, the less attention they require from the user. That also means, however, that the more vulnerable they leave us to social engineering attacks (which tend in fact, to focus on user inattention).

A second problem Professor Anderson was referring to is the fragmented payment ecosystem. There are up to 300 different electronic payments systems listed on Wikipedia. The ecosystem is very fragmented—and the problem is that, as economic historians know very well, the best technology does not always win. For instance, consider a very significant problem—the fact that many payment systems still use passwords confusing together identification and authentication. Identification is a

Figure 1

Figure 2

process through which you tell a system who you are. Authentication is a process through which you prove you are who you claim to be. When you are using credit cards, you are providing to the entity which receives your credit card number the information needed for impersonating you. If another party just has your credit card number and the three digits on the back of your card, they can impersonate you (authenticate themselves as if they were you).

Well, we have had much better authentication (and payment) technologies than that for many, many years. Let me give you an example. Figure 3 depicts a very well-known protocol to those of you who have a CS background. It may be less known among economists: It is a blind signature. The blind signature was a protocol developed in the 1980s by David Chaum. It then was transformed by Stefan Brands into anonymous credentials, which can be used for anonymous payments, in which you have at the same time authentication separated from identification. The idea is analogous to making a carbon copy. Do you remember carbon copy paper, through which you can write something on the first sheet, and that something transfers down as you press onto the second sheet? Imagine that you put a piece of paper together with carbon paper inside an envelope and you give the envelope to the bank together with a payment for $1. The bank receives the $1 from you, knows who you are, puts a stamp signature on the outside of the envelope and gives you back the envelope. The signature, because there is a carbon copy, has now been copied onto the sheet of paper inside the envelope, which the bank has never seen. So, now you can open the envelope and you have a document, signed by the bank, worth $1. While the bank can recognize the document as a valid $1 bill, it cannot recognize it as your bill, so you can spend it at any merchant—achieving full authentication (complete payment) but no identification (anonymity). Arguably, this is a more secure method than just passing a password. But do we have an existing payment system using this technology? Not really. In the United States only one bank was providing this payment—it was called eCash—only for a few years, because this technology did not go anywhere.

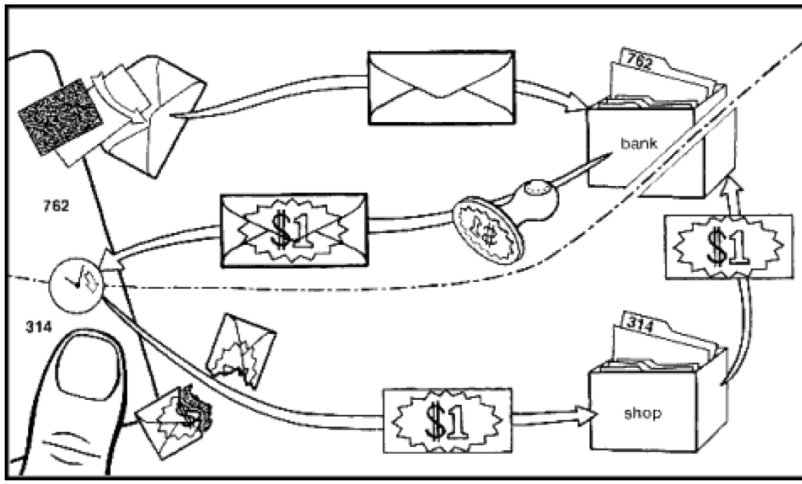
So, yes, I agree that we can have more fraud and more complexity with mobile payments. However, I also wanted to propose a different angle—the angle from which we have less fraud and less complexity. And then I will also mention, why I do not think this would necessarily always be a good thing.

In order to explain that, I would like to invoke two buzz words—one of them "social" has already appeared many times today. The other appears at any conference on privacy nowadays—so I guess I will be guilty of being the first to bring it up today: "big data." So we have "social" and "big data"—the two buzz words.

Of course, companies involved in mobile technologies have an interest in going social, in entering social networks (either coordinating with existing ones like Google+, Facebook, or creating their own). The two buzzwords (big data and social), reinforce each other, in the sense that the larger the social network you have,

Figure 3

Blind Signature and Electronic Cash



the more social data you can create. The more data you can create, the better your social network becomes. The better your social network becomes, the better you are able to target marketing information, products, and so forth.

This is good. In fact, it can create less complexity, in the sense that, as you can imagine, social networks and big data are inherently about network externalities—economies of scale and economies of scope. Facebook and Google+ are the prototypical network goods: You do not want to be in a network where no one else is! However, these networks may also suffer from negative network externalities: The moment when your grandmother is on Facebook, may become the moment you start moving your profile elsewhere (in reality, Facebook has succeeded in passing this threshold somehow unscathed). The success of the network also creates economies of scope, in that once you have so much data about people, you can start creating lots of new products. No longer only the social network itself; you can start innovating in mobile payments, too.

It is possible however, that in the future this virtuous cycle between social and big data—big data and social, social and big data—will also lead to concentration and standardization in the mobile payment industry.

This, in turn, can decrease the risk of fraud in mobile payments—because it allows providers to switch from authentication of individuals to authentication of transactions. Once you have so much data about people, you can recognize their behavior. Each behavior is a signature, and you can calculate instantly what the probability is that this person making a purchase from this type of store at this time of day from this location is really Alessandro Acquisti.

Credit card companies are already doing it, of course. Now, imagine expanding what credit card companies are doing based purely on transactional data, to what they can do when social network data is also combined.

These are the good things. But there is also, let us call it, a "dark side" to concentration and standardization and network externalities. One of the dark sides is, potentially, a decrease in competition. As you have more data, more network externalities, and the ability to combine big data and social, you start facing the temptation also to expand your business into different areas. Indeed, many of the large players in the Internet industry in recent months—in fact in recent weeks—have been accused of doing exactly that.

As a little exercise, a couple nights ago, I simply went to Google and I typed a name of a large Internet or Silicon Valley player, and then added to that the word "forces," and then I looked at what responses I received, using Google's auto-complete. It turns out that, nowadays, everyone is being accused of forcing someone else to do something. Apple is being accused of forcing a PC maker to stop making Acer ultrabooks because they compete with Apple MacBook Air or the iPad. Microsoft is being accused of blocking computer hardware from booting competing operating systems. Google is being accused of pushing Android developers to only use Google Wallet. I have not forgotten about Facebook, by the way. I am getting there in a second.

In terms of privacy externalities, the second potential danger here is the fact that, if you believe the network externality story, you also must conclude, that for those who want to protect their privacy, the costs of doing so is becoming larger and larger. Let me give you an example. There are more and more newspapers in this country that use Facebook Connect for their own commenting systems. Before, if you wanted to comment anonymously on the *Los Angeles Times*, you could do so. Now you cannot, unless you deliberately violate Facebook terms of services (because to comment on *The Times* you must be member of Facebook, and under Facebook terms of services, you are supposed to join with a profile that uses your real first and last name. Not everybody does that, but now you are in violation of the terms of services if you do not).

You can export this challenge to the mobile payments story, and see how—as more and more people start using, for instance, Facebook Credits for payments—then, more and more merchants will start using that too. But then, people who do not want to use Facebook may not be able to buy from these merchants.

Another story. Privacy as control over personal information, or privacy as protection from the control others have over you, once they have information about you? Once again, it is about the power of networks: once they become larger, their ability to influence your behavior in other parts of your life increases.

Take, as an example, Facebook's recent change in policies. If you sign up now, you are agreeing not only not to use the term "Facebook" as a trademark, but also

not even the term "book" or the term "face." So, in this instance, a company tries to expand its claims over the right of its users, once it has reached a certain size and power.

So, bringing this all back to where we started: my point is that mobile payments are both the products and the drivers of acceleration in economic and social changes. We cannot fully predict where they will bring us. You can imagine science fiction scenarios (which are not that much science fiction any longer). You can imagine how—and we are already starting to see this—years ago we went on the Internet to search for information, but now we go there looking for suggestions (there are more and more tools, like Yelp, that provide you with suggestions about where you can go). And then from suggestions, we get into decisions. I was browsing the Internet just a few minutes ago, and I was checking out an application which can choose automatically the perfect seat on your next flight for you. You choose your settings once, and then this app checks with the airlines every four hours, to see whether a seat better matching your needs has popped up. It is good, because automatically it takes the pain of searching for better seats away from you. And then, the next, step, is that you can also get into automatic payments: eBay did something along those lines a few years ago, allowing users to structure bids so that a certain item could be automatically bid upon.

So, finally, you can imagine now a complete sequence in which the future of payment technology is its own disappearance, in that you no longer even need a mobile phone or a smart card. The system knows exactly what you want, before even you know it, and buys it for you. Is it science fiction, or are we just 10 years away from that?

And this can be good, too. It can increase welfare. But…welfare for which party exactly, and at what cost? The now obligatory mosquito bite analogy (to paraphrase Professor Farrell) is the following: in the case of privacy, privacy costs are the mosquito bite. They are very small. You may not even notice them. But over a large number of people, over a long enough period of time, the bites amount to a very, very large transfer of wealth. Thanks.

Risk and Privacy Implications of Consumer Payment Innovation in the Connected Age
Commentary

Sarah Jane Hughes

Mobile payments present both new—and very traditional—challenges. In this paper, I address these challenges through a series of questions that, if I were designing a new payment method or if I were choosing among several to use, I would want to consider. Before I present these questions, however, I would like to offer three general observations.

The first is that payments providers' innovations are removing them, in whole or part, from traditional regulatory regimes. Finding new "spaces" in which to create new products and services to make payments faster, easier and possibly less costly, is a good thing. Leaving established regulatory regimes, however, carries a cost to providers and their partners: to the extent that consumers and perhaps merchants who take payments are uncertain of the rights and responsibilities they will have under new payment products, adoption of new products may be slower than it otherwise might be.

The second is, to the extent that one of these new providers experiences a major incident—whether a cyber-attack or merely a criminal intrusion into their system—and the public learns about it or individual consumers or merchants suffer losses as a result, concerns about what happens to consumers using the same or similar products are likely to arise. If we were to experience multiple incidents across multiple providers, as the cyber-events of 2010 and 2011 with payments processors and cloud computing services evidence may happen, consumers may race back toward the regulated forms of payments they already know, such as debit and credit cards swiped physically at merchants and ATMs, or checks.

My third observation is linked to the first. Despite the fact that the providers and the technology undergirding mobile payments are moving away from established regulatory regimes, a system in which only contracts govern payments (or in which significant issues are not governed even by contract provisions) imposes new costs on the participants in payments—the consumer or other end users, the

merchants or middlemen, the providers of payments bridges such as credit and debit interchanges or nonbank mobile payments providers, and the holders of funds being transferred, whether depositary institutions or not. Thus, in considering how to frame a new payment product from a business perspective, we must anticipate the types of problems the payment product and the participants in the overall progress of a payment transaction may have and deal with them—or decide not to do so and figure it out later if something goes wrong. The wait-until-later approach is more likely to impose unexpected costs than not. Someone in the payment transaction will absorb these external costs. It is highly desirable, in terms of encouraging adoption, for the risks of errors, fraud, and criminal events to be allocated in advance of the events. This is what payments law and payments contracts do.[1] In addition, the change-in-terms model currently operating in Internet-based transactions—in which the provider unilaterally makes changes and the changes go into effect the nanosecond they are posted on the provider's website—won't work in mobile payments. Payors and payees need to know precisely what will happen to the payment instruction and payment receipt they are about to engage in. Any uncertainty of how a particular payment will operate will cause a delay in adoption or an abandonment of one mobile payment provider's products for another provider's product that operates on a more stable contract platform.

My analysis starts with the premise that every payment system—in the United States, at least—presents similar challenges that need to be addressed. Some of these challenges depend on the channel being used for the payment, whether checks, debit, credit, wire transfers, ACH, or mobile. Some of these do not. The fact that the payment system arises outside an established regulatory system is significant because it means that users, applying their experiences from other payments systems they have used, are likely to be surprised. These challenges need to be addressed in the system design and contracts and to be expressed clearly upfront: they cannot be left behind for later consideration. As noted above, an important side observation here is that the model for changes in terms on the Internet —where the provider makes occasional unilateral changes and the changes go into immediate effect following their posting—will not work in the mobile payments arena because users need to know in advance what rules govern the payments they are about to make.

For this presentation, I focused on three clusters of basic issues, which I have presented as a series of questions without much additional exposition.

Issues Relating to Payment Execution and Consumer Protection

As at the advent of e-commerce when proponents argued it should not be "regulated" for fear of stifling innovation,[2] we are hearing the same calls now with new payments products. I would argue that payments are payments and that certain basic issues require attention in contracts between provider and user, among providers and other participants facilitating the payment, and, as appropriate, between providers and government—but, in the latter case, for somewhat different reasons I describe in

greater detail below. But, more importantly, I would argue that most of the issues in fact are closely related to issues in traditional payments law.[3]

The basic questions I recommend that designers of mobile payment products and prospective users consider pertain to most types of payments being executed in the United States without regard to the "channel"—depositary or nondepositary—being used as the provider of the payment services involved. As most of these questions will be familiar to professionals in the broader payments industry, I do not offer detailed explanations of them or the differences that may exist between or among payment systems in this paper.[4]

1. If funds are deposited with the payment system, are those funds protected—by deposit insurance, state money-transmitter bonds, or not at all—so that the depositor is guaranteed completion of a payment instruction or redemption of the credits reflecting the deposit?

2. Are there limits—as there were with traditional savings accounts—on how and when the depositor may redeem the credits they have with the payment system provider?

3. Are sufficient authentication methods in place to deter unauthorized or altered payments? Or the redirection of validly issued payment instructions to someone other than the beneficiary originally specified?

4. How quickly does the specified beneficiary receive the payment?[5] Are likely delays in sending or crediting disclosed at the time the consumer "sends" the payment instruction?

5. Does the consumer receive a confirmation or other usable record of the payment for later purposes? How quickly does the consumer receive this confirmation or record?[6]

6. When does the discharge of the payment obligation occur? What rules govern if the payment instruction is not executed? Whether by dishonor or system failure or outage?

7. Are damages available for misdirection, failure to complete the payment on a timely basis, or for the lack of proper authentication? Are incidental damages allowed? Are consequential damages—such as late payment charges for delayed payments or as loss-of-bargain damages—available without an express agreement allowing them?

8. What charge(s), if any, will the consumer pay to make a mobile payment? Will charges be per transaction or a periodic fee? How and when will charges be collected? By the provider? By the merchant? Otherwise?

9. What rules govern the ability of the provider to change terms in any contract the provider has with the consumer? How frequently and with what length

and type of notice may providers change the terms of service? What options exist for consumers to opt out of any changes?

10. What rules govern substantive error resolution? Are these rules readily available to the consumer? Are they easy to understand and follow? Do federal or state laws also govern error resolution? What recourse will the consumer have in the event that the error resolution provisions of their contract with the provider or other procedure available does not satisfy the consumer? Access to litigation? Access to arbitration?

11. How long will the consumer have to report errors of amount, authorization, duplication, or misdirection? To whom will the consumer report any suspected error?

12. What contractual or regulatory liability limits protect the consumer in the event of unauthorized payments? What does the consumer have to do to invoke those limits? Is the consumer's opportunity to invoke liability limits time-limited?

13. Beyond immediate confirmation messages or copies of receipts, what type of periodic statement will the consumer receive to allow a review of all payments made via the provider's services during a particular period of time? How much information will the periodic statement, confirmation or copy contain?

14. What are the consequences for the consumer sender of a payment instruction if the payment provider files for bankruptcy protection or is closed by government authorities? What happens if a payments intermediary files for bankruptcy protection?

Consumer Issues that Depend on the Payment Channel Being Used

Different *sources of law* currently govern mobile payments made through direct bank account access and relevant applications (payments that should be referred to as "mobile banking") and payments made through nondepositary providers including, but not limited to, telecommunications companies (payments that should be referred to as "mobile payments").[7] For payments that are made via mobile devices and associated software as the "access devices" for payments from demand deposit accounts,[8] I recommend we use the term "mobile payments" so that the taxonomy of payments in these spheres stays as uniform as possible.

Mobile banking transactions are governed by the federal Electronic Fund Transfer Act[9] as well as by contracts between the bank and its customer. Mobile payment transactions currently are governed by a mix of state laws, including laws governing "money transmission" and "money services,"[10] and by whatever contract provisions govern the telecom-customer relationship. As of May 1, 2012, as I was recreating this paper from the original PowerPoint presentation, the FCC had not adopted any regulations that affect the pure payments portion of the relationship—even though it has other spectrum regulations and the like in effect.[11]

The types of questions that affect the telecom-customer relationship and the nontelecom provider-customer relationship may offer different avenues or needs for regulation. For example, one can imagine that near-field mobile payments may present issues different from more remote payments that function with special "apps."

The disparity between the regulation of mobile payments made via access devices directly between the sender's demand account to a merchant, and those that use processing intermediaries including telecom and other nondepositary providers to handle such payments is likely to remain until Congress acts.

Issues Pertaining to Privacy, Data Security, and Government Access

Mobile payments are likely to involve no fewer participants or individual data streams—and probably more of each. This much seems likely: the greater the number of hands through which a mobile payment instruction must pass, the greater the risks to privacy, data security, and, frankly, to government access.

I recommend that providers, users and potential regulators consider the following questions:

1. How does the payment provider protect the integrity of the payment information in transit and in storage, of the consumer's identity and the transaction data?
2. Is the provider's channel subject to federal or state privacy laws, or both?
3. Is the provider's channel subject to federal data safeguards and disposal laws and regulations, or to state data security laws?[12]
4. How may the channel affect government access to the payment and consumer information embedded in the payment instruction/message?
5. Will the consumer sender be able to recover damages (actual, consequential, or incidental) suffered? Will damages related to identity theft, if any, be recoverable? On what standard? Even in an arbitral forum?
6. Will providers recognize a duty to notify consumers in the event of an interruption the timely execution of a payment or in the event of a cyber-event affecting the data about consumer payment transactions executed by or through this provider or processor that is in addition to any statutory duty to notify the provider may have?

Data Storage and Retrieval Issues

This subset of issues covers very important questions. The duration and location of storage will affect significantly access to payments instructions in litigation and otherwise.

1. How long and where (physically or in the cloud) will records of transmitted payment instructions be stored? Which government agencies, federal or state,

regulate record retention for payment instructions and the accompanying deposit, sender and beneficiary information?[13]

2. How long may the consumer sender have access to these records? (Certain online banking records are available only for 72 days.)

3. How much does/will the provider charge the consumer sender for "copies" of records the consumer sender may need later to prove that the consumer made the payment?

Some Concluding Observations

In this presentation I outlined the types of issues that arise in payments generally and identified those that have particular pertinence to mobile payments. I do not intend to call for a particular form of regulation of nondepositary provided mobile payments. Rather, the purpose of this presentation is to inform those preparing to offer mobile payments products, consumers interested in using them, and governments that regulate payments for a range of purposes about the types of payments issues that mobile payments present with particular emphasis on new risks and new types of exposure of payments instructions to risks relating to data security, government access, and transaction execution.

My greatest concerns have little to do with reliable providers, depositary-based or not. Rather, they relate to the functional equivalents of the "wildcat" banks that were sprinkled over the Midwest in the 19th century and whose obligations were based on so little capital that holders of their notes and script often were unable to access the funds that the instruments evidenced.[14] To the extent that rogue providers enter this space and cause losses to consumers, merchants, and others in the payments processing systems, or that cyber-criminals infiltrate and siphon off funds intended for others, consumer and merchant adoption of mobile payments may slow. Whether slower adoption is a collective good or not, is a question for another day.

Endnotes

[1]System rules may lessen this risk, but they do not entirely resolve it for two reasons. First, consumers tend to be ill-informed about system rules so they may not realize that the rules can help them resolve issues. Second, system rules often only apply to entities that subscribe to the system, such as with ECCHO, even if they often benefit consumers indirectly. In the absence of a provision such as Uniform Commercial Code §4-103, which incorporates Federal Reserve regulations and operating circulars and local clearing house rules as if all participants had expressly agreed to be bound by them, in payments transactions to which the UCC's Article 4 does not apply, this provision is only available by analogy.

[2]For a recent example of this type of argument and the concerns it engenders in other providers, I note that brick-and-mortar business owners in Indiana, including the Simon Mall Group, forced a deal under which the warehouse operations in the state will pay sales taxes by arguing that leaving Amazon.com free of the tax created an unlevel playing field between e-commerce and brick-and-mortar operations. "Indiana reaches online sales tax deal with Amazon.com," *Indianapolis Business Journal*, Jan. 9, 2012, *http://www.ibj.com/indiana-reaches-online-sales-tax-deal-with-amazoncom/PARAMS/article/31851 (reporting that Amazon.com will start paying Internet sales tax in 2014).*

[3]In this connection I urge readers to read the invaluable article by the ABA Task Force on Stored-Value Cards titled "A Commercial Lawyer's Take on the Electronic Purse: An Analysis of Commercial Law Issues Associated with Stored-Value Cards and Electronic Money," 52 *The Business Lawyer*, 653 (1997).

[4]I intend to consider these issues more fully in another paper in the near future.

[5]The paper presented by Bruce J. Summers, Ph.D., on March 30, 2012, at this conference titled "Facilitating Consumer Payment Innovation through Changes in Clearing and Settlement," which introduces fascinating (and possibly also fraught) prospects of real-time settlement of payments made on mobile devices, a paper that everyone interested in mobile payments should read. I would observe for the purposes of my paper that, although a boon to merchants and other direct counterparties of the person issuing the payment instruction, real-time settlement has the prospect to attract criminals to the mobile payments arena, those interested in taking the money and running.

[6]One of the best authentication and verification features of many mobile payments products is the sender's receipt of a prompt confirmation of the transaction. Arguably, confirmation received on the mobile device will provide more lasting, and far more secure, records for the sender. Their only deficit relates to issues about how the confirmations will be used later to prove payments when the sender and payee are not in the same locations at the time questions about the payment may arise.

[7]For this crisp distinction between "mobile banking" and "mobile payments," I am indebted to Philip Keitel of the Federal Reserve Bank of Philadelphia whose

essay titled "Contactless Consumer Payments: A Review of Rules, Laws, and Regulations That Apply to Over-the-Air Communication of Consumers' Payment Information" will appear in the forthcoming anthology of essays about Radio Frequency Devices and Other Near-Field Communications that I am co-editing for the American Bar Association.

[8]The Electronic Fund Transfer Act defines the term "accepted card or other means of access" as "a card, code, or other means of access to a consumer's account for the purpose of initiating electronic fund transfers when the person to whom such card or other means of access was issued has requested and received or has signed or has used, or authorized another to use, such card or other means of access for the purpose of transferring money between accounts or obtaining money, property, labor, or services" 15 U.S.C. §1693a(1) (2010). The term "account" is defined as "a demand deposit, savings deposit, or other asset account (other than an occasional or incidental credit balance in an open end credit plan as defined in section 103(i) of this Act), as described in regulations of the Board, established primarily for personal, family, or household purposes, but such term does not include an account held by a financial institution pursuant to a bona fide trust agreement" 15 U.S.C. §1963a(2). I also note that the term "electronic fund transfer" includes electronic payments initiated through "telephonic instruments" or "computer or magnetic tape" so long as the transaction orders, instructs or otherwise authorizes a financial institution to debit or credit an account 15 U.S.C. 1693a(6).

[9]15 U.S.C. §§1693-1693r (2010), Pub. L.90-321,92 Stat. 3728 (Nov. 10, 1978).

[10]A few states, such as Montana and South Carolina, have no laws or regulations governing money transmission or money services. For a complete listing of state statutes governing money transmission and money services, see *www.ncsl.org*.

[11]For a discussion of spectrum regulations affecting near-field communications, see Gregg P. Skall's essay titled "RFID Frequency Issues" in the forthcoming anthology of essays from the American Bar Association. Mr. Skall is a partner in the firm of Womble Carlyle Sandridge & Rice PLLC in Washington, D.C. He can be reached at 202-857-4441 or gskall@wcsr.com.

[12]At the federal level, only "financial institutions" as defined in the Right to Financial Privacy Act of 1978, 12 U.S.C. §3402 (2010), Pub. L. 95-630, 92 Stat. 3697 (Nov. 10, 1978) are covered by the Act and only when the government agency making the request is an agency of the federal government. The definition of "financial institution" was last amended by the Intelligence Authorization Act for Fiscal Year 2004, Pub. L. 108-177 (Dec. 13, 2003), incorporating every provider designated as a "financial entity" for purposes of the Bank Secrecy Act, 31 U.S.C. §5312(a)(2) (2010). Telecommunications providers are not "financial institutions" or "financial entities" for these purposes at this point.

[13]Depositary institutions are required to maintain records of payment and deposit transactions for a period of seven years. Telecomm providers are not yet

subject to similar requirements, and mobile payments providers who fall into neither category seem to have no record maintenance requirements except as the providers themselves may decide to have.

[14]For a history of wildcat banking, see Gerald P. Dwyer Jr., "Wildcat Banking, Banking Panics, and Free Banking in the United States," Federal Reserve Bank of Atlanta, *Economic Review* 1 (December 1996), available at *http://www.frbatlanta.org/filelegacydocs/acfce.pdf*.

General Discussion

Session 3

Mr. Anderson: Thank you. I will only speak briefly. We have heard some interesting points here, especially about the extra things people want to be able do, such as proving they have discharged their obligation or perhaps even having privacy of some kind against some types of government access issues.

Perhaps a good top-level way of looking at this is that systems engineering is all about managing complexity. Perhaps a third of big IT projects in industry fail and this is the same as it was in 1970.

Have we learned anything from 40 years' worth of studying software engineering and building ever more complex tools to manage complexity? No, we just build bigger, better disasters. You keep on rolling the stone up the complexity mountain, and a certain proportion of them fall off. So how you manage complexity is important. The evolutionary environment of your system also matters.

Now there are a couple of extremes here. One extreme is Odlyzko's Law, which says any system you can program eventually becomes so complex that it is unusable and you want to throw it at the wall in frustration. This happens and it does not matter whether it is a PC or a laptop or a phone or a computer game or whatever. And why? It is simple micro-economics, because whenever anybody suggests a new feature be added, the people who want the new feature are a concentrated and vocal interest, whereas the costs of this—the slightly increased probability of a blue screen of death—fall on everybody. So you end up getting complex and buggy machines for exactly the same reason we end up getting agricultural subsidies.

At the other end, Hal mentioned the Downton Abbey thing. This is actually very appropriate, because the goal of technology is often to enable the ordinary middle-class guy to live the way the upper class did a generation ago. When you think about it, we have laptops to do the jobs that were formerly done by secretaries and we have cars to do the work formerly done by coachmen. In an ideal world,

we want things like payments to be completely painless: we want to be recognized, and we want to be sent the bill—like a 19th century nobleman going in to a tradesman on High Street.

This enormous gap between the heaven of Downton Abbey and the hell of featuritis is what the designer has to somehow navigate. Now the problem is that, for most of the world, you are not in a position of having your own machine made by a company like Apple that was run by somebody who is a maniac for design. Systems come out of a long process of evolution, whereby there are various incentives facing the various players.

When you start talking about the trade-offs, such as fraud versus privacy or speed versus resilience to abuse, then I think the key question is this: What is the evolutionary environment of the mobile payment system? Which are the more concentrated and the more effective stakeholders? Will the environment be entirely molded by the Barclays Banks, the Wal-Marts, and the Googles? Will there be regulatory pressure as well? Will there be pressure coming from the civil court system through tort claims and contract cases and so on? How do we arrange things? How do we do the mechanism design so you end up with a payments system which has a reasonable equilibrium we can live with?

Mr. Fish: I will open up Q&A with a question of my own and then we will take questions from the floor.

I know from my work there is the big BYOD (bring your own device) movement, where consumers want to use their personal devices at work. And organizations are being forced into this, because they need to support that for their employees, but they feel this represents their No. 1 security risk.

You had discussed how payment applications tend to be insecure and, unlike a credit card, this now puts the enterprise at risk. Do you see a situation where an enterprise can now hold a payment provider liable for a breach that occurred because of their software?

Mr. Anderson: A big problem, of course, facing a medium-sized company, like I suppose Cambridge University with a few thousand employees and a few hundred million a year of turnover, is what happens if your finance department gets spear-phished. That is the big threat nowadays, because as a corporate body, you do not have the protections offered to a consumer. You are supposed to be a grown-up. And yet, when we look at the types of compromise that happen nowadays, very often the bad guy manages to get, say, 30 of the 50 guys in your finance division.

Old-fashioned accounting rules do not necessarily help there, because double-entry bookkeeping rules were invented to deal with one dishonest person, or alternatively one compromised machine. Once you have three or four, all bets are off. So there may be a case to be made for diversity of platforms.

Alternatively, you may want to make a case saying now consumer electronics have made devices so cheap—this is something I have actually recommended to organizations—you should see to it that your serious money bank account payments are made on a machine that is never used for any other purpose at all. Have an iPad that is kept in a safe and it runs your bank's app and is never allowed to run a mail client or a browser and certainly not a game. So the falling costs of consumer electronics can be a benefit as well as a problem.

Mr. Acquisti: Something I am seeing happening in this area (and also in the educational sector), is organizations outsourcing some of their services, precisely to avoid those liabilities. But that does not necessarily solve the privacy/security problem. It simply switches it to another party. The outsourced party, because of its specific knowledge and expertise, may be better equipped. But precisely due to its being large, and having lots of data from many different entities, it represents also a bigger target for the attackers. So, by increasing security in some sense, you are also increasing the incentives for the attackers to go after that type of entity.

Ms. Hughes: It would seem to me the kinds of experiences we have had, perhaps as individuals with data security risks, normally do not affect us very much except in the hassle factor. It takes us awhile, unless we have actually had identity theft.

Someone, not so long ago, tried to get a $250,000 mortgage in my name for a location I had never been and somehow had managed to get a hold of my Social Security number. Now somebody had the good sense not to give them the $250,000, but I would have had a terrible hassle. So I am not the university and I am not being drained of $300 million or $300 billion, but nevertheless to unscramble that would be a terrible problem for an individual if in fact the transaction had gone through.

That suggests to me Ross's advice is very shrewd. Certain things really need to be firewalled off, so that you can control some of your risks. And then you are going to have to figure out which other risks you are going to have. The university I work for has just announced that, unless those of us who also have computers at home that can link to the university's systems follow certain protocols, it will simply cut us off and no longer allow us to do that. There will be no telecommuting into the university's main email server, for example, unless we follow certain protocols and on a regular basis.

Getting everybody to do that with their mobile phone, getting your teenager to do that with the mobile phone is really going to be interesting. If you took the PayPal example and you are giving $80 to that teenager, but their phone may not be linked to your phone unless it is in one account, then that causes all sorts of other planning and employee behavior monitoring problems for us. It also will impose on the persons who suffer the attacks, as Ross has suggested, a duty to report fast and loud, so we can keep it from happening to others if there is something catastrophic in the works.

Mr. Fish: We will now take questions from the floor.

Mr. Burns: Dr. Anderson, I have a question for you, if I could. I was very delighted to hear you call for some form of registry of fraud data, payment data, and front-end payment data in this country, because we obviously need it. I am somewhat aware, but not totally aware, of an arrangement in the United Kingdom, where these data are reported on a regular basis and managed.

I have two questions. One, Do you have any sense about why we do not do it in this country? And, two, Is this system or the collection mechanism in the U.K. as comprehensive as you were arguing in terms of the different kinds of fraud, because obviously counting is a problem in many areas?

Mr. Anderson: I cannot really comment on why such an organization has never been set up here. I hear various things anecdotally, but certainly it is a good thing—it is de rigueur and it is being done elsewhere.

Britain was one of the first two countries to start doing systematic fraud reporting; the other was France. We have somewhat fallen behind the French, who have been enthusiastic in leading the European effort.

In the U.K., as you may know, there is the U.K. Cards Association, which gets information from the banks and provides relatively aggregated figures to the outside world. So we know, for example, how much was lost from the post, from card-not-present and so forth. But we do not have it broken down by individual bank, because that would be beyond the comfort zone of the participants.

What the U.K. Cards Association doesn't do is to talk to nonbank payment channels. So it would be great if a U.S. system being consciously designed could do more than either the British or the French systems do now. I am acutely aware of the fact that, if you try to legislate for such a thing to be set up, it would take years and years and years. And we do not have years and years and years.

So rather than doing something by compulsion, it may be better to do something simply by asking people nicely. I favor putting together a multistakeholder agreement, in which hopefully most of the serious players will collaborate and those who do not can over time be nudged and shamed and gently bullied along until they start to join in.

Ms. Hughes: The other thing happening in the United States, which has not been getting a great deal of attention, is the October 2011 SEC Corporate Finance Staff Guidance on Cyber Security Risk Disclosures and Events and what the remediation efforts are, etc. If you are not familiar with it, it is terribly hard to find unless you go to the Corporate Finance Division's own website, because there was no press release and it was not a commissioned statement of policy. It is just staff guidelines for the purpose.

But they go through six or seven different aspects of cyber security, event disclosures, including management and analysis—things that would be classic possible material changes. If the attack were large enough and you were a publicly traded company to affect your bottom line in a material way, the number and disclosures that theoretically could be made or have to be made are quite considerable.

We think they may make people very cautious about disclosing things. They want to know what you did to remedy the problem and they want you to describe the problem you had.

I venture that very few people in the room who are in payments are going to want to explain to the world in their SEC filings how it was they happened to get hacked. I just cannot imagine that is going to happen. My hunch is this is something anyone who is a publicly traded company should take very seriously, but they really need to talk with the person who handles their SEC materiality questions to determine precisely what they have to say. Otherwise—and a colleague and I wrote a very short paper about this about three months ago—there is a risk it will help the hackers more than it will help investors and businesses. The delicate balance is between not helping the hacker too much and helping yourself and keeping the SEC and your investors from suing you. Also in our paper is an argument that you may be road-mapping the shareholder derivative suit when you make these disclosures, which I think also no one in the room will wish to do.

Mr. Sullivan: I have a quick, two-part question. The privacy concerns of all these data being out there are tied, to some extent, to the potential damage that can happen when they get stolen. A large channel for that damage is payment fraud. I am proposing, if we can find a way of approving payments without having to rely on all the information about my background and my location that would be a good thing. I am curious about your reaction to that.

Secondly, there is always hope that maybe there is a hardware solution, like an EMV card. I am familiar with Ross's work, and his important work at showing how EMV has some security holes. A lot of that is simply because of sloppy implementation. If the implementation is right, the hardware could work very well at primarily getting appropriate payments into the system.

It is a two-part question and the parts are interrelated. Can we get a way of separating information from payment approval? Is there any hope for a hardware solution?

Mr. Anderson: Well, Rick, yes, I would agree with you that many of the problems with EMV are down to poor implementation, but not just poor implementation. There has also been a lot of sloppy design work. But the EMV documents are thousands of pages long; they are many shelf feet. When we get a new student onstream, we almost invariably discover a new vulnerability and almost invariably now you have to look in six different places and four different books in order to track it down.

You need to have mechanisms, not only to design systems better, but also to maintain the design of the systems as they evolve. This appears to be a problem with EMV. Back in the 1990s, when it was all new and fresh and bright and interesting and sexy, you could get bright engineers and academics to go to work on this. Now that is all really old and boring and tiring and complex and "crufty," and you have hundreds of different vendors fighting each other and thousands of banks complaining about this, it becomes that much more difficult.

How do you solve this core governance problem? If you can get the technology right, then yes, there are things you can do to make privacy a little bit harder to compromise. What we do, for example, is use the hardware tamper-resistant EMV chips in order to authenticate gazillions of payments. Then, again, there are economics issues of how you go about motivating people to accept a privacy payments option, if it means they do not get any air miles.

Mr. Acquisti: Thank you for the reference, because this is closely related to some experiments we did recently. Your question, Rick, is seminal to a debate every privacy conference ends up talking about—trade-offs or ostensible trade-offs between privacy and security. To have secure transactions, you can go one way, which is gathering more and more data about the individual (where they are, who they are, what time it is, which clothing they are wearing).

Or, you can go the completely opposite route. One example I gave was e-cash, based on blind signatures. I have no vested interest in e-cash whatsoever. In fact, the patent for blind signatures-based payments even expired a few years ago, so there's no money to make there. However e-cash was arguably a pretty secure system with complete authentication, without identification.

To clarify: I refer to an identifier as something like your telephone number. You can make it public. People use the number to connect with you. The authenticator is, instead, the four-digit code number you use when you access your voice mail. No mentally sane person would rationally want to use the same number as an identifier and as an authenticator. In fact, this is the way in which most financial systems use passwords. For instance, Social Security numbers in the United States are used as identifiers and authenticators. Similarly, when you reveal your credit card, you are providing information that can be used later to impersonate you. Not so when using blind signature. Now, of course, cryptologists know you can take a provably secure system and then, when you actually deploy it, you start adding vulnerabilities in the way you deployed it. Fair enough.

But at least in theoretical terms we have alternatives. So, the answer to your question is a resounding "yes."

The next point I would like to make is that we can offer economic incentives for the different stakeholders to use it. Professor Anderson was pointing out research about whether and how much people will want to pay to protect their data.

It turns out that, yes, there is a significant group of people who will pay a little bit more, but it is not a majority of the people.

Mr. DeCicco: Professor Anderson, I want to go back to the comments you made about the U.K. Faster Payments service. You talked about it being a target for phishing gangs to potentially get money out of the market there. The clarity I am looking for is, Is there already evidence that this is occurring or is that an issue or concern the market has and it is something they need to manage against?

Secondly, the U.S. market is currently considering our own version of Faster Payments. It would be a proposal out for same-day settlement in the ACH system. As we continue to debate that in this marketplace from a safety, soundness, and fraud mitigation perspective, are there issues or advice you can give us and points we should consider to stand it up in a correct way?

Mr. Anderson: Well, the Faster Payments issue is an industry concern, which I have heard from a number of firms that are involved in this. We do not have statistics yet, because where there are phishing losses, banks typically eat those. Statistics should feed through via the U.K. Cards Association and so on in a time scale of approximately a year. Given the different implementations by different banks, industry insiders at least should be able to take some view on how bad the problem is, perhaps within a year or two.

Generically, if you look at the paper I brought to this conference four years ago, we found there was a strong correlation between the speed and the energy with which banks go about stopping, revoking, and recalling stolen money, and inversely with their vulnerabilities to phishing. And it was those banks that were not very vigorous at stopping suspicious transactions and clawing them back that ended up taking most of the losses.

As far as the implications for same-day settlements in ACH are concerned, I would be most concerned if same-day payments could be used from accounts likely to be compromised and, in particular, to send money out of the country or to places where it could be effectively laundered.

The working assumption to make an engineering list is that you should assume something like 5 percent of all consumer PCs are compromised with malware. Before people do work to take Zeus down, you must always assume perhaps 1 percent of your clients' PCs will actually be running evil software on them. So you have to take a view on what sort of scams are likely and whether it is worth taking the risk of allowing people to move money out of the country on a same-day basis. Then again, what business benefit do you get from it? Normal consumers do not need to do that perhaps.

Mr. Fish: That was our last question. Thank you, panel. I thought that was a great conversation.

Ensuring Consumer Access to the Payments System in the Connected Age

Moderator: Rachel Schneider

Ms. Schneider: This panel is going to be a bit different in format from the other sessions today. None of us has a Ph.D. in economics, as far as I know. We are talking as practitioners, and the idea of this panel is to shift the lens through which we are thinking about payments innovation.

So far today, we have mostly been talking about the ways in which payments innovation will change payments for the mass market and for the affluent market. We have been talking about payments at a systemic level. What we have been thinking about is how payments change is going to impact the way people interact with their current payments system. If people have an account and they also use mobile, for example, how does that change consumer behavior?

What this panel is attempting to talk and think about is how payments innovation might actually change who is in the payments system. How does payments innovation lead to greater access? All of the individuals on this panel help bring a different perspective to that answer.

Kevin Morrison is from U.S. Bank, where he is a senior vice president of prepaid. He will share with us more about the bank perspective on increasing access.

Steve Streit is a founder and CEO of Green Dot, a provider of prepaid services, largely to the underserved market.

We will also hear from Louisa Quittman, who is the director of the Office of Financial Education within the U.S. Department of the Treasury. She will share information about the government's role in directly delivering new payments vehicles, as well as how the Treasury is thinking about this issue more broadly.

Finally, Paul Breloff is here from ACCION International where he is managing director of the Venture Lab. He will give us an international perspective on new models, new interesting ways of thinking about how to bring more people into the financial system.

In this panel, we are taking the approach of hearing multiple different perspectives, different people within the ecosystem, if you will, of serving underbanked consumers. And I will exercise the moderator's prerogative and speak for just a moment or two to kick off the conversation.

I am from the Center for Financial Services Innovation (CFSI), where our sole focus is on advancing the marketplace's ability to serve lower- and moderate-income consumers. I will share a little bit more about whom we mean and what this issue is about as background for the conversation.

Thirty million to 40 million U.S. households do not rely exclusively on traditional banking products. In addition to using bank accounts, 30 million to 40 million households also use financial services such as check cashing, money orders, prepaid cards, and a variety of other products. Within that group of financially underserved households, about one-third has neither a savings account nor a checking account.

Our temptation is to think about this group as not really that important to the payments infrastructure. There is a myth this is a group that has such insufficient resources to put through the payments infrastructure that they should not be our primary focus.

I want to share a few data points to try to counteract that perception. First of all, this group is not all low income. People within the income bracket of $30,000 to $50,000 in annual income are just as likely to be unbanked as people with annual income of $30,000 and below. Actually, 18 percent of households with incomes between $50,000 and $75,000 a year are underbanked. So this group is not entirely low income.

This group also generates, by CFSI's estimate, about $45 billion in revenue each year for the financial services industry. This group is moving a significant amount of dollars through the payment system. They are just not always doing so through a checking account or a traditional debit card.

The second myth is that this group is not technology-enabled. This group very much is technology-enabled. I know Kevin is planning on sharing statistics about this. The Federal Reserve just completed a study on this topic. Smartphone usage is high among this group and, what you see with this population, is that their interest in mobile technology or in new ways of paying their bills electronically is actually much higher than in the mass-market population.

The best way to think about this is in terms of a convenience differential. For many of us, the payments system works seamlessly. It is flawless as is; it is fine. I am marginally happier—a tiny bit—if I can pay for something on my phone, but mostly because it is a little bit faster. If I swipe a card instead, it basically works for me.

If I am an underbanked consumer and I do not have a payment card in my wallet, the incremental improvement in my life by being able to use mobile financial services is enormous. It is actually an incredible difference for me. That difference is coming from a few things. It is coming from immediate access to funds. It is coming from real-time-balance information.

I want to put that in context by sharing one story about an underbanked person. CFSI does a decent amount of consumer research, so I was talking with a woman in Cincinnati about a month ago. I was asking her about how she manages her financial life. She was talking about how she gets back and forth from the job-training program she is enrolled in. She drives. She was complaining about the cost of gasoline, but mostly what she was saying was, "I go to the gas station every few days and put in a dollar or few dollars' worth of gasoline, because putting in $20 is too much risk. I have $20 in my wallet, but I need that $20 in cash, because I do not know what bill is going to come that I might need that $20 for."

Her perspective was, really at a micro level—I need to manage my cash flow to the penny over the course of a week. It is a very different payment need, in some way, that you are solving for with a customer like that. The need for real-time-balance information and the need for immediate clearing of funds are magnified to a huge degree.

Part of what I was so enthused about as I look at the agenda for this conference and what I am really excited to hear about from these panelists is that the answers to these problems lie largely in technology. Not entirely, but for a consumer like the one I was describing there is absolutely a technological advancement we can make that would solve her problem. Such an advancement would enable her to do better financial planning so she knew whether or not she could put $15 of gasoline in her car instead of $5. Technological improvements could help manage her cash flow more accurately and more immediately so that she would know which bills were coming when. Much of that is what you can see as being the next phase of payments innovation.

So, I want you to have the idea of that customer in your mind, but also know, as I pointed out, this is a very large, very diverse segment of our population. There are lots of reasons why people are not using traditional payment mechanism and, hence, a lot of different and possibly very successful approaches to providing new payment mechanisms.

With that in mind, we are going to hear four different perspectives about how you could bring more people into the payments system. I am going to ask Kevin to come up first.

Mr. Morrison: Thank you, Rachel. And thank you all for allowing me to be here.

The U.S. Bank position on how we address the needs of the unbanked/underbanked is taken from what we have learned from our friends at the FDIC and

other organizations about the inclusion of this segment into mainstream financial services. So it is really the idea of offering these types of products and services for this unbanked/underbanked population, who cannot normally afford them.

The overall objective or goal of U.S. Bank is to really build on that and look at what products and services we can offer. From a prepaid standpoint, for which I am responsible, we got into this business early, not directly to the consumer, but more through the government-benefits standpoint. State governments were looking for ways to cut back on check processing costs and other costs as well. The prepaid benefits card fit in there very well. We do it, as well as Bank of America and Chase. That is where we really got our start.

We also have a fairly significant nonreloadable (or gift card), corporate reward, and rebate portfolios. We have been doing this for probably about 10 years now in one capacity or another. In the last couple of years we started getting into products that really were geared toward the consumer—direct consumer general purpose reloadable cards.

We started doing that in a number of ways, but probably the most interesting way has been through our own branches. In November of last year, U.S. Bank launched a general purpose reloadable card in the branch channel called Convenient Cash. When someone walks into the branch and asks for banking services, they are provided a number of choices. Some choose Convenient Cash, based on a price or free structure. Some choose it, or are put into it, if for some reason they are denied a traditional DDA or checking account. We have found these people take the Convenient Cash card and use it for their everyday purposes. They take it to the grocery store, etc.

What is even more interesting is that they come back into the branch to deposit more money on the card and continue to use it. In effect, we are establishing that relationship with that individual and doing exactly what the objective was, introducing them into the financial mainstream.

It is fair to say definition of the term "mainstream" continues to evolve and "financial services," based on this conference alone, continues to evolve, with mobile and everything else that is coming out.

Rachel did mention research. Sandra Braunstein, director of the Division of Consumer and Community Affairs, testified before the Senate this morning and referenced specifically the Consumers and Mobile Financial Services Survey that was done last year by the Fed. It talked about the fact unbanked/underbanked folks do utilize smartphones.

Even more so, in some of the research we have done, we found the reason is because some of these folks who fall into this category actually spend the money they would normally spend on everything else on a smartphone because it takes the place of a laptop or desktop computer. Therefore, they can have their computer, their phone, everything right there in their hand. So it is an investment they

are willing to make and this is why we see the usage of the smartphone for mobile apps and mobile banking very predominant for our products. We offer those types of mobile products for both our government benefits card and our corporate payroll card. Both have mobile apps and we see a very high usage of those taking place.

Again being a traditional bank, we are very fortunate in that we have existing infrastructure in place to service these types of payment transactions. We have an existing ATM network, a branch distribution network, all the way down to fraud—which was a very interesting topic in the last session. We already have those fraud tools that we can utilize on the spend side. On the load side, we have had to work on validating the amount that is loaded. But on the spend side, we can utilize some of those same tools we already have in place. We are very fortunate and in a very good position to offer these types of products. That is all I have, Rachel.

Mr. Streit: How many folks in the room are aware of Green Dot or you know what we do? That is encouraging and maybe a little scary. We are a publicly traded bank holding company in the space of issuing prepaid debit cards. We also have a reload network called the Green Dot Network, which reloads about 120 bank programs that have similar prepaid cards. We also do things for PayPal and others, but that is the core of our business.

I'm going to speak a little bit about our views on inclusion. I will tell you what we do, which is a simple formula. U.S. Bank has done a great job too and Kevin has done a superb job with it.

Going back 12 years ago when the company started, the thought was, How do you productize financial services? For example, when you close your eyes and think of a "bank account," it is not a thing. It is not like a cup or a tablecloth—it is a service. It is difficult to package a service as a product, but we knew we had to do that and so we came up with the prepaid debit card, the packaging, and the things you see in stores.

Then we knew we had to sell it at a location where folks in our demographic would likely be. We knew from research and a little bit of common sense they were not hanging out in the branches of banks and that kind of thing. But they were in retail stores and so we started with 98 Rite Aid stores in 2001 and built from there. Today we are in 59,000 stores nationwide.

We understood initially people did not know what they are. Frankly, education is still a huge challenge. What are these things? Are they gift cards or are they credit cards? What are they? People fairly quickly figured out they were not credit cards, because you have to put your own money on it.

So then we came up with TV marketing and other kinds of in-store marketing to try to help people understand that this is better than cash. You can have direct deposit, you save on check-cashing fees, and all the good things that go along with it.

As the market grew and we started selling more products, we knew we had to make the product more and more mainstream, which includes mainstream from a regulatory point of view. Green Dot has always been a regulator-friendly company and very collaborative with our regulators and other stakeholders.

We knew that to become a long-term sustainable company—let alone a long-term sustainable publicly traded bank holding company— we needed to make sure the products really continued to look more and more banklike. So if you think of a Green Dot product today versus what it would have been a decade ago, today we have FDIC insurance, we are fully regulated, Regulation E-compliant, and proudly note our disclosures. We are always mentioned in lots of quarters of the legislative world for being an example of how all bank products could and should be disclosed and we are really big on that.

Then we seek the support of consumer advocates. If do not have that halo of being pro-consumer, especially in this demographic, that hurts, too.

When you put the functionality, distribution, and the product together with making sure we are aligned with our stakeholders—meaning our government, our regulators, consumer advocates, and others—then hopefully you have an opportunity to serve a group of consumers that heretofore have not been well-served by traditional retail branch banking.

To give you a sense of our size, this year we will do something on the order of 9 million to 10 million FDIC-insured accounts sold out of retail channel. Last year, we did $16 billion of cash loads or deposits and this year, we will do close to $24 billion.

Yet we feel, as you do the research and look at the evidence, we are at the earliest stages in terms of the product and how to market it. We still come to work every day, look at some research, and go, "Ha! I had no idea. That makes sense." Then you have to retool. So we are fairly early on in the prepaid industry is my guess. That is my spiel.

Ms. Quittman: I am going to take a little bit different approach and talk from the policy perspective. I am here representing the Department of the Treasury and we have a broad mission of promoting the economic well-being of the country and to protect it, as well. We have all learned over the last few years that the nation will not have a strong economy if individuals, households, and communities are not financially strong and are not making sound financial decisions. We spend a lot of time thinking about how we can improve household balance sheets and help people make better financial decisions.

Americans need fair and appropriate products and services, as well as information, knowledge, and skills about how to make decisions about those financial products and services. They also need protections from unfair products from tricks

and traps to protect them and their families. Clearly payments are a key part of this. They are really in some ways the starting point in financial products and services that households use every day. Certainly, they are not the only thing, but it is really important to look at payment systems that are valuable to the average American, and especially to those who are operating on the fringe of the financial mainstream, as Rachel described.

We have been talking about payments so much today; specifically, outgoing payments and how people use payment products to spend money. But it is also important to talk about payments as a way of getting money in and getting funds—getting wages, getting wages from multiple sources, as many low- and moderate-income people do. People might have one main job, but they might have entrepreneurial activity on the side. They may also receive payments from benefits or from other types of sources, not just one source. For a lot of low- and moderate-income people, even their wages and where they get their earnings from are more complicated on a regular basis than someone like me, who gets the same check every month from the same employer. That is one thing that is worth talking about.

At the Treasury, we have been thinking a lot about payment methods over the last decade, as we have been moving to an all-electronic Treasury initiative. We are moving toward that and a year from now in March 2013 we are aiming to be all-electronic. Since 2005, we have been focusing a Go Direct Campaign on federal benefit recipients, most notably Social Security recipients, to get them to convert voluntarily to receive their Social Security benefit direct-deposited into a bank or credit union account.

We have been moving the needle. This year we are down to 6.8 million checks issued a month; that is a lot of checks still, but it is down a lot from the 11 million it was on a monthly basis in January of last year. The voluntary effort has been working and we are going to continue to step up the message. I have to ask all of you to help us continue to step up that message that people should be finding a receptacle for those electronic payments, if they are receiving Social Security and other benefits.

The other thing we have done at Treasury to enable this is create the Direct Express Prepaid debit card. It provides a low-cost way for recipients to receive their benefit payments and can also serve as a first step into the financial system. It is a low-cost product and it is very safe and consumer-friendly. In four years, over 3 million people have opted to get their benefits on the Direct Express card. We suspect those are really people who would otherwise not have a financial product and be out of the financial mainstream. So we have been working very hard to develop these products in ways that set standards for use by vulnerable consumers.

I want to talk a little about how we think those standards can be disseminated and used throughout the field. In addition to the Go Direct products and

the Direct Express card, last year we implemented a pilot to test two methods of encouraging people to receive their tax refunds through an electronic payment. You probably know there are over 110 million tax payments, just to individuals, each year. That is a lot of payments. Most of those are electronic these days, but there is still a lot of movement possible in that area.

We had two approaches. We did a payroll card approach and a My Accounts approach. We worked with ADP, a payroll card provider, to encourage existing and potential payroll card recipients to get their 2010 tax refund on that payroll card. Again, we sent our messages highlighting the safety and ease of direct deposit for people who are not used to getting their benefits or their payments into a bank account.

We also developed the MyAccountCard, which is a reloadable prepaid debit card offering taxpayers a safe, convenient, and low-cost financial account for delivery of their tax refunds. This was done on a pilot basis. We sent out offers to people we expected were unbanked, based on their income, and we sent out different options to see what were the most favorable and most desirable options.

We had options around cost. One had a monthly cost, while the other did not. We had different options around messaging—a convenience messaging versus safety messaging. We also had options around having a savings account versus no savings account. I am going to talk more about savings in a few minutes.

So we sent the options. Perhaps it's no surprise the most popular option was the one with no cost, as opposed to one with a cost. There was a statistically significant difference. Basically people were 40 percent more likely to choose a card if it was offered at no cost versus a monthly cost. And the other findings were interesting but they were not statistically significant. We are taking that into account, as we look at future products that Treasury might develop and make available to American consumers. Certainly, the key takeaway there is that cost matters. Perhaps that was obvious, but it always helps to have a pilot and the data to back that up.

Again, we have been thinking about all these factors as we determine future payment products that Treasury might offer. These principles might be useful for some of you looking to serve the underserved market. So I will try to go through a few of them.

As Rachel talked about in her example, payment products need to be quick, simple, controllable, safe, and transparent. People really need to know where the money is going, when it is going, how it is going. The last panel talked about getting a receipt for where it went and when it went there. That was a really good point, as well.

When you are living on the fringe, from paycheck to paycheck, those matter. Those matter very much. Because whether you pay your electric bill today or tomorrow, that is money in your pocket. It makes a real difference if that bill

was paid or not. For people in this population group, the type of payment product and how it works are a lot more significant than saving 30 seconds in buying a cup of coffee in the morning.

It is also important to think about money wiring. A lot of Americans send money to loved ones and family members across the country and overseas. While I realize there are a lot of protections and concerns about money wiring, that is a lifeline for a lot of people and maybe Paul will talk about this a little, as well. It is a lifeline and it is also a savings venue for people all around the world to be sending money to loved ones in other countries. Certainly we think those products should be fair, transparent, and reasonably priced.

Let me come back to savings, because it is something that, as a policy person, we think a lot about. Obviously payment products are not primarily geared to savings, but there is an opportunity for payment products used to promote savings. There is an opportunity for savings products to be as easy for low- and moderate-income people as it is for me to open a savings account when I open my checking account at a bank. It is important to have low barriers to entry and low balance requirements.

But there may be some options—such as an out-of-sight, out-of-mind type of savings product—that lets people put money away, lock it up, and use it either as needed or after a certain period of time to achieve a goal. One example of this, while it is not an automatic savings product, is a product called "Save NYC Account," developed in New York City and now being tested in three other cities. Through this product, people take their tax refund, commit putting some of it away for a year, and after a year it was matched. A lot of people took up this product, were able to save, and meet the match requirement. What is really stunning about this is the average person who saved money in this account had an average income of $17,000 a year. In New York City, it is hard to live on $17,000 a year, yet people were able to find money to put away, commit to saving, and building that nest egg for their future or their children's future. There are a lot of opportunities there.

I will run through a few other things. There is a lot of controversy about whether reasonable credit should be a part of payment, but it is something to consider.

Safety and insurance. Certainly users and government payees need to know that their funds are secure and insured, and their personal data and privacy are protected. There was a great discussion on the last panel about the challenges and importance of that.

Also it is important for people to know when their rights are being violated and know where to go for help when they think their consumer protections have been violated. It is important for financial products to have a way of building those financial skills and knowledge. That is so important for people to move ahead.

I am not really talking about a brochure or a website that may teach people how to use the product, but it really does not change behavior and help people

change their lives. We have to think through other innovative and creative ways we can build on people's financial knowledge through connecting products to education opportunities.

I will talk about consumer protection. This administration is very committed to consumer protection, which is demonstrated in the establishment of the Consumer Financial Protection Bureau (CFPB), which is now up and running. It is important to have a regulatory structure that looks at diverse kinds of financial institutions and providers, treating them all the same, and having a level playing field. Certainly the CFPB will be looking a lot at promoting consumer protection in this space. But I am not here to talk about that in detail, so I will not.

There is a lot of technology discussion here today. But I want to take one other tweak on that, which is there is a lot more we can use to get people access to their own data and their own information to help them develop a better product. We can take that big data and turn it into decision-making tools for consumers.

That being said, the other thing I wanted to put out here is there is still a lot more we can learn. We think that is true as government policymakers. That is true for those of you who are practitioners. And that is true for the industry as well. Also, I want to point out that we are trying to make data available through the government.

We are going to be putting out a set of consumer finance datasets from across the government. We are going to try to make them easier to find through a data.gov website and through the mymoney.gov website. We hope that will encourage innovation in the industry, in research and academia, and I also want to encourage all of you to do the same. Think about ways you can put your data out there and share it with academics, so we can have greater learning and inform great meetings like this and inform the research in that field.

I will stop by saying that. There is a lot more we can learn, but certainly I want to bring this back to the fact that good financial decisions and options for consumers of all kinds are really critical for all of us. It is critical, not just for that woman who is trying to get to work and does not have any money in her pocket to pay for her gasoline each week, but it is critical for all our communities and for our nation.

Mr. Breloff: I have learned a lot today about the domestic space and so I really appreciate the opportunity to be here. I am going to share a few observations based on the work we have been doing internationally and particularly in developing markets around some of these issues and talk about a few examples of things we are excited about. What you might find, or what I often find, is some of what we talk about in emerging markets sounds painfully remedial and some feels like a leapfrog over and above what is happening in more-developed markets. I will let you guys be the judge of which is which.

Just a quick word about who we are and what we do. ACCION International is a global nonprofit that primarily invests in and manages microfinance

institutions around the world. By microfinance, we are more or less referring to providing small sums of credit to low-income entrepreneurs to build businesses, build assets, and hopefully pull themselves out of poverty.

We have worked with over 60 institutions in over 30 countries around the world over the last 30 years. I focus beyond microfinance institutions. We increasingly realize the poor and emerging markets need more than just enterprise credit, and there are a lot of new ways to do that.

I have just established a new investment fund that invests seed capital under $500,000 in start-up enterprises globally that work on issues of financial inclusion. We focus in a few different areas, but hone in on new technologies, new distribution approaches, or new products that connect to our mission of financial inclusion.

Some of the themes we are interested in are mobile-based financial services—a lot of what we have talked about today—but really much broader than that. We are interested in new methods of underwriting credit for first-time borrowers, data analytics, social media-based financial services—which is becoming a theme—new niche credit providers, savings accounts, and generally new technological approaches to help microfinance institutions and other financial institutions that serve the poor and operate better, quicker, faster, etc.

I want to offer a few observations. It is a little dangerous to do this, because everything I will say is probably hotly contested in my own world, but I'm lucky that there is no one here who focuses on international financial inclusion to disagree and counter my point of view. But we will not get into that.

One of the points I would like to make is the distinction between what we call "transformational financial services" and "additive financial services," or transformational branchless banking and additive branchless banking. A lot of what we have talked about today—and I am repeating Rachel's point—is how do we incorporate new payment devices into the systems that already exist? How do we give more options to customers? In the emerging market, it is really about offering customers initial access to a formal financial service. It is about bringing them into the system.

We estimate there are 2.7 billion people who lack financial services around the world; 1.7 billion of those would have a cell phone. That is 1.7 billion people who do not have a bank account that do have a cell phone. That indicates a pretty significant opportunity to either use the cell phone directly to reach these people in different ways but, at bare minimum, recognize that formal providers of services have found a way to reach these people and make a business out of it. Can't we do the same in financial services?

There is a pretty big opportunity in some of these markets, particularly ones that do not have a sophisticated traditional payments infrastructure, to essentially leapfrog the payments infrastructure that exists.

The example that always gets talked about is Kenya, where maybe there is not the most sophisticated ACH and RTGS and all the rest, but they have a cell phone network that covers almost all Kenyans. And there is a service called M-Pesa, which enables customers to load money onto the phone and use it to pay or, the most common-use case, to make transfers by allowing split families to send money home more easily and cheaply. That is a pretty exciting opportunity. Maybe in that case you, more or less, skip a stage of development or maybe not. That is a discussion point.

As we think about it, payments in emerging markets are not about payments, per se. It is not about payments as payment options for the sake of payments. It is about, What do payments offer as a gateway to other products and services? How do we use payments to get people credit or insurance more cheaply or quickly? How do we use payments to allow split families to get money from the city where the husband works to the rural area where the wife works, without having to lose 50 percent of it in leakage as you are paying off truck drivers and the rest.

How do we more easily get government transfers to where they are supposed to go? I work a lot in India. The leakage in a place like India is tremendous. So there are huge pushes by government and policymakers to migrate the various social program payments, pension payments, and things like fuel and fertilizer subsidies to electric channels, which we can track more easily.

Another way things might be different are the kinds of challenges we face. As I hear about things even today in the domestic space, it seems a lot of the challenges we talk about are more technical and technological, and then different issues of stakeholder coordination and negotiation. The value chains for different products here are pretty rich—a lot of characters and a lot of people who need to get negotiated. The value chain for financial services in a lot of emerging markets does not exist, so you are creating the whole thing. If you are not ready to be the whole solution, there probably will not be one.

A big challenge—one that is not as big an issue here, I do not think—is distribution of cash. Cash in, cash out, reload, recharge, whatever you call it. Most solutions are falling flat in emerging markets, not because the technology platform is not there, but because there is no way for people to put money onto the payment instrument. There also is no way for them to spend it, but there is also no way for them to get it back out. If that is not there, these are people who are not accustomed to virtual money. They want to test the system. They want to put money on and prove to themselves they can get it back out and it all stays there. If that agent network—as we often call it—is not there, things will not work.

Marketing is a huge issue. I will break that down in a few ways. One is thinking more about the use case and what will be the killer app. There is an approach, and this is largely driven by development organizations and the rest, "let's build this stuff and everyone will flock to it, because it is great. Of course it is great, it is digital payments. Everybody wants that!" I do not think that is the case with poor people. It has to solve a felt need.

In Kenya, where there is a huge phenomenon of split families and everybody needs to figure out how to get money from the city to the country, it took off. The killer app is P2P transfers. In other markets, it is not always clear what that is going to be.

People are not always designing these solutions to solve a problem. They are more just designing them and hoping people will get on board.

Another is trust and building trust in the system. How do you do that, if there is not an agent network?

Another is the capacity of the person using it and creating enough awareness of what the product is, its financial capabilities, and how to use it. That is not really there, particularly for people who are using this for the first time.

The last challenge I will mention is generally the role of regulation, particularly, the uncertainty around regulation. I do not know as much about how things work here, but in a lot of countries, a big issue is whether or not banks or nonbanks are permitted to drive the answer.

You can see differences and I will give three quick examples: Kenya, India, and Pakistan. Kenya is a regulatory vacuum. Whatever you want to do, you can do as a mobile carrier. Safaricom, who has been driving this M-Pesa product, simply had a couple of letter agreements with the Central Bank of Kenya and they launched. There are a lot of reasons—and we could have an hour-long conversation about why this one succeeded where it has failed so many other places—but one is certainly the regulatory environment. There is really nothing else that holds Safaricom back. They, arguably in that market, were in the best place to execute this. They had the most established relationship with customers. They had the most extensive air-time distribution network.

In a place like India, the Reserve Bank of India says, "No. Mobile network operators (MNOs) can play some minor role in this system, but really we expect the banks to be driving it and everyone must have a bank account. Maybe we will let the MNOs play some minor role as a cash-in, cash-out network, but that is it."

The same happened in Pakistan. In fact, in Pakistan, what one of the big mobile network operators did was go out and buy a bank, so they could do this. Telenor bought Tameer Microfinance Bank so they could build this business. That move was one of the things that puts Pakistan in one of the more exciting positions in this space, and is growing something that seems to be working with customers.

There are also issues around Anti-Money Laundering (AML), Combating the Financing of Terrorism (CFT), and Know Your Customer (KYC) requirements for low-income customers, and how agents are regulated. So, there are a lot of different kinds of challenges.

Just to give you a sense of a few things we are excited about, I will not go into details here, but will dangle them, because we may be running out of time. Once

you have established a safe, secure, easy, cheap way to move money, what kinds of business models you can build on that platform?

In Kenya, CGAP has been supporting an initiative to design a credit product where you never meet the customer, you never underwrite them, and you never do anything. They ask for money and you send them money. You start small and they can pay it back when they want it. They pay an initial fee on that money. If they want to pay it back in a day, great. If they want to pay it back in two months, fine. The next time they pay it back, they can access more money. People look at that and say, "That's insane. You are holding out a bucket of money and asking people to walk away with it. Why are they paying back?" Some do—they have been losing maybe 12 percent. But, they view that as relatively cheap—at a first loan of $20—way of acquiring a customer. For the 85 to 90 percent that they get up the curve, this is an interesting business that actually uses this m-payments platform to match the cash flow needs and cycles of poor customers.

Micro leasing solar. There is a huge issue of grid electricity access and people not having access to electricity, so everyone is trying to push solar on poor customers. The issue is that solar requires a significant upfront investment by the poor person. That has been a problem and distribution has been a problem. There are a number of companies in Kenya trying something where, essentially, they build financing into the product by offering the solar panel on a lease. Instead of having to deal with what would be a traditionally nightmare collection process of sending someone around and hassling, they do it automatically over the M-Pesa platform. They use an automatic switch-off, essentially, if someone does not repay. People are trying to pioneer these models of pay-as-you-go in water, education, and a lot of other areas that are completely payments-enabled, but they are not necessarily payments businesses themselves.

The last one I will mention, although I have a bunch more, is social media in general. This is not as much about payments, but it has come up a few times today. This is an area that is increasingly interesting. Two years ago I would have said this is crazy, but every bit of data we are seeing now suggests that Internet access is rising quickly among poor customers, even in emerging markets. Smartphones are on the rise, tremendously. Facebook is everywhere.

If we can use that platform, somehow, as a way to find customers more cheaply than we have been doing, assess whether or not they can get credit or other products, and actually deliver these services; that is a huge potential cost savings, and possibly a huge potential improvement in customer engagement over the current absolution.

We are looking at a couple of enterprises along this theme. Some are using the data generated to do different things, but others are actual sites that are being set up to mimic some of the principles and the group dynamics of microfinance in this virtual world, which—as you would have guessed—is dramatically cheaper. It is pretty exciting stuff.

As I said, there is a lot of exciting stuff we are seeing. Some of it may sound pretty remedial, but some of it is pretty exciting and I certainly look forward to continuing to learn what is happening in the United States, as well. Thanks.

General Discussion

Session 4

Ms. Schneider: Paul, thank you. I will start us off with some questions and then we will open it up to the audience. The first question I want to pose is jumping off from much of what Paul was talking about—the idea that payments alone are only one piece of the financial puzzle when you are talking about any household, right? Payments can be a real facilitator for additional services or it can be the backbone of a relationship through which you provide others services.

Louisa, you talked about that some. I am curious to hear more from Kevin and Steve on that topic. How do you think about payments as part of the overall product suite and customer relationship?

Mr. Morrison: Payments or credit?

Ms. Schneider: Payments. Given that you talked about U.S. Bank's prepaid offering as a way of being an entry point into a relationship, how do you think about how that entry point into the relationship becomes the basis of a broader financial relationship?

Mr. Morrison: That is exactly the way we designed our Convenient Cash product. What we said was, "That is our way to establish a relationship with a new client."

It was the ability to provide them a product and start building that relationship, and then graduate them into a more mainstream relationship with the bank with mainstream products and services. Interestingly enough, as of right now, those mainstreams are traditional checking account, savings account, and then eventually lending products.

It is always interesting and there is a great conversation around this issue. At what point, if you are unbanked or underbanked, do you get out of that segment and move up to the next segment? "Now that I am 'traditionally banked,' meaning I have a traditional product, then am I now more open to a lending product?"

It has been made pretty clear recently that lending products tied to prepaid are not acceptable at this point. I understand, to a degree, why. But it also pigeonholes prepaid as a whole. We try to be careful with that. But to your point, that is exactly what it is. It is a graduation process in our mind.

Ms. Schneider: Steve, you have often been vocal that payments are the endgame. That is the goal and providing a good, convenient, high-quality payments product is what this customer base needs. It is interesting for us to have a dialogue about that and hear your point of view.

Mr. Streit: Yes, the customer needs, not just a convenient way to pay electronically—nowadays you cannot even go on an airplane without being told you cannot buy Pringles potato chips without a debit card in flight. So it is very important to have electronic payments to buy online and in all kinds of channels.

People need credit too and they want credit. Kevin alluded to this a little bit. It is just so difficult to do with a fellow who is not in the mainstream bank environment and does not have a FICO score above 580 or 600.

Early in our career—going back a decade ago—we dabbled in that and the charge-offs were 50 percent. That is just not a viable business model.

We learned something else and, Rachel, we have talked about this over the years offstage, too. The customer at the end of the day did not like it. In other words, the sense was, "Hey, the reason I like this product—in Green Dot's case—is because I cannot get into trouble. There are no penalty fees or overdraft fees. It is simple. No matter what I do, there is no negativity to it." There is karma about a product that says, "We are not going to hassle you and the product is going to do what we say. And that is it."

As soon as you layer on credit products and repayment and penalty fees, the whole karma of the product spins out of control. "Hey, you did not do this and now we are going to call you and do this."—then we are just one more bill collector calling you at dinner time. The comments were that it was ruining the whole vibe of the product.

We do not like it, but it does not mean that people do not need credit. Look, let's face it. Not everybody is able to handle credit properly. That is a skill set you either have or do not have. Sometimes it is a situation of education and sometimes it is just your income and cash flow. For us, it is not our cup of tea, to be sure.

In terms of "the endgame," our customers are saying, "Look I want somewhere to put my money. I want it to be safe and insured. If I have a problem or an unauthorized charge, I want to be able to call somewhere and get the money credited back (which is Regulation E), and I want to know you are not going to hurt me and you are going to help me and I will use you when I want to and won't when I don't."

When you think about it, that is not a bad offer. Life should be that simple. So it is not the end game. We think consumers need all kinds of things.

Ms. Schneider: Thanks. That is helpful.

Louisa, the government is clearly making huge efforts to get everybody into electronic payments, at least with respect to receiving a government check. You talked about the Treasury's goal of not having any more paper checks be sent out as of 2013. What do you do to ease that transition process for people who, in fact, are attached to the idea of paper checks and like receiving them for one reason or another?

Ms. Quittman: First of all, it is worth pointing out 2013 has been a long time in coming. Some of you in the room know we have been working under this mandate since 1996. This is not something we have done in a hurry and we really have tried to figure out what are the products and services that will migrate check users to electronic payments. The tax refund is still an exception, but it is all the other federal payments.

We have developed the voluntary method. We have developed the card product, but we are still really very much looking for partners in the private sector to help us, because the government cannot do this alone. For financial institutions—whether it is Main Street financial institutions or next-generation financial institutions—you should really see this as an opportunity to bring these people into your institution and into your products and services. All they need is a number to be able to get their check sent as an ACH payment into your financial institution on a monthly basis. This is not something we can do alone in the government. We are giving our best effort.

There is also a lot more that we can do with the community sector, local governments, and state governments to also help promote the understanding that this change is coming. It is beneficial to people in the long run. It does give them greater safety and convenience. Their check is always there on the first day of the month. They do not have to worry about somebody taking it out of their mailbox. So we have been pushing those messages hard. To make this really effective, it does take the whole industry as well.

Ms. Schneider: That is helpful. One thing that is interesting for this group to think about, since we clearly have such depth in terms of payments systemic knowledge in the room, is: What is the barrier from the customer's point of view? Why have you not achieved 100 percent adoption? And why are people still attached to checks? Can you speak to what the perception is among consumers?

Ms. Quittman: It has been implicit, but nobody has explicitly said it all day today, but there is really a generational change. Many Social Security recipients—not all, but many—are people 60 and over. I think we are going to have a generational change as baby boomers are now starting to be Social Security recipients; they have a very different approach, at a minimum, to online banking or direct deposit than perhaps people from generations before.

I think it also speaks to—and I do not have a detailed data breakdown—the fact that the populations in this country that are financially excluded are very strongly correlated with people who are living in low-income communities or are minority populations—African-American, Hispanic, and native populations. These people have not been traditionally well-served by the financial mainstream and financial institutions, and have not been welcome in banks in many places around the country over the last 50 to 100 years.

So the distrust of financial institutions is deep in this country in a lot of communities. It is going to take outreach from us and from you and from community partners and from state and local partners to really bridge that gap. I know you all have data probably saying the same thing.

Ms. Schneider: We do. I would think that is a piece of it. There is also an element of how easy it is to get cash in and out of the system. For a consumer who wants to be able to carry cash in their wallet, the big issue is: how can I cash that check when I receive it from Social Security or, if I get my funds on a card, can I easily convert that card into cash? That is a systemic issue. We have seen more and more improvement, more and more growth, more innovation in ways that people can get cash in and out of the electronic system. To me, that is a big part of the solution ultimately.

Ms. Quittman: I will say one other thing. We were talking earlier about how many merchants take this product or take that product; there are still merchants out there, particularly landlords, who do not take a check, who will only take a money order. Probably most of you do not live in those neighborhoods and I do not either, but Steve knows, because his customers live there.

Modern technology does lag in low-income communities in this country. It will change. I do not know how quickly it will change, but there are still a lot of people who take a money order to their landlord. That is how they pay their rent. Or they pay cash for their phone bill and for their power bill. They go down to the store and pay that way, because that is the most effective way for them to do it.

Mr. Morrison: What is very interesting is that financial services are financial services. Whether you are getting them at the check-cashing window in those low-income neighborhoods or the payday lenders, they are still financial services. What we are in the process of doing is figuring out how to bridge that gap to introduce them into the financial mainstream. To your point, in those low-to–moderate-income neighborhoods, those are the services being made available.

In our research, in one-to-one interviews with these unbanked or underbanked, we heard them loud and clear when they said, "Well, when I walk into a check casher, the cost of cashing my check is right up front. I know exactly how much it is going to cost me when I cash that check. And when I take my money, it is mine and I am gone. At a bank, I do not see that clear disclosure of fees. Then

sometime down the road, all of the sudden, there is a fee taken out of my account and I do not know why."

That is a loud and clear message of what changes we need to make—at least in financial services—to make sure we are educating and providing that transparency to this segment.

Ms. Schneider: Let's take some questions from the audience.

Mr. Salmon: I am fascinated and very happy to hear from Louisa that the Treasury has been experimenting with a reloadable prepaid debit card. I think this is a fantastic development.

Of course, she is sitting between the two other panelists with prepaid debit cards. You said, Louisa, that the response you got was much better for the one without a monthly fee than for the one with a monthly fee. As to this question of the ease of getting cash in and out, the chap to your left (Kevin Morrison) does not have a reloading fee on his card and the chap to your right (Steve Streit) does have a reloading fee on his card.

The question is for Steve. 1) What was the reload fee on your card? And 2) To what degree is the reload fee a less obvious, less salient hidden tax on people with prepaid debit cards, which they might not be so concerned about initially, but might cost them more in the long term?

Mr. Streit: It cannot be hidden, because you cannot buy it without the cash register employee saying that reload will cost you, say, $3 at a Wal-Mart, or $4 at a 7-Eleven, and maybe $5 somewhere else. It would be hard to not know that it is there. So the hidden part is not there.

The question is, Do people know about reload fees? The answer is I suppose they do, because there is no way not to know about them. The better question is, Would people reload more, if there were lower fees or different fees? We are always doing pilots and testing. Amazingly, so far, we are not seeing great differences, but we are game to try all kinds of different tactics and options. You never know. This is still a relatively young industry.

I am not sure, to be honest with you, what you do, Kevin, for reloads at U.S. Bank.

Mr. Morrison: At U.S. Bank we chose to allow free reloads—which surprisingly enough, with the product we offer, almost 75 percent of the people come back in to the bank to do reload. It is a free offering. Strangely enough, it came from the tellers and bankers within the retail branch. Again, we are very fortunate to have a retail branch network. We have that footprint, so we take advantage of it.

If I walked into a bank to deposit a check into my account and they said, "That will be $4.95," I am going to think that one through as a bank customer. This is the same thought process that the bankers and tellers went through. They

said: "We are not going to tell these people that we are going to charge them money in order to put money into their account." In their mind that is what they are doing. This is a financial account for these people. That is why we chose not to put a fee for reload on the card.

Mr. Streit: That is a good point. I should say, by the way—because this is not a prepaid crowd—that the majority of funds loaded to cards through direct deposits, typically are 60 to 70 percent, which is completely free. So we are talking specifically about the retail cash reloadability of the card. In fact, in Green Dot's case, as many of you may or may not know, we actually pay consumers a $10 bonus when they enroll in direct deposit. Our direct deposit penetration is up in triple digits year over year now for two or three years going. So we certainly urge people to reload in direct deposit. They are our best customers. And they also get their monthly fees waived, as well. For those of you who know the company or hear the conference calls, we have a significant number of customers who pay no monthly fee and no reload fee. They are actually our best customers through interchange and ongoing use.

The retail branch network is an advantage. The disadvantage is there are not a lot of U.S. Banks relative to retail stores and the hours are different. So everybody has to pick and choose their product. I am not sure there is any one way or one right product in the same way there are 9,000-plus banks in the United States that have different fees and so forth. People ought to use the product that makes the most sense.

Ms. Schneider: Thanks, Steve.

Ms. Benson: I have a question about the customers who are unbanked using Steve's prepaid card or the card that Louisa is providing. Some of them are obviously trying to send money home to relatives in developing countries, who may be using the mobile wallets provided in the developing world, perhaps from the carriers or the banks depending on that area. What are you doing to help them do that—to make payments out of their prepaid card accounts in the United States—at a reasonable cost?

Mr. Streit: I do not know, Kevin, about U.S. Bank. But, we actually discourage international money transfer with the cards. In fact, if we see somebody doing it, that is a good reason to have the account closed. It is just not what the product is used for. These are FDIC-insured domestic accounts. You have to have full CIP (Customer Identification Program) and KYC (Know Your Customer) to open the account like any checking account. It is not designed for money transfer.

Does that mean that out of our millions of customers somebody did not send a card to Mexico and they are moving money that way? Maybe, but again, if there are too many transactions coming out of a foreign country, our fraud division would probably block it. That is not the way this product is used. Can it be used that way or could there be other products that could be used that way? Sure, I

think Western Union has a product similar to that. There are fees for that and you can do that. But that is not something we do on our side.

Mr. Morrison: I concur with Steve. We do not offer that type of service for exactly those same reasons. Quite frankly, there has to be some level of sophisticated integration to get to that point of using a mobile wallet to transfer funds offshore and tracking of that transaction to validate that there is not a level of AML (anti-money laundering) or fraudulent activity going on. It takes quite a bit of sophistication to get to that level and it will get there at the speed technology moves, but as of right now, our product is not built for that either.

Ms. Quittman: Let me just add the Direct Express card is really meant to be a lifeline account card because of the statute and the regulations that enable it. It is meant to receive benefits, so it has a limited functionality so that it can be very low cost and be that lifeline to receive Social Security and similar benefits. The Treasury Department is not looking to create a sophisticated card product that is meant to meet that specified need.

Mr. Breloff: I would also add I do know that a lot of money transfer organizations are working on this issue now and we come across it a bit. Part of the challenge is not many people have a mobile wallet still. A lot of the work we have been a part of internationally is more about trying to get people on the receiving end excited about having a mobile wallet. Once they have a mobile wallet, there will be more pull to have it connect to inbound international remittances they are getting. So far, there has not been significant volume that I am aware of.

Ms. Merritt: On the subject of international remittances, for Paul, you mentioned one of the impediments you are seeing was the inability to have cash-out distribution in some countries. That could likely be an obstacle for adoption and financial inclusion. Are you starting to see movement from some of the central banking authorities or regulatory authorities in some of these poorer markets to allow cash-out distribution from the mobile channel like they do in Kenya?

Mr. Breloff: We work a lot with domestic remittances. A lot of the work we do is focused on building remittance corridors and cash-out points for domestic flows. The international flows depend market by market. So places like Bangladesh and the Philippines, there is a ton and this is significant. In a place like India, the people who are lucky enough to have relatives who are sending money from overseas are probably in a place that is well-enough served, so it is not as big a problem.

Right now, the harder challenge—and where, for example, the Reserve Bank of India would spend more time—is building that cash-in and specifically, cash-out network in more rural areas for domestic transfers. That is where a lot of the focus has been.

Certainly, there are efforts. What ends up happening, usually, is Western Union and MoneyGram wait until a domestic agent network has been built, then

come in and take the whole thing. I have been part of that a few times. We do not have a strong view of whether that is a bad or good thing. All in all, in the short term, it is good for customers because there are more places they can access it. It makes it harder and harder for people to come in with more competitive offers obviously, because it just cements their position that much more.

Mr. Tomasofsky: I guess I am a little confused. You were speaking about good public policy. Louisa, you said it is good to have prepaid cards available for consumers to receive government benefits electronically. Yet, there was a hearing last week about the Treasury Department and tax refunds going to prepaid debit cards that made it sound like that was a bad thing because of fraud that is going on associated with the refunds. There really seemed to be some focus on the prepaid card as the problem, as opposed to maybe other parts of the process.

There was also some discussion about having access, of course, for electronic payments, for bill payments, rental payments, and other types of payments, and to avoid money orders or to use money orders or whatever. Yet, Regulation II now states that to remain exempt as a prepaid debit card issuer and receive a higher form of interchange, you cannot have electronic bill payment unless it is done through the cards. So you cannot have an ACH bill payment or issue a check because you would lose the exemption.

It seems that some public policies and regulations are going against other public policies…maybe you can help with my confusion.

Ms. Quittman: Public policy is complex. And public policy in the payments space is complex. It is! I do not purport to be an expert on every aspect of regulations you are referring to, so that is my disclaimer. I am not an expert on all those aspects of payment policy. My area of expertise is in financial inclusion.

But let me do my best to answer what I understand. Treasury is working on a number of fronts to address our mandates as a payer, which is to get rid of paper checks for Treasury—as a payer. We are trying to do that in a way that is efficient for the government and beneficial for the consumers, which are federal benefit payees.

First of all, we are mandated to do that by Congress and we are trying to do that as effectively as possible. We are also, in our other role as tax administrator, trying to ensure we run a tax system as efficiently and as effectively as possible, which is extremely complex.

I am not in the IRS and I am not a tax-policy expert, but there are always competing interests in terms of ensuring we are getting our taxes in and there is not fraud in the system, but also that taxpayers get their refunds appropriately, as quickly and effectively as possible. I do not have all the answers to your question because there are a lot of different parts to that and a lot of balancing of various interests.

Ms. Schneider: Does anybody else want to offer a perspective on that? The other thing I would add to this is, from a public policy perspective, the government is

trying to play multiple roles here. So the work Louisa has been talking about is mostly government as payor. As payor, they are thinking very much about how to maximize the ways people can be paid in order to improve the experience of being paid and lower government costs. That role sometimes leads to different outcomes than the role that government also plays of, "How do we maintain consumer protection and play whatever role we think we should play in the payments infrastructure systemically?"

Unfortunately, what you are pointing out is, as government plays those multiple roles, we are not always seeing a consistent answer. We are not always seeing a consistent point of view about, in particular, this product.

My perspective is that this is due, in part, to that fact that prepaid is still relatively new. There is still a need to work out a lot of understanding of what the product is. As Steve pointed out, consumer awareness is still a major issue. It is also the case that a more broad understanding of what this product category of prepaid is about is still a major goal. There is still plenty of work to do there, to ensure that we are regulating it appropriately and talking about it with consumers in the best possible way. And, all that is happening in the context of a product that is changing and still growing.

Ms. Garrett: I actually have a characterization question for all of you. I have heard some of you say different things about it in the past. People like Steve are asked, "When are you going to graduate them to mainstream banking products?" They ask U.S. Bank, "So when do they get to move to a mainstream banking product?" Yet, with prepaid, we have products that have FDIC insurance, bill pay, and mobile banking that are probably more robust than most traditional checking accounts. I guess my question for you all is, What is mainstream banking, if it is not these products?

Mr. Streit: I am so glad you asked that question. Here I was going to be polite, because Kevin is a friend and he has a great program at U.S. Bank.

Look, we do not see it as this concept of "graduate somebody to credit" or "graduate somebody to DDA," where fees are five times a prepaid card. I do not know who is graduating what or how, but the customers do not see it that way. We have done so many focus groups. I just do not know how to describe it. It is like saying you are going to graduate from a green suit to a brown suit. They are unrelated, if you like green or if you like brown. This is not high school where, if you pass your math test, you go to the next grade—or maybe not, in many parts of the country.

That is always offensive. I have to be honest with you, as somebody who works a lot with our customers. And by the way, Green Dot's customers' average yearly family income is $50,000, 25 percent of our customers have a household income of $50,000 to $75,000, half have bank accounts when they buy their Green Dot card and 75 percent were previously banked at a traditional retail bank. We are not talking about Martians with antennas on their head running around. People

always tend to talk about our customers as if somehow they are not regular, everyday Americans who work with us every day. Now I will stop that.

The answer is that we do not see a graduation strategy. We see a right-product strategy. That is someone who says, "I used to use credit. I got in trouble. I do not want a credit card and I got rid of it. I want a product that I do not get into trouble with and that I know where it is" or "I had a bank account at a major bank or a smaller bank and do you know what? Every time I did such and such, I got hit with $35 and that made me bounce these other checks, that made me bounce the other five checks" and all these things.

I spoke before—which is a weird thing for a bank holding company CEO to say—but karma should play a role in your product. Treat people as you like to be treated. It is very basic stuff. You do not need to have a Harvard MBA for that and that is the way it is.

I hear that graduation stuff—and Kevin I do not even mean it that way—but I do not believe people graduate to credit. They want credit and they can qualify or not. Or they want a checking account because they believe that is what they need or they want a prepaid card. When we go to lengths, as Green Dot has, to have FDIC insurance and Reg E, and 3,000 call center employees answering calls, the Green Dot experience is in many cases more satisfying, less expensive, and more predictable than any regular checking account. The same goes for other prepaid companies.

I hear what everyone is saying. People often say, "Unbanked: you are unbanked and you have a prepaid card." But, if you have a Green Dot prepaid card, you are banked, you are in a bank, you have a bank account with all the same rights, privileges, and abilities that anyone with any checking account—including U.S. Bank or anywhere else. OK, now I will be quiet. Good question. Thank you.

Mr. Morrison: It is always the lawyer that starts it up, isn't it? No, it is an excellent point. Graduation strategy is a term that has been used for quite some time, but Steve makes an outstanding point. Today, as we sit in this room, we are who we are, have the experiences we have, and live in the neighborhoods that we live in. We know what traditional is.

I have a 15-year-old daughter, who has a Convenient Cash account but she does not call it a prepaid card and it does not say "prepaid card" on it. She does not know what a check is and she is never going to write a check. We have—to the point that was made earlier—a generational thing going on here. As this generation comes up, they will choose the financial services and products which they will utilize, for whatever best fits their need. And it is not going to be a real big decision point for them.

I truly believe, at the rate we are going, very soon in the future it will be more than likely on a phone. It will be a tap on an app on your phone and you will have three accounts to select from: your spend account, your save account, or your

credit account. You will decide which one you want to use, wave your phone and you are done. That is where we are heading and all of this will be academic by then.

As we sit today and as we look to address "Ensuring Consumer Access to the Payments System in the Connected Age," all of the subjects that have been discussed thus far integrate right to the mobile wallet: the ability of the Web continuing to grow, how we work together to get through it—including the federal agencies, whether it be CFPB or the Fed, working to provide those services to all of our clients. At the end of the day, they are as much clients of the Fed as they are our clients and our customers. That is the point we are heading toward. So good point, Steve.

Ms. Schneider: I want to thank all of our panelists very much for this conversation and thank all of you. We really appreciate your engagement on this topic.

Facilitating Consumer Payment Innovation through Changes in Clearing and Settlement

Bruce J. Summers

The purpose of this paper is to stimulate thinking and action leading to innovation in clearing and settlement of consumer payments in the digital economy, where the public has come to expect immediate completion in all manner of information-intensive transactions. In keeping with the international theme of the Federal Reserve Bank of Kansas City's 2012 payments policy conference, the paper draws on the experiences of countries whose payment systems support immediate completion of consumer payments, and considers the policies and policy processes that are friendly to such innovation. In particular, the paper addresses concerns that the U.S. payment system is not keeping up with the rest of the digital economy in providing new methods of payment that give consumers immediate access to and use of their deposits held in accounts with banks and other deposit-taking institutions ("banks" for short).

The financial system and broader economy depend on payment system innovation for their smooth functioning, including and especially innovation in the way payments are cleared and settled. Innovative development of clearing and settlement infrastructure requires cooperation among private and public stakeholders in the payment system, and competition among payment service providers using that infrastructure. Public policy should help establish the boundary between cooperation that develops and implements far-sighted strategy for shared clearing and settlement methods and infrastructure, and competition in the delivery of payment services to consumers. While competition appears vigorous, cooperation resulting in far-sighted development of clearing and settlement infrastructure is not. Rather, infrastructure investment is concentrated on fine tuning clearing and settlement infrastructure that supports existing methods of payment, not on meeting present and future needs of the digital economy.

In the following sections, the first posits assumptions that are fundamental to a discussion of clearing and settlement of consumer payments in the digital economy. The next presents a framework for analyzing issues related to the design

and operation of clearing and settlement infrastructure, and to its use by suppliers of payment services, including policy development and governance issues. This is followed by a discussion of public policy considerations that should motivate and guide the development of clearing and settlement processes and supporting infrastructure in a digital economy. The fourth section then presents a reference model for clearing and settling consumer payments in a digital transactions environment. The fifth section addresses governance problems that explain the U.S. payment system's failure to keep up with the needs of the digital economy. Finally, the concluding section recommends actions that the U.S. Congress, Federal Reserve Board, Federal Reserve Banks, and other payment system stakeholders need to take if the U.S. payment system is to keep up with the changing needs of the digital economy.

Fundamental Assumptions

It is important to begin with some shared assumptions about the needs of consumers using the payment system in the digital economy. Explicit assumptions will help ground debate about public policy and operational design in the reality of consumer needs. Three assumptions that are fundamental to the public policy themes underlying the paper are posited below. While some of these assumptions might be challenged, each is plausibly based in observed changes in consumer behaviors and the use of digital information services in different countries around the world.

Consumers include individuals, businesses, and governments

The subject of this conference, consumer payments in the "connected age," focuses on increasingly immediate connections between consumers who are economic actors and involved in monetary exchange. These consumers include individuals, businesses, and local, state, and federal government entities whose increased connectedness is enabled by social networks (for example, Facebook), business networks (for example, LinkedIn), and a variety of other broadly accessible and "always on" communications channels. This paper takes a broad view of consumers and of their economic connections. Consumers may form various combinations of connections to make and receive payments for a variety of purposes in markets for goods, services, and information. The relevant payment combinations for these connected consumers include all payments with an individual, business, or governmental entity on one or both sides as sender and receiver, such as person-to-person (P2P), person-to-business (P2B), and person-to-government (P2G) payments.

Consumers value immediate completion of digital transactions

Consumer expectations regarding access to and the usability of their information assets have changed markedly in recent years, as they have become more

connected. Today, almost all types of personal, business, and financial records, including assets held in the form of bank deposits, are stored in digital form and are accessed through digital communications systems. Information-intensive businesses models provide, and consumers have come to value and expect, immediate completion of transactions at the time they are made, including many types of financial transactions.

A completed payment is one that is final—that is, irrevocable by the sender and available for unconditional use by the receiver. Methods of payment that provide immediacy and finality have historically been thought of as highly specialized and useful only for large-value payments. The attractiveness of immediate and final payments to consumers for general-purpose use, however, has been recognized for at least a decade (Kuttner and McAndrews 2001). Shifting consumer preferences in the United States for direct access to bank deposits and completion of payments immediately at the time they are made is evidenced in a variety of research, including findings from focus groups assembled by a committee of the Board of Governors of the Federal Reserve System (Board of Governors of the Federal Reserve System 2002a and 2006a). More recent research shows that the banking systems in a number of countries now provide consumers with a method of payment that is immediate and final, known as Immediate Funds Transfer or IFT (Summers and Wells 2011). There is evidence of strong adoption of Immediate Funds Transfer where it has been introduced.[1]

Consumers value a versatile and universal method for making payments

As was mentioned earlier, consumer payments involve all combinations of payments with an individual, business, or government entity on one or both sides as sender and receiver. These payments reflect transactions for goods, services, and information and account for the lion's share of payment transactions.

U.S. consumers value, and have come to rely on, a method for making and receiving payments that is versatile, that is, the method can be used to pay for any type of transaction between any combination of consumers. Consumers also value, and have come to rely on, a method of payment that is universal, that is, the method connects them through their bank accounts no matter where or how frequently they interact. This method is checks, which is relied on by U.S. consumers because it is versatile and connects the accounts they hold in banks. There is a national clearing and settlement infrastructure for checks connecting all banks, and all banks have historically offered checks to their customers as a method of making and receiving payments. Indeed, current or demand accounts in banks are typically referred to as checking accounts. Checks, however, are rapidly declining in use (Gerdes 2008). The use of checks is declining as consumers adopt more specialized, but usually less versatile methods of payment whose connections to bank accounts and other consumers are limited.

The value of a versatile and universal method of payment such as checks is likely to increase in the digital economy, where consumers make connections in various combinations and in borderless markets for information, goods, services and financial investments. While some immediate and final payment services are being introduced in the United States, their clearing and settlement is limited to proprietary and closed networks that do not connect all consumer bank accounts. Rather, the reach of these services is limited to smaller groups of consumers who hold accounts with a small number of banks participating in a proprietary system or to a given bank's customer base (so-called "on-us" payments). Nonbank providers also offer immediate and final payment services that are substitutes for bank payment services, but again it is over closed networks (analogous to bank "on-us" payments). This pattern of innovation results in new service options including immediate completion of payments, but it fragments the universal clearing and settlement network. A strategic challenge is to combine immediacy and finality of payment with the versatility and universality of the check.

Framework for Analyzing Payment and Settlement Issues

A four-part framework is useful in analyzing payment system issues, including and especially issues pertaining to end-to-end clearing and settlement of consumer payments. Consumer end-users of payment services are the starting and finishing points of the end-to-end clearing and settlement process. This framework will help determine why and where cooperation and competition are important to payment system development, and the appropriate scope of oversight and regulation. The four major components of the framework include the *payment system, payment schemes, payment infrastructure,* and *payment services.*

The *payment system* is the network of endpoints represented by deposit accounts in banks. Payment is completed by transferring claims on banks recorded in deposit accounts. As such, payment is a function of money and banking in a nation's financial system. Transferable deposits are known as bank money, and payment and bank money are "…closely linked by law, regulation, and tradition." (Mitchell 1974). The nation's noncash money supply is stored in deposit accounts and bank money's usefulness as a medium of exchange depends on the transferability of deposit money between accounts. Deposits and bank money are, as we know, digital information records in accounts, and payments are bank money in transit, or digital instructions for the transfer of deposit balances. Banks become part of the payment system by agreeing to clear and settle a particular method of payment through customer accounts. As is the case with other information networks, participation in the payment system will always ideally include the universe of banks.

Payment schemes specify payment instruments by which the public gains access to the payment system, that is, the methods by which payments are made and received using deposit accounts in banks. Payment schemes establish the rules and standards that precisely define the operational processes and behaviors which, when followed, allow the public to access the payment system using any given

payment instrument. Laws and regulations also help define schemes, for example, by allocating liability for errors or fraud losses associated with electronic methods of payment. Types of instruments defined by schemes include checks, credit cards, debit cards, online banking applications, etc., and now in some countries Immediate Funds Transfer, each of which requires those involved in its use to follow a set of rules and standards. Schemes may and often do limit the versatility of a payment instrument, for example, payment cards are designed principally for P2B and P2G transactions. As mentioned earlier, use of the check is not limited to a particular combination of consumers or type of transaction, but rather is designed as a versatile instrument that consumers can use to make payment for virtually any purpose. A scheme's rules and standard specify how a particular instrument is cleared and settled and in particular whether the payment is a credit transfer or a debit transfer.[2]

Payment infrastructure supports clearing and settlement of payment instruments across the payment system. Clearing is the exchange of instructions for transferring claims on banks. Settlement is the actual transfer of value ordered in the instructions, which is accomplished by debiting and crediting the deposit accounts of the sender and receiver of a payment, respectively. Clearing and settlement are arcane processes which are the province of operations specialists. Perhaps for this reason, the attention that is given to clearing and settlement is often narrowly focused on the interbank part of the process with less attention given to the end-to-end process that includes the bank-to-customer. An end-to-end view of clearing and settlement infrastructure is especially important for methods that provide immediate completion of payments, as consumers rely on the transfer of deposit balances and immediate notification that their transfers are completed. The clearing and settlement infrastructure should always be viewed as supporting a universal network connecting all deposit accounts held in banks and as an end-to-end process that includes immediate notification to both the sender and receiver that the payment transaction is complete.

Payment services are the specific means by which banks provide their customers with access to their deposit accounts for payment purposes, using instruments specified by various schemes. Banks extend payment services to their customers through back office links to clearing and settlement infrastructures that support schemes. The range of payment instruments that a bank offers and which consumers can use to make payments from and receive payments into their deposit accounts depends on the number of schemes in which a bank participates. The quality and price of service experienced by consumers are determined by the attributes of the scheme, the effectiveness and efficiency of the interbank clearing and settlement infrastructure, and the bank's terms for extending access to the payment system to its customers. For example, it was noted earlier that checks universally connect consumer deposit accounts across the banking system, and that checks can be used to pay for any type of transaction involving any combination of consumer. The physical form of a check, its information content, and certainty that it will be cleared and settled by all banks are features that are well understood by consumers.

Banks compete for the consumer's business in part by distinguishing their check services on the basis of convenience (e.g., completeness and timeliness of check statements, acceptance of customer-generated check images, etc.), credit features (e.g., overdraft protection for check writers), and the prices they charge for writing checks and accepting checks for deposit.

This four-part framework helps define the primary roles played by those responsible for making the payment system work and for innovating to meet consumer needs. The roles include planning for the evolution of the payment system, management of payment schemes, "nuts and bolts" operation of the clearing and settlement infrastructure, and of course the provision of payment services to the public. The first two roles—planning the evolution of the payment system and scheme management—involve stewardship for common interests and shared resources, which, in the final analysis, will be judged successful if they meet public needs. Planning addresses big-picture issues, such as the type and number of schemes that the payment system should support. Major issues today include the speed with which payments are cleared and settled, and development of a versatile and universal method of payment to replace checks. Another planning issue concerns the requirements and regulations that apply to nonbank participants in the payment system, who are the main digital payment innovators. As common interests, the payment system and its schemes require a high degree of cooperation among stakeholders to be successful. In addition, because they determine the usefulness of bank money as a medium of exchange and constitute a network that serves the public interest, the payment system and schemes require some oversight by a public body like a central bank (Summers 2012).

The U.S. payment system does not currently support immediate completion of payments, and there are no plans for doing so despite long-standing evidence of the need for such a capability and development of these capabilities elsewhere around the globe. While there is innovation in immediate payments, it is limited to small closed systems operated by nonbanks, or to small closed systems operated by individual banks or consortia of a handful of banks. Developing a national capability for immediate completion of payments will require far-sighted and inclusive stewardship over the payment system. Stewardship must be national and involve all major stakeholders. Note that fragmented development of new immediate payment capabilities is occurring at the same time that checks are declining in importance as a means of payment. Fragmented development of a new method of payment supporting immediate completion of funds transfers represents a missed opportunity for creating a viable substitute for the check as the check declines. A later section of this paper assesses the prospects for immediate completion of consumer payments in the United States.

Public Policy Considerations

This section discusses public policy considerations that should motivate payment system development in a digital economy and be used to evaluate its

performance, especially clearing and settlement. The discussion begins with an overview of central bank policy principles for payment systems and how these principles are applied to consumer payments. Four paramount principles are then described that will help guide the design of a reference model for clearing and settling consumer payments in a digital economy.

Payment system policy has an international basis

The international community of central banks has promulgated a number of public policies pertaining to the payment system through the Committee on Payment and Settlement Systems (CPSS), which meets at the Bank for International Settlements (BIS).[3] These policies include standards of conduct and other related payment system guidance. The international standards of conduct are primarily intended for systemically important payment systems, that is, payment systems that have the potential to transmit disruptions to the financial markets and even to the broader economy (BIS 2011a). Some of these international standards, however, are relevant to the design and operation of consumer payment systems.

The international standards are meant to foster financial stability, and their main goals are safety and efficiency. The standards are elaborated in an official set of performance expectations for payment systems and institutions whose weakness or failure would pose risks to the financial system as a whole. These systemically important institutions are referred to by the BIS as Financial Market Infrastructures (FMIs); they include large-value payment schemes (such as Fedwire and CHIPS in the United States) as well as central securities depositories, securities settlement systems, central counterparties, and trade repositories.

Some countries have begun to apply the BIS standards, at least in part, to retail and other payment systems serving consumers that are considered important to the smooth functioning of the economy. For example, the Eurosystem (the European Central Bank and the National Central Banks together) has adopted a classification scheme for retail payment systems based on these systems' importance to the economy, and has designated a new classification, "prominently important" (European Central Bank 2003). In the United States, the Board of Governors of the Federal Reserve System (hereafter the Federal Reserve Board) applies the BIS standards to systems and institutions that it considers to be systemically important, primarily institutions that serve the financial markets, but not to consumer payment systems.

Consumer payment systems require policy attention

Payment systems serving consumers are a crucial part of the infrastructure of a modern economy and, as such, require direct public policy attention. Public policy for consumer payments should consider central bank concerns about the stability of the financial system and the broader economy, and the needs of consumers in the digital economy.[4] Four policy considerations appear paramount in motivating responsive development of payment systems serving consumers: financial stability,

operational reliability and security, effectiveness, and efficiency (Summers 2012). Each consideration is elaborated below in terms of its practical implications for the design of clearing and settlement infrastructure that supports immediate completion of consumer payments. This discussion of public policy considerations is not necessarily intended to be definitive; rather, it is intended to suggest a way of thinking about payment system design with the needs of consumers in a highly connected digital economy at the forefront of thinking.

Financial stability depends on the predictability of final consumer payments

A payment system is financially stable if it is likely to engender public confidence and continue functioning normally when subjected to severe stresses, including credit and liquidity crises faced by its participants. Financial stability for consumer payments is a function of the safety of deposits consumers hold in transactions accounts in banks (money as a store of value) and the predictability that funds transfers between their accounts will be completed as instructed (money as a medium of exchange). Consumer confidence in being able to continue to access deposit accounts in banks to make and receive payments is in part a function of the federal safety net that guarantees bank deposits. Consumer confidence that funds transfers made and received are completed predictably is a function of speed, finality, and timely notification. Finality is determined by the terms under which banks provide account and payment services to consumers. By participating in a payment scheme that supports immediate and final clearing and settlement, banks will provide a service that buttresses consumer confidence in the payment system.

The willingness of receiving banks to extend finality to their customers depends in part on their ability to manage credit and liquidity risks faced from sending banks. The stability of interbank settlement can be readily managed using tried and tested clearinghouse risk management practices, including and especially those used with multilateral netting. Because the financial stability of payment systems that clear and settle consumer payments is an important public policy consideration, it is incumbent on public authorities to lay out the minimum financial stability standards that these payment schemes and their clearing and settlement arrangements should meet.

Operational reliability and security is an end-to-end consumer experience

An operationally reliable and secure payment system is one that delivers uninterrupted service to its customers according to contracted terms, and that protects their information assets. End users will gauge the reliability and security of a digital payment system based on their personal experience with it and by comparing it to what they have come to expect through using other digital services. Consumer experience in the digital economy therefore results in de facto performance

standards for digital payments. For example, consumers in the digital economy expect continuous and uninterrupted connectivity and access to their information assets. Further, consumers expect strong protection of their information assets and transactional identities.

In a digital transaction, operational performance and security must be managed and measured end-to-end, from the sender to the receiver of the digital payment. The operational process incorporates the sending and receiving banks and the clearing and settlement infrastructure. The payment scheme's design, and its rules and standards, must, therefore, result in a continuous governance of the end-to-end process between the payment sender and receiver, regardless of the number of operational handoffs. To meet consumer expectations for uninterrupted service, every step in the process, including the communication channels linking the sender and receiver to their respective banks, must contribute its part to meeting the end-to-end performance expectations.

The bar for digital payment security is set very high: expectations are that valuable consumer information will be well protected throughout the payment process. This expectation cannot be overemphasized. From a consumer standpoint, and assuming a payment process based on credit transfer, there are two scenarios around which security should be built. First, senders of digital payments need to be protected against the threat of an unauthorized party gaining access to their account and transferring funds from it. This threat involves a compromise of the authentication process between a sender and the sender's bank, possibly in the form of account takeover. Second, the sending and receiving banks need to be protected against the threat of unauthorized payment instructions being inserted into the interbank clearing and settlement process. If this threat were realized, the sending and receiving banks could be tricked into acting on bogus payment orders that take time to identify, reconcile, and correct, exposing them to losses if deposits made by final payment are withdrawn.[5]

Effectiveness is influenced by speed, versatility, and universal coverage

The effectiveness of a particular method of payment depends on how well it meets the convenience and needs of individual and business consumers in the digital economy. Among the payment attributes that consumers look for, speed in completing transactions, versatility in the use of a given method of payment, and universal connectivity to accounts held in banks are of special importance in the digital economy.

Speed is an especially important consideration for payments in the digital economy. Consumers expect virtually immediate completion of their digital transactions. The idea that money in transit is digital information which can be processed immediately has not been readily accepted by the banking industry. Most

bank-sponsored payment schemes depend on clearing and settlement systems that are designed around batch processing and delayed settlement, and these clearing and settlement arrangements are being nurtured as opposed to being re-designed around continuous, real-time processing.

The time needed to complete the end-to-end sequence of steps involving communication of payment instructions, verification, risk management, and accounting and settlement can be greatly compressed for digital credit transfers. The time compression enabled by digital technology and processes is such that clearing and settlement can and should be thought of as one continuous process. Properly designed and executed, clearing and settlement of digital payments will benefit all parties to the transaction, including not only end users, but banks as well. For banks, digital payments present an opportunity to better manage their credit risks by integrating real-time monitoring of customer balances with internal risk management processes.

As mentioned earlier, a versatile method of payment can be used for a wide variety of transactions between any combination of consumers (P2P, P2B, P2G, B2B, etc.). There are trade-offs between versatility and specialization, however, and not every method of payment needs to be or should be developed around meeting every conceivable need. For example, a file transfer method of payment that caters to recurring bulk transactions, such as corporate payrolls, provides specialized benefits that make it very valuable to a particular type of use and user. Also, prepaid cards may be especially well adapted for very small purchases whose only practical alternative method of payment is cash. But, there should be at least one method of payment available that is versatile enough for consumers to use ad hoc and for transactions that do not fit a particular mold.

Universal connectivity is a baseline requirement of any new digital payment scheme. This requirement is not uniquely associated with digital networks and is, in fact, a distinguishing feature of the check system in the United States (Board of Governors of the Federal Reserve System 2010b). Universal connectivity is an important inherited trait from checks that should be present in a digital payment system. Universal connectivity depends on an interbank clearing and settlement system linking all deposit account holders, and participation by each and every one of the account holding banks as a provider of the method of payment defined by the digital payment scheme.

Efficiency is determined by prices and operational standards

For consumers, payment system efficiency is determined in the first instance by the prices they are charged for services. An additional dimension of efficiency is the extent to which ease of use translates into concrete opportunities to integrate management of financial processes, accounts, and other records that are closely linked to payment.

Prices charged for consumer payment services are a function of their full cost of production and the market power that banks have over their customers. With regard to production cost, banks shoulder a share of the cost of managing the payment scheme and the infrastructure used to clear and settle a particular method of payment. They also bear the cost of internal deposit accounting and payment processing systems, and related back-end systems such as risk management, general ledger accounting, and the like. As deposit-taking and payment institutions, banks are information-intensive businesses and their production costs are therefore largely fixed costs (or should be largely fixed costs, if they are well-managed businesses). Accordingly, banks enjoy economies of scale and scope in their payment businesses that result in lower marginal costs as transaction volume increases. One would expect to see relatively low prices for digital payment instruments following scheme standards that support straight-through processing and being provided in a competitive banking environment, especially once the volume of payments grows. It is essential, however, that the scheme specify standards that extend end-to-end, so that banks are able to continue straight-through-processing to the end user customers.

While many banks provide payment services and there are indications of vigorous competition among banks in the payment services arena, competition among services providers is not perfect. In particular, not all payment schemes establish standards for the bank-to-customer component of clearing and settlement, which leads to inefficiency in the provision of payment services and opportunity to levy extra service charges that mask inefficiency. For example, operational standards for real-time Fedwire and CHIPS payments extend only to banks and not to end-user customers, which is one explanation for the very high prices that banks charge their customers for access to these two payment schemes (Biehl et al 2002). Also by way of example, while banks may compete vigorously for consumer account relationships, they also make it difficult for consumers to switch banks once these relationships have been established. This difficulty is again due to lack of standardization, this time in account numbering conventions and to industry practices that prevent consumers from retaining their account numbers when they change banks (unlike the portability of telephone numbers that benefits consumers in the telecommunications market). Factors such as these may help explain the high prices banks charge for real-time payments today.[6]

Payment schemes' owners and infrastructure operators also have monopoly power that can be used to set prices far above their production cost. There is abundant evidence of clearing and settlement pricing that is based not on production cost but on methods designed to extract very high returns for use of the infrastructure. Perhaps the most prominent example is ad valorem pricing for payment methods that essentially involve giving bank account holders direct access to their deposits and that do not entail bank credit, as in the case of debit cards.[7]

Smooth integration of payment-related information with business records is another important efficiency consideration. The timeliness and potential accuracy of digital payments are maximized when record keeping is synchronized bilaterally between the sender and receiver of payment, allowing both to complete their handling of a transaction in the same timeframe. For individuals, this amounts to maintaining a continuous record of account activity for both incoming and outgoing payments. Businesses further benefit from integration of payment and invoicing records, which allow close coordination of payment processes and invoicing processes.[8]

Clearing and Settlement Reference Model for Immediate Funds Transfer

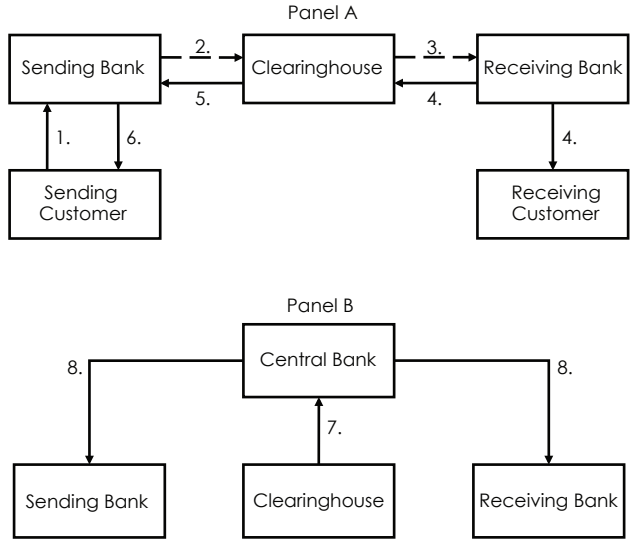
Having posited assumptions about consumer payment needs in the digital economy and reviewed public policy considerations for developing the payment system with the needs of the digital economy in mind, it is now possible to construct a reference model of a payment scheme that meets needs and addresses public policy considerations. The payment scheme should support payments that are immediate, final, and low cost, and that are priced to the consumer at production cost plus a reasonable markup. The scheme should also provide a versatile payment instrument that can substitute for check payments. Ideally, all banks should support the payment scheme by providing the scheme's method of payment as a service. The payment scheme would support a new type of payment instrument—call it Immediate Funds Transfer or IFT, as in "pay by IFT," akin to saying "pay by check." The IFT scheme is intended for any combination of consumer payments between individuals, businesses, and governmental entities.

The model described here is conceptually appropriate for immediate and final funds transfers. This model is fully operational and tested in a number of countries around the world (Summers and Wells 2011). In fact, cumulative evidence suggests that IFT is the predominant new type of payment system in development around the world, in both advanced and developing economies.[9] Experience shows that the IFT model is scalable and can support high volumes of transactions while meeting demanding operational quality targets including rapid end-to-end completion times and strong security. Further, experience shows that IFT can be produced at unit costs consistent with prices consumers are willing to pay for such payments. The clearing and settlement process on which the model is based is end-to-end and depends on scheme rules and standards, promulgated by a clearinghouse, that support straight-through processing and that are followed throughout the process by every entity playing an operational role.

The IFT clearing and settlement model is shown in Figure 1. Six parties play roles in clearing and settlement: the sending and receiving bank customers, their banks (assuming an interbank transfer), the clearinghouse, and the central bank. It is important to recognize at the outset that the clearinghouse role can

Figure 1

Clearing and Settlement Reference Model Immediate Funds Transfer*



There are six main steps in the end-to-end clearing and settlement process for customer IFT transactions depicted in Panel A, and two additional main steps in the interbank clearing and settlement process depicted in Panel B. These steps are as follows.

1. Sending customer transmits an IFT payment order to his/her/its bank

2. Once the sending bank accepts the payment order by authenticating its customer, performs a credit check (for sufficiency of funds or credit capacity), and assuming a satisfactory credit check, it then debits its customer's account and transmits the validated payment order to the clearinghouse

3. Once the clearinghouse accepts the payment order by validating the correctness of the clearing instructions (completeness of mandatory fields, correctness of receiving bank address, etc.), performs a credit check (to ensure that the sending bank's interbank net debit position is within limits), and provisionally records the payment order details and resulting interbank net debit and credit effects for the sending and receiving banks, respectively, it then transmits the payment order to the receiving bank

4. Once the receiving bank validates its receiving customer's account information and credits the receiving customer's account, it then notifies both the receiving customer and the clearinghouse that the payment has been credited (N.B. at this point final settlement has occurred for the end-user customers)

5. Once the clearinghouse removes the provisional designation from the record of payment order and interbank net debit and credit positions, it then notifies the sending bank that the payment is complete

6. Sending bank notifies its sending customer that payment is complete

7. Clearinghouse submits interbank settlement statement to the central bank reflecting net debit and credit positions resulting from customer IFT payments completed during the settlement period

8. Once the central bank acts on the settlement statement by making debit and credit entries to reserve accounts and thereby finalizes the interbank settlement of payments accumulating during the settlement period, it then notifies the sending and receiving banks and the clearinghouse

* This is a stylized IFT clearing and settlement model that is based in part on Faster Payments in the United Kingdom and Real-Time Clearing in South Africa.

be performed either by a privately owned and operated entity, or by the central bank. In the former case, the clearinghouse would provide the interbank clearing functionality and serve as settlement agent on behalf of its participating banks, calculating interbank net settlement positions and presenting settlement statements to the central bank at designated times. In the latter case, the central bank would provide both interbank clearing functionality and settlement: settlement would likely occur payment-by-payment, directly in the banks' reserve accounts, as is the case today for RTGS system payments. This paper is neutral on the question of the private versus public character of the clearinghouse. The IFT clearing and settlement model presented here assumes a private clearinghouse because this approach allows ready distinctions between final settlement of customer transactions using commercial bank money, and final settlement of interbank obligations arising from IFT payments using central bank money.[10]

In Figure 1, clearing and settlement of customer IFT transactions is shown in Panel A, and clearing and settlement of interbank obligations arising from customer IFT transactions is shown in Panel B. Movements of information and funds are illustrated using solid and dashed lines, respectively. The timing, sequence, and legal status of the operational processes shown in Figure 1 are critical to understanding settlement finality for the end users on the one hand, and for their sending and receiving banks on the other hand. Note in particular that the sending and receiving banks provide final settlement to their customers (see Panel A) before they themselves settle their interbank positions arising from the IFT clearing (see Panel B). Panel A depicts the end-to-end process whereby the sending customer of one bank originates an immediate funds transfer to the receiving customer of another bank, for which both customers receive final settlement in commercial bank money and immediate notification that the funds transfer has been completed. Panel B depicts the interbank settlement process for all IFT payments made by bank customers within a designated timeframe using central bank money.[11]

The processes illustrated in Panel A that result in finality of payment for the sender and receiver are operationally and legally binding on the sending and receiving banks. These processes will be detailed in the clearinghouse rules. The end-to-end process is continuous and immediate, and each party will be bound by operational performance requirements pertaining to each step, as is commonly the case for all joint undertakings of this nature. The entire end-to-end process, beginning with initiation of the payment order by the sender and concluding with the notification to the sender that payment is complete, will take no longer than one minute and probably be completed in seconds. While the speed of IFT clearing and settlement is demanding in comparison to traditional clearing and settlement timeframes, experience shows that the common time unit of measure for completing IFT transactions is seconds. Banks are required by agreement to provide final settlement to their customers within the time it takes for the round trip to be completed. The point at which an IFT payment becomes final is when the receiving bank credits the receiving customer account.

The processes illustrated in Panel B result in final settlement among the sending and receiving banks (while the stylized model includes only two banks, many banks would participate and all would be party to the interbank multilateral settlement). It is reasonable to think that banks will want to settle their obligations arising from IFT clearing in a distinct process that mirrors their settlement practices for other real-time payments. Interbank settlement of IFT payments can, and probably will, occur several times during the operational day.[12] Banks have the option of shortening the interbank settlement period as IFT schemes grow in terms of value processed, to the point of converging on immediate settlement of their IFT obligations. Further, oversight authorities will undoubtedly take an interest in the development of IFT, including the risk management implications of interbank settlement practices.

End-to-end clearing and settlement illustrated in Figure 1 can only be completed in the IFT timeframe with virtually instantaneous communication of information in each step of the process. It is not unrealistic to expect that the information flows will be both fast and inexpensive. It is worth noting, however, that communication processes between banks and their customers, and banks and the clearinghouse, need to be seamlessly coordinated. This is readily accomplished for the interbank communications which will take place over a shared communications facility that is coordinated by the clearinghouse. It is possible (but not necessary) that the sending and receiving banks share communications facilities for reaching their respective customers. Banks are likely to compete in the market for IFT services partly on the basis of the channels for access to deposit accounts that they provide to their customers.[13]

Is the IFT clearing and settlement process illustrated here likely to deliver services at a cost that is ultimately attractive to consumers? Based on experience with implementation of the model by banks in a number of countries, and by nonbank payment services providers in the United States, the answer is yes. Bank implementations of IFT schemes are almost always priced to customers on a per transaction basis, or through fixed fees charged for a package of account-related services. Using the per transaction fee as a basis for judging the order of magnitude cost and price that would be expected to result from the introduction of a de novo IFT clearing and settlement system based on what is observed in countries where IFT has been introduced, one would expect the price to consumers to range from 50 cents to $2.50 (Summers and Wells 2011). Prices in this range would be expected to fully cover operational expense, associated risk management costs, normal overhead allocations, and profits.

Payment System Governance and Innovation

The foregoing discussion shows that the U.S. payment system has yet to accommodate the shift in consumer behavior in the digital economy. It has also been shown that the United States is lagging in the development of consumer payment methods that are increasingly expected in the digital economy. The needed payment system response is illustrated with an IFT reference model that supports

payment connections for all combinations of consumers across all account holding institutions; IFT is up and running and is commercially successful in a number of countries. There are no evident prospects for lifting the present payment system in the United States into a new, IFT-like payment scheme.

Market acceptance, technology, and cost do not appear to be barriers to rapid adaptation of the U.S. payment system to the digital economy. The principal barriers involve coordination in planning and developing clearing and settlement infrastructure and related end-to-end payment schemes that threaten existing business models. The IFT model shows that the new clearing and settlement infrastructure requires seamless and impeccable end-to-end coordination in a real-time operational setting. This type of operational coordination is new to banking, longstanding experience with RTGS notwithstanding.

Further, public policy considerations call for explicit pricing of IFT payments based on production cost. This approach is consistent with utility pricing, and it challenges the current practice of ad valorem pricing of some payment methods used by consumers to access deposits (e.g., debit cards). Cost-based pricing would likely result in IFT transaction fees that are much lower (perhaps up to 20 times lower) than similar fees typically charged on bank wire transfers. Obviously, IFT would pose significant challenges to current wire transfer business models, especially because most wire transfers are made by banks on behalf of their customers and are relatively small (Biehl et al 2002). As well, IFT would challenge the business models of consumer payment networks that charge ad valorem prices for directly accessing deposit accounts.

Payment system development that is responsive to the needs of the digital economy and public policy considerations, along the lines of the IFT, will require clear-minded and far-sighted planning, cooperation in the development of payment schemes and clearing and settlement infrastructure, and vigorous competition among providers of IFT services. Is existing payment system governance in the United States capable of developing a broadly supported strategy responsive to the needs of the digital economy and fostering the degree of cooperation needed to devise and implement a new IFT payment scheme? That is the big question.

Governance lies at the heart of payment system development

Governance is about decisionmaking and the allocation of rights among stakeholders with shared interests. Effective governance allocates rights and allows stakeholders to influence decisions in ways that are, and that are perceived to be, fair, sensitive to the needs of each stakeholder group, and in line with the public interest. There is no single governance model for the payment system that is suitable across countries. However, the experiences of countries that have dramatically uplifted their payment systems with IFT offer some interesting case studies and lessons.

National government is the prime mover and enabler in establishing formal governance of the payment system in a number of other countries, including

Australia, Canada, the eurozone, and the U.K. National legislatures or government executive bodies such as the Treasury are moved to address contention among payment system stakeholders, acute consumer protection concerns, the inability of the payment system to innovate and adapt to changing consumer needs, or lack of competition. Commonly, governments act by forming a national commission to study and make recommendations to improve the national payment system, reporting to the legislature or the executive branch.

The recent experience of the U.K. is instructive, as the government's action was prompted by concern about lack of competition in the banking system, resulting in part in a failure to innovate by speeding up clearing and settlement of payments (Smee 2012). The U.K. is one of the countries where IFT has been successfully introduced. The report of a national commission ultimately led to the establishment of the U.K. Payments Council (Cruickshank 2000). The decision to formalize payment system governance arrangements in the U.K. was predicated on the idea that the payment system is part of the critical infrastructure supporting the economy and as such requires strategic planning. In addition, the decision was based on a perception that payment system practitioners, that is, scheme owners and operators, and users, were not communicating or cooperating well. Concerns about competition were reflected in the perception that there was insufficient innovation in the payment system, and in particular failure to speed up clearing and settlement times, despite increased use of electronic means of payment. New governance arrangements were envisioned that would result in commitment to innovation.

The U.K. Payments Council was established in 2007 with the mandate to develop a strategic plan and designate payment schemes. The Council's board includes independent directors who are expected to represent the public interest across user groups, not specialized interests such as corporations or individuals. The Council's business is conducted in a transparent manner, and it relies on consultative mechanisms to engage all stakeholders with an interest in the payment system. Subsequent to its establishment in 2007, the U.K. Payments Council issued a National Payments Plan in May 2008, which was updated in October 2011, and designated the Faster Payments scheme in May 2008. Faster Payments is the first new payment service in the U.K. in 20 years.

The U.S. payment system lacks national governance

Foundational to understanding today's payment system governance in the United States is awareness of its historical antecedents, notably the origins of the Federal Reserve System established in the 1913 Federal Reserve Act (Board of Governors of the Federal Reserve System 2005). Congress intended for the new central bank to play an operationally active and dominant role in the payment system of the time, in part by unifying clearing and settlement across the nation. At the time, the check was the predominant noncash means of payment and was used principally in business and banking transactions. The central banking system created by Congress included the Federal Reserve Banks, whose powers included the

provision of payment services, and the Federal Reserve Board, whose powers included supervision of Reserve Bank affairs and regulatory authority over the operational services provided by the Reserve Banks, including payment services.

Practically speaking, the Reserve Banks were designed to function as the national clearinghouse for checks. In today's terminology, the Reserve Banks were empowered to be check system operators, and the Federal Reserve Board and Reserve Banks together were scheme owners, as they issued, respectively, regulations and operating rules (aka standards) governing Reserve Bank check services. This governance prevails to this day and applies to all payment services provided by the Reserve Banks, including not only checks but wire transfer of reserve account balances (Fedwire) and the automated clearinghouse (ACH). The Reserve Banks have historically played a very significant operational role in clearing and settling checks, ACH items, and Fedwire funds and securities transfers. In essence, the Reserve Banks function as bankers' banks, providing interbank clearing and settlement services to commercial banks and other depository institutions, settling interbank payment obligations in reserve accounts.

Of course, much has changed since 1913. Notably, use of checks as a means of payment expanded well beyond banks and business to include individuals (that is, checks became a highly versatile and general-purpose method of payment). Later, changes in technology and banking structure allowed correspondent banks and private clearinghouses to assume a greater role in clearing and settling first checks and then newer payment instruments. The ACH was introduced as an automated clearing and settlement alternative to the check, and a variety of new methods of payment, such as payment cards, came into use. Electronic communications networks for payments, such as ATM networks and card authorization networks, came into being. During this time of innovation the Federal Reserve Board took a strong position prohibiting the Reserve Banks from expanding their clearing and settlement services beyond check and ACH.[14] In addition, nonbank providers, such as PayPal, began offering substitutes for bank payment services, and supervisory authorities allowed these nonbanks to offer such services without becoming chartered as banks.

In the decades following 1913, Congress directed the Federal Reserve Board to improve the effectiveness and efficiency of specific aspects of the clearing and settlement process for checks by granting it new regulatory powers extending to commercial banks. In exercising its new powers, the Federal Reserve Board issued regulations and supported Reserve Bank service enhancements that would assist commercial banks in upgrading their clearing and settlement practices. For example, under the Expedited Funds Availability Act, Congress directed the Federal Reserve Board to speed up availability of funds for checks deposited by consumers in banks (a congressional action prompted by public outcry over banks' practice of placing long holds on check deposits). The Federal Reserve Board did so by issuing regulations that include check availability schedules, which banks are obliged to meet, and by encouraging and supporting Reserve Bank operational enhancements

to speed up interbank clearing and settlement of checks. Similarly, under the Check Clearing for the 21st Century Act (Check 21), the Federal Reserve Board issued regulations that allow banks to further speed up check clearing and settlement by stimulating electronic clearing of checks. Again, the Board looked to the Reserve Banks to support the intent of Check 21 through operational improvements in electronic check clearing and settlement.

Public concern about the efficiency of clearing and settlement for debit cards led Congress to enact the debit card amendment to the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. Debit card, notably, is a relatively new method of payment which the Reserve Banks do not clear and settle. Accordingly, Reserve Banks operations do not provide a production cost benchmark against which debit card clearing and settlement efficiency can be measured, and the Reserve Banks are unable to enhance clearing and settlement by leveraging their national processing capabilities. The result is exclusive reliance on direct regulation of bank interchange fees by the Federal Reserve Board to achieve the intent of Congress, rather than reliance on the Federal Reserve System's operational and regulatory capabilities in concert, as was historically the case.

The above discussion of congressional intervention in the national payment system underscores four broad themes. First, it is Congress that traditionally acts to motivate significant reforms in the U.S. payment system. Second, Congress acts when there is a clear public concern about the quality or cost of payment services that the banking system is able or willing to provide on its own. Third, Congress looks to the Federal Reserve Board as the principal authority through which its intentions are to be implemented. Fourth, while regulation by the Federal Reserve Board and operational support by the Reserve Banks have typically been used together to improve payment system effectiveness and efficiency consistent with congressional intent, the case of debit card interchange fees suggests a new approach that relies solely on regulation.

This paper does not investigate the question of whether or how debit card clearing and settlement practices might be different if the Reserve Banks were involved. It is worth noting, however, that in its analysis of debit card fees and clearing and settlement practices, the Federal Reserve Board contrasted the check and debit card payment mechanisms and highlighted two important differences (Board of Governors of the Federal Reserve System 2010b). First, check infrastructure is universal whereas the debit card infrastructure is fragmented; the former depends on Reserve Bank clearinghouse services and a high degree of cooperation among all those sharing the infrastructure, whereas the latter depends on competition among a small number of private infrastructure providers. Second, checks are cleared at par (an intent of Congress when it established the Federal Reserve System in 1913) whereas debit cards are not cleared at par but rather are subject to ad valorem pricing—non-par clearing). Arguably, the Reserve Banks would never have allowed non-par clearing and settlement for interbank debit card payments.

To summarize, whereas the Reserve Banks initially functioned as the de facto national clearinghouse for interbank and consumer payments, their role has been greatly diminished as the Federal Reserve Board has largely limited their involvement to wire transfer, and improvements in check and ACH. This conclusion is illustrated by the decline in the share of consumer payments handled by Federal Reserve Banks, from close to 100 percent originally to no more than 20 percent today (which is to say, not more than one in five noncash payments is made using Reserve Bank clearing services).[15] As a consequence, the Reserve Banks' operational leverage to influence the production cost and pricing of clearing and settlement, and the speed and overall effectiveness of the clearing and settlement process, is now severely constrained. While the operational role of the Reserve Banks has shrunk, the regulatory role of the Federal Reserve Board has expanded with increased, although highly prescriptive, powers assigned by Congress. Congressional action in this area can be characterized as ad hoc and a response to constituents' "pain points."

As the national role of the Federal Reserve System in clearing and settling payments has diminished, no other public or private organization has emerged to represent the collective interests of the many stakeholders. While there are many payment-related organizations, they are either focused on a specific and narrow issue such as security or access channels, and/or they are advocates for trade groups with vested business interests in a particular payment scheme. National payment system governance motivated by public interest considerations has eroded. Today's payment system is characterized more by competition than cooperation, even with respect to clearing and settlement infrastructure. Amelioration of concerns about innovation in clearing and settlement should begin with renewal of public interest governance.

Payment system governance in the United States should be strengthened

What are the possibilities for strengthened governance that results in continuous improvement in clearing and settlement infrastructure, and that ensures that the benefits of such improvements are passed on to consumers? The following discussion evaluates potential public and private sector responses to a call for stronger governance of the payment system that is relied on by consumers, especially in light of needs of the digital economy, and assesses the role that government may need to play in the United States, analogous to the roles government has played in other countries.

It is appropriate to start by considering whether the Federal Reserve System is likely to step up to the leadership challenges facing the payment system in the digital economy. Such consideration needs to distinguish carefully between the roles of the Federal Reserve Board and the Reserve Banks, the former, as was said, being the regulatory authority. Also, the Federal Reserve Board effectively controls the extent to which the Reserve Banks become involved in clearing and settlement. Only the Federal Reserve Board has a legislative basis for reaching out to supply- and demand-side stakeholders to address broad payment system issues and concerns, and, as we have seen, this basis is fairly narrowly drawn.

The Federal Reserve Board states that the duties of the Federal Reserve System fall into four general categories: conducting monetary policy, supervising and regulating banking institutions, maintaining financial system stability, and "providing financial services to depository institutions, the U.S. Government, and foreign official institutions, including playing a major role in operating the nation's payments system" (Board of Governors of the Federal Reserve System 2005). In the context of this paper, this statement by the Federal Reserve Board is striking because it does not mention overseeing the payment system, developing payment system policy, or facilitating the effective and efficient functioning of the payment system as one of the Federal Reserve System's duties, except to the extent that the Reserve Banks provide operational services.

Notwithstanding that it excludes the payment system from its current list of duties, over 20 years ago the Federal Reserve Board issued a general policy regarding the Federal Reserve's role in the payments system, a policy which remains in effect (Board of Governors of the Federal Reserve System 1990). This 20-year-old policy does not clearly distinguish between the roles of the Federal Reserve Board and those of the Reserve Banks, but rather it refers to "the Federal Reserve." It states that assuring integrity, efficiency, and equitable access are core Federal Reserve responsibilities. Integrity is described as the smooth functioning of the banking and financial markets. Efficiency is described in terms of cost-saving technical innovations whose adoption can be promoted by incorporating them into Reserve Bank operations. Equitable access is described in terms of the availability of Reserve Bank services to all depository institutions. The policy statement emphasizes recovery of the Reserve Banks' costs as services providers and limits on expansion of Reserve Bank services.

An examination of the Federal Reserve Board's web site and its annual report (Board of Governors of the Federal Reserve System 2011) suggests that it has little appetite for engaging in issues facing consumer payments, unless the issues are directly related to the Reserve Banks' check and ACH services. This is in contrast to the Federal Reserve Board's keen and active interest in supervising and regulating systemically important payment institutions, an interest that is long standing and has recently been formalized in legal powers assigned by Congress in the Dodd-Frank Act.[16] Central bank best practice is to explicitly inform the public as to which payment systems and institutions fall within the ambit of their oversight, supervision, or regulation. The Federal Reserve Board identifies the key financial market infrastructures in which it is interested and these consist of only large-value systems.

The Federal Reserve Board has a Payments System Policy Advisory Committee whose purview includes "retail and wholesale payment systems and instruments" and "strategies to foster the safety, efficiency, and accessibility of the U.S. dollar payments system over the long term." The Committee's agenda and deliberations are not public, however. The only evidence of its interest in the "retail" payment system is an occasional public forum such as the ones cited earlier in this paper. The frequency and subject matter of these forums, and the limited

follow-up after the forums, further suggest that neither the Committee or the full Board have an ongoing interest in or commitment to public policy pertaining to consumer payments.

Members of the Federal Reserve Board occasionally speak on payment system topics. When they do, they tend to focus on systemically important payment systems (Bernanke 2011) or on checks and ACH (Ferguson 2003). The Federal Reserve Board is further signaling through the public appearances of its members that what matters to the central bank is systemic financial risk and the specific operational services provided by the Reserve Banks, but not the payment system broadly viewed.

As indicated earlier, the Federal Reserve Board has, or at least has had, considerable leverage to influence payment system developments through the Reserve Banks' operational services, which it supervises. This leverage has been used to great effect in modernizing and improving the safety and cost efficiency of the clearing and settlement services the Reserve Banks provide. In this connection, and in the context of this paper, the Federal Reserve System deserves enormous credit for the advances made in checks and ACH. As noted, however, checks and ACH have been outstripped by newer forms of payment, and the Federal Reserve Board has tightly restricted the expansion of Reserve Bank services beyond checks, ACH, and wire transfer. The Federal Reserve Board's concern is that new services would broaden Reserve Bank competition with the private sector. Rather than provide strong incentives to the Reserve Banks to innovate in clearing and settlement, the Federal Reserve Board seems to place almost exclusive weight on matching costs and revenues by service line as a determinant of success (Board of Governors of the Federal Reserve System 2011). The Federal Reserve Board seems satisfied with a strategy for Reserve Bank services that would have them keep a low profile and largely withdraw in an orderly way from clearing and settlement operations.

It can be concluded from the above discussion that the Federal Reserve Board is not interested in leading or guiding the development of clearing and settlement capabilities for payments in the digital economy. Moreover, the Federal Reserve Board is satisfied to give up the Reserve Banks' operational leverage as providers of interbank clearing and settlement services. Absent an engaged Federal Reserve Board role, is it likely that private organizations might step up to assume responsibility for organizing and leading national payment system governance? This, too, appears unlikely based on how prominent private organizations with an interest in payments are constituted and how they define their purpose and goals. The purposes and goals of three organizations that might naturally be considered for a national leadership role are reviewed below.

The American Bankers Association (ABA) is the largest and most prominent association of financial institutions in the country. The ABA's self-described purpose is to represent the interests of all banks regardless of size and location. The ABA has formidable analytical and policy development resources at its

disposal, judging from the range of carefully prepared position papers available on its website. The ABA devotes attention to topical payment system issues, such as the Dodd-Frank interchange fee legislation (and the Federal Reserve Board's rule writing to implement that law). Its work also reflects the long-standing concerns of its members about unfair competition from nonbanks in the payment system. The ABA is an industry association and is unlikely to take up public policy concerns about payment system development unless these concerns overlap with the business interests of its member banks. In any event, it is not clear that an industry association would have the instincts or capabilities to organize and lead a governance body which, to be successful, would need to include a broad range of stakeholders in addition to banks.

The Clearing House (TCH), which is still thought of by many as the New York clearing house, is another prominent private sector organization representing banks. It is also a major provider of wire transfer of funds (CHIPS), ACH (EPN), and electronic check (SVPCO) services to banks. The Clearing House makes significant contributions to payment system development, through management of its own services and through its policy analysis of regulatory proposals. Like the ABA, however, TCH's purpose is bank advocacy, and this advocacy is on behalf of a relatively narrow member base consisting of "the world's largest commercial banks." It, too, is not well constituted to develop and lead a broadly based payment system governance body.

Finally, the National Automated Clearinghouse Association (NACHA), which bills itself as The Electronic Payments Association, is a truly national organization that is the de facto scheme owner for the commercial ACH system.[17] Unlike the ABA and TCH, NACHA's membership is inclusive of all financial institutions that participate in the ACH, and it makes an effective effort to include the users of ACH services in decisions about ACH rules and the strategic direction of this payment mechanism. NACHA limits its activities to management of the ACH scheme and leaves operations to others. The foregoing qualities are characteristics that one would look for in a well-designed governance organization. However, NACHA's priorities are strongly focused on the success of the ACH network, which it describes as "the backbone for the electronic movement of money and data." While ACH may be a backbone, its rules and operational modalities are closely patterned after older payment paradigms including batch processing and delayed clearing and settlement. As an industry trade association that advocates and protects the interests of the ACH industry, NACHA is poorly positioned to lead payment system governance whose purpose is to match the pace of change in digital society, especially change that would be likely to disrupt the business plans of financial institutions and ACH operators and services providers.

It can be concluded from the above review of the purposes and goals of the ABA, TCH, and NACHA that these organizations are not well constituted to organize and lead national payment system governance. This is especially the case in

today's digital economy, where traditional payment system modalities and business models are subject to dramatic pressure to change. In particular, it is unlikely that private sector organizations that represent the interests of trade associations and business interest groups would be able to lead the development of new clearing and settlement arrangements along the lines of the IFT reference model described in this paper.

Congress holds the key to stronger payment system governance

The Federal Reserve Board and prominent private sector organizations appear unable to lead payment system development in the digital economy. This leaves direct governmental action as the only practical alternative for initiating needed changes in payment system governance. As we have seen, the typical approach taken by governments is to empower a commission with the mandate to analyze needs from a public policy perspective and then recommend actions to address public interest concerns. Such recommendations typically include incentives for active public interest governance of the payment system, and a major and possibly leading role for the private sector.

In fact, the U.S. Congress established such a commission in 1974, the National Commission of Electronic Fund Transfers (hereafter the Commission). The Commission's 1977 report played an important role in guiding the development of the U.S. payment system in the decades that followed (National Commission on Electronic Fund Transfers 1977). The report is a tome, and it is not the purpose of this paper to recapitulate its findings. Two aspects of the Commission report are particularly pertinent to this paper, however. First, the Commission articulated a consumer-centric vision for a new method of payment which, if introduced, would have been the foundation for a digital payment capability like IFT. Second, the Commission did not make any public interest governance recommendations, but rather it placed heavy reliance on the competitive marketplace, appropriately regulated, to lead the development of the payment system. Absent from the Commission's thinking about or analysis of the payment system is the concept of network, and the implications of network effects and incentives for cooperation among stakeholders. The omission of public interest governance recommendations and network considerations may have doomed its vision for future digital payments.

The Commission strongly encouraged development of a new, giro-like credit transfer system so that U.S. consumers and businesses would benefit from payment features available in Europe but not here. It accompanied this endorsement with recommendations that standard invoicing and billing procedures be incorporated into giro-like payments. The IFT systems springing up around the world are, like the IFT reference model illustrated in this paper, essentially giro designs updated to meet the needs of the digital economy. One can wonder whether an IFT vision would be realized in the United States today had the Commission also recommended new governance arrangements that are friendly to innovation.

The Commission's report was prepared at a time when today's technologies not only did not exist but were unimaginable (the Internet was not in the thinking of the commissioners and the concept of network, and the implications of network effects and incentives for cooperation among stakeholders is notably absent from the analysis). Also at the time, social interactions were much more narrowly conceived (there is no inkling of "connectedness" in the Commission's report). Thirty-five years is a long time, especially when change is measured by super-fast "Internet time," and a strong case can be made that we are overdue for a new national payment system commission in the United States. The new commission, however, would need to deliberate and make recommendations quickly if the payment system is to catch up with changing needs in today's digital society and economy.

Conclusions and Recommendations

Consumers in the digital economy, including individuals, businesses, and governmental entities, value a digital payment method that allows them to complete their transactions immediately, reliably, securely, and at acceptable cost. This method of payment, already in use elsewhere in the world and known as Immediate Funds Transfer (IFT), is described in this paper. An IFT is an immediate and final credit transfer whose completion is communicated to the sender and receiver of payment in a matter of seconds. A digital payment system such as IFT could and probably should also satisfy the long-standing need of consumers for a highly versatile method of payment that universally connects them through their accounts in banks, as does the check today. The National Commission on Electronic Fund Transfers envisioned IFT in its recommendations of 1977.

Despite a vision provided 35 years ago, and despite evidence of consumer demand dating back a decade or more, and notwithstanding successful commercial experience in a number of countries around the world, the U.S. payment system does not appear close to implementing IFT-like capabilities. Governance issues appear to be the primary barrier to innovation in clearing and settlement that would support immediate completion of digital payments in the United States. Effective governance will be guided by public policy considerations including financial stability, operational reliability and security, effectiveness, and efficiency, all envisioned in practical terms that are meaningful to end users of consumer payments in our digital society and economy. The lack of public interest governance is evidenced not only by the failure of the U.S. payment system to keep up with changes in the digital economy, but also by regressive developments such as a retreat from par clearing (taking the form of ad valorem pricing) and from universal clearing and settlement of payment instruments.

Governance must encourage a consumer-centric, end-to-end view of payment system development, cooperation in the adoption of end-to-end payment schemes and shared clearing and settlement infrastructure, and competition in payment services using the shared infrastructure. Unfortunately, neither the Federal Reserve Board nor prominent private sector organizations have either the

interest or the ability to lead payment system development into the digital age. For better or worse, the U.S. Congress appears to hold the key to stronger payment system governance today, as it did 35 years ago when it established the National Commission on Electronic Fund Transfers.

The following recommendations are intended as concrete action steps leading to upgraded payment services to U.S. consumers in the digital economy.

1. The Federal Reserve Board should clarify its role and that of the Federal Reserve Banks in the existing consumer payment system and its future development. This can be accomplished by issuing a new policy statement to replace that last issued by the Federal Reserve Board in 1990. The Federal Reserve Board's clarified policy should specifically describe the operational contribution it expects the Reserve Banks to make as providers of clearing and settlement services in the digital economy, if any, and its own role as overseer, if any.

2. The Federal Reserve Board and/or U.S. Treasury should engage the appropriate congressional committees about the need for a national commission on payment system innovation in the digital economy. The new commission should give priority attention to public policy goals and public interest governance of the U.S. payment system, with particular focus on the needs of consumers in the digital economy. The commission should take care to be well informed about consumer payment system developments globally and the possibilities that these developments hold for innovation in the U.S. payment system.

3. The Federal Reserve Banks should perform a benchmark assessment of implementing national clearing and settlement processes and infrastructure to support immediate completion of digital payments, along the lines of the IFT reference model described in this paper. The design assessment should be end-to-end, including interbank and bank-to-customer interactions, and should consider the possibility of centrally provided, standardized bank-side operational capabilities for connecting their customer accounts through a national clearinghouse.

4. The Federal Reserve Board should develop a special-purpose bank charter for providers of specialized payment services, allowing in particular for the inclusion of nonbanks that are payment system innovators and payment method providers in the nation's money and banking system for payments.

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ENDNOTES

[1]For example, see *fasterpayments.org.uk* for data on the adoption of Faster Payments as a new method of consumer payment in the U.K.

[2]There are two basic approaches to payment that are distinguished by their respective clearing and settlement processes, namely, credit transfers (so-called "credit push") and debit transfers (so-called "debit pull"). For credit transfer, clearing instructions and settlement move together, directly from sender to receiver. For debit transfer, clearing instructions move less directly from sender to receiver, then from the receiver to the sender's bank, entailing return item risk for the receiver and the receiver's bank, and ultimately trigger settlement in bank accounts.

[3]The Board of Governors of the Federal Reserve System and the Federal Reserve Bank of New York are represented on the Committee on Payment and Settlement Systems.

[4]In addition to focus group findings by the Federal Reserve Board cited earlier in this paper, other research identifies payment attributes that individual and business consumers consider important (see Foster et al 2011, and Association for Financial Professional 2010).

[5]An important practical question that is beyond the scope of this paper is how and to what extent immediate completion of payment affects information security. The answer to this question depends critically on the effect of speed on risk management and whether the underlying payment process is credit transfer or debit transfer. Arguably, a security model based on real-time risk management and strong control over key decision points can enhance security. Also, the credit transfer process presents an inherently easier security problem to solve than does debit transfer.

[6]Increasingly, the ease with which consumers can change their banking relationships is a public policy priority in a number of countries. A notable example is the U.K., where the Payments Council is adopting an account switching guarantee (complete within seven days) on the recommendation of the 2011 Independent Commission on Banking.

[7]In some cases involving two-sided markets the collective interests of payment system users may be best served if costs are not shared equally or proportionally. At the same time, however, efficient pricing does suggest that the total revenue extracted for use of a payment method should bear a reasonable relationship to the cost of production.

[8]The full processing efficiency gains of digital payments are enabled by standards that allow for straight-through-processing. The requisite standards include account number, reference number, and e-invoicing standards that can be integrated with digital payment systems. Full integration based on international standards

is well established in the Nordic countries and a priority undertaking in Europe (Leinonen 2009).

[9]The model underlies IFT schemes in developed economies where bank deposit money is most common, but also in developing financial economies where cash is the principal form of fiat money, for example, M-PESA in Kenya. It also underlies IFT services offered by nonbanks, such as PayPal and CashEdge.

[10]National IFT implementations around the world follow both the private and public (that is, central bank) clearinghouse approaches. For example, the United Kingdom and South Africa rely on a privately operated clearinghouse, whereas Mexico and Switzerland rely on the national central bank as the clearinghouse (Summers and Wells 2011). It is important to emphasize that in both cases, consumer settlement is in commercial bank money, whereas interbank settlement is in central bank money.

[11]Hypothetically, if the bank of the receiver of an IFT defaulted on a net debit obligation arising from the IFT settlement, the customer would still have final use of the funds deposited as a result of the transfer, but in a deposit account held with a distressed bank. If the bank of the sender defaulted, all payments accepted by the receiving bank and credited to the accounts of its customers would be available deposits received in the form of final funds transfers.

[12]Interbank settlement for Real-Time Clearing takes place once each hour and for Faster Payments at intervals of several hours.

[13]Most IFT implementations rely initially on existing communication channels such as ATM and online or Internet banking, and then progress and expand to mobile channels using smartphones. Mobile banking on smartphones that exploits telecommunications features such as SMS and email are considered to be a natural match with IFT.

[14]See, for example, Brimmer (1967). In this speech Governor Brimmer speaks to issues of clearing credit card slips and why the national check clearing system should not be burdened.

[15]It is estimated that the Reserve Banks' share of the total number of noncash payments processed in 2009, excluding wire transfer, is 19 percent, computed as follows using data from the Federal Reserve's 2010 payments study (Board of Governors of the Federal Reserve System 2010a). The Reserve Banks handled about 35 percent of all commercial checks (excluding checks converted to ACH) and about 58 percent of ACH items. The check and ACH shares of total noncash payments were 27 percent and 17 percent, respectively. Thirty-five percent of 27 and 58 percent of 17 total 19 percent. This analysis results from work in which I was engaged with colleagues in the Federal Reserve Bank of Chicago Financial Markets Group, serving there as a consultant.

[16]The Dodd-Frank Act for the first time gives the Federal Reserve Board

explicit authority to regulate and supervise systemically important payment systems and institutions. Unlike the case in a number of other countries, the new legislation is silent on the subject of oversight of consumer payment systems. It is likely that the Board and its staff influenced the thinking of the drafters of the congressional legislation, and assuming so, they apparently did not consider broader oversight powers, extending to consumer payments, to be significant.

[17]The U.S. Treasury determines the rules for government ACH payments.

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Facilitating Consumer Payment Innovation through Changes in Clearing and Settlement
Commentary

Richard Mabbott

Good morning. My credentials for being able to comment on Bruce's paper are that I was the program director for the U.K. payments industry, overseeing the build and implementation of our immediate funds transfer system.

Straight off the bat, I would like to say what Bruce has envisioned in his paper is eminently doable. We actually built one of these things in 2006-07. It has been live since early 2008, nearly four years, and it has run 24/7 without incident during that period.

Bruce's thesis or his contention it requires regulatory intervention to make this sort of thing happen certainly parallels what happened in the U.K. I can say, having worked in the industry for many, many years, without regulatory intervention the U.K. would not have the Faster Payment Service it has today.

A brief history of how we got here. Our Chancellor of the Exchequer at the time, Gordon Brown, who many of you might know went on to become our Prime Minister, commissioned Don Cruickshank, who was at that time a regulator in our broadcast media, to look into banking. The Cruickshank report came out in 2000 titled "Competition in UK Banking: A Report to the Chancellor of the Exchequer."

In very broad terms, what Cruickshank concluded was the payments system in the U.K. was a cozy cartel. Witness to that was the fact the industry never innovated unless it was made to. What is worse, the regulator preferred a small number of mature, stable banks rather than a "long tail" of free-wheeling entrepreneurial and potentially risky banks to regulate. So Cruickshank concluded the regulator was also part of the problem rather than part of the solution.

Cruickshank wanted to set up an Office of Payment Control. We have a history of such "offices" in the U.K. set up by the government to regulate monopoly industries—Ofcom for the communications industry, Ofwat for the water industry,

etc.—and he wanted Ofpay. But in the end the Treasury decided to put the issue with the Office of Fair Trading (OFT), which is the competition authority within the U.K. They set up a payments systems task force, which they chaired, to oversee implementing the recommendations of the Cruickshank Report. One of the first things the OFT wanted was faster payments and settlement.

The payments systems task force was inclusive. It included the banks and other stakeholders in the payments industry but was very much led from the front by public policymakers.

In May 2005, the OFT announced an agreement had been reached to reduce clearing times on electronic payments between banks following telephone or Internet instructions from customers. So this is very much about electronically originated payments.

What the payments industry then had to do was to report back six months later—i.e., November 2005—and say how we proposed to meet their requirements. Two years after that, we had to have a new service live with mass market reach. It was no good having the concepts sorted out or a pilot implementation—it had to be mass market. That is a pretty stringent timetable for anybody looking at a major development. It is fair to say the industry would not have innovated had it not been for this mechanism. We would not be where we are today. We would still be talking about it.

In those six months from May 2005 to November 2005 the industry debated two basic models. There was the so-called "ELLE," pronounced "Ellie," early for late/late for early, which was the low-cost option based on ACH. The idea here was that if you got the instructions into your bank before midday on a working day, the money would get to the beneficiary by the end of that day. And, if you got the instructions to your bank after lunch on a working day, the money would get there before midday the next working day. This was basically faster batch processing.

As it happened, our ACH in the U.K.—we only have one because we are quite a small country, an organization called BACS—had just finished a technology refresh. And although our ACH ordinarily works on a three-day cycle, they had already designed in the capability for one-day transfers. So they were keen to capture this business.

The alternative system we called Near Real-Time. Make no mistake, there is nothing near about it, it is genuine real time, but we are coy about saying that in public in case the odd bank goes down at 2 a.m. to do a system upgrade or whatever. The system runs 24/7. It is genuinely real time in the center. There are also technical reasons why the odd payment might get shunted-off onto a siding so that it does not happen in real time. Hence the formal position is "near real time."

Typically, what this means is the payer knows their payment was sent and it was either successful (i.e. they are told the payment has been made) or, if it was

unsuccessful, they are told the reason why it was rejected. They can then get in touch with their counterparty, find out what went wrong, and send it again. This is 24/7, where ELLE was very much working days only.

It is worth saying at this point, we have no history in the U.K. of public-sector involvement in the payments system infrastructure. They regulate it but they do not implement it. Therefore the choice between ELLE and Near Real-Time was down to the private sector. We had to make a decision of: "Are we going to do the minimum we can get away with that the regulator says we have to do" or "are we going to look to developing a new infrastructure for the future?"

It will not surprise you the conservative element wanted the lowest cost option and the more visionary went for the new infrastructure. I am here today because we went for the latter.

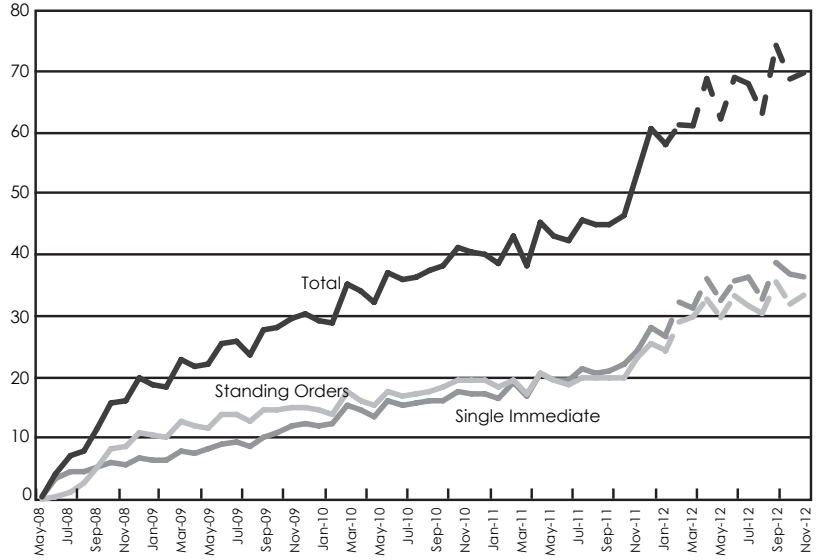
Since going live on May 27, 2008, to the end of February of this year, in round numbers we have processed 1.5 billion transactions—in dollar terms to a value of almost $1 trillion. We have operated 24/7 since we switched on, and we have not had any major incidents. The largest peak cycle we have had was over the holiday period this year. From the close of business on Friday, Dec. 30, through to the morning of Tuesday, Jan. 3, we processed 11.7 million payments to a value of $6.8 billion. Most of those payments were on the return to work on Tuesday morning, stemming largely from the annual peak in Standing orders at the start of January.

Chart 1 will give you some idea of growth in the system. Of the two lines at the bottom, which are very similar, the darker one of the two is what we call "single immediate payments." These are spontaneous payments made by customers paying other customers. That is really what immediate funds transfer is all about. The other line, which all but mirrors it, is "standing orders." These are pre-mandated, routine payments paid on a regular basis. One of the things our regulators said to us after they obtained our commitment to build Faster Payments was "Would we mind doing something about removing float on standing orders?" The easiest way to do that, if you have a real-time engine, is to put your standing orders over the real-time engine, which is what we did. In Chart 1, the top line is the total number of Faster Payments (i.e. predominantly the sum of the other two lines plus a small number of other extraneous payments types). This shows you the real growth rate. You will see that year-on-year there has been significant growth. The dotted line at the end is our projection for 2012 where we are predicting continued growth at an increased rate rather than any drop-off. In terms of "Do customers want this?" "Do customers like it?" The growth figures speak for themselves.

It is also worth mentioning pricing in the U.K. For consumers who are personal customers, if you keep your checking account in credit then banking is free. You do not pay a transaction fee on payments that go through the ACH. If you want to make a CHAPS payment, i.e. a real-time gross settlement payment, then it is liable to cost you quite a lot of money; on the order of £20 to £30.

Chart 1

Monthly Volumes (millions) for Faster Payments 2008-2012



When we looked to pricing Faster Payments, because the regulator said we had to develop such a system there really wasn't much work done on an industry business case as to whether Faster Payments costed-in or not; it was all cost.

We negotiated with our supplier a cost-plus contract for a term in excess of five years to run the system so we knew what it was going to cost to run it. What the commercial banks had hoped was that Faster Payments was going to be a premium service for customers. If personal customers wanted to make a Faster Payment, i.e. faster than the three-day norm for payments made through the ACH, then they should be willing to pay a small price for that. Banks were thinking in terms of £1 to £2.50.

Now the regulator is not allowed to impose pricing. That is competitive within the U.K. and we in the center were not allowed to discuss pricing, because that is against the Competition Act. But talking to people at the time that is the sort of figure they were thinking of. The commercial banks saw a chance here. By launching Faster Payments, people would pay for that premium service and thereby make a contribution to the cost of free current account banking.

Unfortunately, what the commercial banks had not reckoned with was our building society sector, which is similar to your savings and loan sector, who promptly gave Faster Payments away to their customers. If one bank gives it away, they all have to give it away. Faster Payments are thus free to personal customers in

the U.K. Commercial customers typically pay something in the order of £2.50 to £5 for a Faster Payment, where otherwise they would be paying something like £20 or £30 for a CHAPS payment. Personal customers get them free and commercial customers are getting them about a hundredth of the price they would pay for a real-time gross settlement payment. So why wouldn't they use the system?

I would like to tell you about the tiering that is in Faster Payments. We built the system around members. We went live with 13 members. Basically, each member bank has to build a system to send Faster Payments (i.e. acting on payment instructions received from their customers) and a different system to receive Faster Payments (which makes a real-time response back to the paying bank before crediting the beneficiary customer with the funds).

Figure 1 from left-to-right shows sending institution to receiving institution, and from top-to-bottom comprises three tiers.

The top tier is member-to-member. As I said, we went live with 13 banks. This is a push-credit system and the money is settled at the Bank of England.

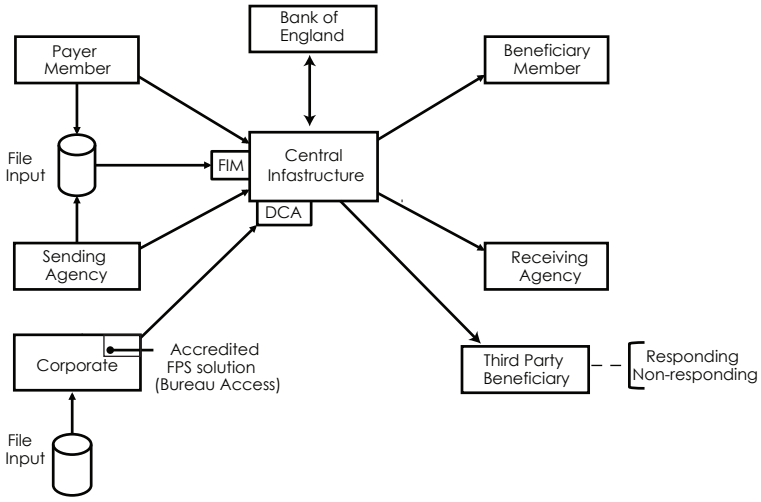
We have a second tier, which are agency banks. They effectively have to operate the same service as members, but they settle with their member bank rather than across the Bank of England. It is mandatory that you are there to receive payments 24/7 but it is the institution's own choice how long they are open for their customers to send. When we went live, 12 out of 13 members were open 24/7 for sending. One of them, because their Internet banking service was only open between 8 a.m. and 8 p.m., only permitted their customers to make Faster Payments during that period, but they have since rectified that. So Faster Payments are genuinely 24/7 for the banks that are participating in it. This is not business hours Monday through Friday.

We also have a third tier, which in the interests of time I will not go too far into, but it is basically for large corporate customers. The receiving side—the right-hand side of Figure 1—was primarily for credit card issuers and for large utilities receiving bill payments. An interesting thing about credit card issuers—I do not know if you have noticed—is that when you get your bill, the due date is almost always a Saturday. With Faster Payments you can pay them on a Saturday.

In tiering terms, banks can either be a member of Faster Payments, or they can be one of these directly connected agencies settling with a member rather than settling with the Bank of England. There is also a batch based file-input module for members and agency banks.

Outside of these three tiers, there are also indirect agency banks. These are banks that take a service either from a member or from a directly connected agency. They are not necessarily there 24/7, but they are available to the system to receive so that sending banks can route payments through to them. It was important that we had this additional routing mechanism because we needed mass market reach to satisfy the regulatory authorities at launch. They insisted that mass market was

Figure 1



anything over 95 percent of checking accounts. In the end, when launched with our 13 members we achieved in excess of 98 percent of checking accounts. The sort of people who are indirect agencies are correspondent banks in London, high net worth banks, boutique banks, that sort of thing—institutions you would not generally expect to be funding the payments infrastructure in the U.K. I will skip anymore about corporates and move quickly on to settlement.

The system uses deferred multilateral net settlement across accounts held by the members at the Bank of England, so that is exactly Bruce's model. The customer payment is end-to-end and in real time. You either know it happened or you receive a rejection but settlement for the successful payments is deferred until the end of the current settlement cycle when it is netted-off with all of the other Faster Payments made during that cycle.

We currently settle three times a working day. When the Bank of England first comes-up with the CHAPS system at 7:15 a.m., midday, and 3:45 p.m. before CHAPS closes down for the day. Settlement, however, is configurable and we can settle more than three times a day if required. Within reason we can do as many as we like.

The next settlement cycle begins before the previous cycle settles. So what we actually do at the end of a settlement cycle is draw a line and start the next settlement period, so there is continuous operation. There is no pause, no hiccup, and then behind the scenes we settle the net differences between the banks.

You will quickly realize, that means that the period from Friday at 3:45 p.m. to Monday at 7:15 a.m., is one long settlement cycle. We do not do much commercial business over weekends. It tends to be all personal customers and, therefore, there is not a huge risk in terms of the values outstanding.

The way the risk is controlled is through net sender caps on each of the members and a liquidity and loss-sharing agreement that all members put collateral into to protect against the loss of a member. If a member is unable to settle its obligations at one of these settlement cycles, then the failed member is blocked in the next cycle. The failed cycle is manually settled and the surviving members are recompensed after the event out of the collateral pledged by the failed member, which is held in trust by the Bank of England.

Faster Payments was designed and built during 2006 and 2007, so that was before the global financial crisis. We were all living in a very different world then. Many of us were perhaps a little complacent. It was designed and built to a very tight timescale set by the regulator and so we decided, prudently I think, to reuse existing concepts and proven components wherever practical. So the real-time switch is based on our ATM switch in the U.K. and the settlement process—the backend process—is based on some of our ACH processes.

What that meant was there really wasn't much choice over deferred multilateral net settlement, net sender caps and the liquidity and loss-sharing agreement. These were all components of the existing systems. That was the way we did things then. We talked about an RTGS settlement system but there was no appetite for the added complexity that would bring particularly the additional time it would take to deliver given the regulators' stringent timetable.

In terms of lessons learned, if we had our time over again (which you obviously still have) we would probably look much closer at the tiering diagram I put up. It is overly complex, it was not what we originally wanted; we wanted very low barriers to entry and that people were either members of the scheme or, if they did not want to be a member of the scheme, they were an indirect participant through a member. What we quickly found out, was if you were going to join the scheme it is fairly onerous running a 24/7 receiving system.

Those that wanted to avoid that cost were looking for a cheaper way of doing it and that is where some of the baggage from previous systems crept back in, which is where some of that tiering has come from.

We already have a commitment on the books to look at collateralizing or prefunding positions for second-tier participants before members make payments.

Facilitating Consumer Payment Innovation through Changes in Clearing and Settlement
Commentary

Neil Platt

I do not have any slides, but I do have some comments and I thank Bruce for the interesting paper. It is definitely very relevant to what we do. Before I launch into those, let me tell you a little bit about what we do and why I am here.

I am the general manager of the Payments business for CashEdge, which is now a division of Fiserv. Fiserv, as you know, is the global financial technology leader. At the CashEdge division, we operate the largest bank-centric digital person-to-person payments network, which is known as Popmoney. We call it a P2P network. This was formed by the merger of two networks—CashEdge's Popmoney network and Fiserv's ZashPay network.

Right now, CashEdge has been part of Fiserv for about six months and we have spent most of that time integrating the two networks. The combined network will be relaunched in June of this year. Essentially what Popmoney allows is consumers and small businesses to make payments to other consumers and businesses from within their online or mobile banking services. Payments can be made by entering recipients' ACH information, as well as by entering a recipient's email address or a recipient's mobile phone number.

We refer to each one of those as a token. We are currently adding to the number of tokens that consumers can transact on. In our own internal pilots, we are piloting debit cards to be able to send money directly to a debit card and Facebook ID to be able to send money to someone's Facebook ID. Those are not yet on the market.

I will not get into the whole logistics of how Popmoney works, but there are two important considerations to point out. One is that the recipient of a Popmoney payment does not need to be known to Popmoney or be signed up or part of the network already. By receiving that payment, the person becomes part of the network.

Second, the funds in Popmoney flow directly from the sender's account to the recipient's account. There is actually a clearing account in the middle, but the user experience—the sender-recipient account—is from my bank account to your bank account.

Unlike some other schemes, there is no notion of a Popmoney account that anyone who belongs to the service has. The only service you interact with is your own bank account. In some ways, the service I would describe using some of the terminology that Bruce introduced as both a universal service, because it can really touch any bank account, and end-to-end. It is from one consumer through to another consumer. And I use "consumer" in the same broad sense that Bruce used the term.

Today, in its current instance, the service relies on an ACH backbone and payments settle either overnight or in two to three days, based on risk and pricing considerations. I will talk more where we are moving the service, but as it exists now it is an ACH backbone and it is still in its formative stages.

The number of total payments that have been made are in the single-digit millions. It is available today—or will be starting in June—to customers of about 1,400 to 1,500 financial institutions, a number which is growing quickly. It reaches about 40 million online and mobile banking customers in the United States. To date, the 2 million transactions have touched—have been sent and received—from about 5,000 to 6,000 financial institutions in all 50 states. So it is growing very quickly. We expect within two years it will be available to over 80 percent of the banked population.

I am not going to talk a lot about the usage we see, but we are seeing some very interesting usage data. The most common use case is people using it to pay their rent. We also see a lot of shared expenses, like roommates sharing bills, and the interfamily payments, like children and parents paying each other.

The average size of a payment is in the mid-$300 range. I bring this up because, often in the total discussion of P2P payments and certainly the bank advertizing reflects this, the typical use case discussed is someone goes out to dinner and forgets their wallet. Then, it is more like a cash substitute. The use cases we actually see and the dollar value indicate that Popmoney is being used more as a check substitute than as a cash substitute at this point.

With all that background, naturally I found Bruce's paper to be very relevant and interesting. So I want to react to a couple of different items. As I was thinking about this, I feel like Bruce and we are approaching a similar problem in different ways. We have a very much bottom-up perspective, which is trying to solve a problem with the tools we have available and had not really considered the policy solution. So I will talk about that in a minute.

A couple of things I am going to react to: First, I want to explore the assertion

in Bruce's paper—the notion of what he referred to in the talk as "the future after the check." In the paper, Bruce says that "a strategic challenge is to combine the immediacy and finality of payment with the versatility and universality of the check."

Then I want to break that down into two pieces, because there are two important statements in there. The first is on the need for a digital replacement of the check. The second is the degree to which instant funds transfer, or IFT, is a necessary component of digital check replacement. Then, I will share what we at Fiserv are doing in working toward IFT in the absence of any changes we foresee in current clearing and settlement models in the market. Finally, I will share a very brief perspective on what the role of the federal government might be in helping overcome the challenge.

I will start with the easiest, which is the question of whether or not we need a digital alternative for the check and whether or not IFT is a necessary component of that alternative. From a consumer's point of view, there is a lot about checks that do in fact seem to be out of sync with our expectations in the digital age. They are slow. They require you to carry around this booklet of paper with you to make payments—and you better make sure you do not lose it. You need to somehow deliver the payment physically to the recipient of the payment, either through the mail—of course, that is a joke in our society, "the check's in the mail"—or otherwise deliver it.

On the deposit side, once you receive the check you are still not done with it. You typically need to go to visit an ATM or branch. Checks are prone to fraud. And, of course, the settlement of checks is not final, as anyone who has ever had a check bounce on them knows.

We look at the check system and we think, "There is a lot of low-hanging fruit here." There are a number of different ways you can improve on the check system and not all of them necessarily mean the digital replacement needs to have immediate settlement in order to be successful and adopted by consumers.

We think about Popmoney, even in its current ACH form, as being a replacement for checks. It improves upon many aspects of checks. It is easier to use. It is easier to deliver. As a recipient, it is automatically deposited into your bank account. It is less prone to fraud. And, even though it settles through ACH, it actually settles faster than checks. Like I said, the use cases and the dollar values seem to imply that it is being viewed as a check replacement in the market.

Now let me talk about "immediate." We have always found that "immediate" is a very loaded term in payments and in consumer payments in particular. We have done some primary consumer research on this and we continue to do it. Generally speaking, if you ask a consumer how soon they would like their payment, the answer is always "immediate." But, if you start to peel the onion and ask the next set of questions, you realize most use cases—but not all—do not actually require immediate settlement and people can accomplish what they are trying to with

settlement that is somehow delayed. Obviously, in all cases, sooner is better than later.

This becomes all the more true when you start to ask consumers about relative price-timing trade-offs. You want immediate, but what if immediate was $5 and next day was 50 cents? Oh well, in that case, maybe for some payments I would still want immediate but, for the majority of my needs, 50 cents next day is better than $5 immediate.

We believe, while immediate settlement is desirable, there is still a great deal of value to be provided through digital check replacement, which is what we think of as P2P payments. Even if the settlement is not immediate, it really just has to be better than the alternative, which, right now, is checks.

Let me pause there, because we do think immediate is better and, in particular, we think that immediate payments are better because they would open up more use cases and generally provide a better user experience. Right now, for example, maybe one of the reasons why we are seeing checklike use cases being promoted through Popmoney is because the experience of exchange and settlement is checklike.

We feel that, by having a cashlike alternative, we will be able to open up more use cases and it will become more useful to consumers, not only for cash exchange, but if you think about it cash is how consumers exchange money with immediate settlement. It also opens up some potential venues in commerce. Despite having said that, I do not think immediate is a necessary ingredient for a digital payments system. I want to be really clear, increasing speed of settlement and clearing is our number one product priority. The way we approach this is a little bit different than some of the things that have been discussed earlier today.

In the near term, we are working on accomplishing immediate and near-immediate transactions by moving transaction volume from the ACH network to the credit, debit and ATM networks. The problem is these networks are not universal. They are fast, but they are not universal. They have all sorts of complexities and interoperability issues between networks. We very much view our job as an intermediary, in effect technology providers. We piece the networks together, we make the technology work, and we help manage the risks. If you think about each network, each one has its own rules, its own fees, its own system with limits, and they are not necessarily that affordable for a consumer to transact over. So there are a lot of issues with it. Ultimately, and I will not talk so much about this, but everything we do is a debit transfer system and it is not a credit transfer system.

We view our role as being the equivalent of payments sausage makers. We take complex payments systems and we make them simple for consumers. We are already moving, like I said, toward faster P2P payments. As of April, we are already internally moving some portion of our payments over EFT networks and we have just started doing real-time payments internally. We are demoing that for our

clients next month, and we expect to be in the market with real-time payments by the end of the year.

But—and it is a big but—it will not be universal at first. In a sense, not all payments that we execute to and from all accounts will be moved in real time. It will be a gradual transition from a 100 percent ACH-based to a model in which more and more payments are executed in real time or near real time.

We have always, in fact, viewed the speed of payments through this incremental approach. It is not our intention that we necessarily have a big bang or sudden change in the model of payment processing and settlement, because of some regulatory action or change in settlement and clearing.

The paper goes on—and this is a transition from the last point—to outline the role potentially of the Federal Reserve Board in defining a national IFT system. I want to be careful with what I say here. It is obviously something that is interesting to us and I want to be clear this is not really my area of expertise and I do not want to be singled out as the private-sector guy who came up here in this roomful of regulators and public-sector people to offer a different opinion, although I suspect that may in fact be the case. We are very committed toward moving to real-time payments. As I said, it is our No. 1 product priority and it is what I spend most of my time working on.

In our search for solutions—it is not new for us, we have been working on this for years—we never really considered a solution coming out of a regulator or a similar industry body. This is what is particularly interesting about this discussion for me. This is a problem we have been trying to solve for a long time and we have never considered a solution with this, because frankly we work in a world where we are constrained by market realities. Our role is finding innovative ways to bring innovative payments products to market. We typically do not view government involvement as a lever that we have to play with. Not because we do not like it, but because we have very explicit market goals and our timelines are very tight.

I talked before about our need to introduce real-time payments into the market this year. In this particular case, I would say the Fiserv experience provides some evidence the private sector is actually moving toward solving the problem that Bruce has laid out. But it is being solved in a very incremental way. It is not a systemwide solution, but we are working on an answer to Bruce's assertion that strategic challenges to combine immediacy and finality of payment with versatility and universality of the check.

When I think about what we are doing now—and by "we" at this point, I will take a whole industry perspective, because Fiserv is not the only provider in this game—the industry is moving toward immediacy and finality, combined with versatility and universality of the check. That is the challenge we are stepping up to meet. We see steady progress being made. And, given we see progress being made

by the private sector, we might question the necessity of a regulator solution. It is certainly something we would be open to, but I think it is something we who are out in the forefront of this innovation would want to view cautiously and make sure that it were well-implemented, because obviously in the world I come from, with every regulatory change there is clearly some sort of potential downside you have to mitigate. Thanks.

General Discussion

Session 5

Mr. Brown: Thank you very much, Neil. I would like Bruce to make a couple comments.

Mr. Summers: I will make one comment and it is stimulated by what both Dick and Neil have said. Let me say that I respect both of these systems and I respect the energy, the thoughtfulness, and the entrepreneurship that have gone into both. My comment is along the lines of clarification, or crystallization if you will, about the role of the public-sector in achieving public policy in this space. In particular, U.K. Faster Payments is an example of what I would call "light touch" intervention. The role of public policy is not to define specific outcomes, notwithstanding that I specified such an outcome in the reference model presented in my paper, but I did so more by way of illustration. But the role of public policy is to say, "Here are desirable objectives we would like to see the payments system achieve."

And it is up to the private sector, then, to achieve those objectives. Some of them are very sensitive in that they have a bearing on business practices and even profitability. They have to do with affordability to the customer, which might challenge a pricing methodology or proposition. They might have to do with cooperation, working together more to define schemes and so on. I see public sector intervention not in an intrusive regulatory way, but as an in-touch overseer—oversight as opposed to regulation—to stimulate that working together where appropriate and to make sure we do not lose sight of the higher level public-policy objectives as the technical and business solutions are crafted, so we are getting where we want to be strategically with the payments system.

Mr. Brown: Thank you, Bruce. We are going to now open up the floor for questions for our panel.

Ms. Benson: First of all, thank you. It was a great paper and interesting comments. When I think about how consumers might use a service like this, I can see it would be used for person-to-person payments. One of the things we lose when we

move away from checks is the ability to make a payment to someone when you do not know their account details. That is a huge value. It is one of the reasons, by the way, that checks have remained pervasive in the B2B space. Let us move forward, then, and say OK, for a consumer using a service like this, it seems pretty clear the way around that problem is using a mobile phone number or something like that as the token. I am sure that is what Popmoney and many other services do.

In consumer bill payment in the United States, we have always had this terrible last-mile problem of getting the payment to the biller. The U.K., I believe, has done something with a sort code directory on that. I wonder if you could clarify how Faster Payments works to get the payment to the biller?

Mr. Mabbott: OK. There are two elements here. You referred to the biller's database that we are developing in the U.K. but we haven't got that yet. There is, however, already a culture in the U.K. that if you want to make payments using Internet banking or telephone banking then you will be asked for the sort code and account number of the beneficiary. The sort code for us is the branch office. It is the same as your transit routing code on a check. So there already is a culture, that if you want to make payments, you either know or seek out the sort code and account number of the beneficiary. That is how you would make a telephone banking payment or an Internet banking payment which goes through the ACH today. Translating that into just going faster, as with Faster Payments, isn't a problem.

As to bill payments, most of the Internet banking sites run by the banks will have pop-down menus. If you are trying to pay a utility bill it will help you get the right sort code and account number. Most utility bills in our country still have a detachable credit voucher at the bottom of the bill which, if you wanted to put it through the paper clearing, contains the account details of the utility anyway. So for bill payments, knowing the sort code and the account number you want to pay is not the problem.

If it is friends and family, then you do not mind trusting those relationships with your sort code and account number.

The gray area for us is if you want to be paid but you do not want to divulge your bank details to whomever is doing the paying. To that end we have also been looking at proxy systems and the favorite one is the mobile phone number. Here you could pay somebody using their mobile phone number instead of knowing their sort code and account number.

We are not there yet. Barclays launched its own service very recently. The U.K. Payments Council has ambitions to launch something similar before the end of this year, which will be an industry-run look-up database. If a bank quotes a mobile phone number, the database will disclose the beneficiary's sort code and account number back but not to you as the payer, only back to your bank, so sensitive account details are keep between the banks and not divulged to other customers.

Mr. Frankel: These were great presentations, all of them. I have a question for Richard. Is there anything in the governance, technology, or any other agreements that would prevent one of these creative innovators from putting some infrastructure on top of your engine to create a new retail payment card system or mobile phone application?

Mr. Mabbott: None, whatsoever.

Mr. Greene: Thanks again to all the panelists for a great discussion. My question is about security and whether we are better served by centralizing systems and having honey pot-type risks as I suspect may exist with Faster Payments. For instance, does Faster Payments enable faster fraud? Or whether distributed approaches, as we seem to have more fragmented here, are safer? The context of the question is there is a report this morning with a potential massive breach of security at MasterCard. So I would like thoughts from the panelists about the right way to have a secure payments system that is also IFT.

Mr. Summers: Maybe I will start the reply to the question. In general, security is a high-order question, a high-order issue to be addressed. The paper takes up security a little bit by discussing the trade-offs between credit-transfer and debit-transfer systems insofar as security is concerned, as well as the relevance of the concept of immediacy for security.

You have added another dimension to consideration of IFT-like payment schemes. However, I do not think the question of platform centralization versus decentralization it is specific to this topic. I faced this question in my own professional career. The side I come out on is a thoughtfully well-secured, consolidated environment buys a lot, as opposed to distributed platforms where the various components might not all have the capacity and the resources to provide the highest level of security for information assets. It is a question we will discuss forever. But the important question you raised here, Mark, is, Because fraud is scalable in an IT environment, what really defines confidence-building security in systems that are responsible for centralizing protection of our information assets and, in particular, our deposit money in banks?

Mr. Mabbott: In relation to Faster Payments, there is no honey pot. In the diagram I put up that showed the central switch and each of the members having to have a sending system and a receiving system (Figure 1), then security is distributed across the different components that between them make up that end-to-end process. And in this context, there is no substitute for the sending bank having a strong front door.

If the sending bank takes instructions from somebody purporting to be one of its customers who in fact is not—merely a fraudster masquerading as one—and acts on those instructions, then it has to take responsibility for the consequences.

During the development we tried to mandate that sending members should apply a minimum of two-factor authentication to accepting instructions from customers to make Faster Payments. Commercial pressures intervened however and we failed to get that mandated although many of the banks in fact implemented two-factor authentication on their Internet banking when taking instructions to make a Faster Payment. So there is no honey pot as such today.

If we go on to talk about further developments, such as the proxy database where we translate a mobile phone number into the beneficiary's sort code and account number, then, yes, that could be viewed as a potential honey pot.

Although we have yet to implement it in the U.K. we are alive to the danger and the developers are well-aware of the need for tight security on that database. The proxy database, however, is not Faster Payments.

Mr. Platt: I do not have a whole lot to add there. But I will just underscore we continue to see the weak link in the system as being the front door of the banks. Frankly, that is where we see all of the fraud come in now. It does not mean we will not be subject to other types of fraud or hacking in the future, but a lot of our attention is focused on working with our clients to help make sure they are only letting the right people in the front door.

Mr. Fortney: I appreciate all the comments. We have a lot of agreement with the desirability of a real-time payments system. I have one question, and I will address this to any of the panelists, but maybe Bruce or Richard may have a perspective on it. It sounded like in the U.K. you skipped this whole thing of, How are we going to rationalize the economic case for this? It sounded like it was a little more than a nudge and not quite a dictate, but it was enough to skip past the rationale there.

Bruce, you may be suggesting a similar process here. Let us just get Congress to dictate this. But assuming that does not happen, my question is whether or not there is a business case, for how could this be "sold?"

Mr. Brown: And before you answer, Bruce, I have an additional corollary question. The reality is you were talking about how the oversight committees in Congress have been soothsaying this or suggesting this some 20, 30, 40 years ago. Based upon those numbers, is it just "pie in the sky" that we should even think we will get any kind of an intervention from the Federal Reserve, the regulators, or Congress?

Mr. Summers: I will start and then turn to Dick and Neil. Let me clarify, I am not suggesting Congress play an active role beyond providing the impetus for the establishment of a national commission, another national commission that represents all the private-sector stakeholders in the payments system. For better or for worse, that is the role of Congress.

Then there is this question of incentives. In terms of the U.S. banking system, there is a cultural transition, there is a large investment cost, not just in central infrastructure, but maybe more importantly in the back offices of banks. The back

offices of banks are, by and large, antiquated. Banks cannot go on forever not keeping up with digital payments processing in their back offices.

Looking at international case studies, what I find is when the stakeholders through their governance arrangement finally decide to embrace a truly innovative approach or technology, that is a catalyst that leads to a breakthrough and causes the banks to upgrade their back-offices from batch processing to real-time processing.

You also see in the case studies banks attribute the cost of that upgrade to the specific innovation at hand. Let us say it is Faster Payments, something that has to happen and it has to happen soon. Faster Payments just happens to be the trigger that ignites the action taken by the banks to upgrade their back offices.

So, congressional intervention should be limited to sponsoring another national commission of private-sector stakeholders—and I would add public-sector stakeholders as well. Yes, there are costs, but at least in the U.S. context, lagging the digital economy in terms of servicers and technology platforms is a problem banks ought to step up to. Maybe something like this would be the trigger.

Mr. Mabbott: I would balk at saying that we skipped the rationale. We did not for instance build a Rolls-Royce solution and damn the cost. We had some serious debates about what we were going to spend the banks' money on. We also had some major challenges in terms of speed to market and universal reach.

What it eventually came down to was a debate between processing ever faster batches through an ACH versus breaking with that model because however fast you put batches through the ACH there is always going to be someone that wants you to process them faster. The way to avoid that is to go for a real-time solution.

So it came down to a debate between those who I characterized earlier as "conservative" who favored an ACH based solution and those who said we have an opportunity to do something new and innovative here. The government is going to make us do something, so let us at least capitalize on our investment while we are about it.

Mr. Platt: I would maybe have a slightly different perspective, which is probably caused by the short-term perspective under which we operate. We really do not look out more than 18 months, effectively, when we are doing our planning and thinking about what the next generation of payments is going to look like.

I am very interested in this notion of a "light-touch" intervention that Bruce referred to but, as someone who is in the guts of this every day, it is hard to imagine within my next two 18-month cycles that the settling and clearing environment is going to look much different than it does today. Much as we might actually like to see that, it is the skepticism that I referred to that is coming back here.

I am very interested in the U.K. story, though, which I had not heard before.

Mr. Williams: I would like to reflect on the universality of payments. I would like more information on bill payments in the U.K., like the lady from Glenbrook. But finally I have a question on end-to-end and how Bruce' model fits with Faster Payments.

On the clarification of the bill payments side, we are working with the Payments Council in the U.K. to create the central database of billers. As Dick says, you can use the sort code and account number to make that payment. But, from a consumer point of view, you actually want to pay Verizon, you do not want to pay necessarily with the transit routing number and the account number. Of course, what happens if Verizon decides to change banks or change accounting practice?

Finally, I would say is there are only two areas the Faster Payments scheme is deficient in comparison with Bruce's model. The first one is the notification of the recipient of the payment. That is not covered by the scheme rules. And the second one is, of course, not all the payments which are meant to be immediate actually occur in real time. If it is an agency bank, it only connects to its sponsoring bank every so often.

When we are talking about reconciling the payments that are coming into a credit card account, quite frequently the sender knows that payment has been received. But the business receiving the payment does not know about that until the end of the day when they get their statement. The real-time payment, then, lags four or five hours until that information is provided by the bank.

So the question is, Do we think we missed something? Was there an oversight in the definition of the scheme that said Faster Payments should inform the recipient the payment has been received?

Mr. Mabbott: In terms of the central infrastructure for Faster Payments, no, we did not miss that aspect. What we did was the minimum that required cooperation between the banks. So we allowed the maximum area for them to compete. There is absolutely nothing to stop banks launching services to tell recipients that they have received a Faster Payment. In fact, I believe some—Lloyds Banking Group, for instance—have already done that. You can usually opt-in for such services. I do not know about you, but I do know of anecdotes where people who have switched this on are desperate to switch it off again because their mobile never stops interrupting them. In that sense, this is in the competitive domain.

In terms of the agency bank point you raised, Jonathan, yes, you are right. If the Faster Payment is member-to-member, the service-level agreement says "if you receive a Faster Payment, you have to put it in the customer's account within two hours maximum." In actuality it is within seconds and if you are one of those people who move money from your checking account to a savings account, I know of numerous occasions where people have sent money to themselves and before they have logged-on to the savings account to check their balance, the money is already there. For the vast majority of payments, it happens in seconds—nothing like minutes or hours.

The reason we have agency banks in the system, however, is the regulator said we had to be able to reach over 95 percent of checking accounts. If we could not persuade second-line banks to join—the members of the Payments Council were bamboozled into joining—then the next best thing we could do was to make it possible for payers with member banks to send Faster Payments to customers at those second-line banks and thereby achieve our 95 percent reach. As I have said, we in fact reach over 98 percent.

The EU Payment Services Directive (PSD)—which many of you in this room will have heard of—also helps here. As of Jan. 1, 2012, the PSD imposed faster processing on EU banks and a lot of these agency banks have had to speed-up the process by which they receive payments through Faster Payments so the situation is improving all the time.

Mr. Summers: If I take Jonathan's question in the right way, I have tried to think entrepreneurially at the level of services provision. We talk about immediate funds transfer being a logical application for mobile. But, why does it have to be a mobile phone?

There was a day, not very long ago, when everybody carried something called a check register. We wrote checks and we kept our account balance up-to-date manually. It seems to me there is some opportunity for banks to think more specifically about what clients are enabled with, along the lines of the equivalent of a dedicated, mobile payment device and register that is electronic. A dedicated, mobile payment device has implications for security, too, as so you are not doing your value transactions on the same device you use for recreational applications. This is just by way of example, there are ways of taking an idea like this and being very entrepreneurial in terms of turning it into something that is attractive to consumers.

Mr. Anderson: If I may return briefly to the issue of security, there is potentially a tension for a regulator who gets involved in promoting a payments system, under the traditional regulatory role of looking after the interests of those customers who are less able to look after themselves.

A fundamental problem in the modern world is that a lot of computers are infected with malware and many of these are running the Zeus trojan, which tries to make payments through bank accounts. In the U.K., the proportion of infected PCs, as we have most recently measured it, is about 6 percent. I am afraid many people do not really put enough effort in trying to design systems which will still work, despite the fact that 6 percent of payment terminals are under the control of the bad guys. In the U.K., we see many hard cases where banks accuse complaining customers of being negligent or complicit, at least initially.

In the United States, I believe there is a problem with small and medium-size enterprises being dunned for ACH payments, because I understand that here if people do not spot a rogue payment within two days, it is no longer the bank's problem. It is the corporate customer's problem. Therefore, banks in the United States

apparently do not have enough incentive to crack down on this kind of thing.

My question, I suppose for Bruce, is this: If you were going to get Congress to give you the power to be a "light-touch" regulator to promote payments services, how do you manage the conflict between that and the role of upholding consumer protection?

Mr. Summers: So security is the top-level question. I will give a three-part or four-part response to Ross's important intervention here. First, to re-emphasize, I am suggesting "light-touch" intervention on the part of Congress or a regulatory authority to stimulate action in a public policy context where we have clear public policy objectives. But, do not pick winners and losers. Do not define security regimes. Leave that to the private sector.

Second, my paper hints at the kinds of design questions we should be asking from a security standpoint. In particular, the paper states that a credit-transfer system is inherently easier to secure than a debit-transfer system. I would also say that moving to immediate processing provides some opportunities for enhancing security, as opposed to a delayed settlement, batch-processing environment, if the notion is embraced within the banking system.

Third, I would like to re-emphasize a point related to something that Ross brought up for the first time yesterday. If you really want to be secure in your banking transactions, dedicate a device to banking and lock it in the cupboard. Do not use it for anything else. I adhere to that advice. The notion of a dedicated device for payments is consistent with my earlier suggestion about opportunities for banks to provide customers with access methods that are dedicated to their banking transactions and not shared with other types of riskier applications.

Mr. Mabbott: I ought to start off by saying by not being a central banker I have probably not been as precise in the terminology I have used when I talked about the regulator as perhaps I should have been. I have tended to lump all authorities together under the term regulator.

In the case of Faster Payments, it was the competition authorities that "leaned on" the payments industry to come up with faster clearing and settlement. It was not the banking regulatory authorities.

Now, Faster Payments, as an extant scheme, comes under the Bank of England's oversight. The Financial Services Authority also has a role in protecting customers' interests.

If banks are taking incorrect instructions masquerading as their customers' instructions and acting on them, then that is outside the perimeter of Faster Payments. In terms of a conflict between a regulator wanting to see an improved service and the security matters Ross raises, I do not see that particular conflict manifesting itself in the way the U.K. has established its Faster Payments system.

Ms. Hughes: Actually I have more of a comment, but it may prompt a reply, so we will see. We have a very good, but very long, stretched out track record in this country of causing people to take specific kinds of actions in this space. The Federal Reserve System was one, letting more institutions into Federal Reserve clearing and settlement was another, and more recently (remember I am a lawyer and not an economist) we had the Check 21 Act. And Check 21 is, in my opinion, a messy legal model, but a brilliant economic model, where Congress said, "Do this to allow more electronic transmission of information for clearing and settlement purposes and provide a solution." Although it is maybe not the most perfect one, it is an interesting solution for the small-bank holdouts—the 3 percent or 5 percent that you have not been able to reach in the U.K. with Faster Payments yet. We created an economic model that let them have paper if they insisted on paper, but let everybody else transfer electronically without specific bilateral electronic transfer agreements, which was really holding up the process.

So I am curious for the panel members, particularly those who are familiar with this system in the United States, whether you could conceive of a model that would create an economic opportunity—like Check 21 did in many respects—but which is not too heavy-handed, because it really is not very heavy-handed?

Mr. Summers: I could conceive of that model, but probably not on the fly. But I take the spirit of the question. We want to be collaborative and we want to be creative and we want to recognize the particular characteristics of our banking culture and our banking system. We have an ideal. We might not achieve the ideal overnight, but, if we can get real close to achieving it and then work on the residual over time, that is great. I would be hopeful about achieving the spirit of what you have to say.

Mr. Platt: I would echo that. One thing I feel has been in short supply in innovation in the banking industry, in general, is a consumer perspective. That is one thing we are very focused on.

For example, and here is where I will directly disagree with Bruce, the notion for us of asking consumers to maintain a separate digital device—a separate piece of hardware for transactions—is something we think has absolutely zero chance of succeeding in the market in the current environment. We need to rise to the challenges. Any regulatory, economic, or legal frameworks that attempt to solve this, really need to keep in mind what consumers are doing and adopt a consumer perspective. That is the genesis of the whole conversation. We need to improve the payments system to align with current consumer expectations about speed and immediacy of payments.

Perspectives on the Role of Public Policy in Facilitating Payment Innovation

Moderator: Sean O'Connor

Mr. O'Connor: As the title indicates, this session will focus on the role of public policy in payments system innovation. So how can public policy facilitate innovation? The focus is less on new innovation in front-end systems—as we talked about yesterday—and a little bit more on how it facilitates, partly in the back end and partly in terms of the infrastructure and schemes development.

Our panel has perspectives from central banks, both from the operations side and from the oversight side, from the antitrust regulatory framework, and from private-sector standards.

Ricardo Medina has been the director of the Payment Systems department at the Bank of Mexico since 2004. Ricardo will comment on Mexico's new interbank electronic payments system and the role of the Bank of Mexico in its development.

Gerard Hartsink is well known to us as the Chairman of the European Payments Council, but he also has a real day job as senior advisor to the managing board of ABN AMRO. Gerard has a long history in dealing with policy issues and he's quite knowledgeable about the European market infrastructure. Gerard is going to talk a bit about the public sector's role in SEPA.

Malcolm Edey is the Assistant Governor of the Reserve Bank of Australia. He has responsibilities for financial systems, including of course payments systems. He is a member of the reserve bank's senior policy committee and deputy chairman of the Payments System Board. Malcolm will comment on inertia and coordination problems in payments networks.

M.J. Moltenbrey is a partner with the firm Dewey & LeBoeuf. M.J. represents clients who are subject to a variety of civil and criminal actions brought by federal and state antitrust authorities, including cases in the federal court and FTC proceedings. M.J. will provide some thoughts on anticompetitive practices and competition issues in retail payments.

Mr. Medina: It is an honor to be here. Thank you very much for the invitation to the Kansas City Fed. I am also very glad to share the panel with my distinguished colleagues from international bodies. I would like to present our experience in Mexico regarding payments systems. In my opinion, the Central Bank of Mexico has had a very important role in the development of our payments systems.

The first thing I would like to mention is that in the Central Bank of Mexico Act, one of the main responsibilities of the Central Bank is to foster and seek a well-functioning payments system in the country. The Act was put into place in the mid-1990s. Traditionally, the interpretation of "seeking a well-functioning payments system" had been oriented to large-value payments systems—the payments in the financial markets, principally.

Recently, the Central Bank of Mexico has focused its interest on consumer payments, or retail payments. This is also an important interpretation of the "seeking a well-functioning payments system" mandate.

With that background, I would like to present the development of SPEI, which stands for Sistema de Pagos Electrónicos Interbancarios in Spanish. SPEI was launched in 2004. Let me tell you about the main features of SPEI. SPEI is a hybrid system. We continuously perform a multilateral netting algorithm. There are two conditions that trigger the multilateral netting: if there are 300 new payments pending to be settled, or when 20 seconds have passed since the last settlement cycle. It is almost continuous settlement. Every 20 seconds, you will see a lot of payments arriving to the system. Usually, a new settlement cycle initiates when 300 new payments have arrived, which happens, on average, every six or seven seconds.

Another important feature of SPEI is that we do not provide credit to the participants. For our participants to make a payment, they must have a sufficient balance in their accounts. When we launched SPEI, the system was oriented principally to large-value payments, but we realized that the capacity of the system also permitted retail payments to be processed. Today, payments for amounts under $8,000 represent 90 percent of the volume in SPEI. Thus, something like 90 percent of the payments in SPEI are in fact retail payments.

Regarding our processing capacity, last December, on a peak day, we processed more than 2 million payments. SPEI is open to participants 23 hours per day. We open at 7 p.m. and close at 6 p.m. on the next day. Because this is an important feature, we are working on making SPEI available 24/7.

Another important characteristic of SPEI is that banks are not the only participants. Other kinds of financial institutions also participate in SPEI. This was a very difficult measure to implement into SPEI because we encountered a lot of opposition by the banks. They wanted to remain the only participants in the payments system.

It is important to mention that SPEI is converging to real time. We really think and observe that clients appreciate real-time processing in the payments system. Banks are already offering SPEI to their clients from 6 a.m. to 5:30 p.m., we are working with banks on a plan for them to offer SPEI to their clients 24/7.

An important condition for promoting convergence to real time is that the Central Bank of Mexico wrote a rule that encourages participants to offer a very high-quality service to their clients. The rule establishes maximum time lapses. After the originating bank receives an instruction from a client, it is obligated by the rule to send that instruction to SPEI within 30 seconds (the time-to-send). Similarly, when the receiving bank receives a payment from the system, it has the obligation to credit the beneficiary´s account within 30 seconds (the time-to-credit).

The time lapses when SPEI started operations were not 30 seconds, but 30 minutes. Then we reduced them to 10 minutes, then to 5 minutes and finally to 30 seconds. Let me tell you that these are the time constraints that the participants have to process data received from or to be sent to SPEI. Once a payment arrives to SPEI, the system settles it in 6 seconds or less. Our statistics show that on average, it takes 23 seconds for a payment to be processed, from the moment it is ordered to the time the funds are credited to the beneficiary account.

It happens for me personally when I instruct a transfer to one of my family members. While I instruct the transfer, I call them on the phone and during the conversation the person who is receiving the money checks his account and acknowledges receipt of the transfer. It happens like this for a lot of transactions in SPEI.

In order to achieve this very efficient processing in SPEI, we implement a proprietary protocol with very short messages. The messages include all the relevant information for payment identification, mainly for the receiving client.

In recent stress tests, we prove to have a processing capacity of 1 million payments per hour, more or less. SPEI does not require a very sophisticated equipment or infrastructure to operate: two sites with a medium-sized IBM server are enough. Of course, the Central Bank of Mexico is encouraging the participants to implement STP (straight through processing) for their operation with SPEI. We do not provide client applications to the participants.

Here an important point is: What is the role of the Central Bank of Mexico in SPEI? The Central Bank of Mexico operates SPEI, but it also has the responsibility for making sure SPEI is very efficient. In order to achieve this, we have the regulatory powers but we also work in close coordination with participants to improve SPEI performance and reliability.

Another important fact I would like to stress about SPEI is pricing. Pricing, I think, is very important and something the clients appreciate very much. The

Central Bank of Mexico charges the participants the equivalent of 4 cents per transaction during the day shift and less than 1 cent during the night shift. The transaction is very cheap to participants.

How do participants translate this cost to their clients? A normal SPEI transaction is charged to the originating bank's client. The average is 40 cents of a $1, something like 5 pesos. Very cheap. An important fact is that by rule of the Central Bank, the beneficiary customers are not charged.

Another important fact is that participant banks cannot differentiate the fee they charge to their clients based on the amount of the transfer. What I mean by this is that if a bank charges 5 pesos for a $100 transfer, it also has to charge 5 pesos for a $1 million transfer. The cost for the bank is almost the same for the two transfers.

The Central Bank has constantly advertised SPEI in the media. We would really like payments to be more efficient in the country and transition from a lot of checks and cash to electronic payments. It is important to mention that the government processes all its payments through SPEI.

We have a payments-tracking service in SPEI. This payments-tracking service was very relevant in the past, when the time-to-send and the time-to-credit were longer than 30 seconds. Now the most important feature of the payments-tracking service is the provision of official receipts. These electronic official receipts confirm the credit to the beneficiary's account.

If I would like to have a receipt for a payment, I can go to SPEI's tracking service and get an electronically signed receipt from the beneficiary's bank. I can obtain the receipt very easily. I can also obtain receipts easily for a large number of payments to confirm that the payments were made to the correct accounts.

As for future steps, we would like to reduce the time lapses to five seconds. We are already working with the banks on this matter. We would like to process 2 million transactions per hour, which is a lot of capacity. We will also work toward 24 hour access. These steps are very important for us.

Also, mobile payments are already being processed through SPEI. To do a mobile payment, a client only needs to identify the account by a mobile telephone number. Normally, the accounts in Mexico are identified by a standard account number, of course, or the debit card number associated with the account. Now banks also identify accounts by the cell phone number associated with the account. Mobile payments are evolving. In addition to mobile payments, the federal government is already making payments through SPEI; state governments have a great potential to do so as well.

This is the evolution of SPEI. We started with 20,000 payments per day, but now on a peak day we are processing 2 million payments. As I mentioned, almost 90 percent of the transactions are of low value, below 100,000 pesos. Most of

Chart 1
Number of SPEI Payments During the Day
(February 2012, daily average)

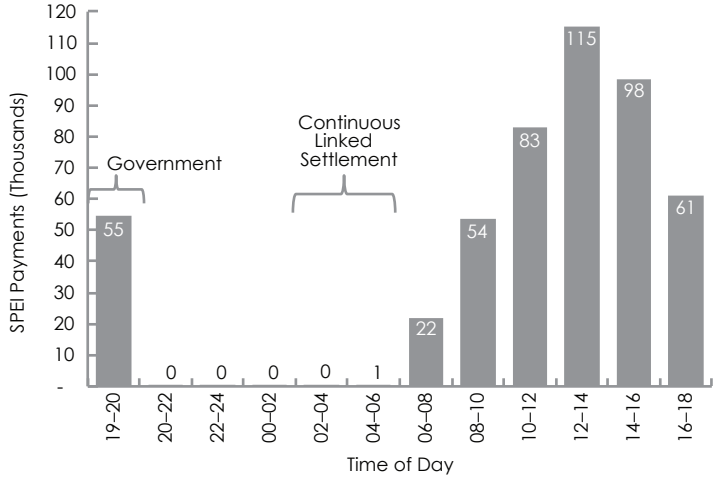
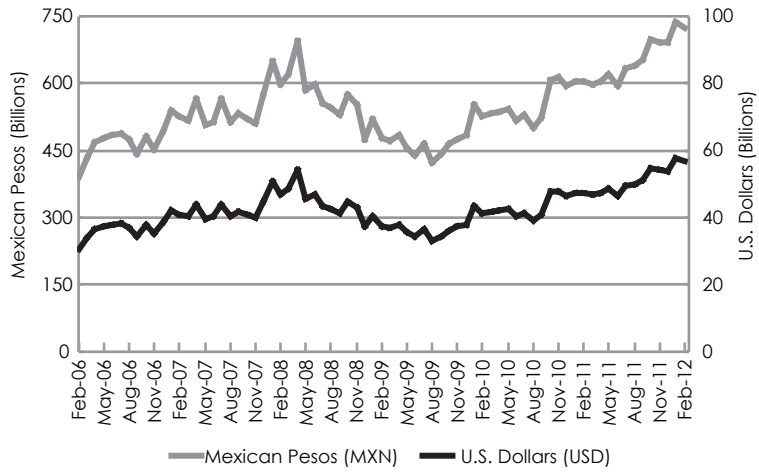


Chart 2
Daily Value of SPEI Transactions
(monthly average)



the transactions occur at midday. You can see on Chart 1 that the bars are higher between noon and 2 p.m., when most transactions occur. And Chart 2 illustrates the value for the transactions in both U.S. dollars (black) and Mexican pesos (gray). We process 60 billion pesos daily in SPEI.

Mr. Hartsink: Good morning. I'm here in my capacity as Chair of the European Payments Council (EPC). The theme for this session is "Perspectives on the Role

of Public Policy in Facilitating Payments Innovation." I am not the guy from the public sector, but I have some views about what happened in Europe from the public sector. Basically, the EPC is a private-sector regulator for payments covering 31 different countries and 74 members, and all the big boys are sitting around the table.

What I'd like to share with you is—What are the expectations of the public sector? What are our deliverables?—some remarks about governance, and conclusions.

The whole show started with one currency and one set of payments system. That was the clear message of the governing council—not only the European Central Bank (ECB), but all the partners of the euro system. In particular in 2005, Mr. Jean-Claude Trichet at the time was crystal clear, and also in his dialogue with the CEOs of the major banks in his regular meetings, that his expectation was: "Please deliver credit transfers, direct debit, an additional card scheme, and move forward with electronic and mobile."

From a public-sector perspective, an initiative was also started in those days to have a better legal relation in law of the EU 27 countries, so not only the euro-area countries, but between the banks and their customers. In that piece of legislation, it is really a financial innovation, there are elements which are very important for the payment industry—for instance, principles such as D+1 (maximum execution time requirement). It is done by public regulation embedded in all the laws of the EU 27. So it is a directive and not a regulation.

The industry, in the end, was confronted with the fact that, "OK, we are ready but who is telling the customers that SEPA (Single Euro Payments Area) is on the radar screen? It is the task of the public sector."

We quarreled quite long on this topic. In the end it was concluded, not only by the banks but also by the buy side of the industry—consumers, SMEs, corporates—together with the ECB and the European Commission, that there should be an end-date regulation. Not so much as to stick it to banks, because we were ready in Europe, but, in particular, we needed that for the buy side of payments services—our customers. We wanted to avoid what happened in certain markets if banks collectively make a decision for which they will be criticized by the competition authorities. So we needed a piece of legislation for an end-date regulation.

It was also recommended by the SEPA council and it is published today in Europe. It was approved by the European Parliament and by the Council. That means on Feb. 1, 2014, in the euro countries, all current formats of credit transfer and direct debit have to be changed into the new format. There are still 23 months to go. There is no issue in Finland and, for instance in Luxembourg, they are ready. But serious issues remain in some of the member states. Not all member states have started in the same way.

After 2014, if everyone is able to reach that deadline, we will have a complete renovation of the industry—the backbone of the industry—based on the newest technology. The expectations of the public sector are pretty high; an additional

card scheme, how to move forward with e-payments—basically using the authentication tools of banks to initiate the payment—and how to move forward with mobiles to initiate payment.

At the end of last year, the green paper was published. If you are interested, please read it. The consultation is still open. It is not closed for Americans or if you come from other jurisdictions. You can give comments to all or part of it.

I personally felt, of course the public sector was very clear, it is a market failure. I will explain in a moment a bit more about the topic. It is more or less a fair assessment, because the industry was not able to conclude on that. Under the umbrella of the EPC, two-thirds of the plenary did not support the move forward as fast as was expected by the public sector.

The message in the green paper is crystal clear. On Page 21, at the bottom, it says, "We may consider legislative action to keep you moving."

What we are facing, as banks and the EPC plenary at large, is the multitude of public policies from the ECB, the euro system, and also the European Commission that have an impact on payments of the ECB, the euro system, and also of the European Commission—this is a short list, there are even more—that have an impact on payments. But it led to a sentiment in the plenary early last year. So, we wrote a letter to Jose Manuel Barroso, the chair of the European Commission. In his own commission, different commissioners delivered messages on payments, what it should or should not be and they were totally inconsistent. For instance, Neelie Kroes taking care of innovation, or Joaquin Almunia taking care of competition, or the French commissioner (Michel Barnier) taking care of market integration. They did not have a consistent policy, apart from the views of the euro system, the governing council.

So we wrote a very nice letter. Creating a letter with 74 members is not easy, but after version 20 it was the right letter—the answer with concrete examples of where the inconsistencies were. Of course, in three weeks, we got a letter back. "You have a different view. It is not correct and we have one consistent policy."

Well, the response was not convincing. Nevertheless, if you have more than one public policy and you have more than one legal entity in the public sector to take care of public policies, then you mostly end up with inconsistency. That is reality in life. So, if the United States wants to renew the industry, it is probably a point to consider.

Commitment of the banks. A point we had to address in Europe: Where is the borderline between the cooperative and the competitive space? That was different in the different communities in Europe. In the end we agreed, "OK, we will create a set of standards, rules, rule books, and also end-to-end or customer-to-customer standards."

That was not easy to achieve. We worked with the concept of a three-layer model, not only for credit transfer and direct debit, but also for cards. The first

layer: the delivery of payment services to customers—competition. The second layer is cooperation on the rules and standards. The third layer is the processing network—again, competition. That's the thinking behind the model in Europe, not only for credit transfer and direct debit, but also for cards.

The rule books are basically a master agreement among scheme participants and all scheme participants sign that they support and will stick to the rules of the rule book. The implementation guidelines are basically message implementation guidelines according to the ISO language for technology end-to-end. Part of it, bank-to-bank, is mandatory and bank-to-customer is recommended. Also, from a competition perspective, we could not have a decision to make it mandatory apart from the individual decision of banks from the bank to the customer space. So the releases are available on our website. We have a large number of scheme participants and you may also find them on our website.

For cards, the story from the public sector was clear: Take care of standardization. The Economic and Financial Affairs Council (ECOFIN), basically all the ministers of finance, had a very clear view. The EPC had no policy from the start. Also it was expected by the governing council of the ECB to create an additional European card scheme. There is a lot of documentation, if you are interested.

But we thought it makes sense for a consumer to be able to use his or her card in any ATM or point-of-sale (POS) terminal in Europe. That is why we created the SEPA card framework. It has principles not only for banks, also for the second layer for schemes, and also for service providers. Those principles, of course, were challenged by EuroCommerce, the trade association for merchants. In the end, while we were grilled by the competition authorities on that matter—it took one and a half years—in the end all we had to clarify were 17 points. They are all published on our website.

We still work on one specific point of the card framework, which is basically standardization. It is a very complex area. We created—and this is all available on the website—functional standards. In standardization we are focusing on end-to-end for POS and ATM transactions—in particular POS—security requirements, and how to take care of certification.

Beware, we did not yet take the step to do real standards. Think about ISO 8583. Think about ISO 20022 for messaging. Because excluding standards—and that will be the name of the game—will have an impact on the market. So, in particular, for POS to inquiring hosts there are a multitude of standards. If you make whatever choice not to include certain standards, you immediately are faced with the challenge that several of the merchants and banks or whatever type of company in between will start to challenge the decision taken. So we did not yet find the right recipe for that matter, but the requirements are OK. If you are interested, you can give your comments, if you prefer.

"E" is a complex story. How to use the authentication tools in relation to the bank and initiate a payment at a web merchant. While we had a lengthy debate for a couple of years within, then, in the end, the plenary concluded that we will not create an e-payment scheme on top of the SEPA credit transfer scheme. That was not appreciated by the euro system. We continue to work on the framework, like the card framework, with principles, and the principles over time became more and more interoperability principles. The day before we wanted to launch the framework for public consultation, we got a nice letter from the Directorate-General for Competition and it had an impact, so we stopped. We first like to listen and understand what you are really, as public authorities, wanting us to do. Because if you want to start public consultation and you send us these types of letters, you don't feel comfortable, not only the EPC, but every member in its own right feels confronted with that letter. I don't know what the outcome will be.

"M" payments in the end has to do with, How do we organize the chip of the mobile—in particular, according to UICC (universal integrated circuit card) standards of ITSI (individual terminal subscriber identity)—in such a way that it accommodates an additional piece of technical security. Think about the house—and one of the rooms of the house can be rented to somebody else, but the owner of the house is not allowed to open that room in the house. That is the concept behind it.

So we did a lot of work together with GSMA, which is the trade association of all mobile operators. So far, it has been very fruitful and is very promising. It is not only the pipeline for initiating a payment but the pipeline to banking infrastructure at large. So what is currently the chip of the plastic of payment cards is basically the chip of the SIM. The SIM is owned by mobile operators, but we would like to have the SIMs organized in a systemic way—an organized, pan-European way. Maybe we need a piece of regulation for that, so that this room in the house of any SIM is organized by banks, so banks continue to have the freedom to have deals with whatever mobile operator. The endgame is that any consumer is free to choose a bank account, free to choose a mobile operator, and free to choose a handset provider. That is very important to understand.

Cooperation. Currently, this is at the top level of the model in Europe. That means that there is the public sector at the highest level. Mr. Benoît Cœuré, a board member of the ECB, together with Jonathan Faull—reporting to the Commissioner of Internal Market and Services—are co-chairs of the SEPA Council. On the buy side, there are the representatives of consumers, SMEs, corporate, treasurers, and the public administration; and on the supply side it is the European Banking Federation inclusive of the EPC.

These are the objectives and this body may evolve to have even more authority over time. They do not have legislative power. If you need legislative power, it can be done through the trick of the European Commission, together with the Council and the European Parliament, which can make legislation if required.

But the coordination problem is complex in Europe, more complex than in the United States. It is not only the European level which has a certain mandate. But it is not true that all member states have given all their decision-making power to Brussels—definitely not. You always have the balance that a similar body exists at a national level. In general, you can say the supply side of the industry (being the banks) is pretty well organized, because the major banks are active at the national and European level and are mostly multicountry. But it is more complex for consumers and SMEs. Sometimes the representatives at the European level tell a completely different story as the same institution at the national level. That is a complex coordination problem.

Conclusions. SEPA will definitely create a single market, as expected by the public sector. SEPA is realized by coregulation. The industry is doing part of the work in the public sector with a stick behind the door of the regulator. There is no misunderstanding about that. Otherwise we would probably not have moved. It is also clear that, based on the green paper (it is maybe too strong to say), but the public sector is fed up with the progress. We did not make enough progress and that is why there is this green paper.

On the other hand, the public sector is easy to tell there is a market failure of the private sector. From my perspective, there also may be a failure by the public sector because of the inconsistency of public policies. Thank you very much for your attention.

Mr. Edey: Good morning. I am not using PowerPoint. I am going to be using word of mouth. It's an old-fashioned technology but it's still a good one.

The question I have been asked to address is whether inertia (or coordination failure) is an obstacle to payments system innovation. And if so, what do we do about it?

To begin with, it helps to distinguish between two types of innovation: proprietary and systemic.

An example of the first type might be a new piece of card technology, or a new customer platform for an individual bank. An example of the second might be the adoption of a new interbank messaging standard or a systemwide shift to faster payment times. The difference lies in whether the benefit can in some sense be captured by the innovator, or whether the benefits are more dispersed and dependent on coordinated action.

Payments service providers are good at proprietary innovation, as you would expect—they have an incentive to be good at it. It's in the second area that problems of inertia and coordination failure can come into play.

I can think of two general reasons why this is the case.

The first is the problem of capturing benefits so as to give a return to the innovator. To give a concrete historical example, think of the question of faster check clearing. For a given cost, faster clearing is obviously an improvement, but it can only be achieved collectively. Yet doing so confers no competitive advantage to any individual participant in the check-clearing system, so there is little incentive to agree on costly action to make it happen.

To make the example more up-to-date, the same problem exists with incentives to deliver faster (or real-time) electronic transfers at the retail level. Faster payments can only happen if the system as a whole is set up for it, and then only if a critical mass of the individual participants are set up to provide timely access. But putting this in place will obviously involve some cost, with little or no proprietary benefit to the investor, particularly where it may cannibalize other potentially profitable product lines. This problem would exist even if all the payments industry participants faced identical incentives. Without an effective coordinating mechanism, industry will tend to underinvest in this kind of innovation.

The second reason is that the costs and benefits of participating in coordinated actions of this kind are not in fact evenly distributed across participants. Some participants will benefit more than others from a given innovation, or may find it more costly than others, for reasons to do with their size or their business model. Another factor is the timing of investment cycles: collective action has to be collective, but the timing of any given investment in payments technology will always be more advantageous to some than to others. A bank that is just about to undertake a regular technology upgrade may be quite receptive to aligning that with a general change in standards; whereas a bank that has just completed a major round of investment may not.

These things can make it very hard for industry participants to agree on the timing of a systemic innovation, or on the pricing arrangements that will underpin it. The end result can be a degree of inertia, or a slower pace of innovation than would be socially efficient.

I think this problem is inherent in any network that doesn't operate as a kind of proprietary unit in the way that, for example, a credit card network does (competing of course with other networks).

For the payments system as a whole, then, this points to the need for coordination mechanisms. What sorts of mechanisms might we be talking about?

For a lot of issues, the appropriate coordination mechanism could be an industry body—especially where the issue is mainly technical and where there are no strong proprietary interests at stake. An example would be routine updating of technical standards.

But where there are significantly conflicting incentives that make coordinated decisionmaking more difficult, it may need a regulator to take a leadership role.

In Australia, the payments system regulator is the central bank, and regulatory decisions are made by the Reserve Bank Payments System Board. We have a mandate to promote stability and efficiency, which I think we can view as including the efficient resolution of the coordination problems that I've just described. And we have significant powers that can be directed to that end.

For these reasons, the Reserve Bank of Australia (RBA) has been increasing its focus on these coordination issues in recent times.

As you may be aware, we announced a Strategic Review of Innovation in the Payments System in July 2010, and we are now in the finishing stages of that review. In the course of the review, we held two rounds of extensive consultation with service providers as well as with end-users of the payments system.

Broadly speaking, the Review focused on three questions, which I could sum up as gaps, governance and hubs.

On gaps, the question is, are there potential innovations that would be in the public interest that are not happening because of coordination failures?

Responses to the consultation suggested that there might be. The main points highlighted as possible areas for improvement were: faster or real-time payments at the retail level; greater availability of payments systems outside normal banking hours; improved capacity to send information with payments; and, greater ease of addressing payments.

The last one of these can be illustrated by analogy with the check. A check payment can be addressed very easily when all you know is the name of the recipient. But we don't yet have a comparably easy mechanism for addressing electronic payments.

Obviously it is not costless to deliver these things, and so a coordinated decision process would need to have some way of taking into account both the costs and benefits, including benefits to end-users, in order to determine whether an investment is worth making.

That raises the further question of who should provide that leadership and under what arrangements—the general question of governance.

To make it more concrete, we can pose the following questions. In the Australian case, should the Payments System Board take a more prescriptive approach to setting objectives for payments system innovation? Could it, for example, set an objective of real-time consumer payments, or the adoption of new messaging standards, by a specified target date? Could it then perhaps delegate the implementation of those targets to an industry body with the necessary technical expertise?

All of that would amount to a governance model where the regulator makes high-level decisions as to the public interest, while industry participants determine the most efficient means of implementing them. I won't foreshadow what we

might conclude on these things, but these are the sorts of questions the Payments System Board is now considering.

The Board is also considering a third area, namely hubs, or specifically the question of whether there needs to be greater use of centralized architecture for clearing and settlement of retail payments. This is a particular issue in Australia, because many of our payments systems are built on bilateral links between institutions. Arguments can be made in favor of hubs on the basis that they may be more efficient than bilateral networks and more conducive to both competition and innovation. But these considerations need to be balanced against the costs of the investment. Again, this is a key question of system design for which there needs to be a coordinated answer, whether the eventual decision is for or against.

To sum up, coordination failures can be an obstacle to innovation. That problem is inherent in the nature of payment networks. It's very hard to design governance structures that make appropriate provision for coordination while still allowing for normal competition to occur. That suggests a role for leadership by payments regulators or central banks. In some ways, central banks have a natural leadership role because they act as a hub already in many payment systems. In Australia's case, the central bank is also the regulator for payments-system efficiency and stability.

Finally, in carrying out any leadership role in this area, it's very important to consult. The advantage we have (as regulators or as central banks) is that we can take a public-interest perspective. But we also need to make use of the expertise of payments industry participants in determining what is feasible and what are the most efficient means of delivery. Thanks very much.

Ms. Moltenbrey: Good morning. I am going to speak to you this morning not as an expert in payments systems, so I feel a little bit intimidated by the depth of knowledge of some of the people I have been listening to already. My area of expertise is antitrust enforcement. I want to talk a little bit about the role of antitrust and the ability of antitrust to promote innovation, as well as more generally, to promote competition in payments systems markets.

My background is as an antitrust enforcer. I spent most of my career at the Justice Department and I spent a fair number of years of that career conducting a very in-depth and protracted investigation of Visa and MasterCard and some of their membership rules, ultimately culminating in a case the government brought against both associations. I am going to talk about that case for a few minutes.

That tells you a little bit. My perspective is generally to be very much in favor of vigorous antitrust enforcement. There are certainly people who think when you're talking about innovation and competition that antitrust enforcement is potentially an impediment to innovation, and excessive enforcement can actually have unintended consequences and maybe a negative, chilling effect on companies' willingness to invest.

I am not going to give a final answer on that or stake out a final position. Trying to apply antitrust to the payments systems industry is a very, very challenging exercise. It is probably a mistake to think antitrust can solve all the problems and be the sole policy that is going to promote innovation and deal with some of the issues that have to be dealt with in this industry.

There has been a lot of antitrust enforcement in the payments system industry over the years. One of the difficulties of antitrust, at least in the United States, is that enforcement is very much case-specific. Most cases are focused very much on a set of practices or a very specific set of issues which are dealt with in isolation. Even a very big, complicated case is going to be focused on a very narrow aspect of what is going on in payments systems. The reality is, when you push on any side of the payments system, it is going to have an impact elsewhere in the system.

There are also limits of antitrust's ability to deal with innovation markets, in the sense of being able to predict how things are going to play out. If you look at some of the history of antitrust litigation and payments systems markets, you can see how some of the theories and concerns of both the regulators and private parties have evolved.

I am going to run through just a couple—this is a very small sampling—of the antitrust litigation that has taken place in the industry and what some of the effects of it have been. Very early on with respect to payment card systems there were challenges to Visa's requirement at the time that card issuers be exclusive to one network or another. The first cases on that were brought by a private party—a member of the Visa Association, then called National BankAmericard—claiming the rule that stated you could only issue one card was a group boycott and a violation of the antitrust laws. The court rejected that challenge, in part because the system was so new at the time and people did not know exactly how it would play out.

Visa then decided it was going to apply its exclusivity rule not just to issuing banks but to acquiring banks as well. In doing this, it went to the Department of Justice (DOJ), because there were obvious competition issues here. One of the tensions you see all of the time in payments systems, especially in talking about private coordination in the payments system area, is the tension between exclusion and collusion and how to deal those things.

So Visa went to the DOJ and asked for a business review letter, which basically asked the DOJ to opine on whether what it was about to do was lawful under the antitrust laws. They received a wishy-washy response. The DOJ said they were not at that time going to object to exclusivity for issuing banks, but were concerned exclusivity with respect to acquiring banks would potentially inhibit the development of new payments systems. They thought that was important, so they declined to bless an exclusivity rule as applied to acquiring banks.

Visa turned around and decided they were going to eventually get rid of all their exclusivity rules. You ended up with a system where members of Visa could also be members of the other competing card system at the time, which was MasterCard.

The next big, significant challenge was related to the setting of interchange fees. There were challenges that the collective setting of interchange fees would be price-fixing and thus, a violation of the antitrust laws. Again, the courts declined to weigh in on that. This was a private litigation, a private challenge to the setting of interchange fees. As of yet, government enforcement agencies have not really taken a position on interchange and whether or not there are competition issues with the collective setting of interchange fees.

The first time the government decided to intervene was the case I was talking about which I worked on. In my earlier discussion, I shared that the initial concerns were whether or not to allow exclusivity for payments systems associations or whether or not you should require the associations to allow banks to issue competing cards.

When we started looking at this issue at the DOJ, it was a very, very complicated issue—and I'm not going to give away any real internal deliberations—but anyone who was talking with us as we were conducting this investigation was very aware of the two competing arguments that the antitrust agency was grappling with. One was an argument that a real problem in payments systems existed because both Visa and MasterCard had gotten rid of their exclusivity rules and the same banks were in both agencies. They were governing both agencies. They were making decisions about what both agencies would do. While those banks competed with each other in issuing cards, in terms of actually running the association and systems, they were not really competing very vigorously.

So there was a camp that thought the biggest problem that existed with respect to the two associations was there was not exclusivity. There was too much coordination and too much inclusion between the two agencies.

You also had a camp that felt that one of the anticompetitive issues that needed to be dealt with was that Visa and MasterCard both—while they allowed banks to issue one another's cards—had adopted rules that arguably were intended to exclude competing payments systems networks from getting into or expanding in the market. Those would be American Express and Discover. So a bank could issue a Visa card or a MasterCard, but it could not issue an American Express or Discover card. There were a lot of people who felt that was also a very anticompetitive restriction that was limiting the scale and the scope of American Express and Discover and their ability to innovate and bring new products to market.

It is important to mention here that an important aspect of that case—and if you look at the briefs and the complaint and the arguments that were made—was that the focus was very much on innovation and whether or not the restrictions and the structure of the association were inhibiting innovation.

The Justice Department ended up walking a very fine line. There were some tensions in the case that it brought, but it brought forward two separate counts. The first challenged both the dual governance of Visa and MasterCard. It said you

need to separate these two entities. You should not allow banks that are serving in governance roles on Visa to also serve in governance roles and issue and profit from MasterCards. Doing so chills the incentives of those associations to invest in new innovations, because part of what will incentivize those associations to invest is the ability to steal share from one another.

The second part of the case was that meanwhile, banks who are members and nongoverning members of the associations should be allowed to issue American Express and Discover cards. Doing so will allow those associations that will remain independently governed to expand, to get greater scale, and to work with banks to introduce new products and services.

Now this investigation lasted several years and the case went to trial relatively quickly for an antitrust case, but still more than a year after it was filed. Ultimately it was resolved. The government lost the first part of that case; the court said there was not enough evidence that the common governance of the two associations was having any impact whatsoever on innovation by the associations. However, on the second part of the case, the court ruled in the government's favor that excluding American Express and Discover from having access to the member banks and allowing banks to issue those cards was anticompetitive.

While that case was in progress, there was a pending private class-action litigation challenging Visa and MasterCard's "honor all cards" rules. That particular challenge focused on the requirement that a merchant who wanted to accept one of the payments systems' cards would have to accept both debit and credit cards. You could not choose one or the other. The argument was that practice was a tie that was allowing the payment associations to sustain higher interchange fees for debit cards.

The government looked at that issue. One of the challenges of relying on antitrust enforcement and law enforcement to set competition policy in this area was at the time we did not have the capability or the resources to tackle that issue at the same time we were tackling the other case. So we decided we would let that private case go forward. That case was ultimately settled and the associations agreed to eliminate those rules.

There are a few other cases to mention in passing. I will not talk about them in detail: 1) challenges that banks and associations coordinated with one another and conspired to set currency conversion fees—again, challenges to collective action; 2) challenges to merchant restrictions that place provisions on merchant contracts that limit the merchant's ability to steer customers to use one payments system over another, whether that is through recommendations or preferences or through surcharges or discounts offered for particular cards.

I want to talk just a minute about what happened after the government won the case I was involved in. It has some interesting results to it. It is not clear that we have seen a huge amount of additional innovation in some specific topics we talked

about during the case, for example smart cards. We have not seen a huge explosion of innovation. There has been some progress, but not a lot. You can argue about whether that is because we did not win the first part of the case—that perhaps if we had, there would be more, but I do not know whether that is true.

One area where we definitely saw a significant increase in competition was between the payments systems for banks issuing high-value credit cards. Shortly after that case was won, Visa and MasterCard started creating unique card products targeted at high-value consumers, with very high rewards programs and levels of services, and as a consequence, that were supported by very high levels of interchange. One of the impacts of that was increased competition on one side of the market. On the other side of the market, however, that competition was driving up interchange fees. That is something people have expressed a lot of concern about, certainly on the merchant side of the business. I have heard criticism that the primary beneficiaries of the case we brought are very well off consumers who get gold or platinum rewards cards and receive a lot of benefits from them. It is not an illegitimate criticism. I very much believe competition and antitrust enforcement should drive competition wherever it goes. One of the impacts of the case was it was very focused on what was happening on one side of the market and not the other.

Most recently, the DOJ brought another case, which is targeted at what they call the merchant restrictions. While I am not privy to how they came to the decision to bring that particular case, I suspect there was a recognition that increased competition for banks to issue cards was driving interchange fees up and something was needed on the merchant side of the market to promote competition to try to drive fees back down again. The goal of that case is that the merchants must be able to offer discounts in order to steer customers to use a less-expensive card with a lower interchange fee as a way to try to put some competitive pressure on the issuing side of the market.

These issues are not going to go away in this industry. There are going to be recurring issues, including how to deal with the significant network externalities that encourage cooperative ventures. There are good reasons to have cooperative ventures here. They can distribute risk, encourage infrastructure investments and help companies achieve necessary scale. However, antitrust issues that come up are how should access in membership be dealt with; if you are going to have cooperation, do you want that agency to be able to limit who will be participants in it or do you want it to be open to the entire industry; how should exclusionary conduct be dealt with; and how should costs be assessed on different sides of the market.

The answers the antitrust laws might give you may vary, depending on where you are and what stage in the development of the industry you are at. So, as you can see, early on the agencies and the courts were reluctant to weigh in on Visa's exclusionary rules. But, as the industry matured and there was less interest in having initial systems get established and more in having new competitors come into the market, the willingness to challenge exclusionary rules increased.

You have issues with the fact that the payments systems are dual-sided platforms, so whatever actions you take on one side of the market will have an impact on the other side of the market and not always in a way that you would predict. I have talked about this in the context of that case.

Standard setting and inoperability. Standard setting is obviously necessary in this industry, but standards can also be used to entrench incumbents. And how and when do the antitrust agencies weigh in to ensure the process itself is working to promote competition rather than to protect incumbents with market power?

How to think about the role of nontraditional payments service providers. A particular challenge here is some of the entities that are involved in and are talking about innovating in this space are incumbent players in related or adjacent spaces who may have market power in those spaces. These incumbents may be the best-positioned to promote innovation, because of their ubiquity, size, and the value they can extract from payments systems in a very rapid way. On the other hand, you worry that those incumbents—who already have market power—will use innovation to entrench their market power and expand it into other payments systems markets. How do the antitrust laws deal with that, and when and at what stage of development can they do so?

One of the final challenges I'll mention about antitrust law is that relying on it as a promoter of innovation in this industry results in a bias toward bringing cases that challenge coordinated behavior. These are easier cases to bring. Under the antitrust laws, coordinated action by two independent entities, whether trade associations or an association of banks setting up a payments system, is a much easier type of case to bring than if you have a single entity that is engaged in conduct you think is exclusionary. In part because of that ease, I know it was at least one of the factors that went into Visa and MasterCard's decisions not to be joint ventures of banks anymore, but to privatize instead. You can question whether that is a good or a bad outcome for an antitrust enforcement. One of the risks is that there may be just as much risk to competition in this industry from dominant incumbents as there is from collective action. But those cases are much, much harder to bring. They are especially hard to bring when you have nascent industries and that you do not want to step in and choke off.

I do not know what the right answer is there. I clearly think there is an important role for antitrust in promoting innovation in these industries, but it is also a very, very challenging thing to do and to get right. I will leave it there.

General Discussion

Session 6

Mr. O'Connor: Before we turn it over to the floor for questions, I'll give the panelists a few minutes to ask each other questions or make comments on presentations of other panelists.

Mr. Edey: I will just ask Ricardo, who described the setting up of a piece of centralized infrastructure for real-time payments in Mexico by the central bank, did you consider getting the private sector to do that and what sorts of considerations were involved in making that decision?

Mr. Medina: Thank you, Malcolm. When we decided to implement our payments system, it was difficult. We first tried to collaborate and see if the private sector could construct and operate a system. There was a lot of conflict of interests, and a lot of big participants wanted to have control of the system. Therefore, we decided it would be better if an unbiased and not very important player in the payments system, like the Central Bank, operated the centralized system. It was a very important decision and there were a lot of discussions internally within the Central Bank. Thank you for the question.

Mr. O'Connor: Questions or comments, panel? I'll turn it over to the floor.

Mr. Grover: Gerard, EU regulators seem to have experienced a bout of cognitive dissonance. On the one hand, they have called aggressively for the establishment of an additional European new payment scheme. At the same time, they imposed price controls on interchange and they jawboned networks to reduce network fees. So I have two questions for you: In that kind of environment, why would European banks want to invest billions of euros, creating what out of the gate would be an inferior payments system or payment network? Secondly, wouldn't encouraging existing networks, such as American Express, Discover, Diners, to expand in Europe and/or encouraging commercial rollup of legacy national payment schemes be a better path?

Mr. Hartsink: OK, I understand the question. Interchange is a complex topic. For cards, the European Commission has taken the stance that the story for cards is different than for direct debit. For direct debit, we had multiple models in Europe at the national level and we had to find a new model for interchange at the European level.

After a debate of I believe three years, we ended up with the perfect number, 9.3 cents as a default. Then, it took the ECB about one day to find out it was 8.6 cents. OK, we accepted that. But then the intervention of DG Competition started and we ended up in a complex game. The market asked for clarity. There were different models. In the end, it was by law and it is part of the SEPA regulation, which is published today, that for direct debit, it is only legally possible for returns and not for regular transactions. That is the outcome.

The policy consequence of the decision is that, in certain member states—think about France, Portugal, Italy—the corporates (the acquiring bank) are not in the end, paying it anymore. Rather, the consumer banks have to charge a bit more to their consumers. That is the reality of this policy intervention.

Second, your question was more related to card schemes. There are several cases on the table in Europe for cards and interchange at the national level but also at the European level. There is one case of one of the international card networks where they did not accept the outcome of the competition authority and it is a pending case at the European court. Nevertheless, the outcome from my perspective as an industry expert is interchange will come down. That means the real debate in the end is not all about interchange. No, it has to do with the discussion of, Who is paying the bill for payments? Should it be the consumer or should it be the one who receives the money? That could be the public sector—20 percent of the number of payments has to do with the public sector—or corporate SMEs.

I am not aware of a strong political stance of the public sector on who is paying the bill. What you hear in a lot of member states in Europe is the question "Who is paying the bill for payments?" The parliaments are crystal clear—the consumer should not pay. Lobbyists on behalf of the merchants are also crystal clear that merchants should not pay. In the end, in this terra incognita of who should pay the bill, the market reality is that probably around 20 percent of the cost space in Europe has to do with payments. The public sector—and it is probably also true here in the United States—and even the central banks, which are active in the debate as a catalyst, ignore that there is also cash in town. That is the most costly factor. But based on the behavior of central banks issuing bank notes and stuff like that, they have an interest in that. Mostly, the policy people are different people than those who run cash. I know the ECB tries seriously to get the costs of payments as a whole on the table, and to have to the debate of who really should in the end, from an efficiency perspective, pay the bill in society. We are talking about 2 percent of GDP and it is probably similar numbers in other communities.

I know some member states are reluctant to give the real data to the ECB. I have a Dutch background. We did deliver the CFO data, so external auditors send the real data to the Dutch Central Bank and the Dutch Central Bank being partner of the ECB.

We know pretty well—if you take segment by segment, consumers on the receiving end or sending side or SMEs, corporates, public administration—who is paying the bill on balance. They are definitely not large corporates. Our guess is it mostly is the SMEs in a lot of member states. If you talk about card networks, I think interchange will go down—that is the market trend. And the value-based interchange will probably go down even faster than transaction-based interchange. It is becoming more and more popular in Europe, if I listen carefully to the public sector.

Mr. Anderson: A question for Gerard. Going back to the security issue, we have seen one market failure in the case of EMV, where there have been repeated implementation vulnerabilities in the payment protocols. For example, there was disclosed in 2009 and published in 2010, the no-protocol attack whereby stolen cards can be used in stores without knowledge of the PINs. Now EMVCo. does not seem prepared to do anything about this and the various vendors pass the buck. In the meantime, individual banks say this is an industry problem not ours. So the big question is, Is this something that you are prepared to take on board and do something about or should it be left to some other body to coordinate that?

Mr. Hartsink: I cannot give comments on EMV as such. What I can give comments on is that the industry decided to implement EMV on the cards, on the POS terminals, and on the ATMs in Europe. Analyze the number—it is all over 95 percent. So that is the market reality. The ECB has a very clear position. They prefer that, on the issuing side—so not on the acquiring side—that banks only issue cards with an EMV chip, but no magnetic stripe anymore. It is a public policy. One of the colleagues of the ECB is still in the room. He can confirm that this is formal policy of the ECB.

The banks, however, were already reluctant in the decision of December, in the plenary last year, to accept this policy. Some banks do. They only issue cards with a chip. The story is "Yeah, but outside Europe you cannot use the chip." Well, if you are able to fly to the United States, then you are probably also prepared to buy an additional piece of plastic. That is not the real cost of the issue compared with the ticket price you pay.

Of course, in Europe, we were—the ECB—also approached by consumer organizations from the United States. Will, over time, it no longer be possible for Americans coming to Europe using a card without a chip to get money out of the ATM or POS? Well, the policy of the euro system currently is only on the issuing side. The thinking is based on the enormous frauds, so it makes sense to do so also on the acquiring side.

The ECB is working together with Europol, the European Banking Authority, and the Commission on a paper about card-not-present fraud that will probably be released within one or two months, I expect. Europol is based in the Netherlands and I've seen serious cases of fraud. So, one way or another it makes sense for the United States to consider, if it continues with the plastic, also to implement the EMV chip. Another way of thinking is that maybe over time we will not need the plastic anymore, although I doubt it. Then at least, it should be done with the mobile.

Mr. Ramamurthi: As you go from thinking to getting things done, I have a two-part question for Ricardo. First, it is very impressive what you guys have been able to do in getting payments out in five seconds in some cases. As we look at similar systems in the United States, my question is on ID verification. I am familiar with CURP ID, which is a very impressive thing that you can actually verify online in Mexico. How valid is that, in terms of real-time authentication, along with voter's registration? That is part A of the question.

Part B is related to what you talked about in regard to being able to use mobile devices as a proxy, meaning the telephone numbers. My question is, Is the Bank of Mexico going to provide a directory service, whereby there is some kind of authentication layer? It kind of relates from part A to part B. If you can answer that.

Mr. Medina: Regarding the portioning of the payments system SPEI in Mexico, the Central Bank of Mexico very much regards and takes care of the center of the diagram. By the center of the diagram, I mean SPEI is at the center. The sender bank, or the sender participant, is on one side. On the other side is the receiving participant. The Central Bank is not involved very much in the relationship between the two participants and the clients. We leave that relationship—the ID, security, and all the issues regarding the client—to the banks and the receiver client with the receiver banks. We left it to the banks. The only thing we asked of the participants, the sender banks and the receiving banks, is that if they want to participate in SPEI, they must comply with the rules and should provide very high-quality service to their clients. We imposed rules for the velocity of payments, for some kind of security of the clients' identification. The ones who implement all these measures are the participants of SPEI. I appreciate your question very much. Thank you.

Mr. O'Connor: We are finishing on time. I will thank the panelists for their excellent presentations and I will thank the audience for their participation.

Ms. George: Let me thank all of you again. I want to close by thanking each of our authors, the discussants, the panelists we have had over the last couple of days, particularly those of you who have come a great distance to join us—my thanks for that. You have certainly added to the quality of our discussion here.

This conference has certainly exceeded my expectations. As we started yesterday, I knew that—because of the quality of the participants we have had—it would

be a good conference. But, as we look at the range of issues we have covered on this time frame, ranging from interconnectedness and innovation, thinking about the information content that is coming from consumers, thinking about the issues of privacy and security, all the way to the issues of segments of consumers, including the unbanked that we need to be thinking about in this space, issues of barriers. I found it very interesting as we try to balance this issue of innovation with what role—if any—public policy might play in that space, particularly as we see the emergence of very innovative and significant platforms coming into play around mobile payments and other aspects here.

Finally, for me personally, as I think about the role of the central bank, today has been most informative in terms of raising the issues about what role public authorities play in this space and how we think about this going forward.

We certainly have enjoyed a range of views, valuable perspectives, and insights. We have raised questions we can take away to research and think more about.

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