The London School of Economics and Political Science

Essays on the Economics of Culture

Andreas K. H. Ek

A thesis submitted to the Department of Economics of the London School of Economics for the degree of Doctor of Philosophy, London, April 2019

Declaration

I certify that the thesis I have presented for examination for the Ph.D. degree of the London School of Economics and Political Science is solely my own work.

I warrant that this authorisation does not, to the best of my belief, infringe the rights of any third party.

I declare that my thesis consists of approximately 52,000 words (excluding numbers).

Andreas K. H. Ek

Abstract

I present a thesis in three chapters on human capital, labor supply, and their relationship with cultural values. Chapter 1 and 2 contribute, respectively, to the questions of what share of income differences across countries that can be attributed to human capital, and on what determines differences in human capital. They rely on unique Swedish employer-employee linked administrative data to estimate differences in human capital as country-of-origin specific labor productivity terms in firm production functions. Unlike previous migrant-based measures in the literature, this is immune to concerns related to wage discrimination and robust to other varieties of discrimination. After accounting for education and experience, estimated human capital still varies by a factor of 3 between the countries at the 90th and 10th percentile of the human-capital distribution. When I investigate which country-of-origin characteristics most closely correlate with my estimates of human capital, cultural values elicited from the World Values Survey are the only robust predictor. This relationship persists among the children of migrants, which lends further credence to the cultural interpretation of human-capital differences unexplained by education and experience.

Chapter 3 documents substantial cross-sectional variation in labor supply across countries, after taking into account differences in tax rates and real wages. When investigating which country characteristics that best explain the variation, I find that a cultural measure of preferences for leisure exerts an economically larger and statistically more robust influence than do traditional measures of labor market frictions. Micro-level labor supply choices of descendants of immigrants in the United States and Sweden buttress the cultural interpretation, that part of differences in labor supply can be attributed to differences in preferences. As an "out of sample" test, the paper looks at the implication of differences in preferences for cross-country differences in labor taxation. Economic theory suggests a negative association between preferences for leisure and labor taxes; empirical data verify the theoretical prediction.

Acknowledgements

This marks the end of my Ph.D. I wish to extend my deepest gratitude to those who helped me through the process and made it worthwhile.

To my supervisor Francesco Caselli. For encouraging me to try and be original and bold. For knowing when I needed to be pushed (and when I really didn't). And for trying to teach me what excellence means — hopefully someday I will get a little closer.

To Wouter den Haan, Ethan Ilzetzki, Per Krusell, Guy Michaels, Rachel Ngai, Steve Pischke, Ricardo Reis, and Silvana Tenreyro, for support, and for their intellectual generosity that characterized the Macro and Labour WIP seminars during my years at LSE. And to Andreas Bergh, for his encouragement and invaluable help in acquiring the data that two of the chapters here rely on; I gratefully acknowledge financial support from the Centre for Macroeconomics towards this data.

To Adrien, Amanda, Ben, Filip, Gianpaolo, Irene, Jonathan, Laura, Matteo, Miguel, Sogo, Trang, and all the other great LSE Ph.D. companions; to Clare, Sevim, and Thomas, for helping me remain (relatively) sane while being introduced to the insanity that is academic economics.

To my parents, Eva and Ingvar, for teaching me independent, critical thinking. And for their constant love and support, in this pursuit as in every other. I owe them everything.

Contents

List of Tables

List of Figures

Chapter 1

A Productivity-Based Measure of Human Capital

1.1 Introduction

There are very large observed income differences across countries. Quantitative assessments of proximate causes have typically found that at least half of the GDP per capita variation remains unexplained after controlling for human and physical capital (Hall and Jones, 1999; Klenow and Rodriguez-Clare, 1997; Caselli, 2005). However, recent studies have been able to reduce the unexplained variation by proposing novel measures of human capital which differ from the traditional ones, in that they allow for factors other than observed schooling (Hendricks and Schoellman 2018; Lagakos et al. 2018). These findings underscore the importance of making further progress in estimating human-capital differences across countries, as well as of identifying determinants of human-capital differences other than schooling. This thesis contributes to both of those questions.

My first contribution is to provide a new measure of human capital differences. I exploit unique Swedish administrative data that matches employees to their employers, allowing me to estimate firm-level production functions with hetero-

geneous labor.[1] In particular, I am able to estimate country-of-origin specific productivity parameters, and I interpret differences in these parameters as cross-country differences in human capital. The labor inputs enter the production function estimation after an adjustment for schooling and experience, so the estimated human-capital differences capture factors over and above these "traditional" determinants.[2]

The early work in the development accounting literature constructed human capital stocks based solely on years of schooling paired with pecuniary returns to schooling. Innovating on this unidimensional measure of human capital, Hendricks (2002) and Hendricks and Schoellman (2018) proposed studying human-capital via wages of U.S. immigrants. If wage differences among immigrants to the US, where they are faced with the same institutional and technological environment, are similar to wage differences among country-of-origin wages, then human capital must be an important determinant of the latter.[3] This approach holds the desirable feature of allowing for differences in every potential dimension of human capital (as measured by labor market returns). However, immigrant wages are potentially (and heterogeneously) affected by ethnic or racial discrimination (Oreopoulos, 2011; Booth, Leigh, and Varganova, 2012; Neumark, 2018), so that a non-negligible fraction of the wage differentials that Hendricks and Schoellman attribute to human capital could conceivably be caused by differential wage

[1]The unique part is that the data includes information on individuals' country of birth and parental country of birth. Previously, Statistics Sweden has only released this type of data aggregated to the continent level, or for a small set of countries. To the best of my knowledge, this is the first paper that exploits disaggregated information on individual and parental country of birth, for a large number of countries, in Swedish administrative data.

[2]To control for unobserved firm-level productivity, I follow the proxy-variable literature initiated by Olley and Pakes (1996). The baseline approach assumes that different types are perfect substitutes. Results are robust to allowing for imperfect substitution across types of workers, across educational types, across occupations, and when estimating a translog production function rather than a Cobb-Douglas production function.

[3]Hendricks (2002) found substantial convergence of immigrant wages to native wages, suggesting a relatively small role for human capital. Due to data limitations, he was forced to rely on an assumption of limited differential selection into migration. The key innovation by Hendricks and Schoellman (2018) is to properly account for differential selection via pre-migration wages. Since that selection turns out to be very strong, and wage differentials between countries-of-origin exhibit surprisingly strong persistence, they conclude that human capital accounts for a much greater share of income differences than both traditional development accounting studies, and Hendricks earlier paper, found.

discrimination.

My approach to measuring human capital is similar to Hendricks and Schoellman (2018), in that it relies on the same identifying assumption: the only country-of-origin characteristic that affects migrants' productivity is embodied human capital. However, instead of inferring migrant productivity from wages, I directly estimate their contribution to production at the firm level, so that wage discrimination cannot possibly affect my estimates. I also present evidence that my results are robust to other varieties of discrimination. When I hold occupation constant, I do not detect any signs of the reversal in human capital estimates that positional discrimination, via differential selection, would imply. Similarly, restricting attention to workers in occupations with a low level of customer-facing intensity does not significantly alter the results, as a story of large-scale societal discrimination would suggest.[4]

I find economically substantial differences in estimated human capital with a 90/10-percentile ratio of around 3. This is larger than, and in addition to, the difference that education and experience imply. However, it is quantitatively smaller than human-capital differences that can be inferred from the estimates in Hendricks and Schoellman (2018). This may be due to their differences partly picking up wage discrimination as human-capital differences, but it could also be because I am not able to account for selection on unobservable characteristics as well as they are.

The remainder of this chapter is structured as follows. Section 2 describes the data. Section 3 outlines the approach to estimate human capital and presents how it varies across countries. In Section 4, I study what fraction of unexplained cross-country differences in TFP that human capital can account for. Section 5 concludes.

[4]Methodologically, the paper most closely resembles Gallen (2015), who study what fraction of the gender pay gap productivity differences can account for, by comparing the relative marginal products and wages for males and females.

1.2 Data

To estimate cross-country differences in human capital, the paper uses administrative individual-level data covering the entire Swedish working age population, and the universe of Swedish firms (excluding financial institutions). All individuals have a unique civic registration number that allows linking information across registers. The *Total Population Registry* contains basic demographic characteristics such as year and country of birth, gender, parental country of birth, etc. Data on educational attainment is from the *Education Registry* and the *Employment Register* provides employment-specific information such as occupation and income from each individuals' main employer. These registers cover the most important variables with complete coverage of the population. I also link information from two registers that do not cover the entire population — the *Wage Structure Register*, and the *Recruitment Authority*. They provide data on, respectively, hours worked for a large representative sample of workers, and a measure of cognitive ability for native-born males carried out during the Swedish Military Enlistment test.[5]

Firm-level data is from the database *Business Economics*, compiled by *Statistics Sweden* (SCB) using mainly data collected by tax authorities. SCB calculates value added as revenue less costs of intermediate inputs. I use the book value of fixed assets and gross investment as the baseline measures of capital and investment.[6, 7] Similar to workers, firms have a unique identifier. Measures of labor

[5]In practice, the *Recruitment Authority* has data on the cognitive ability test from 1997–2010; earlier data is stored at the *War Archive* but the enlistment test was carried out by the same authority.

[6]Fixed assets include physical capital like machinery, equipment, and land but excludes cash, accounts receivable and inventories. It is the closest I get to a book measure of purely physical capital, which is what the production function estimation literature has typically used. However, it might be argued that if the firm did not actually need all of its capital to produce the value added, then it would have distributed that to shareholders, why all financial capital tied up in the firm should be seen as crucial for operations and included in the production function. Therefore, I carry out robustness checks using *total capital* as the measure of capital.

[7]Gross investment maps into the theoretical counterpart of investment in Olley and Pakes (1996). In robustness exercises, I try also the variable *net investment* provided by SCB, or investment calculated using changes in the capital stock according to $i_t = K_{t+1} - K_t(1-\delta)$ (with K equal to the book value of fixed assets) as investment.

input for the firm come from the worker side data — the number of workers (or efficiency units of labor input) per firm is aggregated via this unique firm identifier. Creating firm-level worker characteristics this way, indirectly via data collected by tax authorities, is useful as it is not sensitive to firms misreporting their labor input.

Data is annual and covers the time period of 2008 through 2014, which is the most recent year for which I have data. I make no sample restrictions on the worker side per se but workers are indirectly restricted by which firm they are working in — a worker is only included if (s)he works for a firm that is included in the sample. On the firm-side, the following sample restrictions are made. The baseline sample excludes firms with five or less employees.[8] By necessity, I drop firms without information on industry, value added, or capital. That leaves 407,183 firm-year observations; the average firm is included 5.6 out of 7 years. For estimations following the methodology introduced by Olley and Pakes (1996) (OP), I can only include firms with non-zero investment data which further restricts the sample to 270,109 firm-year observations.

Table 1.1 presents annual average summary statistics for private-sector firms, successively adding sample restrictions. The *Total* numbers are included to illustrate the coverage of the total private sector economy of the different sample restrictions. While I lose the majority of firm observations, first from excluding firms with five or less employees (moving from column 2 to 3), and then excluding firms with missing investment data (from column 3 to 4), I cover a much larger share of the actual economy with, respectively, 88 percent of total sales (78 percent for the OP-sample), and 85 percent of value-added (75 percent for the OP-sample). This

[8] I conduct robustness exercises where I vary the firm-size cutoff in the range of 3–15. Including very small firms has several problems. The risk that the main function of the company itself is tax avoidance is greater, as is the risk that non-negligible fraction of the company's employees, e.g. a spouse or other relatives of the owner, are hired for tax planning purposes. Furthermore, issues with missing investment data are greater, and many of the very small firms hold close to zero or zero fixed assets. If included, firms with 1–2 employees would dominate the estimations as they make up roughly half of the unrestricted sample — while it is not obvious that one would not want to include self-employed, when this category would so dominate the sample, it would be preferable to focus separately on the self-employed if that were the specific category of interest.

is reflecting the fact that a majority of firms are very small with 0–2 employees.

Figure 1.1 shows the firm distribution of the share of foreign-born employees. 63 percent of firms have at least one foreign-born employee, male or female. The spikes in Figure 1.1, for example around one third and one half, are due to mechanical reasons, and decrease with a higher firm-size cut-off.[9]

In my production-function estimation I will want to distinguish between the effect of a worker's own country of origin on that worker's productivity, and the effect of firm-level diversity on a firm's overall productivity. To control for diversity, I construct a firm-level Herfindal index in the firm's workers' country of origin. The firm distribution of country-of-origin heterogeneity is depicted in the right panel of Figure 1.1. Appendix Figure 1.3 presents the firms size distribution, and the firm distribution by share of foreign-born male employees.[10]

Table 1.1: Firm Summary Statistics for Relevant Sample Restrictions

(M SEK)	All Firms	Value-Added, Capital >0	Firms in Sample	Firms in OP Sample
Av. Employment	7	9	36	45
Av. Sales	15	20	88	117
Av. Fixed Assets	12	16	66	89
Av. Total Assets	20	26	107	142
Av. Investment	0.7	1	4	6
Av. Value Added	5	6	25	33
Tot. Employment	2,839,503	2,449,825	2,065,739	1,748,074
Tot. Sales	5,796,226	5,671,858	5,108,392	4,499,723
Tot. Fixed Assets	4,535,810	4,450,350	3,860,133	3,415,718
Tot. Total Assets	7,625,199	7,117,814	6,230,953	5,497,301
Tot. Investment	243,931	243,426	215,023	215,023
Tot. Value Added	1,726,293	1,669,444	1,460,092	1,292,294
Number of Firms	431,387	279,075	58,169	38,587

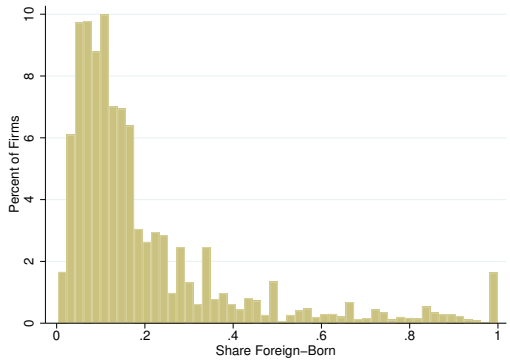
Notes: Values are the yearly average over the pooled sample of firm-year observations (implying e.g. that the total number of firm-year observations in the OP-sample is 7 times 38,587). The financial variables are given in units of Million SEK. The first column include all private-sector firms; in columns 2–4, I successively restrict the sample to exclude firms without (strictly positive) data on value added and fixed assets, firms with five or fewer employees, and firms lacking investment data (each new restriction is in addition to previous restrictions).

All workers employed by a firm are included as labor input for that firm, but

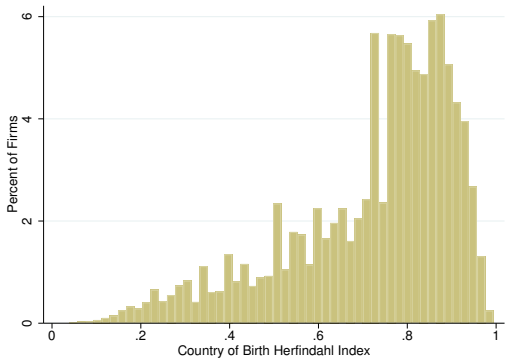
[9] A firm with e.g. 6 employees can end up at 33 or 50 percent foreign-born, but not at 35 or 52 percent. This, in combination with the relatively higher frequency of smaller firms, leads to the spikes.

[10] 627 firms in the sample have only foreign-born employees, so the number of firms with a Herfindahl index of 1 is slightly larger than the number of firms with no foreign-born employees at all, although the rounded number of 63 percent remains the same.

Figure 1.1: Firm Distribution by the Share of Foreign-Born Employees



(a) Distribution of the share of foreign-born employees amongst the 63 percent of firms that have a foreign-born employee. The average foreign-born share of employment in the sample (incl. firms with no foreign employees) is 13 percent.



(b) Distribution of Firms by Herfindahl Index in Country-of-Birth Dispersion. The histogram excludes the 37 percent of firms with an index of 1. The average value is 0.82 (including those with a value of 1).

the focus of the analysis is on male workers. In particular, while I split male workers into country-of-origin specific labor inputs, I split female workers only into foreign-born and native-born types. The reason to focus on male workers is the relatively strong relationship between female labor force participation and cultural factors as demonstrated by Fernández (2007) and Fernández and Fogli (2009), among others. Their results from a U.S. context replicate qualitatively in Sweden — female labor force participation, as well as the difference between male and female employment rates across country of origin are correlated with country-of-origin cultural values. In other words, there is differential selection of females into the labor force. Furthermore, that differential selection is correlated to the cultural values I study below in chapter 2. There are no analogous results for male labor force participation or indications of strong differential selection into the labor force more generally.

Table 1.2 presents summary statistics for male workers aged 25–64 by region of birth. The numbers are annual averages for my sample period. Age, years of education, and hours worked are mean values conditional on being employed by a firm in the main sample. These conditional means are relatively similar across birth regions (differences in unconditional mean values across origins are some-

what larger). Employment rates, however, differ substantially with particularly low numbers for African and Asian-born workers; employment rates are lower also conditional on education and age, indicating selection into employment (by any sensible mechanism) is positive, in terms of productive capacity, for these origin regions. This suggests a possible upward bias in my human-capital estimates for Africa and Asia. However in my estimates, African and Asian countries are generally those with the lowest human capital.

Conditional on employment, Table 1.2 does reveal some differential sorting of migrants, especially Asian and African-born, into cities and firms with a higher share of migrants (conditional on city of residence, the differential selection into firms is smaller than that indicated by the bottom row in Table 1.2). Firm-sorting is only problematic for my estimates if it takes place in a discriminatory fashion, i.e. if firms fill positions in a way that systematically penalizes certain backgrounds at the expense of firms' financial returns.[11] Summary statistics is a very blunt way of trying to assess whether that is the case. It cannot possibly confirm or rule out its existence, but finding extreme levels of firm-sorting, with certain groups of migrants relegated to separate labor markets, would be cause for concern that it may not only take place, but also be quantitatively important. However, I do not find any indication of that kind of extreme sorting — a majority of workers from all groups are active in firms with a majority native-born employees and are not confined to firms dominated by employees of similar (non-Swedish) backgrounds.[12]

A key variable for my purposes is country of birth. SCB has historically been very restrictive with releasing data on individuals' (and parents') country of birth at a disaggregated level — normally it is given at the continent level. The data

[11] If one has a view of the labor market as characterized by the most extreme level of rents, where the output generated by a given worker is solely determined by the characteristics of the position of that worker and not at all by the human capital she possesses, then the firm-sorting need not be discriminatory to be problematic; my entire approach would be meaningless.

[12] Also, note that what my estimates would be sensitive to is differential (discriminatory) firm-sorting across different groups of migrants, and not migrants vis-à-vis native-born.

Table 1.2: Worker Summary Statistics

	Native-Born Parents	Sec. Gen. Mig.	Europe	Asia	Africa	North Am.	South Am.
Total Prime-Age	1,758,921	241,087	241,168	152,112	45,898	11,581	23,649
Share Employed	0.84	0.81	0.65	0.54	0.50	0.63	0.70
Share Employed in Private Sector	0.68	0.66	0.54	0.45	0.38	0.48	0.54
Share Employed in Firm Incl. in Sample	0.48	0.46	0.37	0.28	0.29	0.33	0.41
Share Employed in Firm Incl. OP Sample	0.42	0.40	0.31	0.24	0.25	0.28	0.34
Age, OP Sample	43.89	41.47	43.98	39.54	40.19	41.35	41.68
Years of Education, OP Sample	11.95	12.02	11.32	11.78	11.42	12.77	11.75
Percent of Full-Time Position, OP Sample	92.74	91.09	92.86	89.56	88.65	91.15	90.92
Hours Worked, OP Sample	131.92	127.97	133.52	130.84	127.00	131.43	131.54
Share Foreign-Born in City, OP Sample	0.16	0.19	0.20	0.23	0.24	0.21	0.23
Share Foreign-Born in Firm, OP Sample	0.10	0.13	0.25	0.34	0.35	0.23	0.28

Notes: The table presents average summary statistics for male workers for 2008–2014 by region of birth. Native-born are workers born in Sweden with two native-born parents. Second Generation Migrants are workers born in Sweden but with at least one foreign-born parent. The other columns refer to workers born outside Sweden. *Total Prime-Age* is a yearly average for 2008–2014; other values are for pooled averages over the same time period. In the *sample* are employees in firms with data on value added and fixed assets; *OP sample* requires data also on investment. The top five rows are based on all males, 25–64 years of age; row six and down are based only on workers that are employed by a firm in the OP sample. *Percent of Full-Time Position* is an alternative measure of average labor supply — for any individual worker it can take any number in the range 0–100, where a number below 100 indicates a part-time position whose scope corresponds to the number. The two bottom rows calculates the average share of foreign-born individuals in city and firm over workers in each respective category. I treat individuals born abroad, but with two native-born parents, as natives (the vast majority are likely adoptees).

I use contains information on 129 different countries or groups of countries.[13] To obtain the release of country (and parents' country) of birth at a more detailed level than Statistics Sweden normally does, I have agreed to the condition that no results are presented with individual countries named. Therefore, I will only present results that are related to country characteristics, and never point to specific countries.

1.3 A New Measure of Human Capital Differences

The main goal of this section is to construct a new measure of human-capital differences across countries. The measure complements existing work in that it is robust to discrimination-related issues, and by being based on high-quality register data as opposed to survey data. I exploit the feature of the data that employees are matched to their employers to estimate differences in human cap-

[13]SCB merged countries with less than 1,000 individuals in Sweden in 2014 into groups of countries, each of which contains at least 1,000 individuals. Of the 129 country groups, all but 18 are individual countries.

ital or labor productivity via firm-level production functions with heterogeneous labor.

1.3.1 Estimating Production Functions with Heterogeneous Labour

I estimate firm-level production functions with heterogeneous labor, on the form of

$$ln(VA_{j,t}) = \alpha_t + \boldsymbol{\kappa}\mathbf{D}_{j,t} + \theta_L \frac{1}{\rho} ln\big[\sum_{c=1}^{n}(\delta_c L_{j,c,t})^{\rho}\big] + \theta_K ln(K_{j,t}) + \omega_{j,t} + \epsilon_{j,t}. \quad (1.1)$$

Each firm j produce value added at time t by combining capital $K_{j,t}$ and heterogeneous labor inputs $L_{j,c,t}$, where c is a mnemonic for "country of origin". Effective labor enters the production function as a CES aggregator over workers from different countries of origin with an elasticity of substitution of $\frac{1}{1-\rho}$. The objects of interest are the country-of-origin specific productivity terms δ_c. I intepret differences in the δ_c's as differences in human capital. As already implied in the data section I estimate different δ_c's for male workers by specific birth country, plus a separate δ for native-born female workers and another for foreign-born women. Equation 1.1 also contains fixed effects for five firm-size bins, industry, and city, contained in the vector $\mathbf{D}_{j,t}$, year fixed-effects α_t, a firm-specific productivity level $\omega_{j,t}$, unobserved but known to the firm, and an error term $\epsilon_{j,t}$, containing firm-specific productivity shocks not known by the firm.[14] The error term also captures misspecification in the production technology and potential measurement error.

Since I am interested in variation in the δs which captures differences in human capital not accounted for by the standard determinants of education and

[14]The firm-size bins are based on number of employees: up to 15 employees, 16–50, 51–150, 151–500, and > 500. Firm city is the city in which the firm has the majority of its employment; I include fixed effects for cities as defined by SCB, which is the closest I get to local labor markets. Industry fixed-effects are at the two-digit level.

experience, the country-of-origin labor inputs $L_{j,c,t}$ enter Equation 1.1 with an adjustment for these observables. I now turn to these adjustments.

Labor Efficiency-Unit Adjustments

I employ two alternative (but partially overlapping) methods to account for differences across groups in education and experience, arguably the two most important observable factors for labor productivity. As a baseline, I adjust the number of efficiency units that a worker contributes using relative predicted wages. I run a Mincerian regressions for native-born employed males, where education enters as dummy variables for nine different educational categories, and experience as a third-degree polynomial in (potential) years of experience. I then use the coefficients from this regression to generate predicted wages for all workers. Finally, I adjust the number of efficiency units that an individual worker provides by the size of that individual's predicted wage relative to the average predicted wage. If, for example, a worker has a predicted wage that is twice the average predicted wage, then that worker's contribution to the relevant $L_{j,c,t}$ is two efficiency units.[15] In addition to the efficiency adjustments, I also adjust the labor input based on the average number of hours worked by workers from a given origin. Unfortunately, I only have data on hours worked for a representative sample, not for all workers. However, as my objects of interest are group averages, this should not be a concern — differences are relatively small across origins (see Table 1.2, rows 6 and 7).[16]

An advantage of only including native-born workers when I calculate predicted wages is that the efficiency unit adjustment is not sensitive to differential wage

[15] Dividing by the average predicted wage does not make a difference for the labor productivity levels when Equation 1.1 is estimated; all it does is to keep the number of total (adjusted) units of labor input equal to the total number of actual workers.

[16] Table 1.2 shows continent averages. But differences across countries are also small, rarely larger than 5 percent. As a robustness check, I include hours worked in the Mincerian regressions, based on the logic that the hourly wage (and worker efficiency) may be a function of hours worked. Differences are negligible.

discrimination between different groups.[17] However, as a robustness exercise, I estimate predicted wages including the foreign-born, and including a dummy for migrating as a child (defined as up to 16 years old at the time of migration) and a third degree polynomial in the time since migration. In yet another robustness check, I exclude child migrants altogether from the groups of workers that form the basis of country-specific labor productivity estimates. The results are very similar to the baseline approach based on native-born workers only.

The predicted-wages approach implicitly assumes that efficiency units provided by workers with different educational attainment are perfect substitutes. In an alternative specification, I relax this assumption and add an educational layer in the CES aggregator — a type of labor is then defined by both a level of education and a country of origin.[18] Hence, I replace Equation 1.1 with

$$ln(VA_{j,t}) = \alpha_t + \boldsymbol{\kappa}\mathbf{D}_{j,t} + \theta_L \frac{1}{\sigma} ln\Big[\sum_{e=1}^{3} \gamma_e \Big(\sum_{c=1}^{n} (\delta_c L_{j,e,c,t})^{\rho}\Big)^{\frac{\sigma}{\rho}}\Big] + \theta_K ln(K_{j,t}) + \omega_{j,t} + \epsilon_{j,t}. \tag{1.2}$$

In Equation 1.2, e indexes for the different educational categories: less than high-school degree, high-school but no college degree, and college degree or more. γ_e captures the relative productivity, and σ the substitutability, across different educational levels.[19] The advantage of the baseline is that it is possible to control for education at a more fine-grained level, and it is straightforward to include other explanatory variables such as differences in time since migration.

[17] Theoretically, if other types of workers, and not only the reference group, were included in calculating predicted wages, differential discrimination could pose a problem in the following way. If a group of workers x suffer from discrimination and belonging to group x is strongly correlated to characteristic y (e.g. tertiary education), then the market returns of y will be downward biased due to the discrimination. From the downward biased estimate of returns to y, it follows that the number of efficiency units provided by group x will also (on average) be under-estimated, and the productivity of an efficiency unit provided by group x therefore over-estimated.

[18] In Equation 1.2, I continue to account for differences in experience via predicted wages.

[19] I have also carried out robustness exercises where I add an occupational layer in a similar fashion. However, I would want to include the differences emanating from different occupations in the average labor productivity estimates, insofar as that occupational sorting is not discriminatory; I do not find any indications that it is. Therefore, I do not include that version here.

Addressing Endogeneity

There is a large literature on production function estimation. The main challenge faced by this literature is the endogeneity of factor input choices to the unobserved firm-specific productivity level $\omega_{j,t}$.[20] For my parameters of interest, the specific form this concern could take is that the firm uses knowledge about its productivity level when it decides the *composition* of labor types. If so, unobserved productivity biases country-of-origin specific productivity estimates.[21]

To tackle the problem of endogenous factor input choices, I follow the proxy variable literature. As a baseline, I follow Olley and Pakes (1996). Their basic idea is that (observed) investment decisions are informative of the firm's (unobserved) productivity level.[22] If the choice of investment is a monotonically increasing function of productivity (for a given level of capital), this function can be inverted to get unobserved productivity as a function of investment and capital. The inverted investment function $\omega_{j,t} \approx \phi(k_{j,t}, i_{j,t})$ is unknown so they, and I, approximate it by a third-degree polynomial in investment and capital (including all interactions). I also explore the modifications of Olley and Pakes' approach devised by Levinsohn and Petrin (2003), and Ackerberg, Caves, and Frazer (2015) as robustness exercises.[23]

[20]Some of the problems the production function estimation literature has faced are less of an issue here. In virtue of the administrative data that firms are required to report for tax reasons, measurement error should be less problematic than in survey data.

[21]If the firm uses knowledge about its productivity level to decide total labor input, but chooses different types of labor at random conditional on total labor input, that would be a problem for estimating the labor share, but should not pose a problem for estimating relative productivity levels of different groups of labor.

[22]Unlike papers aiming to estimate firm-level TFP, for my purposes, OP also alleviates concerns that stem from potential differences in markups across firms correlated to the labor type composition, assuming investment responds to differences in profit opportunities caused by market power similarly to differences in profit opportunities induced by firm-level TFP.

[23]Levinsohn and Petrin differs from Olley and Pakes in that they use intermediate inputs as the proxy variable that contains information on unobserved TFP. Ackerberg, Caves, and Frazer modifies the approach by adding conditional moment conditions to relax assumptions related to e.g. dynamic effects of labor input choices.

Functional Form and Controlling for Cultural Heterogeneity

The Cobb-Douglas (CD) functional form assumption is a standard one in the production function estimation literature; for this reason, and because it makes the mapping to the standard aggregate production function straightforward, it is my preferred choice. As a robustness exercise in Section 2.2.2, I instead estimate a translog production function.

As a baseline, I follow the literature and set $\rho = 1$. The perfect substitutability assumption has several advantages. The estimation doesn't suffer from the identification issue pointed out by Diamond, McFadden, and Rodriguez (1978), and it appears reasonable from an a priori perspective to treat workers with the same education and experience level, but that are born in different countries, as very close substitutes.[24] I do relax the assumption in a robustness check; results are robust, and the estimated ρ is very close to 1.

My parameters of interest, δ, capture the direct effect of country of origin on a worker's contribution to output. As mentioned in Section 1.2, it is important that these estimates are not confounded by any potential effect of cultural heterogeneity on overall firm productivity — there is indeed a literature on diversity, suggesting that diversity could be both advantageous and harmful for firm-level output.[25] To try and address this, I have conducted two robustness exercise, both based on including a variable related to firm diversity, when I estimate Equation 1.1. The first diversity-related control is the Herfindahl index in the within-firm country of birth dispersion, which I plotted in Figure 1.1. As an alternative, I also calculate the average "cultural distance" within a firm. This is calculated by first attributing to each worker the cultural value associate with that worker's country of birth, and then taking the standard deviation of those values within

[24]It also makes the comparison between marginal productivity and wage rates straightforward — with imperfect substitution, the estimated marginal productivity for labor types with few workers are very sensitive to small changes in the elasticity parameter.

[25]See, among others, Williams, and O'Reilly III (1998), Alesina, and La Ferrara (2005), Ottaviano and Peri (2006), and Parrotta, Pozzoli, and Pytlikova (2014).

each firm.[26] I include both of Inglehart's and Welzel's *cultural dimensions* as measures of culture.[27] These alterations leave the results largely unchanged.

1.3.2 Human-Capital Dispersion

I estimate Equation 1.1 by the various methods discussed above. Appendix Table 1.4 gives a summary of parameter estimates. In general, the production function parameters are fairly plausible with estimates of returns to scale well in the range of previous micro estimates.[28] The goodness-of-fit is relatively high, with adjusted R-squared in the range of 0.80–0.88.

Figure 1.2 gives a first graphical illustration of the dispersion in labor productivity or human capital across countries. It plots the estimated human capital (the δ's from estimating Equation 1.1) using the baseline specification and method, against GDP per worker; circle sizes are proportional to the country-of-origin weight in the sample. Table 1.3 gives the corresponding summary statistics.[29] Two immediate lessons emerge — there appears to be significant dispersion in human capital across countries over and above any dispersion associated with the quantity of schooling and experience, and those residual differences (for a given level of schooling and experience) are strongly correlated to GDP per worker. A 1 percentage-point increase in estimated human capital is associated with an increase of 10 log-points in real GDP per worker. The relationship is statistically significant at the 1-percent level, both when data are weighted by a country-of-origin weight in the sample, and when they are unweighted.[30]

[26] As an alternative, I instead calculate the mean absolute deviation over all employees within each firm.

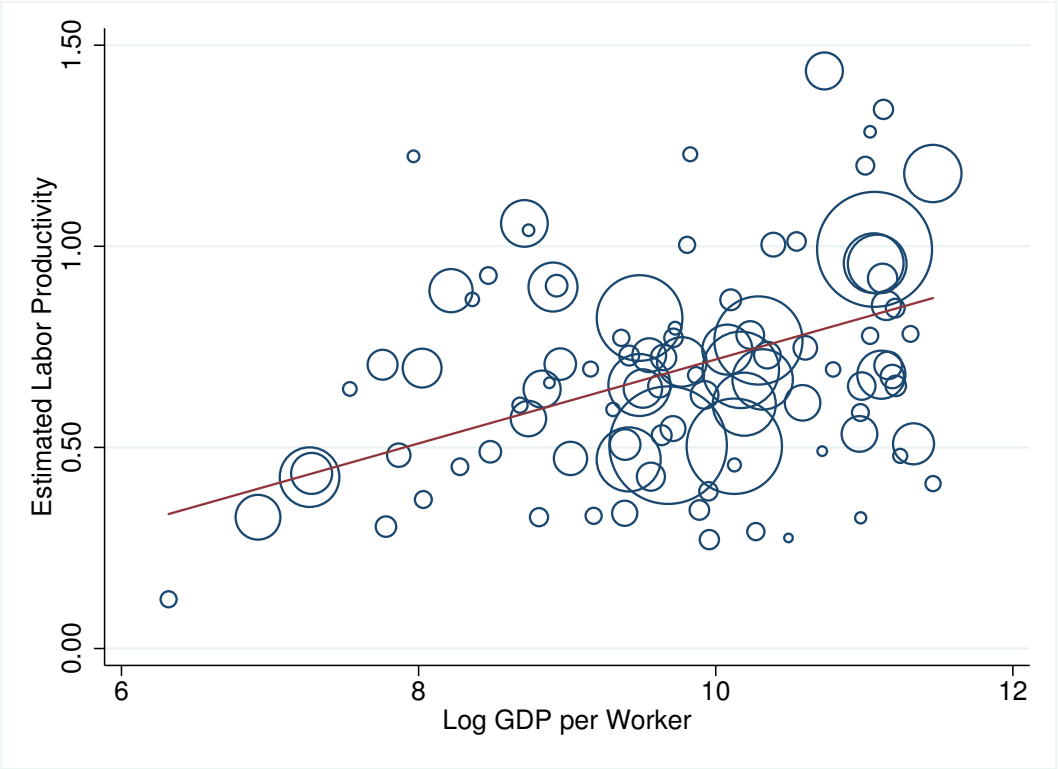
[27] See e.g. Inglehart and Welzel (2005).

[28] The potential exception is a relatively low capital share. I discuss reasons for this in Appendix 2.A. It is important to note that none of my results are driven by this — they are robust to using an alternative measure of capital which brings factor-share estimates closer in line with aggregate factor shares, they are robust to using cost-based factor shares, and the results are quantitatively stronger with when fixing capital shares around aggregate values.

[29] The average estimated human capital is in itself uninformative for my purposes as the native-born act solely as a reference group; I include it to provide a point of reference for the standard deviation of 0.36 or 0.24, and for the 90/10-percentile ratio of 3.4.

[30] In Table 1.3 and Figure 1.2, I have dropped the δ's that corresponds to groups of countries,

Figure 1.2: Country-of-Origin Specific Productivity and GDP per Worker



Notes: The graph plots estimated relative labor productivity, on the y-axis, against log GDP per worker on the x-axis. The unit of labor productivity is the productivity level of the reference group (native-born male workers) whose productivity is normalized to 1. Estimated labor productivities are based on micro-level data from SCB; GDP numbers are from the Penn World Tables.

Table 1.3: Summary Statistics for Estimated Human Capital

Av. $\hat{\delta}$	Av. $\hat{\delta}$, Freq. Weighted	St. Dev. of $\hat{\delta}$	St. Dev. of $\hat{\delta}$ Freq. Weight	90/10-ratio	Nbr. of Countries	Reg. Coeff. on Log GDP
0.73	0.71	0.36	0.24	3.2	101	0.097

Notes: Summary statistics for the country-specific measures of human capital $\hat{\delta}_c$ from equation 1.1, in the baseline estimation. Standard deviations and the 90/10-ratio quantify the country-of-origin dispersion in human-capital estimates.

Appendix Table 1.4 reports the key statistics from Table 1.3 for alternative specifications of the firm-level production function, of how correction for schooling and experience, and of estimation method. The cross-country dispersion in the δ's is somewhat smaller in some of these cases, and larger in others. However,

as opposed to country-groups made up of one single country. Including them, together with the average GDP per worker of the countries each group is made up of, improves the statistical significance of the of the GDP-δ relationship. As I am, for the most part, not able to include these country-groups in Section 2.2 below, I do not include them here.

considerable differences are always featured, with a minimum 90/10-percentile ratio and standard deviation of 2.1 and 0.24 respectively for the specification that both adds an educational layer in the labor aggregator and allows for imperfect substitution (those alterations also, very marginally, decrease the goodness-of-fit). I discuss several further robustness variations in Section 2.2.2, in relation to determinants of human-capital differences.

The cross-country differences in human capital implied by my estimates are not only large economically, but also large compared to those based on schooling that have dominated the development-accounting literature. For example, the 90-10 percentile ratio in the cross-country average years of schooling distribution is around 2, and so is the 90-10 percentile ratio in the human capital stocks calculated by Hall and Jones (1999). Recall that my estimates capture human capital differences other than those induced by the quantity of schooling, so an implication of my findings is that factors other than schooling account for more of the overall variation in human capital across countries than schooling itself. Investigating what these factors may be is the focus of the next chapter.

Hendricks and Schoellman (2018) do not produce an estimate of human capital differentials as their focus is on the fraction of income differences potentially explained by human capital. However, my back of the envelope calculation from their results suggests a 90-10 percentile ratio, inclusive of both schooling- and non-schooling components of human capital, in excess of 6 — hence somewhat larger than mine.[31] A possible explanation for this difference is that, indeed, their wage-based measure exaggerates human capital differences because of wage discrimination (if workers with low true human capital also happen to be discriminated against). However, it is also possible that my estimates underestimate

[31] Hendricks and Schoellman report the share of income differences that human capital account for in their additive log decomposition, 60 percent, implying a role of country factors (that they denote by z) of 40 percent. The number of "at least on the order of 6" is based on a back-of-the-envelope lower bound of $h_{90}/h_{10} = 5.74$ implied by following two equations. $\frac{y_{90}}{y_{10}} = 22 = \frac{z_{90}}{z_{10}}\frac{h_{90}}{h_{10}}$ and $\frac{z_{90}}{z_{10}}/\frac{h_{90}}{h_{10}} = 4/6$ where 22 is the 90-10 percentile GDP-per-worker ratio in the 101 countries included in Table 1.3. The calculation is assuming that h and z are perfectly correlated, which is why it is a conservative lower bound.

human capital differences because migrants from low-human-capital countries are more strongly positively selected on unobservables. I have a plan to correct my estimates for such positive selection and the results will be included in future work.

1.4 Conclusion

This paper provides a new measure of human capital based on migrants. I find large differences in human capital net of education and experience; in that sense, I reach the same conclusion as previous migrant-based measures of human capital: that *years of schooling and experience* is insufficient to properly account for human capital differences across countries. In contrast to previous literature, differential discrimination cannot explain the human-capital differences I find, since the approach is immune to wage discrimination and robust to other types of discrimination. In that sense, this paper upwardly adjust the lower bound of human-capital differences across countries.

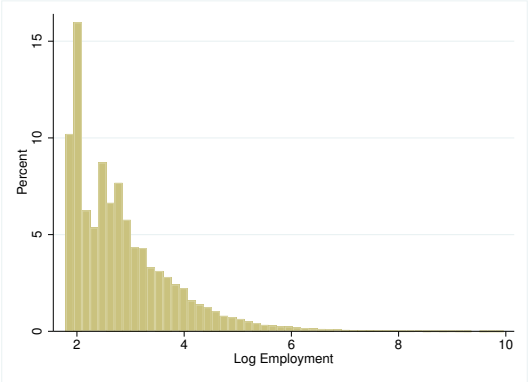
Whether this paper understates the human-capital dispersion across countries due to an ability to properly account for migrant selection, or whether Hendricks and Schoellman (2018) overstates the same dispersion due to differential wage discrimination is an interesting avenue for future work.

Regardless of whether this paper or Hendricks and Schoellman (2018) comes closer to the truth, the differences are quantitatively large and begs the question of what determines human-capital differences in excess of what the traditional factors can account for. Chapter 2 turns to this question.

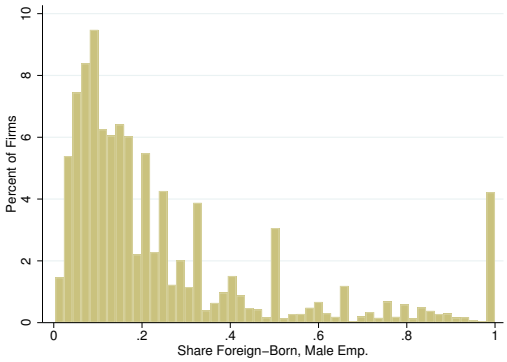
Appendix 1.A Data

1.A.1 Micro-Level Data

Figure 1.3: Firm Distribution by Size and Share Foreign-Born Males



(a) Distribution of Firms by Number of Employees



(b) Distribution of the share of foreign-born male employees amongst the 55 percent of firms that have a foreign-born male employee. The average foreign-born share of male employment in the sample (incl. firms with no foreign employees) is 13 percent.

1.A.2 Macro-Level Data

Below I list the data sources for cross-country variables and their corresponding variables.

Barro and Lee (2013): measures of schooling quantity.

Hanushek and Woessman (2012): measures of schooling quality.

World Development Indicators from The World Bank: *Pupil/Teacher-ratio*; *Government Expenditure on Education*; all measures of health and fertility.

Barro and McCleary (2006): *Belief in Hell*; *Monthly Attendance of Religious Service*.

Hofstede (e.g. 2001): *Individualism*.

The World Values Survey: all other measures of cultural values except those from Barro and McCleary, and Hofstede.

Penn World Tables 7.1: National account aggregates.

Appendix 1.B Productivity Estimation

Table 1.4: Summary Table of Production Function Parameter Estimates for Various Specifications

	NLS Full	NLS Baseline	Baseline (Following OP)	Tot. Assets	Fixed Factor Shares	Baseline Excl. Mig<18	Cost-Based LS, 3-dig. Ind.	Imp. Subst.	Imp. Subst. Nest. Ed.
90/10-Ratio	2.9	2.6	3.2	2.9	4.4	3.2	3.1	3.1	2.1
$\hat{\delta}$ St. Dev.	0.26	0.25	0.36	0.30	0.46	0.36	0.28	0.32	0.24
$\hat{\delta}$ St. Dev., Weighted	0.18	0.18	0.24	0.18	0.30	0.28	0.19	0.21	0.16
$\hat{\theta}_L$, Eq. 1.1	1.0	0.98	0.96	0.72	0.70	0.96	Av: 0.79	0.96	0.92
	0.0023	0.0027	0.0026	0.0026		0.0026		0.0026	0.0023
$\hat{\theta}_K$, Eq. 1.1	0.084	0.11	0.067	0.27	0.30	0.069	0.078	ToDo	ToDo
	0.0004	0.0006	0.0016	0.0025		0.0015	0.0022		
$\hat{\rho}$, Eq. 1.1								0.93	0.95
Adj. R-Squared	0.82	0.84	0.85	0.88	0.80	0.85	0.82	0.85	0.84

Notes: The table presents production function parameter estimates for a select sample of the specifications, as well as the 90/10-percentile ratios and standard deviations for the labor productivity estimates, the δ's. I.e. the top three rows corresponds gives summary statistics of the country-of-origin specific labor productivity parameters that I retrieve from the production function estimates. The bottom four rows gives parameter estimates from those estimated production functions.

Chapter 2

Human Capital Determinants

2.1 Introduction

Chapter 1 of this thesis, as well as other recent contributions (Hendricks and Shcoellman, 2018; Lagakos et al. 2018) find large differences in human capital. What drives these large differences, unexplained by schooling? Investigating that question is the main contribution of this chapter. Concretely, I rely on the results from Chapter 1 and regress my firm-level estimates of country-of-origin specific productivity on a large number of country-of-origin characteristics. Several different measures do have explanatory power, such as educational quality and health indicators. However, in a "horse race" between different factors, only measures of cultural values are economically and statistically significant predictors of human capital. The most powerful predictor is the first principal component from a factor analysis of a large number of answers to questions from the *World Values Survey* (WVS), as estimated in highly influential work by Inglehart, Baker, and Welzel (Inglehart and Baker, 2000; Inglehart and Welzel, 2005).[1] A one standard devia-

[1]Inglehart, Baker, and Welzel select a set of questions from the WVS and run a factor analysis on those questions. They identify the top two factors as a two-dimensional summary of *culture*. This has become a standard reference in the fields of Political Science and Sociology. Note that the factor analysis is conducted to explain as much of the variation in the underlying WVS questions as possible, and *not* to maximize explanatory power of my human capital measure.

tion change in this cultural measure is associated with a 13–15 percentage-point change in estimated human capital. When I "unpack" this principal component and investigate which underlying questions most drive its relationship with human capital, I find that an index aimed at measuring the value placed on *autonomy* exerts an overwhelming influence.

The influence of culture on human capital proves robust to different specifications of firm production functions, and concerns with selection into migration; it is still detectable among second-generation immigrants; it is replicated in countries other than, and culturally very distinct from, Sweden; and it is not simply proxying for the effect of cultural heterogeneity within a firm's workforce.

I also study the explanatory power of the cultural component of estimated human capital on GDP-per-capita differences across countries. A culture-augmented version of development accounting increases the explained fraction of income differences by 16 percentage points (or around 50 percent). This is economically substantial and lends further support to the proposition that cultural factors are important to understand cross-country differences in economic development.

Confronted with evidence of large unexplained residuals in income differences across countries, macroeconomists have tended to gravitate towards explanations based on technology, institutions, geography, or misallocation. My paper suggests that cross-country differences in prevailing cultural attitudes amplify differences in human capital, and through these reduce the unexplained component of income differences.[2] The idea that culture influences human capital goes back at least to the classic writings by Max Weber (1930). David Landes (1998), in an influential exposé of the causes of differences in income across countries, highlights the cultural value of *autonomy*, or "the *autonomy* of intellectual inquiry" (his

[2]As implied by the discussion above, Hendricks and Schoellman also conclude that human-capital differences are larger than previously thought, but they are silent on the underlying drivers of human capital difference. Schoellman (2012) suggests educational quality, but I find little room for educational quality as an explanatory factor once I control for measures of culture. De Philippis and Rossi (2017) show that children of migrants from high PISA test score countries keep performing well also in low-quality schooling systems; they suggest cultural traits as an explanation of this persistence, in line with the cultural interpretation of my findings.

italicization), as one out of three key explanations. Landes' propositions are well-grounded in the history of economic development, and he provides a multitude of qualitative supportive anecdotes. My finding that *autonomy* is the strongest predictor of human-capital differences constitutes further evidence of his thesis, but of a more systematic kind.

My evidence does not allow me to pin down the specific mechanism through which autonomy enhances human capital, but there are rich psychological and sociological literatures that afford plausible mechanisms. The cross-cultural psychology literature documents that culture has an impact on psychological and personality traits (Markus and Kitayama 1991; Williams, Satterwhite, and Saiz, 2002; Schwartz, 2004; Heine and Ruby, 2010),[3] while an overwhelming body of research in psychology, sociology, management, and economics, demonstrate that personality traits have an impact on job performance (Barrick and Mount, 1991, 1993; Borghans et al., 2008; Ployhart and Moliterno, 2011). A particular personality trait highlighted in this literature is proactivity (e.g. Griffin, Neal, and Parker, 2007). Proactivity amongst the workforce decreases the need for scarce managerial resources, and potentially mitigates issues related to incomplete contracts. Taking on additional tasks is one particular form of initiative found to be strongly positively related to high job performance (Morgeson, Delaney-Klinger, and Hemingway, 2005). Related to role breadth is role choice, or sorting into more or less productive occupations (Holland, 1997). There is also a significant relationship between workplace obedience and workers taking on more routine-based tasks (Campante and Chor, 2017). This evidence suggests a natural and plausible interpretation for the role of a culture that values autonomy in affecting human capital, in that an upbringing emphasizing autonomy is likely to forge more proactive individuals. Consistent with this channel, I find evidence that

[3] As Markus and Kitayama (1991) notes in an influential paper, "People in different cultures have strikingly different construals of the self, of others, and of the interdependence of the two. These construals can influence, and in many cases determine, the very nature of individual experience, including cognition, emotion, and motivation". In particular, Schwartz (2004) documents systematic cross-cultural variation in *autonomy* which he contrasts to *embeddedness*, or the desire to sustain the social order, avoid change, and retain tradition.

workers from high-autonomy backgrounds sort into jobs with a high degree of non-routine task intensity.[4,5]

At first sight, an alternative interpretation for my findings could be offered by the model in Gordnichecnko and Roland (2017).[6] In their model *individualism* is growth-enhancing because it alters social incentives, so that achievement, and in particular innovation, receives greater social recognition, permitting more individualistic societies to grow faster. To the extent that societies that value autonomy are also more individualistic, one might conclude that the connection between autonomy and productivity I uncover is driven by the Gorodnichenko and Roland mechanism. However, note that in their model, the individualism that matters to shape workers' incentives is the one in the environment in which a worker makes her choices, not the one in which the worker grew up. Since my measure of human capital is estimated on workers all operating in the same society, my results are unlikely to be driven by their mechanism.[7,8]

Aside from the individualism-collectivism dimension emphasized by Gorodnichenko and Roland, the two cultural traits that have been more systematically explored

[4]The cultural psychology and cultural neuroscience literatures describe the difference between individualism and collectivism in the sphere of parenting as one of encouraging *autonomy* vs. *embeddedness* — analogous to Schwartz (2004). They have also pointed out that autonomy is likely more advantageous in the workplace, while a relational approach is perhaps more desired within families (Triandis, 1989, 2001; Maselko, 2016).

[5]The literature on *positive psychological capital* documents a significant, positive relationship between self-efficacy and job performance (Avey et al., 2011). Self-efficacy, or "the belief a person holds regarding his or her power to affect situations positively", is also the main trait that Guiso, Sapienza, and Zingales (2016) propose to explain the *Long-Term Persistence* in civic capital that they find amongst Italian cities. Self-efficacy is probably correlated with autonomy in that they are both cultural attributes, but it is conceptually distinct: autonomy is a value while self-efficacy is a belief.

[6]See also Gordnichecnko and Roland (2011).

[7]For migrants who do not integrate, it could be that social rewards are still similar to their respective origin country. However, this would still be distinct from the proposed mechanism of Gorodnichenko and Roland (2017). Their story posits a trade off between higher growth-rates from the positive spillovers of innovation (a dynamic advantage) in individualistic societies vs. more efficient production (a static advantage) in collectivist societies. The dynamic part of their story would not play out in my setting, and my static findings are inconsistent with their thesis, with higher productivity estimates for workers from more individualistic origins.

[8]Gorodnichenko and Roland also present cross-country regressions showing that a measure of individualism is positively correlated with country growth. As expected, the correlation between their measure of individualism, due to Hofstede (2001), and the WVS measure of autonomy, is positive, at 0.44, but in my human-capital regressions, it lacks explanatory power once I control for autonomy, which on the other hand remains statistically significant at a 1-percent level.

in the macroeconomics and development literature are *religiosity* ant *trust*. The evidence on the impact of religiosity on economic growth is mixed. Barro and McCleary (2003, 2006) find a positive relationship but Durlauf, Kourtellos, and Tan (2012) question these results' robustness. Guiso, Sapienza, and Zingales (2003) find that religiosity is associated with characteristics that are beneficial for economic activity, such as industriousness, thriftiness, trust(worthiness), and attitudes towards corruption. Bryan, Choi, and Karlan (2018) find a positive impact of evangelical catechization on outcomes related to health and income. On the other hand, Campante and Yanagizawa-Drott (2015) find a negative relationship between certain religious practices and economic growth. I do not find a significant role for religiosity once I control for autonomy and trust.

I also find a positive effect of *trust* on human capital. In the literature, the typical interpretation of the finding that trust is beneficial for economic activity is that trust facilitates interaction and exchange, whether in markets for goods (Guiso, Sapienza, and Zingales, 2009), financial markets (Guiso, Sapienza, and Zingales, 2004, 2008), labor markets (Algan and Cahuc, 2009; Fehr et al., 1998), or within firms or other production teams (La Porta et al., 1997; Bloom, Sadun, and Van Reenen, 2012; Ilzetzki and Simonelli, 2018).[9] My evidence on trust supports the view that a trusting attitude increases a worker's effectiveness within production teams.[10]

By looking at inherited cultural traits through the second generation of migrants, the paper is related to the literature that follows the epidemiological approach.

[9]Ilzetzki and Simonelli's contribution relates to mine in another way as well: they also offer a novel way to estimate differences in human capital. They look at cross-regional differences in vote-counting rates in Italian elections. Since vote counting is a simple task, requiring virtually no capital, no technology, no particular skills, and featuring no institutional differences, they argue that vote counting speed is a good proxy for raw labor productivity. Their reported cross-regional variation in vote-counting efficiency is similar in magnitude to the differences in human capital I find. One difference between my approach and theirs is that their approach by construction can only be applied to within country variation, and so cannot be used to estimate cross-country differences in human capital.

[10]Having said that, it is worth stressing that my evidence on trust differs from most of the literature in that it is at the individual level — namely it relates an individual's trust to that individual's productivity. In that sense, my exercise is closesr to Butler, Giuliano, and Guiso (2016), who look at the relationship between individual trust and individual outcomes.

Numerous papers argue that there is an inherited component to cultural values, e.g. Bisin and Verdier (2001), Guiso, Sapienza, and Zingales (2008), Tabellini (2008), and Dohmen et al. (2012). Fernández (2011) provides an exhaustive survey.[11] This paper contributes to the epidemiological branch of the culture literature by studying both a new outcome, labor productivity or human capital, and new measures of cultural values. Furthermore, I am able to control for parental characteristics in a more detailed way than previous papers typically have been able to do.

The remainder of the paper is structured as follows. Section 2.2 investigates the drivers of human capital differences; it includes an extensive list of robustness variations and experiments. In Section 2.3, I combine the results from sections 1.3 and 2.2 and study what fraction of unexplained cross-country differences in TFP that differences attributed to cultural values can account for. Section 2.4 concludes.

2.2 Determinants of Human Capital Differences

The findings in Chapter 1 suggest that human-capital differences are substantially larger than what is captured by direct measures of years of schooling. This section investigates what the key determinants of human capital (HC) are. The measure of HC is the one constructed in Chapter 1 above, with the same baseline specification. I explore a large number of different versions of human-capital estimates; the great majority of these are based on estimating firm-level production functions with heterogeneous labor, similar (or identical) to Equation 1.1, with some variation in functional-form specifications and/or sample restrictions.

I begin by investigating the explanatory power of different categories of country-of-origin characteristics in OLS regressions.[12] Although these regressions at first

[11] See also Guiso, Sapienza, and Zingales (2006) for a survey of the literature on culture in economics more generally.

[12] As pointed out in Chapter 1, Statistics Sweden (SCB) has historically been very restrictive

glance look like standard cross-country regressions, they are not. The dependent variable in these regressions is a country's HC as estimated from workers operating in Sweden, which greatly diminishes the risk of relevant omitted variables. Any country-of-origin omitted variable must have followed the worker in his/her move to Sweden, and I believe my regressions below truly exhaust the possibilities that plausibly fit this requirement. In fact, since (as I show below) my results are robust to using second-generation migrants, omitted variables must *not only* be embodied in the migrants *but also* susceptible of intergenerational transmission. None of the usual institutional, geographical, or factor-endowment variables can fit these criteria.

2.2.1 Different Categories of Country Characteristics

For the reasons discussed above, in my baseline analysis, I mainly restrict attention to country-of-origin characteristics that can plausibly have a direct impact on transportable human capital.[13] These characteristics fall into the broad categories of *education*, *health*, and *cultural values*. First, I examine these categories separately. Then, I compare the statistically most successful predictors of human-capital differences from each category. The data sources for the cross-country variables used, in this section and the previous one, are quite standard and I list them in Appendix 1.A.

Educational Factors

Table 2.1 reports the result of OLS regressions of estimated human capital on measures that capture educational characteristics of origin countries: educa-

with releasing data on individuals' (and parents') country of birth at a disaggregated level as opposed to the continent level. To obtain the release of disaggregated data, which is key for what I do in this chapter, I have agreed to the condition that no country-level results are attributable to specific countries. Therefore, I present results that are related to country characteristics, but never point to specific countries.

[13] In a robustness exercise, I also try all of the country characteristics that Sala-i-Martin (1997) investigates.

tional quality as measured by pupil performance in standardized test scores, the pupil/teacher-ratio, government expenditures on education, the respective shares of the working-age population with a given (highest) educational attainment, and the average years of education of workers in my sample. I weight by the number of workers each $\hat{\delta}_c$ is based on.[14] The characteristic with the strongest relationship with human capital is educational quality.[15]

There are two main take-aways from Table 2.1. First, measures of educational *quantity*, whether in terms of proportion of workers achieving a certain educational attainment, or in terms of average years of schooling, are never significantly related to my measure of human capital. This is reassuring, as it suggests that my adjustment for schooling quantity in the production function estimates has been effective at netting out its contribution to human capital.[16] Second, measures of schooling *quality*, based on test-scores, do correlate positively with estimated human capital. Recall that I did not adjust the labor inputs for schooling quality, so this finding is entirely consistent with schooling quality being an important determinant of human capital. It is also in line with the findings of Schoellman (2012). What remains to be seen is if the relation between schooling quality and human capital is robust to adding additional possible determinants of human capital.

Health and Fertility

Another intuitive determinant of mobile human capital is health — which has also received a great deal of support in the development literature. I also include fertility here as it is associated with health; fertility rates often decrease in tandem with infant mortality. Furthermore, fertility also has its own direct impact

[14] Weighting by the (inverse of the) standard error of $\hat{\delta}$ yields very similar results.

[15] For ease of comparison, both here and later on, I have restricted the sample to only include origin countries for which I have data on educational quality. Relaxing the restriction does not change the overall picture.

[16] If I estimate human capital based on a pure body count labor input measure, average years of education for workers in the sample does have predictive power for estimated differences.

Table 2.1: Human Capital and Education-Related Country Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
Education Quality	0.281*** (0.0532)					0.218** (0.104)
Pupil/Teacher Ratio		-0.0121** (0.00566)				0.00173 (0.00657)
Government Educational Expenditures			0.0674*** (0.0226)			0.0288 (0.0289)
Share Primary Education				-0.00293 (0.00550)		-0.000405 (0.00601)
Share Secondary Education				0.00123 (0.00402)		-0.000183 (0.00451)
Share Tertiary Education				0.00730 (0.00553)		0.00278 (0.00469)
Years of Education of Workers in Sample					-0.0464 (0.0525)	
Observations	63	59	61	60	63	57
Adjusted R^2	0.333	0.122	0.161	0.180	0.014	0.308

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$ from Equation 1.1. Education quality is from Hanushek and Woessman (2012) and based on test score results from international assessments. The other variables are self-explanatory. The shares of workers with different educational attainment are the in-country shares, while the years of schooling variable is based on the Swedish sample.

on human capital. If parents (and society) have limited resources to invest in their children, then a higher fertility rate implies less resources from the previous generation invested per individual child.

Table 2.2 presents results analogous to those in Table 2.1 but with fertility and health measures as the independent variables. In line with the intuitions I have described, fertility is negatively related to human capital differences and the measures of health are positively related, although only the fertility rate and life expectancy are statistically significant. The general explanatory power of health measures is weaker than that of educational quality. This is also relatively intuitive considering that the human capital estimates are constructed conditional on labor supply and the largest impact of health issues on output is likely via labor supply. Furthermore, the convergence in healthcare access that takes place among Swedish immigrants is also bound to lead to a partial convergence in health status.

Table 2.2: Human Capital and Health-Related Country Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
Fertility Rate	-0.0165**					-0.0234***
	(0.00625)					(0.00815)
Life Expect. at Birth		0.0187**				0.0276*
		(0.00930)				(0.0161)
Immunization Rate,			0.000846			-0.00224
Measels			(0.00491)			(0.00460)
Share Low				-0.00797		0.00581
Birth-Weight				(0.0135)		(0.00996)
Mortality					-0.00327	0.00568
Under 5					(0.00235)	(0.00419)
Observations	62	62	61	62	61	61
Adjusted R^2	0.146	0.122	-0.016	0.007	0.076	0.180

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$ from estimating equation 1.1.

Cultural Values

The economics literature has suggested several different channels for cultural values to impact economic prosperity. I will investigate the relationship between estimated human capital and dimensions of culture that previous literature has proposed, with a particular emphasis on cultural characteristics that could most plausibly affect individual worker performance at the firm level — consistent with the setting from which I derive my measures of human capital.

Table 2.3 shows the predictive power of different cultural values on estimated human capital. *Belief in Hell* and *Monthly Attendance* follows the hypothesis of Barro and McCleary (2006) (inspired by Weber, 1930) that religiosity is conducive to economic growth, but that the resources invested in religion (attending services) are costly. In contrast to their findings, but similar to Campante and Yanagizawa-Drott (2015), I find a negative relationship between religiosity and human capital. Columns 2–6 look at variables representative of the categories that Guiso, Sapienza, and Zingales (2003) identify as most conducive to economic prosperity, in the order they introduce them, measures of attitudes towards: cooperation; women; legal norms; the market; thriftiness.[17] Among these, the measure with the strongest relationship to labor productivity, *trust*, has been proposed by many other authors as important for economic prosperity (Algan and Cahuc, 2010; Ilzetzki and Simonelli, 2018). Thrift, and market attitudes are also significantly related to human capital. Column 8 follows Gorodnichenko and Roland (2017), who suggest that individualism is important for economic growth. The simple bivariate relation with human capital is indeed positive.

The cultural measures in Column 9 and 10 of Table 2.3 are constructed following work by Ronald Inglehart, Wayne Baker, and Christian Welzel (e.g. Inglehart

[17] I exclude *attitudes towards the government*, as those questions relate specifically to the government in the respective country, for example, to what extent people have confidence in the police or the military in the country they live. This does not naturally carry over to a low or high confidence in the Swedish military. Including the category change none of the conclusions. I have chosen the WVS question in each category with the greatest R-squared.

and Baker, 2000; Inglehart and Welzel, 2005), that has been very influential in political science and sociology. The variables are the top two factors extracted from an underlying set of answers to WVS questions by means of factor analysis; the original authors refer to the factors as *Traditional vs. Secular-Rational*, and *Survival vs. Self-Expression* values. These factors explain on the order of 70 percent of cross-country variation in the underlying questions.[18]

Column 11 in Table 2.3 runs a "horse race" between the different variables that were individually significant.[19] The single predictor that remains statistically significant is the top cultural factor from Inglehart, Baker, and Welzel. Figure 2.1 gives a graphical illustration of the relationship. It has the highest R-squared on its own, almost identical to when I include all the variables, and remains statistically significant at a 1 percent level with a stable point estimate when I pairwise include the other cultural variables (Appendix Table 2.32). This is consistent with the view that cultural values in general are important for human capital, and that factor analysis successfully extracts more information on culture than individual questions. Since cultural values are often strongly correlated, Column 11 in Table 2.3 does not imply that non-significant variables do not matter. In particular, *trust*, is also one of the underlying questions included in Inglehart and Baker (2000), as is another measure of religiosity, strongly correlated to *belief in hell*. For this reason, and because of the drawback that factors in themselves are difficult to interpret, I will later investigate which of the finer cultural values subsumed in the first principal component of culture most drive its relation with human capital.

[18]Note the difference between using factor analysis to find the combination of WVS questions that explain as much as possible of the variation in estimated human capital. That is *not* what I do here. The cultural measures are constructed to explain as large a fraction as possible of cultural differences across countries. That measure is then a fixed measure like any other cultural measure in the regressions in Table 2.3. I discuss the questions included in the factor analysis, and their respective importance, below.

[19]I exclude individualism because I lose 10 observations from including it; nevertheless including only works to strengthen the economic and statistical significance of the top cultural factor, and individualism itself is insignificant.

Table 2.3: Human Capital and Cultural Traits

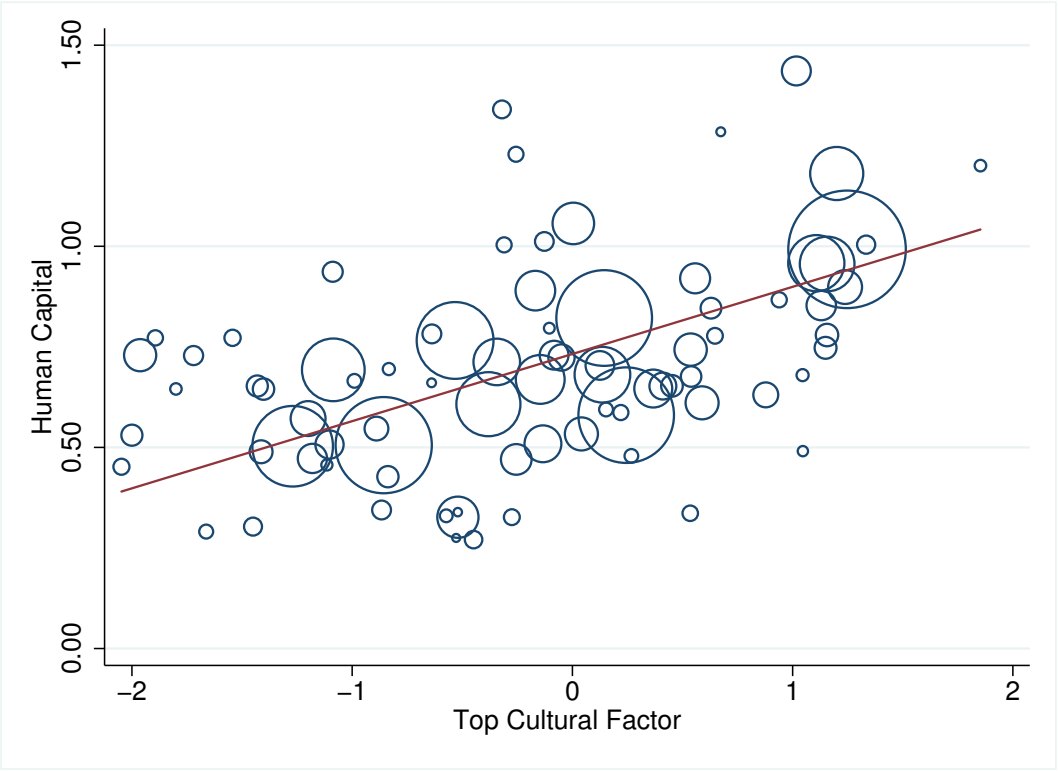
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Belief in Hell	-0.405*									0.0225
	(0.227)									(0.144)
Rel. Service, Monthly Att.	-0.206									
	(0.231)									
Attitudes Towards		0.652***								0.266
Cooperation		(0.0767)								(0.225)
Attitudes Towards			0.00875							
Women			(0.230)							
Attitudes Towards				-0.0882						
Legal Norms				(0.0820)						
Attitudes Towards					0.133***					-0.00622
the Market					(0.0485)					(0.0500)
Attitudes Towards						0.120***				-0.0580
Thriftiness						(0.0431)				(0.0552)
Individualism							0.00357*			
							(0.00194)			
Inglehart et al.'s								0.163***		0.126*
Cultural Factor 1								(0.0205)		(0.0711)
Inglehart et al.'s									0.112***	0.0412
Cultural Factor 2									(0.0341)	(0.0472)
Observations	40	63	62	63	62	63	52	63	63	61
Adjusted R^2	0.292	0.448	-0.017	0.005	0.175	0.181	0.083	0.471	0.215	0.470

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$ from equation 1.1. Belief in Hell is the average response to a yes/no-question. The *attitudes towards*-questions are, in order of appearance in row 3–6, the fraction of respondents who say that *most people can be trusted* as opposed to *you cannot be too careful*; to what extent respondents agree that *being a housewife is just as fulfilling*; whether it is *Justifiable: someone accepting a bribe*; the average agreement with *private ownership of business should be increased* as opposed to *government ownership of business should be increased*; the average agreement with *People should take more responsibility to provide for themselves* vs. *The government should take more responsibility to provide for people*. The market- and thrift-variables are both coded so that a high value reflect a more market- and less government-friendly attitude. Cultural factors 1 and 2 are the top two factors from a factor analysis on a set of answers to WVS questions, following Inglehart, Welzel, and Baker; see e.g. Inglehart and Baker (2000).

Figure 2.1: Country-of-Origin Specific Productivity and Cultural Values



Notes: The graph plots estimated relative human capital on the y-axis against the top cultural factor on the x-axis. Estimated labor productivities are based on micro-level data from SCB. The measure of cultural values is based on data from the World Values Survey following Inglehart, Welzel, and Baker; see e.g. Inglehart and Baker (2000). They name the top factor *Traditional vs. Secular-Rational* values.

Comparing Categories

Table 2.4 presents a comparison of the different categories of country-characteristics related to transportable human capital. I include the variables from each of the categories with the strongest predictive power: educational quality, fertility and life expectancy, and the cultural factors. The top cultural factor is the explanatory factor with the most robust and quantitatively strongest relationship with human capital — a one standard deviation change is associated with roughly 13 percentage points higher labor productivity. No other explanatory variable is robustly related to human-capital differences.

Column 3–5 and 6 includes a number of characteristics of the workers in my sample whose labor productivity I have estimated. I account for education at the

micro level. To the extent that the functional form does not accurately capture the impact of education, I have tried to include the average number of years of education. Other characteristics are average age at migration and time since migration, and average share receiving residence permits as refugees or to reunite with family.[20]

Including GDP per capita as an explanatory variable is questionable — after all, the purpose of the paper is to explain differences in income via human capital. Seeing as it is the most frequently included variable in cross-country regressions, I nevertheless try including it. As I show in Section 1.3, it is strongly correlated to the measure of human capital on its own. Here, after controlling for human capital determinants, it lacks predictive power. The dependent variable is constructed to capture human capital, and independent variables are chosen to explain human capital differences as well as possible. Therefore, it is reassuring that GDP, a variable which is a combination of TFP and human and physical capital, does not add explanatory power, both for the choices of potential human-capital determinants, and for the identifying assumption that the migrant-based measure reflects human capital levels of origin countries, but not TFP or physical capital. The key takeaway from Table 2.4, as from the many robustness exercises I carry out below, is that the one country characteristic that remains strongly statistically and economically related to estimated human capital is the top cultural factor.

Individual questions underlying the cultural factors

The two cultural measures I include above are composite measures extracted from an underlying set of WVS questions by means of factor analysis. One of the lessons from the work of Inglehart, Baker, Welzel, and others, is that many cultural attitudes are strongly correlated and it is thus difficult to conclusively

[20] I try all of these characteristics at the micro level instead when labor efficiency units are computed — results are very similar.

Table 2.4: Human Capital and Country Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Inglehart et al.'s	0.150***	0.149***	0.131***	0.133***	0.134***	0.129***	0.130***
Cultural Factor 1	(0.0393)	(0.0397)	(0.0346)	(0.0399)	(0.0418)	(0.0289)	(0.0254)
Inglehart et al.'s	0.0463	0.0495	0.0474	0.0487	0.0406	0.0477	0.0566*
Cultural Factor 2	(0.0438)	(0.0460)	(0.0352)	(0.0369)	(0.0374)	(0.0290)	(0.0309)
H-W Ed.	0.0793	0.0881	0.0638	0.0665	0.0381		
Quality	(0.0966)	(0.106)	(0.197)	(0.237)	(0.243)		
Fertility Rate	0.00379	0.00394	0.00366	0.00365	0.00370	-0.00494**	-0.00703***
	(0.00916)	(0.00915)	(0.00812)	(0.00840)	(0.00850)	(0.00214)	(0.00237)
Life Expect. at Birth	-0.00882	-0.00716	-0.00597	-0.00612	-0.00912	-0.00127	-0.00729
	(0.00902)	(0.0105)	(0.00811)	(0.00817)	(0.00954)	(0.00678)	(0.00654)
Log GDP per Worker		-0.0182			0.0426	-0.0181	0.0236
		(0.0668)			(0.0678)	(0.0452)	(0.0420)
H-W Ed. Quality,			0.135	0.130	0.163		
Basic			(0.458)	(0.573)	(0.585)		
Years of Ed.			-0.0370	-0.0374	-0.0404		-0.0357
in Sample			(0.0269)	(0.0276)	(0.0263)		(0.0229)
Av. Age at Migration			-0.0186	-0.0188	-0.0204		-0.0242*
			(0.0135)	(0.0141)	(0.0139)		(0.0132)
Av. Time in Sweden			-0.0101	-0.0107	-0.0116		-0.0142
			(0.00760)	(0.0104)	(0.0103)		(0.00895)
Share Refugees				0.0171	0.00351		0.131
				(0.191)	(0.191)		(0.148)
Share Fam.				0.0116	-0.0190		-0.129
Reunification				(0.338)	(0.344)		(0.270)
Observations	62	62	62	62	62	81	81
Adjusted R^2	0.494	0.486	0.526	0.507	0.501	0.500	0.539

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of answers to questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression.*

disentangle their respective separate effects. The results indicate that culture generally is an important determinant of human capital. The drawback is that it is difficult to give a more detailed interpretation of why cultural values affect human capital based on the factor (although underlying factor loadings can give some guidance). Therefore, I look at the underlying questions individually. I find that the key dimensions are autonomy and trust. Below, I give three separate but closely related statistical arguments for this conclusion, reinforced by a priori reasoning.

Table 2.33 in the appendix provides a first piece of evidence; it presents regressions of the baseline productivity measure on the individual questions. *Autonomy* and *trust* are the two question with the highest R-squared and t-ratio. A second reason is given by the combined picture of several different model selection methods. Table 2.5 presents the specification selected by, respectively, the General-to-Specific, or *GETS* approach (Hendry and Krolzig 2004, 2005; Hoover and Perez,1999); the Least Absolute Shrinkage and Selection Operator or LASSO (Tibshirani, 1996); the square-root LASSO (Belloni, Chernozhukov, and Wang, 2011); an information-criterion based step-wise forward selection; an information-criterion based step-wise backward elimination.[21] All of the different model-selection methods include the dimension of individual *autonomy* vs. *authority* or *obedience*. The leaps-and-bounds algorithm (Furnival and Wilson, 1974) also supports the conclusion that autonomy and to some extent trust are the two key dimensions of culture; Table 2.35 in the appendix presents the different models selected by this algorithm. Although these methods are typically used for more high-dimensional data than what is the case here, they have the advantage of being agnostic, and all provide support for the view that the *autonomy vs. obedience*-dimension of culture is key.

Table 2.6 presents a third piece of perhaps more immediately transparent evi-

[21]The information-based model selection algorithms are implemented by Lindsey and Sheather (2010); the selected model is the same with the different information criterions: Mallows's C_p, Akaike's information criterion, and Akaike's corrected information criterion.

Table 2.5: Specifications Selected by Various Model-Selection Methods

	(1) GETS	(2) LASSO	(3) Sqrt-LASSO	(4) Backward Elim.	(5) Forward Selec.
Greater Respect for Authority	-0.0711**	-0.0531*	-0.0678**	-0.0670**	-0.0531*
(E018)	(0.0273)	(0.0289)	(0.0274)	(0.0263)	(0.0289)
Autonomy	0.139***	0.0916**	0.0929**	0.0948**	0.0916**
(Y003)	(0.0307)	(0.0411)	(0.0444)	(0.0359)	(0.0411)
Trust		0.0440*			0.0440*
(A165)		(0.0257)			(0.0257)
Justifiable: Abortion			0.0450		
(F120)			(0.0304)		
Sign a Petition				0.0400	
(E025)				(0.0262)	
Observations	63	63	62	62	63
Adjusted R^2	0.491	0.507	0.505	0.453	0.507

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$ from equation 1.1, estimated by nonlinear least squares. Attendance of religious services is from Barro and McCleary (2006); the measure of individualism is constructed by Hofstede (and suggested as important for growth by Gorodnichenko and Roland, 2017). The remaining categories are one question each from the categories that Guiso, Sapienza, and Zingales (2003) propose as potentially important for economic prosperity. The individual questions are, in order of appearance, A030 mentioning *Hard Work* as an important child quality; E037 agreement to *People should take more responsibility to provide for themselves* vs. *The government should take more responsibility to provide for people*; A165 *Most people can be trusted*; F117 *Justifiable: someone accepting a bribe*; D057 agree that *Being a housewife is just as fulfilling*; E036 *Private ownership of business should be increased.*

dence. There, I show the output of OLS regressions with the autonomy index included throughout, and pairwise inclusion of the other WVS questions; autonomy remains statistically significant throughout, while *trust* is the only question that remains significant once *autonomy* is included (with the exception of question E018, which is itself a question concerning the autonomy vs. authority dimension).[22]

Table 2.6: Human Capital and Questions Underlying Inglehart et al.'s Cultural Factors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Happiness	0.00897								
(A008)	(0.0277)								
Trust		0.0524*							
(A165)		(0.0276)							
Greater Respect for Authority			-0.0650**						
(E018)			(0.0253)						
Sign a Petition				0.0291					
(E025)				(0.0324)					
Importance of God					-0.0424				
(F063)					(0.0600)				
Justifiable: Homosexuality						0.0216			
(F118)						(0.0308)			
Justifiable: Abortion							0.0384		
(F120)							(0.0382)		
National Pride								0.0412	
(G006)								(0.0261)	
Post-Materialism									0.0213
(Y002)									(0.0288)
Autonomy	0.140***	0.0895**	0.108***	0.117***	0.110*	0.124***	0.111**	0.159***	0.130***
(Y003)	(0.0410)	(0.0421)	(0.0351)	(0.0391)	(0.0602)	(0.0452)	(0.0481)	(0.0426)	(0.0432)
H-W Educ.	0.0594	0.0334	0.0472	0.0396	0.0439	0.0568	0.0442	0.0565	0.0573
Quality	(0.0359)	(0.0395)	(0.0303)	(0.0386)	(0.0450)	(0.0385)	(0.0429)	(0.0350)	(0.0369)
Observations	63	63	63	62	62	61	62	63	63
Adjusted R^2	0.452	0.486	0.499	0.403	0.462	0.458	0.465	0.465	0.457

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Economically, a one standard-deviation change in *autonomy* is associated with a 10–18 percentage-point change in human capital, based on the point estimates in Table 2.6. Finding the strongest relationship with human capital for dimensions of culture that can plausibly be thought to have an impact on productivity lends credence to the view that the relationship is not spurious. It would have been

[22]Here, I include the measure of educational quality throughout as it is the non-cultural variable with the strongest relationship with labor productivity, I consider education to be the most important a priori explanatory factor, and I do account for the quantity of education at the micro level (excluding educational quality here does not matter for the assessment of between-question importance).

reasonable to exclude some of the questions on a priori grounds. It is difficult to think of reasons why political or moral opinions concerning very specific questions (abortion or homosexuality) would directly affect a worker's labor productivity. Also happiness is a questionable candidate. In contrast to the other questions, it appears to be more a state of mind than a deeply held value, and is less likely to exhibit the persistence as individuals migrate that many cultural values have been shown to do.[23] For trust and religiosity on the other hand, there is an existing body of work suggesting that they are important for economic prosperity.

The economics literature on autonomy is more sparse, but there are rich psychological and management literatures offering plausible mechanisms. A particular personality trait highlighted is proactivity (e.g. Griffin, Neal, and Parker, 2007) argue for an important role of proactivity and adaptability in worker performance). Proactivity amongst the workforce also decreases the need for scarce managerial resources, and potentially mitigates issues related to incomplete contracts.[24] Taking on additional tasks is one particular form of initiative found to be strongly positively related to high job performance (Morgeson, Delaney-Klinger, and Hemingway, 2005). Related to role breadth is role choice, or sorting into more or less productive occupations (Holland, 1997).

Recent work in economics documents a significant relationship, specifically between workplace obedience, and workers taking on routine task intensive jobs (Campante and Chor, 2017). To further probe the interpretation that autonomy is an important dimension of culture for human capital, I go back to the micro-level data and investigate occupational sorting. Consistent with Campante and Chor, I do find that workers from cultural backgrounds that place a higher

[23] I consider national pride and to what extent people would sign a petition intermediate cases. They may capture something productivity-related (e.g. potential cooperation problems with people from other countries for *national pride* and a higher general level of engagement for *sign a petition*, but they are less clear candidates than the remaining four: trust, religiosity, post-materialism, and autonomy.

[24] The cultural psychology and cultural neuroscience literatures describe the difference between individualism and collectivism in the sphere of parenting as one of encouraging *autonomy* vs. *embeddedness* — analogous to Schwartz (2004). They have also pointed out that autonomy is likely more advantageous in the workplace, while a relational approach is perhaps more desired within families (Triandis et al. 1985; Triandis, 1989; Maselko, 2016).

value on autonomy tend to select into occupations characterized by a low degree of routinization. I make use of the task-based measures of occupations constructed by Autor, Levy, and Murname (2003), denoted by T_o^{xx}, and follow Autor and Dorn (2013) and Campante and Chor (2017), and combine different task-based measures into one measure of non-routine task intensity of occupation o as $NRT_o = ln(T_o^{nr,ca}) + ln(T_o^{nr,m}) - ln(T_o^{r,c}) - ln(T_o^{r,m})$ where nr denotes non-routine, $c(a)$ cognitive (analytical), and m manual.[25] With a measure of occupational non-routineness at hand, I split workers into percentiles based on where in the distribution of employed workers they are, so that $NRT_{i,o}^{PC} \in \{1, ..., 100\}$, and regress the percentile $NRT_{i,o}^{PC}$ of individual i on education, experience, and the cultural measure of autonomy.[26]

Table 2.7 present the results of this exercise. Individuals with an origin country characterized by placing a higher value on autonomy tend to work in less routinized occupations. This is true both of the first generation (colums 1–3) and the second generation of migrants (columns 4–6); on average, a one standard deviation increase in autonomy is associated with moving up 3.6–3.9 percentiles in the non-routineness distribution of occupations for migrants. For children of migrants, the corresponding change in the parental country-of-birth proxy of cultural autonomy is associated with a 1.3–2.4 percentile change. In columns 2–3 and 5–6, I control for an interpersonal task intensity measure due to Sevinc (2018); the reason is that, this being a migrant-based study, I aim to avoid picking up cultural differences or some version of interpersonal discrimination that could have a detrimental impact on worker performance. I also try controlling for earnings, which is somewhat problematic as there is clear reverse causality — remuneration is lower in more routinized occupations. The relationship between non-routine occupations and autonomy does remain also conditional on earnings.

[25] This differs from Campante and Chor in that I exclude the measure of non-routine cognitive interpersonal task intensity. Including it has a negligible impact on the results.

[26] I also include year and city fixed effects in the regression. The statistical significance of autonomy is virtually identical with the raw measure of non-routine task intensity rather than percentile. The percentile-version of the dependent variable makes the quantitative interpretation more straight-forward.

Table 2.7: Non-Routinized Occupations and Autonomy

	First Generation			Second Generation		
	(1)	(2)	(3)	(4)	(5)	(6)
Autonomy	7.259***	7.838***	6.460***	2.695***	4.876***	4.017***
	(1.332)	(1.123)	(1.019)	(0.607)	(0.871)	(0.811)
Years of Education	3.467***	3.343***	2.995***	3.831***	3.689***	3.344***
	(0.292)	(0.281)	(0.283)	(0.00752)	(0.0136)	(0.00331)
Experience	0.513***	0.679***	0.135***	0.527***	0.693***	0.163***
	(0.0195)	(0.0213)	(0.0265)	(0.0132)	(0.0182)	(0.0143)
Experience Squared	-0.00349***	-0.00613***	0.00148***	-0.00323***	-0.00594***	0.00147***
	(0.000369)	(0.000265)	(0.000211)	(0.000194)	(0.000263)	(0.000226)
Foreign (Parent)	-10.34***	-9.919***	-8.190***	-0.873**	-0.627***	-0.400***
	(0.914)	(0.833)	(0.780)	(0.319)	(0.0926)	(0.0944)
Interpersonal Task Intensity		13.657***	14.044***		13.823***	14.171***
		(0.165)	(0.135)		(0.0711)	(0.0643)
Log Income			7.066***			6.730***
			(0.277)			(0.0573)
N	11145730	10936204	10817132	10145467	9946952	9840809
Adj. R-sq	0.147	0.283	0.307	0.145	0.287	0.309

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

2.2.2 Robustness Variations

This subsection outlines general robustness variations of how I obtain human-capital estimates, e.g. variation of data choices. The majority of the concrete results are located in appendix 2.B.1.

Production Function Variations

I explore variations in both the labor aggregator, how to account for differences in TFP and factor shares, and the high-level structure. I begin with two alterations in the labor aggregator. The first alteration is to not assume perfect substitutability across groups of origins but estimate the elasticity of substitution parameter ρ in Equation 1.1; the second is to relax the implicit assumption that different levels of education are perfect substitutes and calculate the relative labor productivity level with an added educational layer in the CES aggregator, as outlined by Equation 1.2. The relationship between cultural values and produc-

tivity with these specification changes is very similar; see tables 2.20 and 2.14 for, respectively, the first and both of these alterations in how the dependent variable is calculated.

The departure from the assumption of perfect substitutability across labor types leads to the the problem, pointed out by Diamond, McFadden, and Rodriguez (1978), that the elasticity of substitution may be upward-biased by technical change. The only way to solve this is to take a stance on the form of the technical growth. The simplest way for me to address the issue is to estimate human capital using data for only one year and assume that there is no technical growth — indeed, there is then no time-variation. Results, presented in Table 2.23, are robust.

Investigating returns to scale and factor shares has been one frequent purpose of estimating production functions. It is not my aim. That enables me to carry out robustness exercises otherwise not possible. In a first, I simply keep them fixed at 2/3 for labor and 1/3 for capital, which maps into the aggregate production function I will make use of later.[27] Table 2.19 shows the analogous results — they are quantitatively stronger for the top cultural factor.

Imposing the same production structure for the entire economy is a potentially restrictive assumption. I relax this in two alternative ways. The first alternative is to set factor elasticities based on average labor costs at the three-digit industry level; in the second, I estimate elasticities at the two-digit level and allow the parameters in the approximation of the inverted investment function (following OP) to vary at the same level. Tables 2.17 and 2.18 presents the respective results.

Assuming a Cobb-Douglas (or first-order loglinear approximation) production function, like I do above, is very common in the literature on estimating production functions. In appendix 2.21, I present results analogous to those in Table 2.4,

[27]For C-B production to aggregate I need constant returns to scale.

but where I have estimated country-specific productivity with translog production function (or a second order loglinear approximation). A translog production function relaxes the unitary elasticity of substitution and admits a more flexible relationship between labor and capital.[28] The qualitative pattern in Table 2.21 is the same as in Table 2.4 with the top cultural factor significantly related to human capital, statistically and economically. Also for individual questions underlying the cultural factors, the relationship remains similar. Autonomy and, to a lesser extent, trust appear to be the key underlying cultural values that drive the relationship. The same three statistical arguments I put forth for this conclusion in Section 1.3.1 holds virtually identically when labor productivity is calculated based on the specification here. Table 2.34 and 2.24 presents results analogous to those of tables 2.33 and 2.6. Column 10 of Table 2.24, which includes the autonomy index and question E018 on support for an authoritative society, is the specification that results from the *GETS* approach. Again, the conclusion that autonomous vs. authoritative values are the main underlying driver receives support.

Variations of Data Choices

The labor literature has found that the age at migration as well as the time elapsed since migration are important factors for labor market success. If these variables are correlated to the cultural values, that, rather than the cultural channel proposed here, could explain the relationship between cultural values and human capital. Above, I have included the average characteristics at the country-level. I have also carried out three different robustness exercises at the micro-level when estimating human capital in the first place. Two of them are to simply exclude, either migrants arriving in Sweden at the age of 17 or younger, or migrants who have acquired 50 percent or more of their schooling in Sweden.

[28]The main advantage with the Cobb-Douglas production function is that it is straightforward to use the Cobb-Douglas productivity estimates for the augmented development accounting exercise in Section 2.3 since it is the same theoretical framework as in "classical" development accounting. It is also less demanding of the data, with fewer parameters to estimate.

Tables 2.28 and 2.29 presents the results. The results are quantitatively stronger, as one would expect in the case where both time and age of migration are not strongly correlated to cultural values, and there is some convergence for young migrants with respect to culture and schooling quality.

On the cross-country level, to ease worries that results are mainly driven by the nordic countries, I have exclude nordic countries; Table 2.30 presents results showing that is not the case.

I also try total assets as a measure of capital rather than fixed assets. The baseline is following the standard in the production function estimation literature, but it is a standard grounded in studying fixed-asset heavy manufacturing. From a finance perspective, one could argue that firms by construction need the all their assets — if they did not, then the assets that were not needed should be distributed to shareholders (ignoring e.g. debt held for tax purposes). By this logic, total assets is a more accurate measure of capital. Neither of the two measures are perfect. For the purpose of this paper, it is nevertheless reassuring to see that results in Table 2.31 are robust to using a measure that is likely an upper bound of capital rather than the standard measure in the literature which is likely towards the lower end of actual assets needed to carry out the firm's activities.

Additional Cross-Country Controls

It is easy to think of a long list of characteristics of a given country that affect labor productivity *in that country*. The advantage of studying labor productivity through migrants is precisely that the act of migration physically separates the migrant worker from geographic, institutional, and technological factors in their respective origin country. They all work in one and the same labor market, sharing the same institutional setting, why institutional and geographic differences between countries are no longer candidates to explain differences in labor productivity. Instead, any such candidate must be related to the human capital that

a migrant brings with him. Looking at country characteristics that that do not have a direct logical connection to transportable human capital is betraying the purpose of studying migrants.[29] Nevertheless, when presenting this paper, there has been persistent demand to look at other country characteristics more broadly that the empirical growth literature has emphasized. To do so in a systematic fashion, I try all the variables that Sala-i-Martin (1997) studied. I show these results in appendix 2.B.1. I also try a number of variations of the measures included in the baseline tables. The top cultural factor remains robust throughout.

2.2.3 Selection

There are issues of potential differential selection in almost every study of migrants. This study is no exception. There is clear differential selection, but selection that attenuates the relationship I find between productivity and cultural values.

Which individuals that decide to leave their home country is generally not random. Empirically, migrants to rich countries are predominately positively selected.[30] What matters for the results in this paper is not the average selection of migrants to Sweden vs. natives, but the differential selection across source countries. If it were the case that individuals from countries with a low TR-value (where TR abbreviates the name given the top cultural factor by its original authors) were negatively (or less positively) selected relative to high TR countries, then that could cause a spurious relationship between low TR origins and low

[29]Some aspects of institutional quality may impact different dimensions of human or social capital, including cultural values. For example, growing up in a corrupt society likely affects an individual's level of trust or trustworthiness. However, it appears a roundabout way to then study the relationship between a given institutional factor and labor productivity rather than directly study the human or social capital related characteristic that the particular institutional factor may impact. Furthermore, cultural values likely play a role in shaping institutions, see e.g. Alesina and Giuliano (2015). Again, it is precisely to get out of this complicated causal nexus that I study migrants rather than workers in their respective origin country.

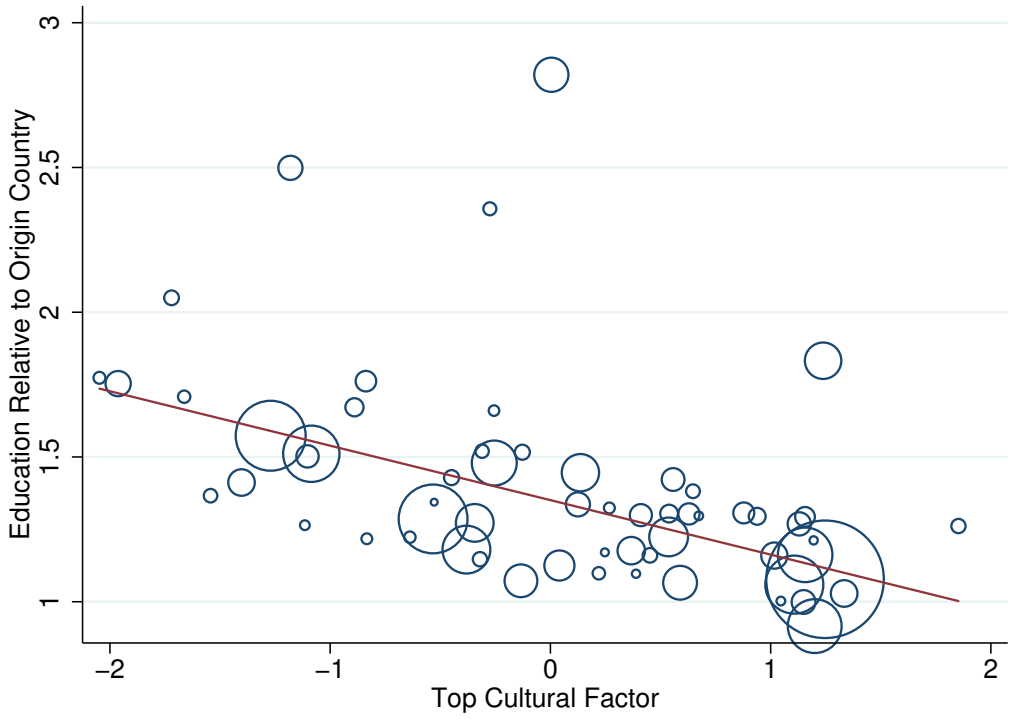
[30]The canonical Roy model would predict negative selection from poorer countries as Sweden's income distribution is relatively compressed. See e.g. Grogger and Hanson (2011) for an empirical documentation of positive selection from poorer to richer countries, as well as a modification of the Roy model that predicts positive selection.

estimated productivity.[31] I do not actually observe individuals' place in their respective country of origin human-capital distribution. What I can do is to compare how migrants in my sample fare on observables related to productivity relative to their respective source-country average. Figure 2.2 plots, for a given country, the ratio of the educational attainment of migrants in my sample to the average educational attainment in that source country, against the top cultural factor. Migrants from low-TR countries are better educated relative to their source-country average, compared to the education level of migrants from high-TR countries relative to their source country. That indicates a stronger positive selection from low-TR countries on education. As I control for education, the relevant selection would in fact be individuals' human capital conditional on education. However, the selection mechanism that would imply significant negative selection on observable human-capital related characteristics but significant positive selection on unobservable human capital appears highly contrived. Hendricks and Schoellman (2018) provides a concrete piece of evidence that selection on observable and unobservable productivity factors are positively correlated. They also find that the extent of positive selection is negatively related to average income in the origin country, which is in line with what I find in Sweden.[32]

[31] The name given is *Traditional vs. Secular-Rational* values.

[32] Hendricks and Schoellman have data on both pre and post migration wages, as well as data on education, for immigrants in the United States. It is this data, and the assumption that wages reflect productive capacity, that enables them to say something informed on the question of selection on unobservables.

Figure 2.2: Cultural Values and Educational Attainment of Migrants Relative to Source Country Educational Attainment



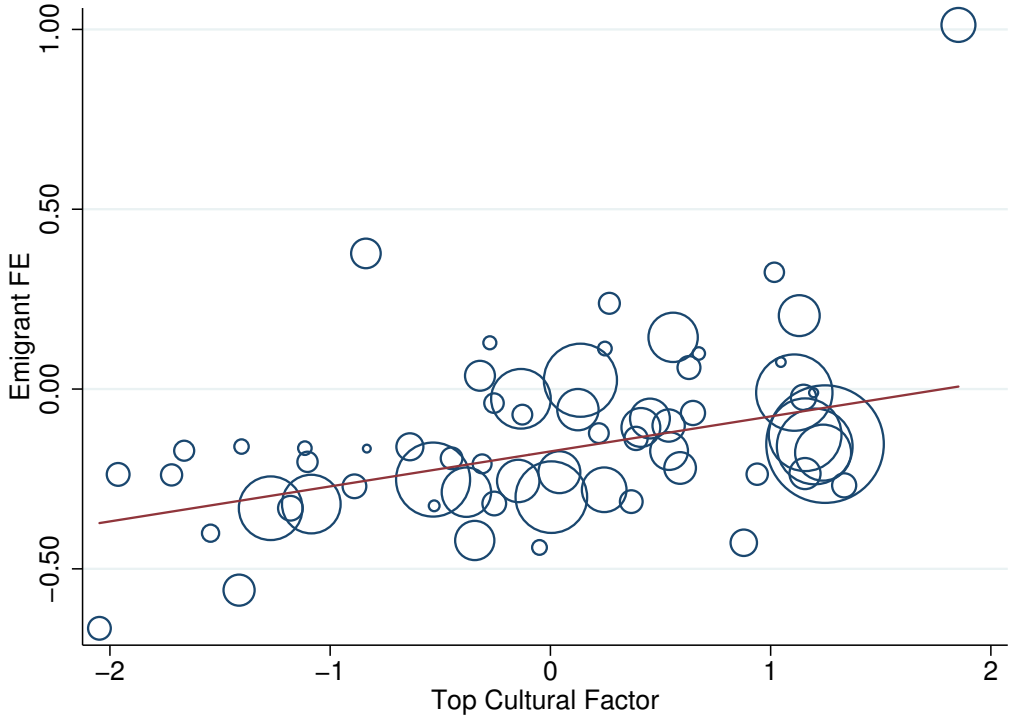
Notes: Data on average years of education is from Barro and Lee (2013). Data on years of education of migrants is calculated based on micro level data from SCB.
The y-axis represents the average educational attainment of employed migrants in Sweden from a given country relative to the average educational attainment in that source country. A value above 1 indicates a higher educational attainment for migrants from that country, than for a randomly chosen person in that source country. The graph plots these relative educational attainments against TR values across countries.

A second point of similar potential differential selection is that immigrants can re-migrate; who decides to stay in the country is unlikely to be random. Generally, I find that those who re-migrate are doing worse in the labor market than those who remain.[33] If re-migrants from low-TR countries are less (more) negatively selected relative to re-migrants form high-TR countries, then this would downward (upward) bias the productivity estimates for low-TR countries, and upward (downward) bias the relationship between TR-values and productivity. Figure 2.4 plots the earnings of "leavers" relative to "remainers" for the respective source countries against the TR values. It shows that the differential selection is relatively more negative for emigrants from low TR countries, suggesting that, if

[33]This finding mirrors Lubotsky's (2007) result for (re-)migrants in the United States.

anything, the bias from re-migration is towards underestimating the relationship between culture and productivity.

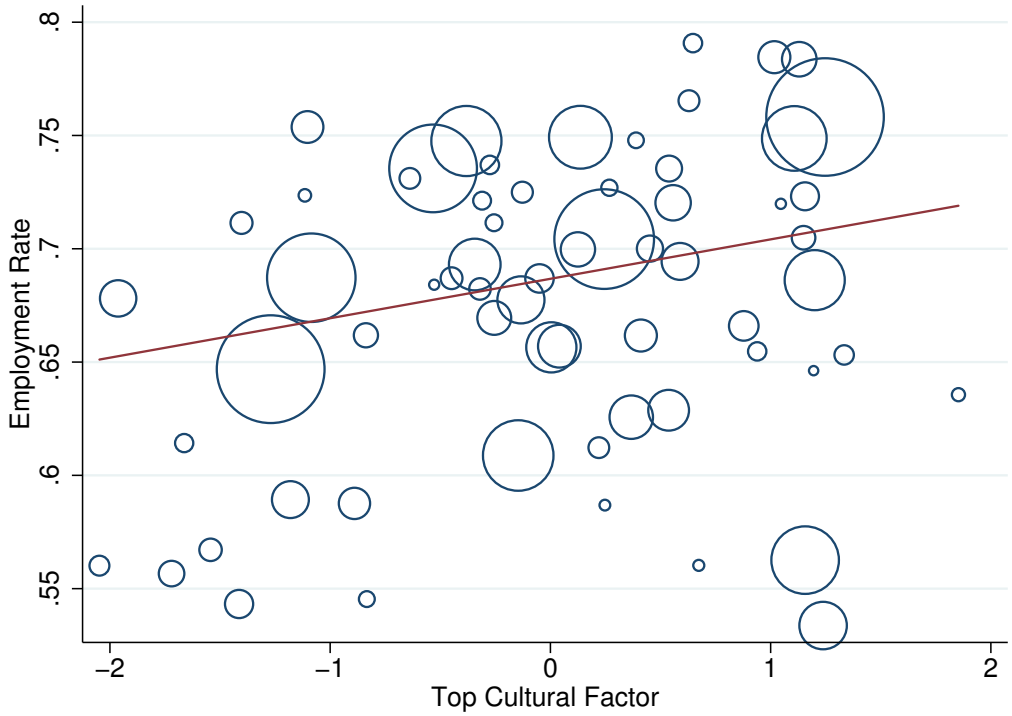
Figure 2.3: Cultural Values and Relative Earnings of Re-Migrants



Notes: The graph shows a country of origin specific emigrant fixed effect from a Mincerian regression of earnings that includes also education, and third-degree polynomials in experience and time since arrival in Sweden. It plots the fixed effect against the *TR* values across countries.

Thirdly, there is selection into employment. As my human-capital estimates are based solely on employed individuals, selection into employment affects those estimates. Employment rates are lower for low *TR* countries. Assuming selection into employment is positive, which any reasonable selection mechanism would predict, then selection is more strongly positive for low *TR* countries. This is a third source of selection that plausibly attenuates the positive relationship between estimated productivity and *TR* values.

Figure 2.4: Cultural Values and Employment Rates



Notes: The graph shows the employment rates across birth countries plotted against the top cultural factor, *TR*.

In summary, there is differential selection of who immigrates, remains in the country, and finds employment, but it appears to overwhelmingly be in the direction of dampening the relationship between *TR* values and productivity relative to the "true" relationship absent of selection.

2.2.4 Occupational Discrimination

The baseline approach is immune to wage discrimination. However, being paid less for the same position is only one type of discrimination. It may be that positions are allocated in a discriminatory way, with high-productivity positions more difficult to obtain for certain groups of workers. Analogous to Becker's model of taste-based discrimination, employers could be prepared to take a cut in value added-generating capacity to avoid granting workers from the groups they are averse to high-productivity positions. Then, for a given position, those

suffering from discrimination would need to be superior in productive capacity to acquire that position — it is a story of discrimination that implies differential selection, conditional on occupation.[34, 35]

It could be the case that the relationship I detect between cultural values and human capital is driven by occupational discrimination e.g. related to ethnicity. I conduct two separate robustness experiments to address this concern. Both are in the spirit of holding occupation constant and see if there are any signs of a reversal in estimated productivity. The first alteration is straightforward; I include occupational fixed-effects at the 4-digit level when labor input efficiency units are estimated based on predicted wages. The second alternative is to add an occupational layer in the labor aggregator, so that the labor input of firm j at time t is a function of imperfectly substitutable occupational types in the following way:

$$L_{j,t} = \big[\sum_{o} \beta_o (\sum_{c=1}^{n} \delta_c L_{j,t,c,o})^{\sigma}\big]^{\frac{1}{\sigma}} \text{ where } o \in \{\text{Manager, High-Skilled, Low-Skilled, Unskilled}\} \tag{2.1}$$

Analogous to the discussion concerning how to account for differences in education, the advantage of the first is that it holds occupation constant at a very detailed level; the advantage of the second is that it relaxes the assumption of perfect substitutability across occupations.

I present results, with human capital estimated following the two respective alterations outlined above, in Table 2.8 and 2.9. The results are similar to the baseline results, albeit slightly quantitatively weaker. Note that solely a weaker relationship between cultural values and estimated productivity is *not* a prob-

[34] It need not be taste-based discrimination. A model where search is costly, and it is more costly to extract accurate information on workers from certain groups would have the same prediction — that workers from those groups would need to be on average "better" (from a value-added generating perspective) to acquire a given position.

[35] The logic does assume that the value-added generation associated with a given position is not completely unrelated to the human capital of the worker filling that position — a view of the labor market where differences in output between workers are purely driven by differences in rents tied to the position the worker holds would invalidates not just the argument made here, but the entire paper.

lem.[36] If the baseline results were explained by occupational discrimination, that would imply a *reversal* via differential selection — that the workers suffering from discrimination had a *higher* estimated productivity, conditional on occupation, implying a negative coefficient on the top cultural factor. There is no indication of that; the relationship remains statistically and economically significant, far from a reversal. Even if the alterations to control for occupation are not perfect, the results here strongly suggest that the relationship between cultural values and human capital is not spuriously driven by occupational discrimination. They do suggest that a fraction of estimated human-capital differences are explained by occupational sorting, but not of the discriminatory kind.

2.2.5 Human Capital Determinants in the Second Generation

Studying the second generation of migrants serves several purposes. It is the cleanest test of separating cultural values from educational quality and health. The second generation has grown up in the same country, been through the same schooling system, and had access to the same healthcare, but differ in inherited cultural values.[37] For the same reason, transferability of skills is also not an issue for the second generation.[38]

My baseline results estimate Equation 1.1 with country-specific labor types. Un-

[36]Not even a zero-relationship between cultural values and estimated human capital once occupation is held constant would be a problem; it would indicate that the baseline results were driven by occupational sorting. To the extent that the occupational sorting is not done in a discriminatory way, I would want to include that sorting. The real problem is if that sorting takes place in a discriminatory fashion. There is no indication of that here.

[37]As argued by, among others, Bisin and Verdier (2001), Guiso, Sapienza, and Zingales (2008), Tabellini (2008), Algan and Cahuc (2010), Dohmen et al. (2012), and Ek (2017), people's beliefs and values are determined partly by their contemporaneous environment, and partly by beliefs and values inherited from previous generations.

[38]It is sometimes claimed that selection is also not an issue for the second generation. It is likely mitigated by moving a generation away from the actual migration selection. However, that it would no longer be an issue at all appears too strong of a claim. Consider the evidence on the inheritability of many characteristics, cognitive or non-cognitive, (and regardless of whether it takes place via nature or nurture) paired with how the second generation of migrants in the United States has typically outperformed natives, and it seems questionable that there is no selection at all.

Table 2.8: Country Characteristics and Human Capital Estimated Incl. Occupation Fixed Effects at 3-digit Level

	(1)	(2)	(3)	(4)
H-W Educ.	0.187***		0.0479	0.0720
Quality	(0.0641)		(0.0706)	(0.0713)
Life Expectancy	-0.00523		-0.0119	-0.00680
at Birth	(0.00685)		(0.00847)	(0.00779)
Fertility Rate	0.00172		0.00222	0.00238
	(0.00690)		(0.00869)	(0.00823)
Inglehart et al.'s		0.0892***	0.105**	0.101**
Cultural Factor 1		(0.0213)	(0.0404)	(0.0385)
Inglehart et al.'s		-0.000574	0.0188	0.0279
Cultural Factor 2		(0.0194)	(0.0283)	(0.0338)
Log GDP per Worker				-0.0532
				(0.0719)
Observations	62	63	62	62
Adjusted R^2	0.154	0.239	0.279	0.282

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1 by nonlinear least squares, but where labor efficiency units are calculated based on predicted wages that includes occupation fixed effects at the 3-digit level. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.9: Country Characteristics and Human Capital Estimated with Occupational Layer in CES Aggregator

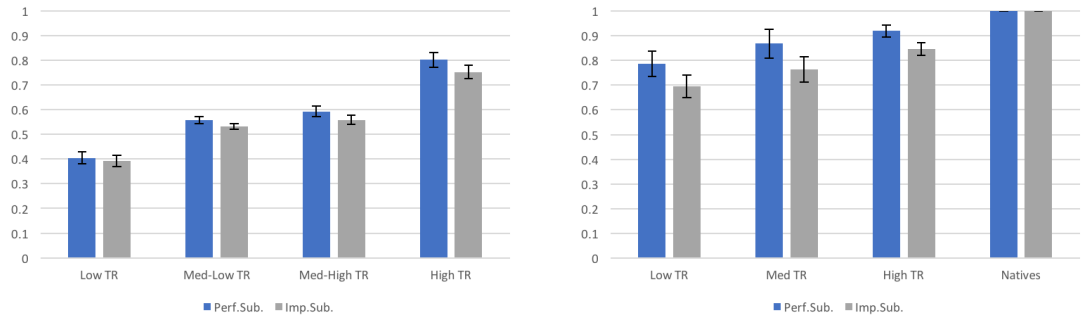
	(1)	(2)	(3)	(4)
H-W Educ. Quality	0.140**		0.00797	0.0346
	(0.0679)		(0.0672)	(0.0643)
Life Expectancy	-0.00363		-0.0106	-0.00492
at Birth	(0.00645)		(0.00753)	(0.00714)
Fertility Rate	-0.000846		-0.00114	-0.000957
	(0.00676)		(0.00842)	(0.00803)
Inglehart et al.'s		0.0807***	0.0941**	0.0893**
Cultural Factor 1		(0.0241)	(0.0421)	(0.0402)
Inglehart et al.'s		0.00211	0.0227	0.0328
Cultural Factor 2		(0.0186)	(0.0249)	(0.0305)
Log GDP per Worker				-0.0588
				(0.0624)
Observations	62	63	62	62
Adjusted R^2	0.129	0.240	0.253	0.262

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1 by nonlinear least squares, but with an occupational layer added in the labor aggregator, allowing for imperfect substitution across types. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Figure 2.5: Estimated Labor Productivity of Workers Binned by *TR*-Values



(a) Estimated productivity of foreign-born workers.

(b) Estimated productivity of native-born workers.

Notes: The bars show the estimated relative productivity of groups of workers; the error bars represent the 90 percent confidence interval of the estimated productivity. In (a), workers are binned based on the *TR*-value of their country of birth. In (b), they are instead binned based on the average *TR*-value of their parents' countries of birth. "Natives" are native born with both parents native born — this is the reference group.

fortunately, the number of second generation migrants is not large enough to produce country-specific estimates.[39] Therefore, to estimate differences between groups of second-generation migrants, I split (second generation) migrants into groups based on the *TR*-value associated with their (parental) country of birth. Figure 2.5 presents the result of this exercise. For both native and foreign born, the productivity is increasing in the *TR* measure of cultural values. This persistence of estimated productivity differences into the second generation provides additional evidence that a cultural channel really plays a role in driving productivity differences.

Human Capital Via Wages

While issues like transferability of skills and imperfectly measured quantity or quality of education can arguably be ruled out as issues for the estimates based on the second generation, there may be other non-cultural candidate explanations. Socioeconomic status is one; ethnically related discrimination is another (although the latter conflicts with the results above thad condition on occupa-

[39]For most countries, the standard errors are at least an order of magnitude larger than point estimates.

tion). Parental country of birth is related to ethnicity and correlated to socioeconomic status. To control for parental characteristics at a more detailed level I move to study human capital differences via wages. An individual-level outcome variable enables me to include individual characteristics at a level of detail that would render the number of distinct labor types unmanageable for production function estimation.

Appendix 2.A.1 shows that wages in my data do reflect differences in estimated productivity well, at least at the group level.[40] The precise quantitative relationship between estimated productivity and wages differ slightly across specifications, but the data always rejects a zero relationship and can never reject that average marginal productivity move one-for-one with average wages.[41] With the result that earnings differentials reflect productivity differences for male workers quite well as motivation, I look at individual worker earnings as the outcome instead of firm-level value added. This enables me to control for individual characteristics of workers in a much more detailed way, and without binning origin countries. I run Mincerian regressions on the form of Equation 2.2.

$$ln(w_{i,c}) = \alpha + \rho P_i + \psi D_i + \beta X_i + \gamma C_c + \varepsilon_{i,c}. \tag{2.2}$$

Here, P includes the parental characteristics of education, income, and age at which the income was earned, D includes dummies for city and a dummy for having at least one foreign-born parent, X includes individual characteristics of education, age, and a mandatory ability test administered by the military. The key variables of interest are the group-level characteristics associated with the parental countries of birth, here captured by C.

I present the results of these regressions in Table 2.10. The key takeaway is

[40] This result, that wages reflect productivity across groups, is merely a tool for the purpose of this paper. Nevertheless, it is far from something that can be taken for granted, or projected onto other settings; although not central here, it is a finding that deserves a paper of its own.

[41] This finding is for male first and second generation migrants; there are some indications of discrimination towards foreign-born females.

that the top cultural factor (TR) remains strongly positively related to earnings as I successively add controls for parental wages and education, individual education, and the ability test score, suggesting that inherited cultural values matter for productivity over and above any relationship they may have with parental income and education, and individual education and ability. The results corroborate the cultural interpretation of previous results; they are inconsistent with socioeconomic stories of explaining lower estimated productivity of certain second-generation migrants with low parental earnings and education.[42] Another story related to ethnicity is the controversial proposition that there are inherited IQ differences related to ethnicity; see e.g. Rushton and Jensen (2005) for a survey. The positive relationship between the top cultural factor and earnings persists when I control for *ability* — if this relationship was actually driven by ethnical differences in inherited ability, it should not remain.[43]

2.2.6 External Relevance

The main results of this paper are based on outcomes in Sweden. While it is a clear advantage of the paper to hold labor market institutions, technology, and the like constant when studying human capital differences, there is also a potential down side — it could be the case that while certain cultural traits are detrimental for productivity in the Swedish labor market, that need not necessarily be the case elsewhere. Here, I follow two separate routes to address this concern. The first

[42]Table 2.10 also partly alleviates concerns about certain kinds of discrimination, under the following added assumption: the positive coefficient on parental earnings reflect inherited productive capacity and not solely an advantage of a materially richer upbringing — this should be less controversial in a welfare state with free education than in e.g. the United Stats. Under this assumption, if there is positional discrimination related to ethnicity, presumably, individuals' parents would suffer at least as much from this discrimination as their children. Then, parental earnings should reflect this discrimination, and since individual wages are positively related to parental wages, the suppressed parental wages should partly account for the lower individual earnings.

[43]The ability score is a military test score. The test is mandatory for all Sweden-born males. As an example of how military test scores in a similar setting does change results drastically, in Fryer (2011), the racial wage gap in the United States largely vanishes when a test score is added as a control: the black male gap goes from -39% to -11%; black women, and hispanic men and women respectively move from -13, -15, and -6 percent to a wage premium of 13, 4, and 16 percent relative to their white counterparts.

Table 2.10: Regression of Individual Log Wages on Parental Characteristics, and Characteristics of Parental Country of Birth

	(1)	(2)	(3)	(4)	(5)	(6)
Wage Father		0.0607***	0.0550***	0.0572***	0.0501***	0.0482***
		(64.16)	(88.03)	(73.47)	(56.86)	(49.56)
Wage Mother			0.0452***	0.0461***	0.0417***	0.0375***
			(62.05)	(61.61)	(57.63)	(42.12)
Education, Father				-0.00703***	-0.0201***	-0.0199***
				(-11.31)	(-46.85)	(-44.69)
Education, Mother				0.000782	-0.0111***	-0.0119***
				(1.64)	(-15.45)	(-13.65)
Education, Individual					0.0691***	0.0502***
					(36.11)	(49.43)
Ability Test						0.0239***
						(66.86)
Foreign Parent	-0.0869***	-0.0731***	-0.0684***	-0.0681***	-0.0553***	-0.0608***
	(-4.90)	(-7.46)	(-7.00)	(-6.97)	(-5.97)	(-4.94)
TR	0.106***	0.0962***	0.0818***	0.0789***	0.0824***	0.0668**
	(5.79)	(5.13)	(4.25)	(4.14)	(4.75)	(2.81)
SS	-0.00224	-0.0202	-0.0167	-0.0144	-0.00753	-0.0153
	(-0.15)	(-1.81)	(-1.38)	(-1.19)	(-0.64)	(-1.08)
Educational Quality	0.0843	0.0866*	0.0917	0.0927	0.0737	0.0675
	(1.76)	(2.04)	(1.92)	(1.95)	(1.65)	(1.44)
GDP/Cap, Educational Controls Throughout						
N	717965	645155	604071	604071	604129	419938

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's calculations based on Swedish register data and data from the World Bank, the WVS, and Hanushek and Woessman (2009).

Notes: The Dependent variable is average individual log gross earnings averaged over four years. The first seven rows are based on individual level register data. The following three rows are characteristics associated with the individual's parents countries of birth; I use the average value of the two birth countries. Standard errors are clustered at the parental country of birth level (using mother's, father's, or unique combination of countries of birth does not matter for the statistical significance of TR).

one addresses the very general phrasing of this issue, that what is a productive characteristic in Sweden may not be so elsewhere, without considering why that is. I simply estimate country-of-origin specific labor productivity in other countries. The second approach relates more specifically to being a migrant in Sweden and again uses the same data as the baseline estimates do. There, I control for within-firm cultural dispersion and split the sample into workers in occupations with, respectively, high and low levels of customer-facing intensity. The latter approach also constitutes a further robustness check against large-scale societal-level discrimination.

Non-Swedish Evidence

Ideally, the paper could replicate the same exercise outside of Sweden. Unfortunately I do not have access to the same kind of data in other countries. Instead, I am forced to rely on the assumption of competitive labor markets and use wages or labor income as a proxy for productive capacity. I study the relationship between inherited cultural values and productivity by estimating Mincerian regressions as specified by Equation 2.3. Subscripts h and o indicate the respective host and origin country of the individual worker. Both equations include host-country specific intercepts and returns to education. The parameters of interest are the country-of-origin specific intercepts in Equation 2.3 captured by the δ-parameters.

$$ln(w_{h,o,i}) = \alpha_h + \beta_h Ed_{h,o,i} + \sum_o \mathbb{1}(o_i \neq h_i, o_i = o)\delta_o + \gamma X_{h,o,i} + \varepsilon_{h,o,i}. \quad (2.3)$$

Under the assumption of competitive labor markets, so that the marginal product of labor equals the wage rate, the δ parameters in Equation 2.6 estimates a country-of-origin specific labor productivity (or human capital) that is equivalent

to the δ-parameters in Equation 1.1 above.[44] In a "second stage" I then relate the estimated human capital to country of origin characteristics, analogous to those above using human-capital measures based on production function estimation.

Since the paper's main result on determinants of human capital pertains to cultural values, it is of particular interest to investigate the same relationship in countries that are culturally distinct from Sweden. I make use of three separate publicly available data sources that contain such countries (as measured by the top cultural factor). The first one of these sources is *IPUMS International*. It contains data for a long list of countries. For my purposes, I crucially need information on labor income and country of birth for individual workers. This reduces the sample substantially. I estimate Equation 2.3 using one narrow sample of countries that include information on both labor earnings and hours worked, so that I can calculate the wage rate. To be able to extend the sample, I also estimate the same equation relying on total income of an individual as a proxy for wages.[45]

Table 2.11 presents the results of regressing the country-of-origin specific relative wage (the δ-parameters from Equation 2.3) on country-of-origin characteristics. The results in Column 1 and 2 are based on the restricted sample where data exists for both labor earnings and hours worked, while in Column 3 and 4, the dependent variable is total labor income rather than hourly wages. The restricted sample includes data from Brazil, Canada, Mexico, Puerto Rico, and Venezuela; the wider sample also contains the Dominican Republic, Panama, South Africa, and Trinidad and Tobago.[46] All of these countries have TR-values below the global average and are hence characterized by significantly more "traditional"

[44]The equivalence of δ_c in 1.1 and δ_o in 2.6 also requires the additional assumption that labor types in 1.1 are perfect substitutes (which I maintain in the baseline specification). If not, the relative marginal product of labor in 1.1 is $\delta_g\left(\frac{L_g}{L_h}\right)^{(\rho-1)}$ — with the empirical estimates of the substitutability close to perfect across types of labor (ρ in the range of 0.91–0.99), $\delta_g \approx \delta_o$ holds also without the strict assumption.

[45]Hours worked are not significantly correlated to the origin country characteristics that I study (when data on hours worked exists) why, for my purposes, this approximation appears reasonable.

[46]Note that these are the *host* countries; the number of observations in Table 2.11 refers to the number of *origin* countries.

values than Sweden.[47] As is clear from Table 2.11, workers with an origin characterized by more "secular-rational" or autonomous values (a higher TR-value) have a higher estimated labor productivity (as proxied by their wage) than workers with a culturally more "traditional" background — if anything, the quantitative relationship in these host countries, culturally distinct from Sweden, is stronger than the corresponding relationship in Sweden.

Table 2.11: Country Characteristics and Human Capital Via Wages Using IPUMS International Data

	(1)	(2)	(3)	(4)
Inglehart et al.'s	0.231***	0.335***	0.239***	0.223**
Cultural Factor 1	(0.0647)	(0.101)	(0.0584)	(0.0872)
Inglehart et al.'s	0.111	0.101	0.151	0.0216
Cultural Factor 2	(0.130)	(0.130)	(0.117)	(0.135)
H-W Ed. Quality		-0.820**		-0.328
		(0.318)		(0.298)
Fertility Rate		-0.113		0.126
		(0.199)		(0.218)
Life Expectancy		0.0621**		0.0650***
		(0.0242)		(0.0212)
Observations	50	49	57	56
Adjusted R^2	0.243	0.600	0.274	0.485

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variables throughout are the δ-parameters from estimating equation 2.6, in column 1 and 2 with hourly wages and in column 3 and 4 with total income. Micro data is from IPUMS International. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012). Observations are weighted by the number of individuals they are based on.

The sample using IPUMS International data is dominated by South and Central

[47] Pureto Rico, Panama, Dominican Republic, and Trinidad and Tobago are not included in the WVS why the statement is not strictly speaking true. However, geographical clustering in cultural values, as well as "popular beliefs" (loosely speaking), would be that these countries are culturally distinct from Sweden. Canada, on the other hand, would by many accounts be culturally similar to Sweden, although, as measured by TR values, it is not. Crucially, none of the results presented here are sensitive to the exclusion of some or all of these countries. In terms of number of observations, the sample is dominated by Brazil, Mexico, South Africa, and Venezuela.

America (with the exception of South Africa). I also make use of data from the European Social Survey (ESS), including data from 31 European countries, and U.S Census data. Appendix 2.B.2 presents those results — again, they are in line with the cultural interpretation proposed in the main text of this paper.[48] There are no indications that the estimated relationship between labor productivity and cultural values at the origin varies systematically with the cultural values of the host country. If anything, when studying host countries culturally distinct from Sweden, the quantitative relationship is stronger than the baseline results.

Accounting for Cultural Differences

The paper has proposed the interpretation of the results that it is the *level* of certain cultural values that explains differences in estimated human capital. An alternative interpretation is that it is not about the level of cultural values, but how those cultural values differ from those of the majority population's. This is a particular concern because Sweden is an outlier in terms of the cultural factors — I cannot simply control for both the level and the difference as they are virtually perfectly collinear. The results above from culturally distinct countries is one way of addressing the concern; it is reassuring for the level-interpretation to find similar results elsewhere. In this section, I instead try and tackle this at the micro-level in the Swedish data.

Since I estimate human-capital differences across countries through migrants, those estimates are in principle both a function of the direct level of all of the skills, knowledge, health, attitudes, values, etc. that any one migrant brings, and of how those skills and values interact with the host society. That interaction takes place both within the firm, and with broader society, mainly via customers

[48]Quantitatively, the U.S. results are roughly in line with those in Sweden. The ESS results are quantitatively a bit weaker, but there are some important downsides to the ESS data. It is survey data with very small sample sizes for some origin countries, and the only included income measure is total family income. Crucially though, for the issue of Sweden being a cultural outlier, is that results in the ESS data if anything becomes somewhat stronger when I restrict the sample to countries that are the least similar to Sweden (as measured by the top cultural factor).

of the firm. I try and isolate the human capital related to the level of cultural values by altering the baseline production function estimation in two ways to address the two respective types of interactions.

Firstly, I control for the cultural dispersion within the firm when I estimate human capital. Each employee of a firm is attributed the *cultural factor 1* and *2* associated with the employee's country of birth. The measure of dispersion in *cultural factor X* is the standard deviation of that measure within the firm. I also try the mean absolute deviation of the corresponding measures, as well as a Herfindahl-Hirschman-index in countries of birth within the firm with only negligible differences to the results I present here.

Secondly, I split the sample of workers based on the degree of customer-facing intensity of an individual worker's occupation. I follow Sevinc (2018) who develop a measure of interpersonal task intensity (ITI) focused specifically on customer interactions. I split workers into two groups by the median ITI-value so that a worker type is defined by both country of birth and degree of customer-facing job.

The first reassuring result for the interpretation that it is the level of cultural values driving the lion's share of estimated differences in human capital, rather than the cultural distance to Sweden, is presented in Table 2.12. There, the dependent variable is the country-specific human capital for non customer-facing workers, estimated in a production function that controls for the within-firm cultural dispersion. The second, indirect result, not shown here, is that the relationship between human capital and *cultural factor 1* is similar for more customer-facing workers — the difference is statistically insignificant (see Table 2.38 in the appendix).[49]

Overall, considering both the results here in Table 2.12, and the evidence from

[49]There is a slight difference between the two measures. Since the task-based measure of customer-facing intensity is correlated to other task-based measures such as *non-routine cognitivie analytical*, it is unclear whether this difference is driven by differences in the degree of customer-facingness or other occupational differences.

Table 2.12: Country Characteristics and Human Capital for Workers with a Low Level of Customer Facing Intensity Estimated Controlling for Within-Firm Cultural Dispersion

	(1)	(2)	(3)	(4)
H-W Educ. Quality	0.156		-0.0370	0.00943
	(0.122)		(0.116)	(0.136)
Life Expect. at Birth	0.00804		-0.00240	0.00625
	(0.00931)		(0.0111)	(0.0155)
Fertility Rate	0.00225		0.000215	0.000590
	(0.00893)		(0.0109)	(0.0112)
Inglehart et al.'s		0.112***	0.130**	0.123**
Cultural Factor 1		(0.0396)	(0.0579)	(0.0563)
Inglehart et al.'s		0.0329	0.0416	0.0650
Cultural Factor 2		(0.0322)	(0.0435)	(0.0424)
Log GDP per Worker				-0.105
				(0.0895)
Observations	62	63	62	62
Adjusted R^2	0.107	0.251	0.217	0.228

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating a modified version of equation 1.1 by nonlinear least squares. The modification is to distinguish labor types by customer facing intensity as well as birth country (results here are for a low level), and controlling for within-firm cultural dispersion. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

other countries, the relationship between cultural values and human capital does neither appear to be driven by cultural distances to Sweden specifically, nor by some more general characteristic of countries culturally similar to Sweden.

2.3 TFP Differences

An important motivation to study the determinants of human capital differences is the very large unexplained TFP variation across countries.[50] In this section, I carry out a relatively standard development accounting exercise with the modification that I adjust human-capital stocks across countries based on the main determinant of residual human capital (net of education and experience) according to Section 2.2 — cultural values. The purpose is to study how much of unexplained cross-country income disparities human capital differences related to cultural values can explain.

I follow the development accounting approach and notation of Caselli (2005). Countries produce output according to the per worker production function

$$y_c = A_c k_c^{\alpha} h_c^{1-\alpha} \tag{2.4}$$

where k_c and h_c are respectively the per worker physical and human capital stock of country c. The accounting exercise essentially consists of comparing how much output variation that a *factor-only model* $y_{kh} = k^{\alpha} h^{1-\alpha}$ can explain of the variation across countries relative to the actual output $y = Ay_{kh}$. I include two measures of the relative dispersion induced by the factor-only model: $var[log(y_{kh})]/var[log(y)]$ and $\frac{y_{kh}^{90}/y_{kh}^{10}}{y^{90}/y^{10}}$, each with their own known advantages and

[50] Jones (2014) argues that differences in educational attainment across countries can explain income differences entirely, once imperfect substitutability across skill levels are taken into account. If that were true, I (and indeed much of the growth and development literature) would have no reason to search for alternative explanations. However, Caselli and Ciccone (2017) show that Jones's conclusion is driven by the extreme (and implausible) assumption that the relative wage of skilled workers is determined solely by factors embedded in the workers, and not at all by e.g. institutional or technological factors, giving Jones' argument an air of circularity.

draw-backs. A value for these respective ratios close to 1 (0) indicates that the factor-only model explains cross-country differences in income very well (poorly). The importance of cultural values is measured by the magnitude increase in the respective ratios, relative to the baseline, when human capital is augmented by the cultural component of labor productivity. My aim here is not to argue that technology, institutions, and other factors captured by TFP are unimportant, but rather that culture is important. Therefore, I am more concerned with the improvement of the factor-only model, relative to the baseline, than achieving a ratio close to 1.

In the baseline approach, human capital is a function of average years of schooling, $h_c = e^{\phi(s_c)}$, where $\phi(s_c)$ is a piecewise linear function following average returns to schooling at different levels of average schooling across countries.[51] I additionally adjust the human capital stock based on the cultural component of estimated labor productivity. In Section 1.3.1, I essentially estimate production functions of the form

$$Y_j = A_j K_j^{\alpha_k} L_j^{\alpha_h}, \quad L_j = \big[\sum_{c=1}^{n} \delta_c L_{j,c}(Ed, Exp)^{\rho}\big] \tag{2.5}$$

so that the estimated country-specific labor productivity multiplies the (education and experience-adjusted) labor input from country c in an Cobb-Douglas production function. Following that model, I adjust human capital stocks by simply multiplying them with (the cultural component of) their corresponding estimated labor productivity. The country-specific estimates of labor productivity likely capture other factors related to country of origin, as well as noise, not just culture. To get the cultural component (after controlling for differences in educational quality and health), I use the predicted value of labor productivity $\hat{\delta}_c$ based on the point estimates presented in Table 2.12, Column 3.[52] The rea-

[51] Following Hall and Jones (1999), $\phi(s) = 0.134s$ if $s \leq 4$, $\phi(s) = 0.1344 + 0.101(s-4)$ if $4 < s \leq 8$, and $\phi(s) = 0.1344 + 0.1014 + 0.068(s-8)$ if $8 < s$.

[52] Instead using the point estimates presented in Table 2.12, Column 2, makes only a negligible difference.

son I use the estimates from Table 2.12 in Section 2.2.6 rather than the baseline estimates in Table 2.4 is the focus on cultural values combined with the move to the cross-country level — I want differences in human capital driven by the level of cultural values rather than e.g. the within-firm cultural distances. Therefore, in the culture-augmented version, I adjust the human capital stock according to $\tilde{h}_c = \hat{\delta}_c h_c$.[53]

The development accounting exercise then consists of comparing the baseline version, where $y_{kh_c} = k_c^{\alpha} h_c^{1-\alpha}$, to the culture-augmented version, where $y_{kh_c} = k_c^{\alpha} \tilde{h}_c^{1-\alpha}$. Table 2.13 presents the results of this for years 1995 and 2005. I consciously do not use the most recent data — since my estimates of human capital are based on migrants in Sweden around 2010, they reflect country-of-origin characteristics when these workers grew up, at the very least 20 years prior to the time in which I estimate human capital.[54] Adjusting the human capital stock based on the culturally related component of estimated labor productivity decreases the unexplained variation in income differences as measured by the variance ratio (the 90^{th}-to-10^{th} percentile ratio) by 16 (15) percentage points in 1995, and 16 (11) percentage points in 2005.

Since the adjustment here is only for the direct impact of cultural values on human capital, it neglects the potential role of culture for technological or institutional differences, or differences in factor accumulation; this makes it a conservative estimate for the broader question of "the impact of culture". The improvements in explanatory power for the augmented factor-only model is nevertheless economically substantial and adds further credibility to the conclusion that culture matters for productivity.

[53] To be clear, the hat in $\hat{\delta}_c$ refers to the predicted value based on point estimates in Table 2.12, and not the fact that the original, non-culture adjusted δ_c is itself an estimate.

[54] In practice, it should make little difference, as the cross-country differences, especially in cultural values, are very persistent.

Table 2.13: Development Accounting with Culture-Augmented Human Capital

	1995		2005	
	Baseline	Augmented	Baseline	Augmented
$\frac{y_{kh}^{90}/y_{kh}^{10}}{y^{90}/y^{10}}$	0.51	0.66	0.37	0.48
$var[log(y_{kh})]/var[log(y)]$	0.31	0.47	0.26	0.42
Number of Countries	57	57	71	71

2.4 Conclusion

The large differences in human capital over and above differences in education and experience that recent contributions have found beg the question of what determines those differences. The data in this paper supports cultural values as a key determinant. "Secular-rational" values, or values related to autonomy and trust, are the strongest and most robust predictor of human capital. The conclusion receives support both from direct estimates of production functions with heterogeneous labor, where the different groups of workers are defined by the their country of origin, and Mincerian regressions, using data from countries culturally distinct from Sweden. Key pieces of evidence relate to the second generation of migrants — the relationship with productivity persists, so that differences in schooling or transferability of skills cannot account for productivity differences. Furthermore, robustness exercises demonstrate that (non-cultural) channels related to discrimination — a first-order concern when studying migrants — do not appear to drive the results.

The relatively well-identified relationship between the parental country of birth-based proxy of cultural values and estimated productivity for the second generation, as well as the economically quantitatively substantial impact of culture on productivity for both the first and second generation of migrants, provide support for the proposition that cultural factors are key to understand differences in economic development. This has previously been articulated by e.g. David Landes, although he provided mostly anecdotal evidence. A development accounting

exercise constitute further support. The cultural component of estimated productivity decrease unexplained cross-country differences in income by around 16 percentage points.

I consider the estimated impact of culture on cross-country differences in income conservative. Firstly, there are several points of selection that attenuate the productivity estimates' relation to the cultural values. Secondly, I only estimate the direct impact on productivity and ignore any potential indirect channel, such as the impact of cultural values on institutions, on average educational attainments, on technological progress, or on capital accumulation. These indirect channels are exiting avenues for future research.

Appendix 2.A Human Capital Estimation

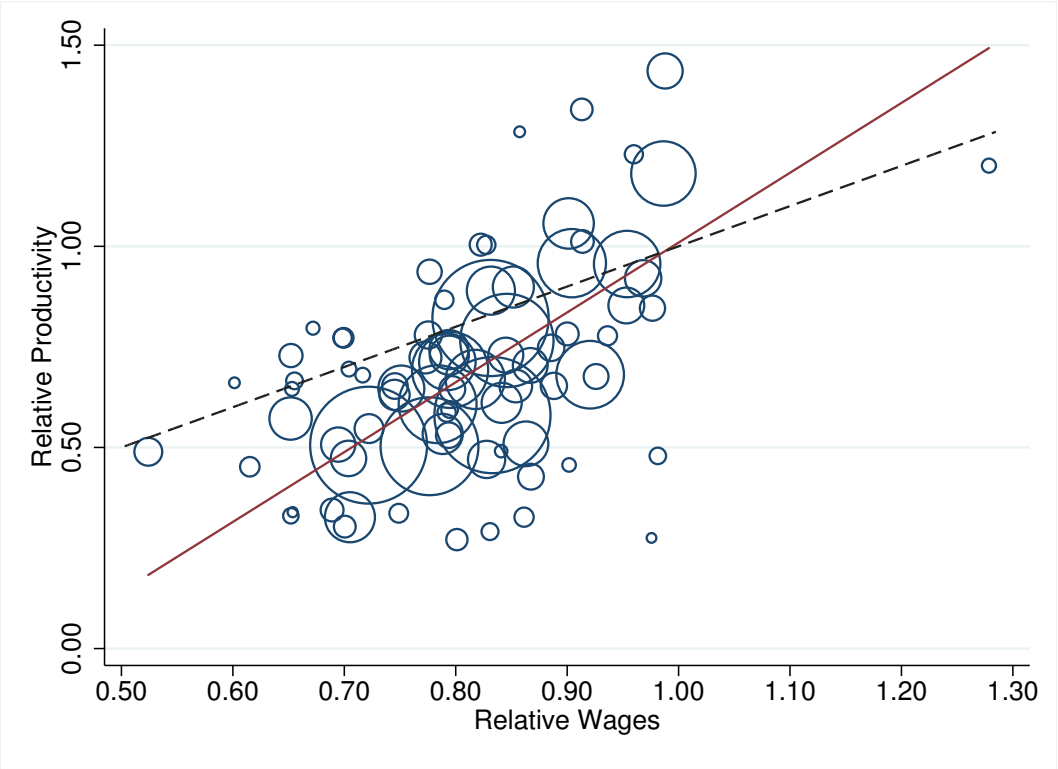
2.A.1 Human Capital Through Earnings

Here, I argue that relative wages of groups reflect their respective relative productivities well. This enables me to use wages as an outcome that approximates productivity well.[55] To make that argument, I compare estimated relative marginal productivities of groups of workers with the corresponding relative wages. In a perfectly competitive labor market with profit-maximizing firms, where the (relative) marginal products of input factors equal their (relative) rental rates (wages), productivity moves one for one with wages. However, frictional labor markets may be far from this theoretical ideal.

The probably biggest worry when studying migrants is differential discrimination, so that certain groups receive wages below the level that their respective productivity level motivate. If the level of (hypothetical) discrimination is correlated to the cultural values of different types of workers (directly, or through ethnicity), that could drive a spurious relationship between those values and wages. Figure 2.6 presents a first indication that relative wages reflect productivity quite well. It plots relative wages against relative productivities. If wages were uninformative about productivity, the fitted values represented by the solid line would be horizontal; if wages instead moved one for one with productivity, the fitted values should coincide with the dashed 45-degree line. In Figure 2.6, the fitted values-line is steeper than the 45-degree line so that productivity appear to move more than one for one with wages — if anything, this would indicate that productivity comparisons through wages may understate productivity differences.

[55]Here, I use wages interchangeably with earnings. I do not actually observe hours worked for all workers, why part of differences in average earnings may reflect differences in work hours rather than differences in wages. However, when I compare relative wages to relative marginal products, differences in work hours would "show up on both sides", why these comparisons are not actually sensitive to differences in work hours at all (at least not when groups are perfect substitutes). Furthermore, I do control for differences in work hours at the group level, based on a representative sample of workers — differences in work hours across groups are very small.

Figure 2.6: Relative Marginal Productivities Plotted Against Relative Wages



Notes: The graph plots relative productivity levels against relative wages with circles proportional to the number of workers included in each respective group. The solid line is the (weighted) linear fit — a comparison with the 45-degree dashed line is informative of whether relative productivity moves more or less than one for one with relative wages.

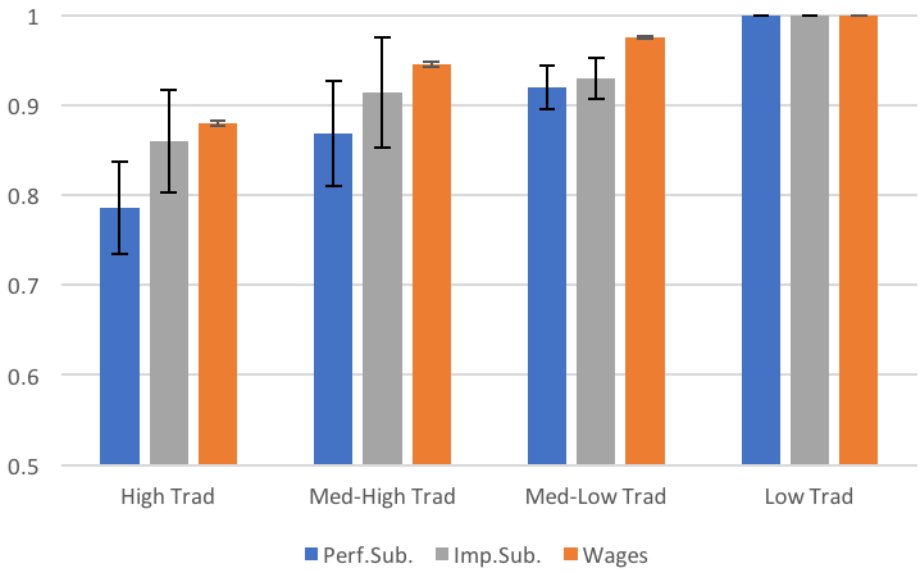
Although the main second step of the argument in this section relates to earnings of second generation migrants, Figure 2.6 presents the relationship between wage and productivity levels for groups of first generation migrants. I do this for two reasons. Firstly, the greater number of first generation migrants in my data enables me to look at productivity at a more detailed level, with country-specific estimates, which is closer to what I do in the wage regressions below for the second generation. Secondly, as a test of discrimination, it should be a more demanding test — if the first generation does not generally suffer from ethnically related wage discrimination, it appears unlikely that the second generation would. Nevertheless, there may be differences between the first and second generation. Figure 2.7 show that estimated relative wages are informative of relative productivity levels also for the second generation. There, workers are binned based on their average parental *TR* value. When I compare relative wages with marginal

products across groups, productivity moves more than one for one with wages.[56] Alternatively, comparing the ratios of relative productivity to relative wage across the groups, productivity for groups with low *TR* values is larger relative to wages compared to higher *TR* groups.[57] Overall, the evidence indicates that relative wages reflect relative productivity levels very well for both the first and second generation of migrants — if anything, productivity comparisons through wages could underestimate productivity differences. In a country such as Sweden, with strong social norms in favour of equality and a relatively compressed wage structure, it is perhaps not so surprising to find that high productivity workers are slightly underpaid from a pure productivity perspective.

[56]The statement is based on comparing productivity estimates with assumed perfect substitutability. The same is true for estimates based on imperfect substitutability if the reference group with the lowest *TR* value is included. For the second generation estimates, I prefer those where perfect substitutability is assumed for two reasons. Firstly, it makes less sense a priori to consider workers born in the same country, that have been through the same educational system, imperfect substitutes, than it does for first generation migrants originating in vastly different countries. Secondly, there are large differences in group sizes in the productivity estimation underlying the result presented here, stemming from four different groups of foreign born that are significantly larger than the second generation groups. These large differences in group size make estimated marginal products of the smallest groups (high and medium TR) very sensitive to small changes in the elasticity of substitution estimate.

[57]The latter statement is not true for estimates based on imperfect substitutability across groups, but all ratios are within one standard deviation of the productivity estimate for the high or med-high *TR* group (standard errors of productivity estimates are an order of magnitude larger than relative wage estimates), i.e. also in this case, I would not be able to reject the hypothesis that there is no systematic relationship between the ratio of estimated relative productivity and wages on the one hand, and *TR* values on the other.

Figure 2.7: Relative Marginal Productivities vs. Relative Wages



Notes: The figure shows relative marginal productivities and relative wages for groups of second generation migrants. Workers are binned based on the individual workers' average parental TR value. The rightmost group, with the lowest level of TR values, is the reference group. For each cluster of columns, the left and middle column show respectively the point estimate of relative marginal productivity assuming perfect substitutability and estimating the substitutability across groups of workers; the right column represent relative wages. The error bars represent 90 percent confidence intervals. Relative marginal products are calculated following the baseline specification, netting out educational differences based on predicted wages.

Appendix 2.B Determinants of Human Capital

2.B.1 Robustness Variations

Production Function Variations

Table 2.14: Country Characteristics and Human Capital Estimated with Imperfect Substitution and Education Layer in CES Aggregator

	(1)	(2)	(3)	(4)	(5)
H-W Ed. Quality	0.147**		-0.0148	-0.0175	0.0160
	(0.0718)		(0.0517)	(0.0541)	(0.0534)
Life Expect. at Birth	0.00909		0.00157	0.00106	-0.00182
	(0.00593)		(0.00495)	(0.00607)	(0.00526)
Fertility Rate	0.00520		0.00540	0.00536	0.00352
	(0.00573)		(0.00524)	(0.00524)	(0.00425)
Inglehart et al.'s		0.0934***	0.119***	0.119***	0.0856***
Cultural Factor 1		(0.0215)	(0.0296)	(0.0299)	(0.0244)
Inglehart et al.'s		0.0268	0.0223	0.0214	0.0139
Cultural Factor 2		(0.0199)	(0.0231)	(0.0246)	(0.0234)
Log GDP per Worker				0.00569	0.00556
				(0.0434)	(0.0439)
Incl. Av. Sample Characteristics	No	No	No	No	Yes
Observations	62	63	62	62	62
Adjusted R^2	0.225	0.439	0.431	0.421	0.565

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1, but with an educational layer added in the labor aggregator, which also allows for imperfect substitution across types. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Education quality is from Hanushek and Woessman (2012) and based on test score results from international assessments.

Table 2.15: Country Characteristics and Human Capital Estimated with Imperfect Substitution

	(1)	(2)	(3)	(4)	(5)
H-W Ed. Quality	0.277***		0.0891	0.0961	0.113
	(0.0681)		(0.0802)	(0.0877)	(0.0830)
Life Expect. at Birth	0.00217		-0.00780	-0.00649	-0.00879
	(0.00711)		(0.00813)	(0.00947)	(0.00902)
Fertility Rate	0.00462		0.00319	0.00331	0.00363
	(0.00655)		(0.00800)	(0.00796)	(0.00724)
Inglehart et al.'s		0.127***	0.126***	0.125***	0.115***
Cultural Factor 1		(0.0220)	(0.0360)	(0.0363)	(0.0354)
Inglehart et al.'s		0.0310	0.0362	0.0387	0.0370
Cultural Factor 2		(0.0222)	(0.0358)	(0.0383)	(0.0334)
Log GDP per Worker				-0.0145	0.0300
				(0.0616)	(0.0617)
Incl.Av. Sample	No	No	No	No	Yes
Observations	62	63	63	62	62
Adjusted R^2	0.340	0.460	0.478	0.479	0.510

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1 by nonlinear least squares, but allowing for imperfect substitution across types of labor. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.16: Human Capital and Country Characteristics, Labor Cost Based Factor Shares

	(1)	(2)	(3)	(4)
H-W Ed. Quality	0.194**		0.0168	0.00718
	(0.0767)		(0.0722)	(0.0759)
Life Expect. at Birth	-0.00500		-0.0154*	-0.0174**
	(0.00738)		(0.00800)	(0.00795)
Fertility Rate	-0.00524		-0.00687	-0.00693
	(0.00682)		(0.00913)	(0.00921)
Inglehart et al.'s		0.124***	0.118**	0.120**
Cultural Factor 1		(0.0212)	(0.0455)	(0.0489)
Inglehart et al.'s		0.00653	0.0387	0.0351
Cultural Factor 2		(0.0203)	(0.0281)	(0.0342)
Log GDP per Worker				0.0212
				(0.0722)
Observations	62	63	62	62
Adjusted R^2	0.258	0.371	0.392	0.383

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1 by nonlinear least squares, but fixing the labor share within each 3-digit industry based on the average fraction of labor costs to value-added within that industry. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.17: Human Capital and Country Characteristics, 2-digit Industry Spec. Factor Shares and OP Proxy

	(1)	(2)	(3)	(4)
H-W Ed. Quality	0.224***		0.0888	0.110
	(0.0643)		(0.0868)	(0.0860)
Life Expect. at Birth	0.00244		-0.00276	0.00175
	(0.00554)		(0.00786)	(0.00800)
Fertility Rate	0.0101		0.0121	0.0122
	(0.00670)		(0.00823)	(0.00806)
Inglehart et al.'s		0.0858***	0.112***	0.108***
Cultural Factor 1		(0.0247)	(0.0291)	(0.0269)
Inglehart et al.'s		0.0144	0.00851	0.0165
Cultural Factor 2		(0.0217)	(0.0364)	(0.0394)
Log GDP per Worker				-0.0471
				(0.0561)
Observations	62	63	62	62
Adjusted R^2	0.171	0.259	0.305	0.304

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1 by nonlinear least squares, and allowing parameters in the function proxying for unobserved productivity, as well as factor shares, to vary by 2-digit industry. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.18: Human Capital and Country Characteristics, Labor Cost Based Factor Shares

	(1)	(2)	(3)	(4)
H-W Ed. Quality	0.194**		0.0168	0.00718
	(0.0767)		(0.0722)	(0.0759)
Life Expect. at Birth	-0.00500		-0.0154*	-0.0174**
	(0.00738)		(0.00800)	(0.00795)
Fertility Rate	-0.00524		-0.00687	-0.00693
	(0.00682)		(0.00913)	(0.00921)
Inglehart et al.'s		0.124***	0.118**	0.120**
Cultural Factor 1		(0.0212)	(0.0455)	(0.0489)
Inglehart et al.'s		0.00653	0.0387	0.0351
Cultural Factor 2		(0.0203)	(0.0281)	(0.0342)
Log GDP per Worker				0.0212
				(0.0722)
Observations	62	63	62	62
Adjusted R^2	0.258	0.371	0.392	0.383

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1 by nonlinear least squares, but fixing the labor share within each 3-digit industry based on the average fraction of labor costs to value-added within that industry. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.19: Human Capital and Country Characteristics, Fixed Factor Shares

	(1)	(2)	(3)	(4)
H-W Ed. Quality	0.246*		-0.0498	-0.0379
	(0.145)		(0.157)	(0.159)
Life Expect. at Birth	-0.00240		-0.0109	-0.00837
	(0.0132)		(0.0171)	(0.0187)
Fertility Rate	-0.00226		0.00555	0.00563
	(0.0141)		(0.0154)	(0.0154)
Inglehart et al.'s		0.205***	0.269***	0.267***
Cultural Factor 1		(0.0440)	(0.0762)	(0.0754)
Inglehart et al.'s		-0.0262	-0.00412	0.000353
Cultural Factor 2		(0.0377)	(0.0622)	(0.0706)
Log GDP per Worker				-0.0262
				(0.123)
Observations	62	63	62	62
Adjusted R^2	0.100	0.310	0.315	0.304

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1 by nonlinear least squares with fixed CRS factor shares. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.20: Country Characteristics and Human Capital Estimated with Imperfect Substitution

	(1)	(2)	(3)	(4)	(5)
H-W Ed. Quality	0.277***		0.0891	0.0961	0.113
	(0.0681)		(0.0802)	(0.0877)	(0.0830)
Life Expect. at Birth	0.00217		-0.00780	-0.00649	-0.00879
	(0.00711)		(0.00813)	(0.00947)	(0.00902)
Fertility Rate	0.00462		0.00319	0.00331	0.00363
	(0.00655)		(0.00800)	(0.00796)	(0.00724)
Inglehart et al.'s		0.127***	0.126***	0.125***	0.115***
Cultural Factor 1		(0.0220)	(0.0360)	(0.0363)	(0.0354)
Inglehart et al.'s		0.0310	0.0362	0.0387	0.0370
Cultural Factor 2		(0.0222)	(0.0358)	(0.0383)	(0.0334)
Log GDP per Worker				-0.0145	0.0300
				(0.0616)	(0.0617)
Incl.Av. Sample	No	No	No	No	Yes
Observations	62	63	63	62	62
Adjusted R^2	0.340	0.460	0.478	0.479	0.510

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1 by nonlinear least squares, but allowing for imperfect substitution across types of labor. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.21: Human Capital and Country Characteristics, Translog Production

	(1)	(2)	(3)	(4)
H-W Ed. Quality	0.115***		0.0177	0.0141
	(0.0423)		(0.0398)	(0.0396)
Life Expect. at Birth	0.00861**		0.00411	0.00335
	(0.00378)		(0.00381)	(0.00431)
Fertility Rate	0.00759*		0.00813**	0.00811**
	(0.00391)		(0.00356)	(0.00357)
Inglehart et al.'s		0.0536***	0.0750***	0.0756***
Cultural Factor 1		(0.0128)	(0.0168)	(0.0169)
Inglehart et al.'s		0.0253*	0.0119	0.0106
Cultural Factor 2		(0.0129)	(0.0166)	(0.0177)
Log GDP per Worker				0.00788
				(0.0271)
Observations	62	63	62	62
Adjusted R^2	0.243	0.391	0.422	0.412

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating a translog production function. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.22: Estimates of the elasticity of substitution-parameter ρ across years (1 corresponds to perfect substitution).

	2008–2014	2008	2010	2012	2014
Estimated ρ	0.93	0.93	0.90	0.96	0.93

Table 2.23: Human Capital and Country Characteristics, Imp. Sub. Using Year with Lowest Estimated Elast. of Sub.

	(1)	(2)	(3)	(4)
H-W Ed. Quality	0.0795		-0.130	-0.146
	(0.0908)		(0.110)	(0.111)
Life Expect. at Birth	0.00684		-0.00896	-0.0123
	(0.00845)		(0.0113)	(0.0126)
Fertility Rate	-0.00562		-0.0118	-0.0119
	(0.00892)		(0.0109)	(0.0110)
Inglehart et al.'s		0.0973***	0.112***	0.114***
Cultural Factor 1		(0.0253)	(0.0384)	(0.0427)
Inglehart et al.'s		0.0420*	0.0734*	0.0675
Cultural Factor 2		(0.0225)	(0.0403)	(0.0457)
Log GDP per Worker				0.0346
				(0.0779)
Observations	62	63	62	62
Adjusted R^2	0.118	0.249	0.237	0.227

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1, but allowing for imperfect substitution across types of labor, and only using data for the year with the lowest estimated elasticity of substitution, 2010. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Education quality is from Hanushek and Woessman (2012) and based on test score results from international assessments.

Table 2.24: Labor Productivity and Individual Questions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Happiness	0.0137									
A008	(0.0609)									
Trust		-0.170*								
A165		(0.0892)								
Greater Respect for Authority			0.144***							0.139***
E018			(0.0489)							(0.0462)
Sign Petition				-0.0466						
E025				(0.0365)						
Importance of God					-0.00309					
F063					(0.0127)					
Justifiable: Homosexuality						0.00957				
F118						(0.00793)				
Justifiable: Abortion							0.0191			
F120							(0.0135)			
National Pride								-0.149***		
G006								(0.0556)		
Index: Post-Modernism									0.105	
Y002									(0.0691)	
Index: Autonomy	0.164***	0.109***	0.122***	0.142***	0.156***	0.138***	0.120***	0.202***	0.145***	0.108***
Y003	(0.0355)	(0.0335)	(0.0261)	(0.0340)	(0.0524)	(0.0375)	(0.0390)	(0.0333)	(0.0352)	(0.0245)
H-W Ed.	-0.00274	-0.0294	-0.0184	-0.0255	-0.00716	-0.0108	-0.0245	-0.0100	-0.00783	
Quality	(0.0311)	(0.0275)	(0.0220)	(0.0278)	(0.0366)	(0.0316)	(0.0287)	(0.0265)	(0.0315)	
Observations	63	63	63	62	62	61	62	63	63	63
Adjusted R^2	0.391	0.439	0.487	0.361	0.394	0.413	0.424	0.461	0.414	0.492

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable throughout is estimated country-specific labor productivities from estimating a translog production function by nonlinear least squares, with labor input as a nested CES aggregator over educational levels and countries of origin; independent variables are the individual questions that Inglehart and Welzel include in the factor analysis to construct the composite cultural measures TR and SS. Observations are weighted by the number of individuals they are based upon. Standard errors are clustered at the country level.

Alternative Country Characteristics

Several alternative country-of-origin characteristics without a direct logical link to transportable human capital have been tried. This is a response to seminar-demand; I consider it a betrayal of the identifying assumption.

Table 2.25: Human Capital, Cultural Factors, Educational Quality, and Country Characteristics from Sala-i-Martin (1997)

	Top 5	Var. 1-5	Var 6-10	Var. 11-15	Var. 16-20
Inglehart et al.'s	0.189**	0.187***	0.220***	0.170**	0.220***
Cultural Factor 1	(0.0704)	(0.0523)	(0.0628)	(0.0641)	(0.0694)
Inglehart et al.'s	0.0959	0.112**	0.0620	0.0257	0.0643
Cultural Factor 2	(0.0588)	(0.0538)	(0.0567)	(0.0744)	(0.0625)
H-W Ed.	0.0360	0.0784	-0.0913	0.00774	0.00763
Qual.	(0.101)	(0.131)	(0.140)	(0.164)	(0.111)
Observations	41	46	42	42	44
Adjusted R^2	0.650	0.598	0.592	0.549	0.588

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.26: Human Capital, Cultural Factors, Educational Quality, and Country Characteristics from Sala-i-Martin (1997)

	Var. 21–25	Var. 26–30	Var. 31–35	Var. 36–40	Var. 41–45
Inglehart et al.'s	0.227***	0.141**	0.153**	0.112**	0.179**
Cultural Factor 1	(0.0587)	(0.0633)	(0.0737)	(0.0535)	(0.0715)
Inglehart et al.'s	0.0544	-0.00694	0.0848	0.0601	0.153***
Cultural Factor 2	(0.0540)	(0.0585)	(0.0566)	(0.0437)	(0.0489)
H-W Ed.	0.141	0.0434	-0.0292	-0.0643	0.154
Quality	(0.109)	(0.116)	(0.0997)	(0.101)	(0.134)
Observations	44	45	47	46	36
Adjusted R^2	0.532	0.500	0.588	0.649	0.558

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.27: Human Capital, Cultural Factors, Educational Quality, and Country Characteristics from Sala-i-Martin (1997)

	Var. 46–50	Var. 51–56	Var. 57–61
Inglehart et al.'s	0.194**	0.164***	0.200***
Cultural Factor 1	(0.0850)	(0.0588)	(0.0638)
Inglehart et al.'s	-0.000127	0.105**	0.0452
Cultural Factor 2	(0.0719)	(0.0484)	(0.0602)
H-W Ed.	-0.0482	0.0160	-0.0110
Quality	(0.174)	(0.0838)	(0.117)
Observations	40	50	47
Adjusted R^2	0.501	0.597	0.516

Ordinary least squares. Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Variations in Underlying Data

Here, I present regression tables where human capital is estimated based on alternative data choices,

Table 2.28: Country Characteristics and Human Capital Estimated Excl. Migrants Arriving < 18

	(1)	(2)	(3)	(4)
H-W Ed. Quality	0.449***		0.181	0.148
	(0.107)		(0.136)	(0.137)
Life Expect. at Birth	0.0112		-0.00285	-0.00985
	(0.00901)		(0.0128)	(0.0113)
Fertility Rate	0.0145		0.0139	0.0136
	(0.00987)		(0.0145)	(0.0144)
Inglehart et al.'s		0.189***	0.191***	0.197***
Cultural Factor 1		(0.0338)	(0.0491)	(0.0555)
Inglehart et al.'s		0.0608**	0.0465	0.0340
Cultural Factor 2		(0.0298)	(0.0604)	(0.0680)
Log GDP per Worker				0.0732
				(0.109)
Observations	62	63	62	62
Adjusted R^2	0.386	0.513	0.537	0.538

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1, but excluding individuals who arrived in Sweden at an age of 17 or younger. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.29: Country Characteristics and Human Capital Estimated Excl. Majority Sweden Educ.

	(1)	(2)	(3)	(4)
H-W Ed. Quality	0.379***		0.127	0.121
	(0.0927)		(0.116)	(0.116)
Life Expect. at Birth	0.00752		-0.00700	-0.00820
	(0.00781)		(0.0106)	(0.0100)
Fertility Rate	0.0108		0.00874	0.00870
	(0.00884)		(0.0120)	(0.0120)
Inglehart et al.'s		0.163***	0.170***	0.171***
Cultural Factor 1		(0.0293)	(0.0426)	(0.0453)
Inglehart et al.'s		0.0531**	0.0534	0.0513
Cultural Factor 2		(0.0255)	(0.0495)	(0.0556)
Log GDP per Worker				0.0125
				(0.0848)
Observations	62	63	62	62
Adjusted R^2	0.364	0.512	0.536	0.528

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1 by nonlinear least squares, excluding individuals who undertook a majority of their schooling in Sweden. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.30: Human Capital and Country Characteristics, Excluding Nordic Countries

	(1)	(2)	(3)	(4)
H-W Ed. Quality	0.262***		0.168	0.172
	(0.0976)		(0.109)	(0.113)
Life Expect. at Birth	-0.00165		-0.00205	-0.00130
	(0.00724)		(0.0109)	(0.0111)
Fertility Rate	0.00417		0.0105	0.0105
	(0.00811)		(0.0105)	(0.0106)
Inglehart et al.'s		0.131***	0.124**	0.123**
Cultural Factor 1		(0.0286)	(0.0495)	(0.0519)
Inglehart et al.'s		0.0185	0.00571	0.00630
Cultural Factor 2		(0.0289)	(0.0542)	(0.0567)
Log GDP per Worker				-0.00753
				(0.0763)
Observations	58	59	58	58
Adjusted R^2	0.197	0.250	0.282	0.268

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Table 2.31: Human Capital and Country Characteristics, Using Total Assets as Capital

	(1)	(2)	(3)	(4)
H-W Ed. Quality	0.215**		0.0956	0.105
	(0.0851)		(0.0942)	(0.0945)
Life Expect. at Birth	0.00531		0.00434	0.00635
	(0.00726)		(0.00851)	(0.00961)
Fertility Rate	0.0119		0.0180**	0.0180**
	(0.00752)		(0.00878)	(0.00879)
Inglehart et al.'s		0.0922***	0.128***	0.127***
Cultural Factor 1		(0.0291)	(0.0365)	(0.0364)
Inglehart et al.'s		0.00291	-0.0208	-0.0173
Cultural Factor 2		(0.0285)	(0.0358)	(0.0387)
Log GDP per Worker				-0.0209
				(0.0590)
Observations	62	63	62	62
Adjusted R^2	0.109	0.193	0.237	0.225

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating equation 1.1 by nonlinear least squares, but with total assets as the measure of capital instead of fixed assets. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Individual Questions

Table 2.32: Human Capital and Cultural Traits

	(1)	(2)	(3)	(4)	(5)	(6)
Inglehart et al.'s	0.143***	0.158***	0.1000**	0.163***	0.160***	0.126*
Cultural Factor 1	(0.0244)	(0.0464)	(0.0413)	(0.0277)	(0.0324)	(0.0711)
Inglehart et al.'s	0.0385					0.0412
Cultural Factor 2	(0.0263)					(0.0472)
Belief in Hell		-0.0168				0.0225
		(0.145)				(0.144)
Attitudes Towards Cooperation			0.306*			0.266
			(0.161)			(0.225)
Attitudes Towards the Market				0.000414		0.00622
				(0.0371)		(0.0500)
Attitudes Towards Thriftiness					0.00552	-0.0580
					(0.0366)	(0.0552)
Observations	63	61	63	62	63	61
Adjusted R^2	0.483	0.460	0.492	0.463	0.463	0.470

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$ from equation 1.1. Belief in Hell is the average response to a yes/no-question. The *attitudes towards*-questions are, in order of appearance in row 4–6, the fraction of respondents who say that *most people can be trusted* as opposed to *you cannot be too careful*; the average agreement with *private ownership of business should be increased* as opposed to *government ownership of business should be increased*; the average agreement with *People should take more responsibility to provide for themselves* vs. *The government should take more responsibility to provide for people*. The last two variables are both coded so that a high value reflect a more market- and less government-friendly attitude. Cultural factors 1 and 2 are the top two factors from a factor analysis on a set of answers to WVS questions, following Inglehart, Welzel, and Baker; see e.g. Inglehart and Baker (2000).

Table 2.33: Labor Productivity and Cultural Values

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Happiness	-0.0361									
(A008)	(0.138)									
Trust		0.498***								
(A165)		(0.144)								
Greater Respect for Authority			-0.315***							
(E018)			(0.0989)							
Sign Petition				-0.129						
(E025)				(0.0886)						
Importance of God					-0.0556**					
(F063)					(0.0215)					
Justifiable: Homosexuality						0.0337**				
(F118)						(0.0155)				
Justifiable: Abortion							0.0586**			
(F120)							(0.0226)			
National Pride								0.0332		
(G006)								(0.0982)		
Post-Materialism									0.274	
(Y002)									(0.175)	
Autonomy										0.275***
(Y003)										(0.0817)
H-W Ed.	0.277***	0.104	0.189***	0.169**	0.107	0.195***	0.129	0.275***	0.236***	0.108*
Quality	(0.0546)	(0.0718)	(0.0506)	(0.0651)	(0.0805)	(0.0608)	(0.0787)	(0.0569)	(0.0528)	(0.0640)
Observations	63	63	63	62	62	61	62	63	63	63
Adjusted R^2	0.331	0.459	0.440	0.318	0.427	0.395	0.422	0.331	0.367	0.460

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable throughout is estimated country-specific labor productivities, the δ_cs from estimating equation 1.1 by NLS; independent variables are the individual questions that are included in the factor analysis to construct the composite cultural measures. Observations are weighted by the number of individuals they are based upon.

Table 2.34: Labor Productivity and Questions Underlying TR and SS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Happiness	0.0136									
A008	(0.0775)									
Trust		-0.285***								
A165		(0.0753)								
Greater Respect for Authority			0.198***							
E018			(0.0517)							
Sign Petition				-0.0847*						
E025				(0.0448)						
Importance of God					-0.0274***					
F063					(0.00955)					
Justifiable: Homosexuality						0.0224***				
F118						(0.00762)				
Justifiable: Abortion							0.0371***			
F120							(0.0115)			
National Pride								-0.0339		
G006								(0.0688)		
Index: Post-Modernism									0.194**	
Y002									(0.0800)	
Index: Autonomy										0.164***
Y003										(0.0349)
H-W Ed.	0.0984***	-0.00176	0.0412*	0.0352	0.0132	0.0420	0.00291	0.102**	0.0678**	-0.00326
Quality	(0.0362)	(0.0318)	(0.0246)	(0.0312)	(0.0428)	(0.0294)	(0.0324)	(0.0392)	(0.0297)	(0.0301)
Observations	63	63	63	62	62	61	62	63	63	63
Adjusted R^2	0.181	0.383	0.390	0.209	0.294	0.313	0.357	0.185	0.271	0.400

Ordinary least squares. Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable throughout is estimated country-specific labor productivities from estimating a translog production function by nonlinear least squares, with labor input as a nested CES aggregator over educational levels and countries of origin; independent variables are the individual questions that Inglehart and Welzel include in the factor analysis to construct the composite cultural measures TR and SS. Observations are weighted by the number of individuals they are based upon. Standard errors are clustered at the country level.

Table 2.35: Selected Underlying WVS Questions by Leaps and Bounds Algorithm

Number of Variables	Selected Predictors									
1	A165									
2	Y003	E018								
3	Y003	E025	E018							
4	Y003	E025	F118	E018						
5	Y003	E025	F118	E018	A165					
6	Y003	E025	F063	F118	E018	A165				
7	Y003	A008	E025	F063	F118	E018	A165			
8	Y003	A008	E025	F063	F118	E018	Y002	A165		
9	Y003	A008	F120	E025	F063	F118	E018	Y002	A165	
10	Y003	A008	F120	E025	G006	F063	F118	E018	Y002	A165

2.B.2 External Relevance

Non-Swedish Evidence

Section 2.2.6 presents results based in data from IPUMS International. Here, I show the analogous results using U.S. census data, via Schoellman (2012), and ESS data for European countries. For the latter, there are few individuals per country for many of the origins, making the approach specified by 2.3 untenable. Therefore, for the ESS data, I estimate Mincerian regressions on the form of Equation 2.6, where I directly include country of origin characteristics CC_k, which is statistically more efficient than the "two-stage" approach. The characteristics I include are cultural values and educational quality.

$$ln(w_{h,o,i}) = \alpha_h + \beta_h Ed_{h,o,i} + \mathbb{1}(o \neq h)(\delta_1 CC_{1,o,i} + ... + \delta_N CC_N^{o,i}) + \gamma X_{h,o,i} + \varepsilon_{h,o,i}. \tag{2.6}$$

There are some downsides to the ESS data — the sample sizes are small and the only included income measure is total family income. I estimate Equation 2.6 and present the results in Table 2.36. I split the sample in two separate ways. Firstly, because the income measure is at the family level, I look separately at a subsample consisting of only non-married individuals in columns 1 and 2, so that the income is attributable to the worker for which I have country of birth data. Secondly, as the main purpose of the exercise is to study also the impact of cultural values in countries culturally distinct from Sweden, in Column 2 and 4, I restrict the sample from all 30 countries in the ESS (except Sweden, which I never include) to countries with a TR-value below the global average. This leaves Cyprus, Hungary, Ireland, Poland, Portugal, and Turkey. Albeit quantitatively somewhat weaker than in the Swedish data (perhaps due to the imprecision brought about by the income measure), the qualitative pattern remains the same,

and restricting attention to the more "traditional" countries if anything strengthens the relationship quantitatively.

Table 2.36: Income and Country of Origin Characteristics

	(1) Non-Mar, Full	(2) Non-Mar, $TR_h < 0$	(3) Incl. Mar, Full	(4) Incl. Mar, $TR_h < 0$
H-W Ed.	0.00874	-0.00727	0.00875**	-0.00646
Quality	(0.00666)	(0.0106)	(0.00392)	(0.0127)
TR	0.0427*	0.0758**	0.0539***	0.0872**
	(0.0230)	(0.0333)	(0.0154)	(0.0328)
SS	0.0460**	0.0889***	0.0640***	0.0739***
	(0.0194)	(0.0263)	(0.0135)	(0.0237)
Observations	16726	1732	35212	4103
Adjusted R^2	0.194	0.218	0.253	0.263

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable throughout is total family income (the only available income variable in the ESS). TR and SS are the two cultural measures constructed by running a factor analysis over a set of questions, following Inglehart and Baker (2000); H-W Educational Quality is a measure from Hanushek and Woessman (2009). Standard errors are clustered at the country of origin level.

Finally, I take advantage of work done by Schoellman (2012) who looks at the relationship between quality of schooling across countries and how that help explain different returns to education for migrants in the United States (a country characterised by significantly more traditional values than Sweden, as measured by a TR-value close to the global average). For this purpose, Schoellman calculates country specific returns to education.[58] Column 1 in Table 2.37 shows the result of regressing the returns to education from table A1 in Schoellman (2012) on data on educational quality compiled by Hanushek and Woessmann (2012). The positive and significant coefficient on educational quality corresponds to the positive slope of the linear fit in figure 1(b) of Schoellman (2012).[59] In the second column of Table 2.37, I add the *TR* and *SS* cultural measures based on WVS data (exchanging *TR* and *SS* for the measures of autonomy and trust yields similar results). Reassuringly, the result here mirrors that in Table 2.4 above — cultural

[58]This is an intermediate purpose. Schoellman's ultimate purpose is to look at how much of income disparities across countries that can be explained by human capital differences.

[59]The first column in Table 2.37, and other versions is essentially Schoellman's empirical support for that differential returns to education reflect differences in educational quality.

values are positively and significantly related to returns to education while the coefficient on educational quality is insignificant (and here even turns negative) once the cultural measures are included.

Table 2.37: Country of Origin Specific Returns to Education and Country Characteristics

	(1)	(2)	(3)
H-W Ed.	0.0188***		-0.00626
Qual.	(0.00539)		(0.00954)
TR		0.0145***	0.0176***
		(0.00256)	(0.00516)
SS		0.0141***	0.0153***
		(0.00218)	(0.00285)
Observations	59	59	59
Adjusted R^2	0.235	0.528	0.529

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable is returns to education from table A1 in Schoellman (2012). H-W Cognitive is the main measure of educational quality in Hanushek and Woessman (2009). TR and SS are the two cultural measures as constructed by Inglehart and Baker (2000) or Inglehart and Welzel (2005).

Table 2.38: Country Characteristics and Human Capital for Workers with a High Level of Customer-Facing Intensity Estimated Controlling for Within-Firm Cultural Dispersion

	(1)	(2)	(3)	(4)
H-W Educ. Quality	0.286***		0.0528	0.0323
	(0.0908)		(0.104)	(0.117)
Life Expect. at Birth	-0.0103		-0.0229**	-0.0269**
	(0.0113)		(0.00987)	(0.0130)
Fertility Rate	-0.00549		-0.00621	-0.00632
	(0.00926)		(0.00864)	(0.00905)
Inglehart et al.'s		0.158***	0.160***	0.165***
Cultural Factor 1		(0.0328)	(0.0436)	(0.0474)
Inglehart et al.'s		0.0141	0.0551	0.0438
Cultural Factor 2		(0.0351)	(0.0417)	(0.0450)
Log GDP per Worker				0.0489
				(0.0801)
Observations	62	63	62	62
Adjusted R^2	0.226	0.329	0.365	0.358

Ordinary least squares. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable throughout is the human capital measure across countries, $\hat{\delta}_c$, retrieved from estimating a modified version of equation 1.1 by nonlinear least squares. The modification is to distinguish labor types by customer-facing intensity (results here are for a high level), as well as birth country, and controlling for within-firm cultural dispersion. Independent variables included are those with the strongest predictive power from each respective categories of health and fertility, education, and cultural values. The *Cultural Factor* 1 and 2 are the two top factors from running a factor analysis on a set of questions in the *WVS*, following Inglehart, Welzel, and Baker. See e.g. Inglehart and Baker (2000); they label the factors *Traditional vs. Secular-Rational* and *Survival vs. Self-Expression*. Data on health and fertility measures are from the *World Bank Development Indicators*. Educational quality is from Hanushek and Woessman (2012).

Chapter 3

Cross-Country Differences in Preferences for Leisure

3.1 Introduction

The time-series macro literature has recently devoted substantial attention to the variation over time in the labor wedge as a measure of labor market frictions. This paper instead focuses on the cross-sectional variation in the labor wedge and documents significant differences. Quantified in terms of hours supplied, the necessary adjustment to reach a labor wedge that is constant across countries, ranges from a 54% decrease (1,073 yearly hours) in labor supply for Hungary, to a 33% and 31% increase for the Netherlands and Switzerland (464 and 517 hours per year respectively).

The substantial labor-wedge variation naturally raises the question of what lies behind. I try a long list of potential explanatory factors that the literature has suggested as important for labor market frictions, but make little progress with these alternatives. What is found to be more successful, is widening the scope of potential institutional explanations, to include also the slow-moving institutions

that are cultural values.[1] A cultural variable from the WVS improves significantly on the explained variation, and is by far the most robust explanatory factor.[2]

Interpreted as partly reflecting differences in preferences, the individual country results are sharply at odds with what is popularly believed and generally reflected in the media.[3] For example, the cultural interpretation of labor wedge differences, *after controlling for for typical measures of labor market frictions*, imply that Greece and Italy have a markedly weaker preference for leisure than northern and western European countries such as the Netherlands, Ireland, and Sweden, with Germany falling somewhere in between the northern/western and southern European countries.[4] Moreover, in contrast to conventional wisdom, the United States exhibits a relatively strong preference for leisure.

To further test my cultural interpretation of that (part of) the cross-sectional labor-wedge variation reflects differences in preferences, I turn to U.S. micro-level data. As suggested by previous work, individuals' attitudes are shaped by their contemporaneous environment and by cultural beliefs and values passed down by previous generations.[5] Within the United States, second and successive generations of immigrants share the contemporaneous, first component. They do, however, differ in the dimension of beliefs and values that are passed down. Since such influences are determined at a considerable temporal as well as spatial distance, these preferences are unlikely to be affected by current economic and institutional

[1] Roland (2004) refers to cultural values as "a prime example of slow-moving institutions".

[2] I use the question that comes closest to asking individuals about their relative labor/leisure preference. The question is C041 from the World Values Survey: *Do you agree or disagree with the following statement? Work should always come first, even if it means less spare time.*

[3] Beliefs concerning labor/leisure preferences may have a considerable impact on international cooperation. The rhetoric used during the euro crisis provides some recent suggestive evidence that cultural beliefs may influence political outcomes. See for example *The Economist*, June 15th 2013: "The second reason for Germany's reluctance to lead is the belief that the ultimate cause of the euro-zone crisis is the laziness of southern Europeans." In other domains, there is actual evidence of cross-country beliefs affecting economic outcomes. For example, Guiso, Sapienza, and Zingales (2009) show that beliefs regarding trustworthiness can affect international trade.

[4] The measures of labor market frictions include, but are not limited to, unionization, employment protection, employment/population-ratios, tax avoidance, unemployment, and unemployment benefits.

[5] Examples include Dohmen et al. (2012); Bisin and Verdier (2001); Bisin, Topa, and Verdier (2004); Guiso, Sapienza, and Zingales (2008); and Algan and Cahuc (2010).

factors. I exploit this inherited cultural component by assigning individuals the preference for leisure measure associated with their stated country of ancestry. Reassuringly, in reduced-form regressions of individuals' labor supply, this preference measure does exhibit statistically significant explanatory power. In the United States, descendants immigrants from countries with a weaker preference for leisure tend to work more hours, in line with the suggested interpretation of the model's measure as capturing some underlying difference in actual preferences. The same results hold true when looking at children of migrants in Sweden.[6]

Finally, the paper conducts an "out of sample" test by asking the question of what differences in preferences for leisure theoretically imply for cross-country differences in the level of labor taxation, and whether this prediction, together with the differences in preferences suggested by the documented labor wedge variation, line up with the observed empirical relationship. Theoretically, a stronger preference for leisure implies a lower optimal level of labor taxation. The reason for this negative relationship is that a stronger preference for leisure is associated with a larger elasticity of labor supply to taxation, and labor taxes therefore result in greater distortionary effects when preferences for leisure are strong. Empirical data verify the relationship between labor taxation and labor-wedge differences; taxes are significantly and negatively correlated with a larger labor wedge, also after controlling for total government spending and a number of labor market indicators.[7]

This paper does not in any way argue that tax rates, productivity changes, and institutional factors are not important for influencing labor supply decisions. It is reasonable to assume that differences in preferences across countries change very slowly, so that as a factor, preferences really cannot explain the variations in labor supply observed over the last half century. However, responses to policy

[6] I have verified this, although the current draft does not include the actual results; a next draft of the paper will include them.

[7] Furthermore, the choice of lower labor taxes in the face of a more elastic labor supply can be interpreted as suggestive evidence of the responsiveness of policy choices to underlying cultural differences. Ignoring this responsiveness would lead to an underestimation of taxation's distortionary effects in a cross-country setting.

changes and institutional design look different if preferences for leisure are allowed to vary, as does optimal policy prescriptions. If taxes are high in certain countries because they can be (because they are less distortionary), then assessing distortionary effects from cross-country data, while ignoring cross-country differences in preferences, would underestimate the distortionary effects of labor taxation.

So far, this introductory discussion has used the term "culture" without offering a more precise definition, and at times has used "culture" interchangeably with "preferences." Throughout the analysis, I follow Guiso, Sapienza, and Zingales (2006) and define "culture" as *those values and beliefs that are passed down fairly unchanged from generation to generation.* Cultural values are part of the deep mental programming shaping the lens through which people view themselves and their surrounding environment, and how people act in that environment. For my analysis, key in this definition is the *persistence* — that *those values and beliefs* are not a continuously updated best-response to a changing environment, but remain *fairly unchanged*, both over time, and as people migrate.

Relation to the literature This paper is related to at least three different fields in the economics literature. The first is the strand of the empirical business cycle literature that studies labor market frictions over time by backing out a labor wedge from a representative-agent model; this is technically identical to backing out a labor wedge for the purpose of studying cross-sectional variation. Chari, Kehoe, and McGrattan (2007), using a model nesting the one used here, show that time fluctuations in output, labor, investment, and government consumption can be characterised by fluctuations in corresponding output, labor, investment, and government consumption "wedges", and that any friction used in this model can be expressed as a combination of these wedges. Shimer (2009) uses a similar accounting exercise to back out a labor wedge in a representative-agent model.[8]

[8]There is a large literature investigating various angles of labor wedge fluctuations or differences. Examples include Karabarbounis (2014) who looks at a wider sample of different countries, and the relative contributions of the the marginal productivity of labor and the marginal rate of substitution; Mulligan (2002) documents movements in the U.S. labor wedge for the 1896–1996 period; Hall (1997) studies time allocation over time and, distinguishing between intertemporal and atemporal driving forces, attributes most of the changes to the atemporal

In this paper, potential between-country differences in the labor wedge, using the terminology of Chari, Kehoe, and McGrattan (2007) or Shimer (2009), would be observationally equivalent to differences in the model's relative preference for leisure. If those labor-wedge differences where unrelated to differences in preferences, one would expect the measure to be more strongly correlated with a host of labor market indicators than with a survey-based measure of preferences, while, as previewed above, I obtain the opposite result.

The second concerns the general importance of culture, particularly for outcomes and choices in the labor market. Closely related to this paper, Mocan and Pogorelova (2015) employ data from the European Social Survey (ESS) on the labor supply decisions of second-generation immigrants to investigate the effects of taxes and a cultural "taste for leisure" on labor supply decisions, and find that both factors have an impact. Moriconi and Peri (2015), also using ESS data and a similar approach, find evidence that country-specific labor-leisure preferences explain a non-negligible share of variation in employment rates across countries. Also studying second-generation immigrants, but using U.S. Census data, Fernández (2007) and Fernández and Fogli (2009) show that culture has a significant impact on female labor supply decisions and fertility behavior; Alesina, Giuliano, and Nunn (2013) traces the origins of gender roles back to traditional agricultural practices. Also Giavazzi, Schiantarelli, and Serafinelli (2013) find an impact of cultural traits on female employment rates and for hours worked; they try to exploit changes in cultural traits over time, and between countries to avoid the issue of attitudes responding to economic and institutional conditions. Eugster et al. (2017) look at the impact of culture on unemployment spells by exploiting a swiss language border between Romance and German speakers, that does not follow political or labor market borders. They find that Romance speakers' job search lasts for 22 percent longer that the German speakers. Becker and Woessman (2009) rejects the Weberian hypothesis of a Protestant work ethic

effects of preference shifts; Jermann and Quadrini (2012), and Arellano, Bai, and Kehoe (2012) study labor wedges as arising from firm-level financial frictions.

having spurred economic prosperity in (north)western Europe. Instead, they argue that education promoted the growth of human capital and prosperity. Since this educational channel was the result of Protestantism, with its instruction to read the Bible first-hand promoting literacy, the importance of culture as such is not rejected.[9] The positive impact of Protestantism on economic progress through an educational channel is also one of two cultural characteristics emphasised by Landes (1998).[10] Another paper closely related to this paper is Falk et al. (2015) who documents significant cross-country differences for six different types of preferences (none of which are preferences for leisure), and show that these differences in preferences have predictive power for numerous aggregate- and individual-level outcomes. Falk et al. (2015) also share this paper's agnostic approach towards exactly what drives a certain cultural characteristic in a given country; this agnosticism is in contrast to many other papers related to culture that test a specific hypothesis. For example, Becker and Woessman (2009) test whether Protestantism is a driving force of longer work-hours. Good literature reviews of the impact of culture are given by Guiso, Sapienza, and Zingales (2006), and Fernández (2011).

Third, over the last decade, a growing body of literature has attempted to tackle the issue of cross-country differences in labor supply. Prescott (2004) argues that differences in labor supply between the United States and the European G7-countries stem solely from variations in taxation. Rogerson (2006) suggests that taxes and productivity changes together can explain the changing patterns in hours worked across countries. Rogerson (2008) expands on this hypothesis by looking at sectoral data. He argues that the market service sector in Europe never expanded the way it did in the United States, due to the higher labor taxes in Europe. McDaniel (2011) and Rogerson (2008) both include home production in

[9]Botticini and Eckstein (2012) propose a similar channel for the economic success of Jews, as does Caicedo (2014) for various South American missions.

[10]The second one is the importance accorded to time, reflected in the production and purchases of clocks. My interpretation of this is as an emphasis on organizational efficiency and minimization of time waste. To the extent this is what Landes meant, it is not necessarily at odds with the findings of Becker and Woessman (2009), nor with this paper.

a model otherwise similar to the one used by Prescott (2004), and also attribute changes in hours worked to changes in taxes and productivity levels. Bick, Fuchs-Schündeln, and Lagakos (2016) abstract from policy differences, but study a much wider sample of countries. They find that the number of hours worked is higher in low-income countries than in high-income countries. Aguiar and Hurst (2007) document a significant increase in the number of leisure hours in the United States over the past two generations. A shared feature of these papers is a focus on the temporal aspect of conditions driving labor supply while preferences for leisure, among other things, are still assumed to be constant across countries.[11,12]

3.2 Cross-Sectional Labor-Wedge Differences

In this section, I set out the theoretical framework that lies behind the construction of either a (post-tax) labor wedge, or a model-based preference-for-leisure measure.

3.2.1 Theoretical Framework

Following, among others, Prescott (2004), Rogerson (2006, 2009), Shimer (2009), and Karabarbounis (2014), a representative household in country i solves the utility maximization problem,

$$\begin{aligned} &\max_{c_{i,t},h_{i,t}} \quad \sum_{t=0}^{\infty} ln(c_{i,t}) + \gamma_i \frac{(1-h_{i,t})^{1-\phi}}{1-\phi} \\ &s.t.\ (1+\tau^c_{i,t})c_{i,t} \leq (1-\tau^h_{i,t})w_{i,t}h_{i,t} + T_{i,t}, \ \ \forall t. \end{aligned} \tag{3.1}$$

[11] The one exception to the temporal focus is Bick, Fuchs-Schündeln, and Lagakos (2016), which looks mainly at the cross-sectional aspect of the data.

[12] In what is partly a response to Prescott (2004), Alesina, Glaeser, and Sacerdote (2005) show that a crucial assumption for Prescott's model to succeed in predicting changes in hours worked is a high labor supply elasticity, which is at odds with micro estimates. Instead, they emphasize institutional factors, such as trade union density and labor market regulations.

Here, c is consumption, h market hours worked, w is the price of labor, τ^c and τ^h are proportional taxes levied by the government, and T is unearned income. Note that "leisure", $1-h$, is any time not spent doing paid work in the labor market, i.e. it also includes home production.

The "tax wedge" in country i is defined as[13]

$$\tau_i \equiv \frac{\tau_i^h + \tau_i^c}{1+\tau_i^c}. \tag{3.2}$$

The first-order conditions for the representative agent problem give the optimality condition

$$\frac{\gamma_i}{(1-h_i)^\phi} = \frac{1}{c_i}(1-\tau_i)w_i, \tag{3.3}$$

where in optimum, the utility loss from working an additional unit ($LHS = -\frac{\partial u}{\partial h}$) has to be equal to the utility gain, meaning the additional consumption enabled by increasing the labor supply multiplied by the marginal utility of consumption ($RHS = \frac{\partial u}{\partial c} \cdot proceeds$).

A representative firm in country i chooses investment, I, and labor, h, to solve the dynamic profit-maximization problem[14]

$$\begin{aligned} &\max_{I_{i,t},h_{i,t}} \sum_{t=0}^{\infty} \beta^t [y_{i,t} - w_{i,t}h_{i,t} - I_{i,t}] \\ &with \;\; y_{i,t} = Ak_{i,t}^\theta h_{i,t}^{1-\theta} \;\; and \;\; k_{t+1} = (1-\delta)k_{i,t} + I_{i,t}. \end{aligned} \tag{3.4}$$

[13]Note that this tax wedge is different from the "labor wedge" mentioned above. This tax wedge is also different from what will be referred to as the "tax wedge" later on when discussing the data used. The OECD uses the term "labor tax wedge" to signal that it is a measure not only including labor taxes, but also other government-imposed costs that drive a wedge between the firm's cost of hiring a worker, and what the net pay the worker receives. This later OECD "labor-tax wedge" will not include the consumption tax, which is included in the theoretical version here in Equation 3.2.

[14]Using a model that is static on both the firm and worker side would not change any of the optimality conditions that I combine to get Equation 3.6 below. However, in a completely static setting, there is no reason for consumption to differ from the level of GDP. In the empirical implementation of Equation 3.6, the consumption to GDP-ratio is less than one. To keep the model consistent with this fact, I instead look at the steady state of the dynamic model presented here.

The firm's first-order condition with respect to labor demand, h, is

$$\frac{(1-\theta_i)y_i}{h_i} = w_i. \tag{3.5}$$

By assuming equilibrium in the labor market (short of the assumed labor wedge), adding the labor wedge $(1-\tilde{\tau}_i)$, rearranging Equation 3.3, and combining with Equation 3.5, I obtain the main theoretical relationship used in this paper:

$$\frac{\gamma_i}{(1-\tilde{\tau}_i)} = \frac{(1-h_i)^{\phi}}{h_i}\frac{y_i}{c_i}(1-\theta_i)(1-\tau_i). \tag{3.6}$$

The business cycle literature has used "accounting" approaches like this one, typically focusing on a single country over time. For example, Shimer (2009) backs out the labor wedge from Equation 3.6 over time, and interpret this as frictional changes. With preferences reasonably assumed to be constant at business-cycle frequencies, and only moving very slowly (if at all) over longer time spans, this appears to be a sensible approach.

There is, however, no contradiction between this standard labor-wedge literature interpretation and cross-country labor wedge differences at a given point in time being explained partly by differences in preferences. Equation 3.6 makes clear that allowing for a country-specific labor wedge is theoretically isomorphic to a country-specific preference for leisure. With data for hours worked, GDP, consumption, taxes, and the labor share, in a given country i, an implied preference for leisure, γ_i or labor wedge $(1-\tilde{\tau}_i)$, can be backed out.[15] In anticipation of my empirical results below, I focus on the intuition of this expression from the "preference perspective".

Ceteris paribus, a low model wage $(\frac{y(1-\theta)}{h})$ means that the representative agent needs a smaller reward for a given amount of work, which is indicative of a

[15]The way I have included the wedge implies that it appears in the household's optimality condition. This is in line with Karabarbuonis (2014) who finds that the household-side wedge is the more important one quantitatively.

weaker preference for leisure. In the same way, a high tax rate reduces both the pay-off from working more and the preference for leisure γ, indicative of the pay-off required to work more. If the agent spends a large share of his/her time endowment working, this choice decreases $(1-h)$, which is also associated with a weaker preference for leisure. The parameter γ is decreasing in consumption; if an agent in optimum consumes (relatively) more, it must be that s/he values consumption more highly relative to leisure. In the baseline version of the model, ϕ will be equal to 1, i.e. a log-log specification, following Prescott (2004).[16,17]

3.2.2 Data

The data needed to back out the labor wedge or γ_i from equation 3.6, are the consumption-to-GDP ratio, the tax rates on labor and consumption, the hours worked, and labor shares. To ensure that the cross-country comparisons are as strong as possible, all the data comes from the OECD Data Library.[18]

As the baseline model consumption, I will use what the OECD calls *Actual Individual Consumption* which includes tax revenues in the consumption figure.[19] Prescott (2004) assumes that public spending (with the exception of defence spending) substitutes one-to-one with private consumption. As pointed out by

[16]This parameter, together with γ, determines the labor supply elasticity, which has been subject to a great deal of debate. To avoid taking a stance on the magnitude of the labor supply elasticity, for robustness larger values of ϕ will also be considered. Using a value of 1 corresponds to a significantly higher wage elasticity of labor supply than is commonly found using micro data. The validity of these labor supply micro elasticity estimates in a macro environment have been questioned quite convincingly by Imai and Kean (2004), who show that macro labor supply elasticities would be significantly higher than micro elasticities if estimated in a model taking human capital accumulation into account.

[17]Potential cross-country differences in ϕ will be ignored. This is a limitation of the study; like γ, ϕ is a preference parameter, and may very well vary between countries. One reason for focusing on γ is that it is of first-order importance for consumption/labor-leisure trade-offs. This preference is something that it is possible to ask people about in a survey, which allows for comparisons. Trying to inquire about the curvature of individuals' utility function through a survey is more challenging.

[18]The OECD provides data on an annual basis. The model does not take a stance on data frequency. Given production plans and labor contracts, often including e.g. an annual number of vacation days, this appears a sensible frequency.

[19]"Actual individual consumption" (also called household actual final consumption) is the sum of the total value of household final consumption expenditure, non-profit institutions serving households (NPISHs) final consumption expenditure and government expenditure on individual consumption goods and services.

Alesina, Glaeser, and Sacerdote (2005), this assumption suppresses the income effect of taxes and therefore increases how tax changes alter the response in hours worked as measured in the model. It is reasonable to include taxes in the consumption figure to the extent by which the government eventually return tax revenues to consumers; since this extent is debatable, in Appendix 3.B, I consider what the OECD calls *Household Final Consumption*, which excludes government spending. In general, the results I obtain are stronger with this alternative version of household consumption.

For hours worked, I use the average annual hours worked per employed person. It is only those people who do work who actually receive wages and pay taxes, and it is for those working individuals for whom a labor–leisure trade-off, as phrased in the survey-based measure employed below, is the most relevant. In addition, whereas voluntary non-participation in the labor market is a choice, being unemployed (or a discouraged worker) is not, but would be treated as such with annual hours worked per working-age population as the measure of labor supply.[20] As such, annual hours worked per employed person may be more relevant for discovering differences in preferences related to culture than a measure also including involuntary and corner-solution non-employed individuals. However, for robustness, I also consider the preference for leisure calculated using average annual hours worked among people 15–64 years of age, taking into account the impact of unemployment and labor force participation on hours worked. Both measures adjust for the annual number of vacation days, holidays, and so on. This adjustment gives the actual number of hours worked, as opposed to measures based on hours worked in "a normal work week" that are sometimes used. The yearly time endowment (the "1" in equation 3.6) is set to 5,200 hours, or marginally above 14 hours per day.[21]

[20] Add to the unemployed and discouraged those individuals that are on sick leave, parental leave, in education, or early retirees, although they would rather work, and the proportions of voluntarily/involuntarily out of work is much less clear than it is by simply looking at the headline numbers of unemployment vs. out of the labor force.

[21] This is the same as Prescott (2004) who uses 100 hours per week, and very close to Wallenius' (2013) 14 hours per day.

The country-specific labor share is calculated by the OECD as total labor costs (adjusted for self-employment) divided by output.[22] The labor tax rate used will be the *marginal tax wedge* for an individual earning 100 percent of average annual income in a given OECD member nation.[23] Consumption tax rates are mainly based on government revenue in relation to annual average household consumption. Following Prescott (2004), the consumption tax is $\tau^c = \frac{Indirect\,taxes}{Indirect\,taxes + Household\,Consumption}$.[24]

The model's baseline version uses data from 2004. For robustness, I also consider the average over the years 2002–2007, where averages are calculated using as many years as possible given data availability for the individual countries.[25] Three main factors played a role in the timing decision. First, data should be available for as many OECD countries as possible.[26] Second, I have avoided time periods that are too close to peaks or troughs in the business cycle as this might skew the measured labor supply. Third, I have chosen time periods that coincide with time periods where data is available also for explanatory variables (measures of labor market frictions, institutions, and preferences). The baseline year of 2004 is one of the years for which the number of countries with available OECD data is maximized. Moreover, 2004 lies in the middle of the business cycle, between the inflection points of November 2001 and December 2007 as defined by National Bureau of Economic Research.[27] The 2002–2007 business cycle roughly coincide

[22]The common assumption to set the labor share to 0.67 across countries is a fairly poor approximation. The range is 0.42–0.76 and the standard deviation in this sample is 0.08.

[23]Here the term "wedge" is used by the OECD to indicate that the measure also includes for example social security contributions not paid by the employee. The marginal tax wedge is not just the marginal tax rate. The terminology may be somewhat confusing because the "tax wedge" defined in the previous section also includes consumption taxes, which are not included in this measure of the marginal tax wedge.

[24]An alternative approach would have been to follow Mendoza, Razin and Tesar (1994), who calculate the consumption tax as $\tau^c = \frac{5110 + 5121}{c + g - gw - 5110 - 5121}$ where c is household final consumption, g is government final consumption, and is gw government wages. In the OECD's terminology, 5110 is the code for *general taxes on goods and services*, and 5121 for *excise taxes*. The problem with these categories is that some observations for the countries considered in this paper are lost due to missing data, but this alternative approach has been briefly considered for robustness.

[25]These results are shown in Appendix 3.B; they are in line with those presented in section 3.4 of the main paper.

[26]"Available data" here refers not only to the data needed for calculating the model-based preference for leisure, but also to control variables in regressions below.

[27]According to the Economic Cycle Research Institute, also many European countries, e.g.

with the period in which the survey data was collected, which puts 2004 in the middle of also this period.

3.3 A Survey-Based Measure of Preferences for Leisure

To argue that the measure of culture described in section 3.2.1 captures actual underlying social differences, or alternatively that differences in underlying preferences are actually related to meaningful differences in macroeconomic outcomes, some other empirical measure of culture is needed for comparison. Direct quantitative measures of culture have typically been based on survey data from *The World Values Survey* (WVS), and *The European Values Study* (EVS). That is also what I will use. Unless otherwise noted, WVS will refer to both of these studies; as the survey questions are coordinated, they are essentially equivalent studies.[28] The WVS is a cross-country collaboration by social scientists, in which researchers interview a statistically representative sample in each participating country, asking them about a fairly wide range of topics, e.g. attitudes towards work, politics, religion, life experiences, etc. The WVS has been used quite widely in the economics literature over the last two decades (e.g. Alesina, Glaeser, and Sacerdote 2001; Algan and Cahuc 2010; Fernández 2007).

The WVS-question mainly used in this paper is question C041:

> *Do you agree or disagree with the following statement?*
> *Work should always come first, even if it means less spare time.*

The respondent answers by choosing a number from 1 to 5, where 1 corresponds to *Strongly agree* and 5 to *Strongly disagree*. The measure used is the arithmetic

Germany, France, Switzerland, and Austria, did indeed experience a marked downturn in economic activity around 2002, as did Mexico, Japan, and South Korea.

[28] In terms of questions, there are some differences between the two surveys, as well as some differences between each wave, and which countries within each wave that are asked a particular question. Here, only questions that are identical in the two studies are considered.

mean of responses for each country.[29] Quite a few other questions concern either the importance of hard work, of material well-being, or the importance of leisure time, but none of the other questions addresses their *relative* importance. The question I use is the one question that inquires about the relative importance of work and leisure within the same question.[30] To the extent that work is a means to an end, i.e. wage income is spent on consumption, the question is as close as the WVS gets to asking about individual's relative disutility of labor. Since I try to construct a survey analogue of γ_i, that is what I want. Question C041 also fulfils the necessary condition of data availability for the vast majority of OECD countries. The average country values of the survey-based measure can be seen in Table 3.7 or in Figure 3.3, where I plot the average country response to this question (henceforth referred to as "the survey-based measure", or "the WVS measure") against the country's model-based preference for leisure.[31]

3.4 Results

This section presents the main results of the paper. First, I investigate which country characteristics best explain the cross-country variation in the labor wedge. I document a robust relationship between the survey-based measure of preferences and the labor wedge. This in turn provides a preliminarily motivation to interpret labor-wedge differences as differences in a model-based measure of preferences for leisure at a macro level. Second, I present the raw empirical measures of preferences for leisure and explore what component(s) are driving differences in measured preferences for leisure across countries. Third, I verify that the mea-

[29] There are also the options of *Don't know*, or to not give an answer at all. These respondents are discarded. Typically, they amount to no more than 5 percent, and usually less.

[30] There is one exception to this statement, which is question C008. This asks the respondents to indicate from 1 to 5, whether *It's leisure that makes life worth living, not work* vs. *Work is what makes life worth living, not leisure*. The problem with this is that for the OECD countries in my sample, the question was only included in the WVS for about half of them.

[31] The question is included in wave four (1999–2004) and five (2005–2007) from the WVS and wave three (1999) and four (2008) from the EVS. The baseline takes the average country response over all available data for each country. Restricting the sample to the earlier waves yields similar results. Unfortunately, these two respective waves are the only ones in which this question is included.

sures of preferences for leisure have predictive power for labor supply choices for descendants of migrants in the United States.

3.4.1 Cross-Country Evidence

To investigate what country-characteristics that best explain differences in the labor wedge (or in preferences for leisure), I estimate equation 3.7 by ordinary least squares:

$$LaborWedge = \alpha + \beta X_i + \eta WVS_i + \varepsilon_i. \tag{3.7}$$

Here, the left-hand side is as defined above in the left-hand side of Equation 3.6. X_i is a vector of controls meant to capture labor market frictions and other heterogeneities; I discuss it in greater detail below. WVS is the World Values Survey-measure of culture, as defined in Section 3.3. ε_i is an unobserved error term. The results of the baseline regression are shown in Table 3.1. The correlation between the labor wedge (or the model-based measure of preferences) and the survey-based measure of preferences for leisure is remarkably robust. Note also that the point estimate of the coefficient on WVS is quite stable across all the specifications. This positive correlation is consistent with the hypothesis that there are meaningful differences in underlying preferences between countries, and that these differences actually have an impact on aggregate outcomes. Nations in which individuals indicate a relatively strong disagreement with putting work before leisure are also nations where the representative agent "reveals" a strong preference for leisure (a high γ).

As implied labor-wedge differences are normally interpreted as frictional differences, I include the standard measures thought to capture cross-country differences in labor market frictions: unemployment, unemployment benefits, employment protection laws, and unionization. There are various potential ways in which these variables affect the observed labor wedge or model-based measure of preferences (γ). Indeed, a large literature investigates how these variables impact

Table 3.1: Regression of the Model-Based Preference Parameter γ on Self-Reported Attitudes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
"Work Before Leisure"	0.440	0.316	0.375	0.380	0.344	0.381	0.372	0.349	0.297	0.326
	(5.18)	(2.79)	(3.09)	(3.32)	(2.58)	(2.81)	(2.63)	(2.22)	(2.20)	(2.89)
Emp/Population-Ratio		0.00787	0.00739	−0.00168	−0.00436	0.000457	0.000382	−0.0298	−0.0388	−0.0376
		(1.99)	(1.78)	(−0.36)	(−1.16)	(0.09)	(0.07)	(−1.25)	(−1.78)	(−1.59)
Union Membership Density			−0.00260	−0.00386	−0.00425	−0.00437	−0.00432	−0.00349	−0.00434	−0.00455
			(−0.86)	(−1.37)	(−1.69)	(−1.64)	(−1.56)	(−0.86)	(−1.12)	(−1.68)
Female Labor Participation				0.0100	0.0115	0.00689	0.00675	0.0363	0.0479	0.0444
				(2.51)	(3.51)	(1.19)	(1.27)	(1.72)	(2.32)	(2.06)
Unemployment					−0.0131	−0.0101	−0.0101	−0.0293	−0.0159	−0.00273
					(−1.68)	(−1.07)	(−1.06)	(−1.69)	(−0.94)	(−0.14)
Unemployment Benefits						0.423	0.421	0.461	0.327	0.457
						(1.42)	(1.37)	(1.45)	(0.91)	(1.11)
Tax Evasion							−0.00760	0.0417	0.215	0.262
							(−0.11)	(0.41)	(1.77)	(2.32)
Employment Protection								−0.0610	−0.0404	−0.0171
								(−0.84)	(−0.68)	(−0.26)
GDP/Cap, PPP									0.0221	0.0464
									(1.73)	(2.18)
GDP/Hour										−0.0119
										(−1.47)
Nordics	−0.0619	−0.166	−0.0311	0.0541	0.0818	0.0499	0.0549	0.0444	−0.0940	−0.0960
	(−0.75)	(−1.87)	(−0.18)	(0.31)	(0.54)	(0.30)	(0.28)	(0.18)	(−0.36)	(−0.44)
Observations	32	32	30	30	30	27	26	24	24	24
R^2	0.448	0.520	0.548	0.601	0.633	0.677	0.664	0.682	0.756	0.793
Adjusted R^2	0.410	0.469	0.475	0.518	0.538	0.558	0.506	0.477	0.569	0.603

t statistics in parentheses

Source: Author's calculations, based on data from the OECD and the WVS.
Notes: Dependent variable is the model-based preference for leisure measure as described in section 3.2.1. "Work Before Leisure" is the survey-based measure, calculated as the country average of the *World Values Survey* response to question c041, "Work should always come first, even if it means less spare time". Unemployment benefits are measured as the replacement ratio; tax evasion is taken from Buehn and Schneider (2012); employment protection is an index calculated by the OECD, including *individual and collective dismissal*.

labor market outcomes. One example is Wallenius (2013), who claims that 17–31 percent of the U.S./European difference in hours worked is explained by differences in social security programs. In the theoretical literature, unemployment insurance and other unemployment benefits (UI) are commonly assumed to decrease the labor supply, often through lower search efforts (Bailey, 1978; Chetty, 2006). The improved outside option that UI constitutes also leaves workers less afraid of losing their jobs and decreases incentives to put in effort while actually working, thereby enabling them to maintain a more lax attitude towards the importance of work. Differences in UI could therefore explain both differences in the model-based preference for leisure, and attitudes expressed in the WVS. Includ-

ing UI as a control, defined here as the replacement ratio, leaves the significant correlation between γ and WVS intact, as does including an additional control for total spending on unemployment as a percentage of a nation's GDP. Another study previously mentioned, is Alesina, Glaeser and Sacerdote (2005), who emphasize less unionization and less employment protection as two key reasons for why Americans work more than Europeans.

As the measure of hours worked only takes into account the intensive margin of labor supply, X_i includes both the female labor force participation rate, and the employment/population-ratio of country i (in a separate robustness check, I calculate the model-based preference based on hours worked per working-age population instead of per employed; the results hold — see Table 3.13). Differing proportions of households with one vs. two wage-earners might skew measured labor/leisure preferences. If, for example, the different self-reported attitudes to the importance of work is due to a higher prevalence of families with a single wage-earner, and this also increases the number of (market) hours worked by this single earner, the correlation could be due not to actually differing preferences, but rather to the division of labor within families (again, note that home production is included in the model's definition of leisure).[32] In line with this reasoning, female labor force participation is significantly positively correlated to γ in some of the specifications, but not throughout.

To the extent that people evade taxes, the OECD tax rates are a mismeasured version of the effective tax rates that workers face. This recognition motivates adding a control for tax evasion; the measure is taken from Buehn and Schneider (2012), who use a structural equation approach to calculate the level of tax evasion over time, across 38 countries.[33]

[32]With decreasing returns to hours spent in home production, having a spouse who has already put in a lot of home production hours will decrease the family's labor market participant's model-based value of "leisure", while the same spouse does not earn a wage acts to increase the value of monetary compensation.

[33]For consumption taxes this should be less of an issue as they are based on government tax revenues.

GDP per capita, purchasing power parity adjusted (PPP), and GDP per hour are also included as controls. If the model used to back out γ was a perfect depiction of the real world, γ would be describing the relative consumption/leisure preference for any income level. However, to the extent that the model is misspecified, e.g. that the functional form does not fully capture the decreasing marginal utility of consumption, one could argue that at higher levels of GDP, people can afford both to both work less, and to hold attitudes about work being less important.

The reason for including a Nordic dummy is, as argued by Rogerson (2003), that the Nordic countries subsidize labor force participation through transfer payments, e.g. through free daycare, which may make the single-good representative agent model that I use a relatively worse depiction of reality in the Nordic countries, than for most other countries. Excluding this dummy, or also including a dummy for Europe, does not alter the significant explanatory power of the survey-based measure of preferences for leisure. The regression table without the Nordics-dummy is shown in Appendix 3.B, Table 3.17.

Although it is comforting for the preference-interpretation that the explanatory power of the survey-based measure of preferences for leisure is very robust, it is difficult to claim that I have perfectly controlled for every conceivable factor.[34] Appendix 3.B.1 outlines an important robustness check where I instead exploit the labor wedge within-country time variation to construct the dependent variable. There, I allow the labor wedge level to differ across countries, and ask what implications misspecified preferences would have on fluctuations in the labor wedge. If it is the case that in reality, preferences are non-constant across countries, and a labor wedge is backed out under the assumption of constant preferences, then countries with a relatively strong preference for leisure will have a relatively depressed labor wedge difference over time.[35] The advantage of looking at implications for labor wedge fluctuations relative to the baseline approach is

[34]Simply using panel data with country fixed effects would not help as γ would be subsumed in the country fixed effect. This is clear by taking logs of Equation 3.6 and rearranging to get $ln(h) = ln(y) - ln(c) + ln(1-\theta) + ln(1-\tau) + \phi ln(1-h) - ln(\gamma)$

[35]I show this in Appendix 3.B.1, as the difference between equation 3.19 and 3.20.

that it, already theoretically, allows for cross-country level differences in the labor wedge. In line with non-constant preferences, the labor wedge spread turns out to be significantly and negatively correlated with the survey-based measure of preferences for leisure.[36]

While it is quite reassuring to note that the WVS coefficient is quantitatively robust as I add various controls, none of these added controls, or the other macro level robustness checks, improve on potential reverse causality issues. It is indeed conceivable that the economic circumstances influencing the implied γ (or labor wedge fluctuations) would also influence what attitudes towards work people report in a survey. Therefore, in section 3.4.3, I turn to micro data for descendants of immigrants to the United States. This is a group with a common contemporaneous environment and country of birth, so any influence from an individual's country of origin can reasonably be assumed to reflect beliefs and values transmitted through their parents, grandparents, and so on, i.e. these attitudes reflect a cultural channel.

Additional Robustness Experiments

This section briefly outlines the robustness checks carried out; Appendix 3.B supplies the details. Since the preliminary evidence points towards the preference interpretation of the left-hand side of Equation 3.6, the point of departure of the experiments is to investigate the robustness of the preference interpretation. I therefore refer to what could a priori be capturing differences in preferences as well as labor market frictions

Theoretical Framework

The theoretical framework was chosen to closely follow the existing related macroeconomic literature, but I have considered a number of alternative specifications.

[36] See Table 3.11.

Within the class specified in equation 3.2, the baseline log-log specification ($\phi = 1$) implies a relatively high labor supply elasticity. Results are robust to higher values; Table 3.9 in Appendix 3.B shows the results of performing same regression shown in Table 3.1, but with $\phi = 3$. With typical values for other variables, this corresponds to a Hicksian labor supply elasticity of roughly 0.5, which is in line with both micro and macro estimates (see e.g. Chetty [2012]). Furthermore, I have also considered a wider range of values for ϕ, as well as utility functions of CES-type, of the type outlined by Greenwood Hercowitz, and Huffman (1988), and of the type suggested by MaCurdy (1981). The backed-out preference parameter is strongly correlated to the baseline specification under all of the alternative functional form-assumptions, ranging from 0.82–0.96, and the preference ordering across countries changes little. The *labor wedge fluctuations under misspecified preferences* robustness check mentioned above is another robustness check based on a different theoretical experiment. It is also presented in more detail in Appendix 3.B.

In a final variation on the theoretical framework I follow Bick, Fuchs-Schündeln, and Lagakos (2016), and Ohanian, Rafflo, and Rogerson (2008), and include a subsistence level of consumption in the representative agent's utility function. The results hold; they are presented in Table 3.10.

Data Used

The preference parameter γ is a function of variables, some of which have more than one reasonable counterpart in the actual data. Perhaps most importantly, I have considered calculating γ based on hours worked per working-age population instead of per employed, as this is the measure of hours worked that some other authors have used for calibrating representative agent models. Furthermore, I have tried consumption excluding government spending instead of including (most of) it, and calculating the consumption tax rate following Mendoza, Razin and Tesar (1994) instead of Prescott (2004) as alternatives to my baseline choices.

For the time dimension, instead of data from 2004, I have also used the average γ over the expansion phase of 2002–2007. As Tables 3.13, 3.14, 3.15, and 3.16 in the appendix show, the results are robust to each of these respective variations.

Additional Control Variables

In Table 3.1, I include the right-hand side variables ex-ante most important to control for. In addition, I have also tried variations of those measures, as well as potentially more far-fetched explanatory variables. These variables are full unemployment benefits as percentage of GDP; a broader measure of amount of spending on unemployment, including spending on training programs, employment maintenance and recruitment incentives, in addition to actual unemployment benefits; the length of paid parental leave; the expected number of retirement years; the employment/population ratio restricted to working-age population; two rough measures of credit constraints: *Getting Credit, Distance to the Frontier* from the *World Bank*, and the difference between interest rates and inflation based on data from the OECD; a number of different measures from the WVS (see below). Despite controlling for these additional variables, the results remain robust (and are sometimes stronger in terms of statistical significance).

Alternative Cultural Variables

I have run the same regression as the one presented in Table 3.1, but with different variables from the WVS than the main one. This serves as both placebo experiments, and as including additional control variables. For each of the alternative measures, I have both rerun the regressions presented in Table 3.1 with C041 exchanged for the alternative measure, and run the regressions with C041 as well as the alternative measure included. The alternative measures broadly fall in three categories: the role of women, the degree of materialism, and left/right leanings in political beliefs. I have chosen cultural dimensions that can plausibly be

thought to impact labor supply decisions. For these three dimensions, that could be through family structures and gender roles that impact household income and the division of home production; it could be through a focus on material things (achieved through labor income) as opposed to spiritual or social dimensions of life (pursued during leisure time), or it could be through attitudes to taxation and public goods provision as high taxes and a high degree of public goods provision both alter the labor/leisure trade-off and may impact the attitudes of survey respondents.[37] Throughout, C041 remains significant when it is included, and when C041 is excluded, the placebo variables are statistically significant roughly as frequently as what is predicted by chance alone.

3.4.2 Empirical Preferences for Leisure

Table 3.2 gives a picture of each individual country by looking at how much its preference for leisure deviates from the average OECD preference for leisure, $\bar{\gamma}$, and how much of this deviation we can attribute to the individual factors of the measured preference. For a given country, I simply move each of the right-hand side variables in equation 3.6 from the country-specific value to the OECD average, and look at how much this reduces the total deviation from the average preference for leisure; this is what column 2-5 in Table 3.2 reports.[38] This approach, as opposed to say, looking at log-deviations from each respective input variable, is an attempt to not completely abstract away from non-linearities and

[37] See Appendix 3.B for the precise questions.

[38] With total deviation denoted by $\Delta \equiv \frac{\gamma^i - \bar{\gamma}}{\bar{\gamma}}$ (where $(x_1, ..., x_4) = (\frac{1-h}{h}, \frac{y}{c}, (1-\theta), (1-\tau))$, $\gamma^i = \gamma(x_1^i, ..., x_4^i)$, $\bar{\gamma} = \gamma(\bar{x}_1, \bar{x}_2, ..., \bar{x}_4)$, and $\bar{x}_j = \frac{1}{I}\sum_{i=1}^{I} x_j^i$), an individual variable's contribution $\Delta(x_j^i)$, is set to $\Delta(x_j^i) \equiv \Delta - \frac{\gamma(\bar{x}_j, x^i_{-j}) - \bar{\gamma}}{\bar{\gamma}} = \frac{\gamma(x_j^i, x^i_{-j}) - \gamma(\bar{x}_j, x^i_{-j})}{\bar{\gamma}}$.

interdependencies.[39,40] For example, Germany's preference for leisure is slightly below the OECD average; this is the net effect of a low level of hours worked and a high labor share, both increasing the measured preference for leisure, and a significantly above average tax wedge, which work to decrease the preference for leisure. Greece's weak preference for leisure is driven mostly by high work hours, and to a lesser extent by high taxes. Table 3.7 shows the model-based preference measure and raw data for all the countries in the sample.

The precise variables driving a weak or strong model-based preference for leisure vary substantially across countries. Based on the summary statistics presented for the preference for leisure in Table 3.3, and the variables from Table 3.2, tax rates and hours worked are the two most important sources of explanations for differences in leisure preferences, but variations in the other variables are not negligible. For ease of comparison, Table 3.3 and 3.7 also include the average response to a World Values Survey (WVS) question. I discuss this measure is below in section 3.3.

The differences in preferences for leisure are quite large, considering that preferences are commonly assumed to be constant across countries. These differences in measured preferences are also likely capturing some cross-country differences in a labor wedge, albeit, as I argue below, the fact is that labor wedge differences

[39]Table 3.2 takes as input variables $(x_1, ..., x_4) = (\frac{1-h}{h}, \frac{y}{c}, (1-\theta), (1-\tau))$. While using the model variable$(x_1, ..., x_4) = ((1-h), w, (1-\tau), c)$ may appear a more intuitive choice, there are some advantages to the former choice. Including y and c as a ratio makes this variable "unit-less" and insensitive to some choices that w and c in the other factorisation is not (such as if and how to adjust for purchase power parity, and which population number to normalize by). Looking at the impact of hours worked as a separate variable (instead of splitting it up into *leisure* and w) is another important reason for the choice of input variables. Moreover, by a fortunate coincidence, it gives a γ of averages ($\bar{\gamma}$) equal to the average γ (up to two decimals). Furthermore, modelling hypothetical changes in these variables is problematic, as the model assumes decisions are made simultaneously and in conjunction. Conducting a thought experiment regarding how much γ would change by moving one of its input factors to some other number is an inherent violation of the model, since other variables themselves are outcomes of the original value that gets changed in the thought experiment. Of course, this is a problem for any attempt to decompose γ-differences into various "causes", but casting doubt on the feasibility of making a model interpretation for an exercise such as the one carried out here does weaken the rationalization for preferring the variable decomposition used in the model.

[40]One disadvantage is that, in general, $\sum_{j \in \mathbf{N}} \Delta(x_j) \neq \Delta$. Appendix 3.A proposes an approach achieving this, whilst also taking non-linearities into account. The results concerning the relative importance of variables are very similar.

Table 3.2: Country Percentage Deviation From the "Average" γ, and Each Individual Argument's Percentage Point Contribution to the Total Percentage Deviation.

Country	Total Dev.	Hours	labor Share	GDP/Consump	Tax Wedge
Australia	19.7	4.1	−5.6	−3.3	23.5
Austria	−19.2	−0.9	6.8	1.7	−29.6
Belgium	−14.5	15.4	7.3	1.5	−50.2
Canada	6.0	1.3	−2.4	−1.0	7.9
Czech Republic	−3.8	−4.5	−4.9	7.3	−2.2
Denmark	11.3	17.5	4.0	−0.0	−11.7
Estonia	−22.7	−15.8	−8.5	0.8	1.6
Finland	−13.2	3.6	0.3	1.3	−19.7
France	5.4	22.7	8.5	−8.0	−23.4
Germany	−6.0	24.7	9.8	−4.7	−50.0
Greece	−35.7	−19.4	3.4	−7.0	−8.9
Hungary	−65.5	−6.7	0.4	−0.5	−49.1
Iceland	0.2	−4.5	6.1	−10.8	8.2
Ireland	43.6	12.5	−15.0	22.6	25.9
Israel	−12.4	−13.3	1.1	−4.1	3.7
Italy	−22.2	−3.6	4.6	−3.8	−19.1
Japan	32.3	−1.6	−2.8	−0.9	36.2
Korea	22.9	−79.5	22.3	15.8	37.8
Luxembourg	30.5	17.7	−12.7	37.9	−17.9
Mexico	−35.8	−32.0	−28.5	−4.6	21.1
Netherlands	51.7	43.7	14.9	8.7	−13.8
Norway	13.3	31.0	−15.4	13.5	−24.3
Poland	−24.2	−14.5	−8.1	−8.8	7.9
Portugal	−7.8	−1.4	7.0	−12.6	−1.5
Slovak Republic	−16.7	2.2	−20.2	2.3	−1.7
Slovenia	−8.2	2.8	10.7	0.7	−25.9
Spain	11.4	6.4	2.6	−2.4	5.0
Sweden	14.0	15.6	7.9	−1.1	−9.3
Switzerland	53.3	12.7	2.3	−0.3	42.7
Turkey	−44.2	−7.2	−26.7	−7.3	2.9
United Kingdom	17.0	9.6	10.7	−17.8	12.9
United States	27.2	−3.2	7.2	−12.6	33.1

Source: Author's calculations based on data from the OECD.
Notes: Total deviation from a γ of averages, $\frac{\gamma^i - \bar{\gamma}}{\bar{\gamma}}$, and how much variable x_j's deviation from its own average contributes to this, approximated by $\frac{\gamma(x_j^i, x_{-j}^i) - \gamma(\bar{x}_j, x_{-j}^i)}{\bar{\gamma}}$. A positive number indicates a positive contribution the deviation. Hence, for e.g. hours worked, since γ is decreasing in hours, a positive number is indicative of a below-average labor supply. Due to the non-linear nature of $\gamma(\cdot)$, these contributions do not add up to the precise total deviation; see Appendix 3.A for an approach that does achieve this, while still taking interdependencies into account.

are empirically insufficient to serve as an explanation for different preferences for leisure. The relative preference for leisure among different countries does not accord with cultural stereotypes. Southern European countries such as Greece

and Italy have a weaker preference for leisure than Germany, the Netherlands, and other northern European countries, and the United States has a relatively strong preference for leisure. Why this is the case, or why any given country has a relatively high or low preference for leisure, varies across the sample.

Table 3.3: Summary Statistics of the Components of Equation 3.6

Variable	Mean	Std. Dev.	Min.	Max.	No.
γ	0.84	0.23	0.29	1.28	32
Hours	1,773	225	1,399	2,392	32
y/c	1.5	0.16	1.3	2.1	32
labor Share	0.62	0.07	0.42	0.76	32
τ	0.54	0.12	0.31	0.81	32
Hours Dev. Cont.*	14.1	21.3	-79.5	43.8	32
LS Dev. Cont.*	9.0	11.7	-28.5	22.3	32
y/c Dev. Cont.*	7.1	10.8	-17.8	37.9	32
τ Dev. Cont.*	19.6	24.9	-50.2	42.7	32
Hour Dev.: $\gamma^i = \bar{\gamma}$*	14.9	18.9	-54.0	33.2	32
"Work Before Leisure"	2.82	0.36	2.11	3.36	32

Source: Author's calculations based on data from the OECD and the WVS.
Notes: Summary statistics for components of Table 3.7, and Table 3.2.
* "Mean" of the deviation contribution-variables is mean of its respective absolute value; std. dev., min., and max. are actual values.

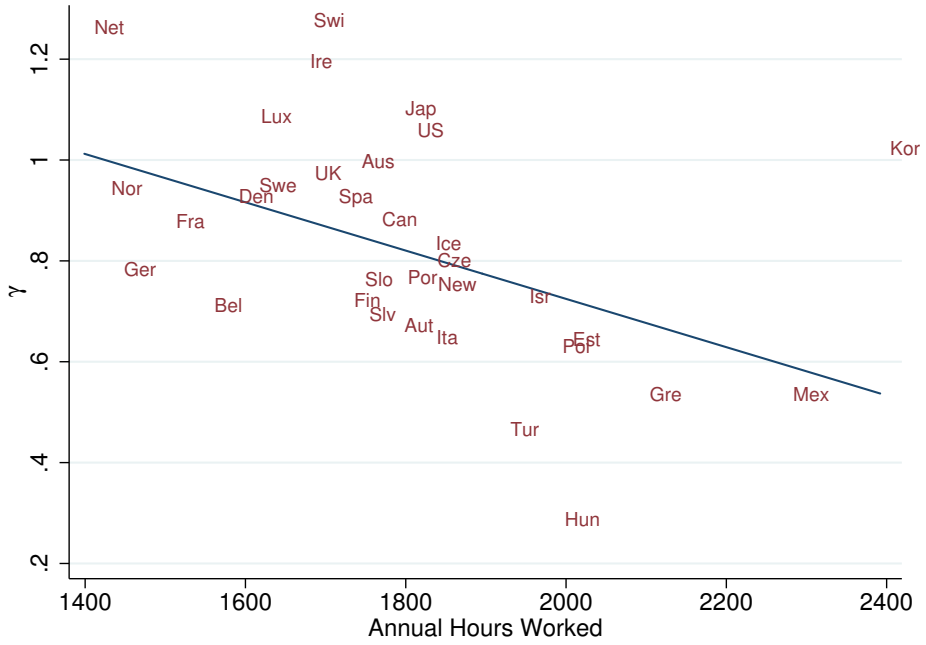
Figure 3.1 illustrates the relationship between the preference for leisure and hours worked. The negative correlation is significant at a 1 percent level, with an r-squared of 0.22. Instead if this relationship is approached from the "opposite direction", equation 3.6 implies $ln(h) = ln(\frac{y}{c}) + ln(1-\theta) + ln(1-\tau) - ln[\gamma + \frac{y}{c}(1-\theta)(1-\tau)]$. When estimating this equation by ordinary least squares, with a cross-country constant $\gamma^i = \bar{\gamma} \ \ \forall i$, the r-squared result drops to 0.45, compared to the perfect fit achieved (by construction) with country-varying γ.[41] Furthermore, a regular Wald test of whether the coefficients in this regression are in accordance with the model, without a country-varying γ, rejects the null hypothesis at a 1 percent significance level.[42] Thus, the overall picture is one where differences in preferences should not be ignored when studying labor supply differences across

[41] The r-squared is relatively insensitive to choices of a constant preference for leisure different from the average preference for leisure across OECD countries, as long as these choices do not approach zero.

[42] Instead using (the log of) the model variables $c, w, (1-\tau)$ as the right-hand side variables enhances the significance of rejecting the null.

countries.

Figure 3.1: The Relationship Between the Model-based Preference for Leisure and Hours Worked Across Countries



Source: Author's calculations based on data from the OECD.
Notes: γ from equation 3.6 plotted against annual hours worked. This illustrates that there is (1) large dispersion in hours worked across countries, (2) a clear negative relationship between these hours worked and the preference for leisure, and (3) a significant part of cross-country differences in the model-based preference for leisure comes from other variables than hours worked.

To more clearly illustrate how large the quantitative differences are in leisure preferences across OECD countries using the more concrete unit of hours, I carry out the exercise of fixing preferences across countries at an average preference for leisure, and allow hours and consumption to adjust in accordance with the model so that equation 3.6 holds.[43] The adjustments range from a 54 percent decrease (1073 hours) in labor supply for Hungary, to a 33 percent and 31 percent increase for the Netherlands and Switzerland (464 and 517 hours respectively).[44]

[43]To be precise, hours and consumption will adjust according to the following:

$$h_{pred} = h_{act} + h_{\Delta} : (1-(h_{act}+h_{\Delta}))^{\phi} = \frac{\bar{\gamma} c_{act}}{w(1-\tau)} + \frac{\bar{\gamma} c_{\Delta}}{w(1-\tau)}; \; c_{\Delta} = h_{\Delta} w(1-\tau)\kappa; \;\; \kappa \equiv \frac{c_{act}}{w(1-\tau)h_{act}}$$

where κ is set so that with zero labor input there will be no consumption or production.

[44]Fixing preferences and only allowing for hours to shift would give even larger adjustments, but this would not be in keeping with the model, as only letting hours adjust would no longer solve maximization problem 3.2: either, the consumer's budget constraint would be violated, or it would leave labor income unspent.

The details of this exercise, and further illustrations of differences in the leisure preference and its components, can be found in Appendix 3.A.

3.4.3 Microeconomic Evidence

In a cross-country comparison, while I try my best to overcome problems of omitted variables by adding controls and through the different robustness exercises, it is not possible to get at reverse causality issues. To overcome this endogeneity problem, I follow the "epidemiological" approach and look at second and successive generations of immigrants in the United States.[45] As argued by, among others, Bisin and Verdier (2001), Guiso, Sapienza, and Zingales (2008), Tabellini (2008), Algan and Cahuc (2010), and Dohmen et al. (2012), people's preferences are determined partly by their contemporaneous environment, and partly by attitudes, beliefs, values, and norms inherited from previous generations. By comparing people who share the same institutional and economic setting, it is possible to get closer to the differences that stem from cultural influences.

Second and higher generations of immigrants in the United States constitute such a group of people, sharing the same contemporaneous environment, but with potential differences in inherited cultural traits. I look at whether culturally related preferences for leisure affect labor market decisions, as suggested by the macro evidence in section 3.4.1, by including either the model-based measure of leisure, γ, or the survey-based measure from the WVS, associated with an individual's heritage as an explanatory variable in a regression with hours worked as the dependent variable (but, again, only including individuals born in the United States). The results are supportive of the interpretation of the macro-level evidence: that preferences for leisure differ across countries, and that this shows up in aggregate variables.

This approach should be immune to reverse causality issues; it cannot be the

[45] That is, firs generation migrants are never included, only individuals born in the United States. For a survey of this literature, see Fernández (2011).

case that as an individual's preference for leisure is an outcome of the current economic or institutional environment, as that preference is based on data at a considerable temporal as well as spatial distance. However, there are some difficulties inherent to the approach. The timing of migration in combination with data limitations is one. Another potential problem would be factors that have an impact on labor market decisions that are distinct from the cultural channel proposed here but nevertheless are related to ancestral country of origin. I discuss these potential issues of the epidemiological approach, that are not unique to this paper but a general problem of many papers in this literature, at greater length in Appendix 3.C.2.[46]

Data and Results

The main data used is US Census data for 2013, the most recent available data at the time this analysis was carried out.[47,48] In addition, because it is the last year in which specifically second-generation immigrants can be identified, I briefly consider the 1970 US Census (immigrants themselves are always excluded from the regressions).

[46]It is worth adding, as stated by Fernández (2011), that: "It should be noted explicitly that the epidemiological approach is biased towards finding that culture does not matter. As mentioned previously, the fact that parents are only one source of cultural transmission among many and that they may have cultural attitudes that differ from the average ones in the country of ancestry, implies that one is more likely to rule the cultural proxy insignificant. Thus, just like the absence of convergence in disease does not provide definitive evidence in favor of genetics, the absence of a significant coefficient on the cultural proxy does not imply that only the economic and institutional setting matters."

[47]Data downloaded from the IPUMS-USA Database, University of Minnesota, www.ipums.org

[48]The reason for choosing 2013 as the time period studied is related to the timing issue mentioned above. Ideally one would want data for individuals' ancestors time of emigration, and measure the country of origin-variable (γ or WVS) roughly coinciding with this point in time. The data availability problem here is firstly that U.S. Census data only contains the ancestral country of origin, without specifying the time of emigration or the number of generations separating the respondents from their migrating ancestors. Secondly, the cultural measures used are not measured sufficiently far back in time to coincide with this (unknown) time of emigration. Due to these draw-backs, the necessary underlying assumption that justifies using this data is that culture is sufficiently slow-moving. To minimize the timing disconnect, the most recent available data is selected.

I estimate the following reduced form equation:[49]

$$H_{i,c} = \beta_0 + \beta_1 C_c + \beta_2 X_i + \varepsilon_{i,c}. \tag{3.8}$$

The measure of hours worked, $H_{i,c}$, is the product of *Usual hours worked* and (the midpoint of the intervall of) *Weeks worked last year* for individual i with ancestor country c. X_i is a vector of personal characteristics (varying with the specification), and $\varepsilon_{i,c}$ is an error term. The variable of interest is C_c, which will be the (either survey- or model-based) cultural measure associated with ancestor country c.[50]

Related to the issue concerning confounding cultural values (discussed in Appendix 3.C.2), non-married and married individuals are studied separately. This is done to mitigate the issue of within-couple gender-related cultural values, whose effects have been established by, among others, Fernández and Fogli (2009).[51] As labor market decisions likely look quite different for married individuals, the preferred specification for married couples is the combined household labor supply.[52] Since being unemployed is not necessarily a choice related to preferences, I exclude unemployed individuals, and couples where both are unemployed.[53]

The main results of this section are presented in Tables 3.4–3.5, which show OLS estimations of equation 3.8 for unmarried individuals and married couples of prime working age, respectively. All columns include age (squared), sex, edu-

[49]The reason for not directly estimating the model relationship from section 3.2.1 is the lack of consumption data, and potential difficulties in calculating precise individual marginal tax rates.

[50]Table 3.18 shows the population composition and some basic characteristics split up on the different ancestral countries. Only countries for which the cultural measures described above exist are included.

[51]As a robustness check related to this, I also restrict the sample to the male working-age population, and find that the results hold.

[52]The same regressions including married individuals, with individual hours worked as the dependent variable have been considered for robustness; the results remain qualitatively the same, and significant, but as would be expected in light of previous literature, they are weaker.

[53]It may also be argued that the United States should be excluded from this analysis; including it basically assumes that the subset of individuals stating the U.S. as their country of ancestry is a good proxy for cultural values prevailing in the country, despite them making up only a subset of the people actually living there. Neither of these sample selection decisions change the significance of the results shown below.

cation, and dummy variables for metropolitan area; standard errors are clustered at the country level.[54] Given the documented importance of race in the U.S labor market, I include racial dummies.[55] In columns 2–3 and 5–6, unearned income, number of children below the age of five, and wage, are also included.[56] The negative, significant coefficient on the cultural measure of preferences for leisure across all the specifications is supportive of there being a culturally related aspect of preferences for leisure, varying between countries, in line with what was suggested by the across-country macro level results presented in section 3.4.1. Recall that a high value of either γ or WVS is indicative of a stronger preference for leisure.

Table 3.4 shows these regressions with a population that is restricted to a sample of individuals between the ages of 30 and 50 years (inclusive). This age range captures what are arguably the two most active decades in individuals' working lives. If differences in age distributions are correlated with ancestral measures of preferences for leisure (and the age controls do not fully capture its impact), looking at prime working age individuals should pose less of a problem than an unrestricted sample.[57]

Corresponding regressions for married couples, with spouses combined hours worked as the dependent variable, are shown in Table 3.5. Couples are given the average γ (or WVS) of the two individuals' ancestral countries.[58] Age and education controls are included for both individuals, and unearned income is included at household level. The results are similar to those for unmarried individuals.

[54]For couples, to the extent that the small number of clusters is a problem, I can cluster at the unique country of ancestry combination of the couple. That increases the statistical significance substantially, compared to clustering at either the level of husband or wife country of ancestry.

[55]See e.g. Altonji and Blank (1999) for the importance of race. Results are very similar with race dummies excluded.

[56]Where the wage is missing, it has been replaced by its predicted value from a linear regression.

[57]The corresponding results for a sample unrestricted by age is presented in Appendix 3.C. The results are robust.

[58]Including both the individual measures of a couple instead of the average yields similar results; generally, these results are statistically stronger if joint significance is considered.

Table 3.4: Labor Supply and Inherited Preference for Leisure: OLS Estimation of Equation 3.8 (Unmarried; Prime Working Age)

	(1)	(2)	(3)	(4)	(5)	(6)
γ	−138.2	−137.7	−226.4			
	(−2.89)	(−2.83)	(−3.46)			
"Work Before Leisure"				−131.2	−130.4	−144.9
				(−6.57)	(−6.30)	(−9.95)
GDP/Hour			2.63			1.18
			(2.39)			(1.91)
Age; Sex; Education	Yes	Yes	Yes	Yes	Yes	Yes
Unearned; Wage No. Child<5	No	Yes	Yes	No	Yes	Yes
Observations	123,101	123,101	123,101	123,101	123,101	123,101
Adjusted R^2	0.759	0.760	0.760	0.759	0.760	0.760

t statistics in parentheses

Standard errors clustered at country level (32 clusters). Dummies for metropolitan area and race included.

Source: Author's calculations, based on U.S. 2013 Census data, retrieved from IPUMS.
Notes: The dependent variable is annual hours worked for unmarried individuals, within the age span of 30–50 years. Dummy variables for metropolitan area of residence and race are included throughout. Standard errors calculated allowing for clustering at the country level. If missing, wage is replaced by a predicted wage.

Economically, although the effects are not very large, they are also not negligible: a one standard deviation increase in γ (WVS) corresponds to approximately 32–52 (47–52) hours less worked in a year for individuals, and 58–95 (87–99) hours for couples.[59] Of the two cultural measures, the survey-based measure appears to be the slightly less noisy one.

Robustness

The approach taken above should avoid endogeneity caused by reverse causality. In 2013, the economic and institutional environment in the United States cannot possibly be causing individual attitudes that were held (or the economic variables going into constructing γ) in other countries by individuals' ancestors many years prior to 2013. There are, however, other possible reasons for why the cultural

[59]These figures are calculated by multiplying the standard deviation of 0.23 for γ with respectively the minimum and maximum of the coefficients from columns 1–3, and analogously for WVS.

Table 3.5: Labor Supply and Inherited Preference for Leisure: OLS Estimation of Equation 3.8 (Households; Prime Working Age)

	(1)	(2)	(3)	(4)	(5)	(6)
γ	−252.5	−257.7	−415.2			
	(−3.39)	(−3.28)	(−3.62)			
"Work Before Leisure"				−244.1	−250.2	−275.2
				(−11.14)	(−10.69)	(−15.38)
GDP/Hour			5.048			2.547
			(2.86)			(4.14)
Age; Sex; Education	Yes	Yes	Yes	Yes	Yes	Yes
Unearned; Wage; No. child<5	No	Yes	Yes	No	Yes	Yes
Observations	150,872	150,872	150,872	150,872	150,872	150,872
Adjusted R^2	0.906	0.907	0.907	0.906	0.907	0.907

t statistics in parentheses

Standard errors clustered at country level (32 clusters). Dummies for metropolitan area and race included.

Source: Author's calculations, based on U.S. 2013 Census data, retrieved from IPUMS.
Notes: The dependent variable is annual hours worked for households with both spouses within the age span of 30–50. γ and "Work Before Leisure" are calculated as the average of spouses' individual values. If missing, wage is replaced by a predicted wage. Standard errors calculated allowing for clustering at the country level.

measures here may be endogenous. One example is if other factors related to the country of ancestry, correlated to preferences for leisure, affect labor market outcomes without having anything to do with differences in underlying preferences. A clear candidate for other reasons why cultural measures may be endogenous, is human capital differences related to an individual's ancestral background. For this reason, in columns 3 and 6 in Tables 3.4–3.5 (as well as in corresponding regression tables presented in Appendix 3.C), a rough measure of human capital as it relates to ancestry is included, namely GDP per hour worked. Interestingly, this measure only works to strengthen the results, both in terms of economic and statistical significance. I have also tried various measures of educational quality from Hanushek and Woessmann (2012), or the average educational level of parents of the same ancestral background; all yield similar results.[60]

[60] Alternatively, one could directly include the educational level of parents as control variables. The issue with this is that data availability heavily skews the sample population towards younger people. In the subset of the population for which educational level of parents is known, 80 percent are of age 18–30, compared to 20 percent for the unrestricted case. Conditional on excluding individuals in school, the results are the same also with this measure.

For reasons discussed in Appendix 3.C, I also try restricting the sample to males, study a sample unrestricted in terms of age, and look at a sample restricted to second generation migrants.[61] The results, all robust to these variations, are presented in Tables 3.19, 3.20, 3.21, and 3.22.

At the very least, this micro-level investigation is consistent with the interpretation of the macro level findings suggested above: there are cross-country cultural differences in preferences for leisure, and these differences are significant enough to be detected in national accounts data, in a survey, and looking at labor supply decisions taking place within the same labor market.

3.5 Differences in Preferences for Leisure and Labor Taxation

I provide a final piece of support for the interpretation of cross-sectional labor-wedge differences as non-negligible cross-country differences in preferences for leisure by investigating their relationship with labor taxes. I theoretically ask the following question. *Suppose preferences for leisure differ across countries, what relationship between preferences for leisure and labor taxation should we then expect?* I then test whether the empirical relationship line up with the theoretical prediction. In that sense, this exercise constitutes an "out of sample" test of the cross-country differences in preferences for leisure that the preceding section finds.

In addition, this section can be interpreted as an illustration of the responsiveness of policy choices to underlying cultural differences. As such, it argues that advancing policy (or institutional) differences as an ultimate explanatory factor may be inadequate as it takes these differences as exogenous when, in fact, observed policy heterogeneity could partly be caused by underlying preference

[61] Other regressions include also higher successive generations. First generation migrants are never included.

heterogeneity.[62] In the setting I study, countries may tax higher because 'they can' (because taxes are less distortionary); to the extent that is the case, differences in preferences for leisure attenuate the observed negative relationship between labor supply and taxation as taxes are higher where the preference for leisure is weaker.

3.5.1 Theoretical Relationship

To investigate the interaction of preferences for leisure and labor taxation theoretically, I start by showing that the labor supply wage (semi-)elasticity increases with the preference for leisure.[63] I then present an extended version of the model from Section 3.2.1, altered to explicitly include government spending in the representative consumer's utility function. This modification enables me to talk about *optimal* taxation — without it, the optimal tax rate is always zero. I show that the theoretically optimal taxation is, *ceteris paribus*, decreasing in γ.

As countries differ in other respects than their preference for leisure, I calibrate wages and unearned income in the model to empirical data and calculate the optimal model tax rate across countries. I find that the negative relationship between taxes and preferences for leisure does not appear to be driven by cross-country differences in the other variables that the model contains. This negative theoretical relationship is the key prediction that the model delivers, and it is what I test below in Section 3.5.2.

To get an expression for the labor supply (semi-)elasticity, I first rearrange equation 3.3 with the agent's budget constraint substituted for c to get an expression that implicitly defines optimal hours worked:[64]

[62] For a good review of the interaction between culture and institutions, see Alesina and Giuliano (2015).

[63] What I need for the setting where I look at theoretically optimal taxation is the semi-elasticity; since the literature on tax distortions usually focus on the elasticity, I start by showing an increasing relationship between γ and the standard Marshallian elasticity.

[64] There is no closed form solution except in the special case of log-log utility.

$$h^*(w,\tilde{T},\tau,\rho,\phi,\gamma) : (1-h_t^*)^{\phi} w(1-\tau) = \gamma\big[wh^*(1-\tau)+\tilde{T}\big], \quad \tilde{T} = \frac{T}{1+\tau_c} \quad (3.9)$$

The (uncompensated) elasticity of labor supply, $\epsilon^M \equiv \frac{\partial h^*}{\partial w}\frac{w}{h^*}$, can be obtained by differentiating Equation 3.9 with respect to w (or $1-\tau$):

$$\epsilon^M \equiv \frac{\partial h^*}{\partial w}\frac{w}{h^*} = \frac{1-E}{\phi H + E}; \qquad E \equiv \frac{wh^*(1-\tau)}{wh^*(1-\tau)+\tilde{T}}; \; H \equiv \frac{h^*}{1-h^*} \qquad (3.10)$$

To the extent that government revenue is used for public goods expenditures (separable in utility from private consumption), which is the setting I will study here, the uncompensated elasticity is the relevant one for evaluating the distortionary effects of taxes.[65] Although γ does not appear explicitly in the expression for ϵ^M, it is a function of γ via E and H, that are both functions of γ through h^*. Since $\frac{\partial h^*}{\partial \gamma} < 0$, the earned share of income, E, and H, are decreasing in γ. Therefore, the denominator in equation 3.10 is decreasing in γ, and the numerator increasing, implying that the Marshallian elasticity is unambiguously increasing in γ.

Using the same notation as above, the semi-elasticity can be expressed as follows:

$$e^M \equiv \frac{\partial h^*}{\partial w} w = \epsilon^M h^* = \frac{\tilde{T}}{\frac{\phi H}{E}+1} \qquad (3.11)$$

By an argument analogous to the one for the elasticity above, $\frac{H}{E}$ decreases with γ, so e^M unambiguously increases with γ.[66] I will make use of this result to show

[65] If government revenue is instead given back to the consumer, the Hicksian (compensated) elasticity would be the relevant one. This can be obtained using the Slutsky decomposition and implicit differentiation with respect to T of the Equation 3.9 above that defines optimal hours worked.

$$\epsilon^H \equiv \frac{\partial h^*}{\partial w}\frac{w}{h^*}\bigg|_U = \frac{1}{\phi H + E}$$

Analogous to the argument for the Marshallian elasticity, the Hicksian elasticity will also be unambiguously increasing in γ.

[66] Alternatively, this can also be seen looking directly at the expression for ϵ^M: $\frac{\partial h^*}{\partial w} w =$

that the theoretically optimal tax rate decreases with γ. In the setting below, the difference between a social optimum achieved through lump sum taxes, and the case of distortionary taxation, is directly proportional to the semi-elasticity, and therefore increasing in γ.[67]

To study the optimal (relative) level of labor tax rates, I modify the framework from section 3.2.1 to include utility from government spending.[68] The addition of utility from government spending enables me to talk about differences in the optimal level of taxation. Specifically, let the utility of public spending be represented by an increasing, differentiable and concave function G, and define the indirect utility function $v(\tau, w, \tilde{T}, \phi, \gamma) = U(c^*, (1 - h^*))$, where $c^* = c(\tau, w, \tilde{T}, \phi, \gamma)$ and $h^* = h(\tau, w, \tilde{T}, \phi, \gamma)$ solves the household maximization problem 3.2. A benevolent government maximizes utility according to

$$\begin{aligned} &\max_{g,\tau} G(g) + v(\tau, w, \tilde{T}, \phi, \gamma) \quad s.t.\ g \leq wh^*\tau \Rightarrow \\ &FOC: \quad G'(g)\left[wh^* + \frac{\partial h^*}{\partial \tau} w\tau\right] = -\frac{\partial v(\cdot)}{\partial \tau}. \end{aligned} \tag{3.12}$$

Without any distortionary effects from taxation, the optimal level of taxation and government spending would be characterized by $G'(g)wh^* = \frac{\partial G}{\partial g}\frac{\partial g}{\partial \tau} = -\frac{\partial v(\cdot)}{\partial \tau}$. Hence, the term $\frac{\partial h^*}{\partial \tau} w\tau$ is what is different between this setting and a social optimum that allows for lump sum taxes; it captures the distortionary effect of taxation.[69] Since $\frac{\partial h^*}{\partial \tau} w\tau = e^M w \propto e^M$, it follows from Equation 3.11 that the distortion increases with the preference for leisure. As distortions are larger with a stronger preference for leisure, the optimal level of taxes τ is lower when

$\epsilon^M h^* = \frac{1-E}{\phi \tilde{H} + \tilde{E}}$ where $\tilde{E} \equiv \frac{w(1-\tau)}{wh(1-\tau)+T}$; $\tilde{H} \equiv \frac{1}{1-h}$; both $\tilde{E}$ and $\tilde{H}$ are decreasing in γ why $\frac{\partial h^*}{\partial w} w$ must increase with γ.

[67] An alternative way to phrase this is that the difference between the marginal utility of private and public consumption in optimum, which in some sense is a measure of the tax-based distortion, will be directly proportional to the semi-elasticity.

[68] In a standard Ramsey framework, it is usually the optimal composition of taxes that is studied. There, the level of government revenue is exogenously given and of no benefit to the consumer. Hence, the framework is not well-suited for studying level-differences.

[69] The expression $\frac{1}{wh^* + \frac{\partial h}{\partial \tau} w\tau}$ can also be interpreted as the marginal (utility) cost of public funds, as it captures to what extent the marginal utility of government spending needs to be greater in optimum than the marginal utility of private consumption.

preferences for leisure are stronger — that is the key theoretical prediction that I will test empirically below.

The elasticity ϵ^M above is a partial equilibrium object. In the general equilibrium version of the model, where other variables adjust as hours change, ϵ^M will not capture precisely how the steady state equilibrium hours respond to changes in taxes. The general equilibrium elasticity of labor supply, $\epsilon^{GE} \equiv \frac{dh}{d(1-\tau)}\frac{(1-\tau)}{h}$, will depend on precisely how the relationship between hours, wages, and unearned income is specified.[70] I show in Appendix 3.D that, in the setting presented here, ϵ^{GE}, like ϵ^M, is increasing in γ.

Cross-Country Optimal Taxation

Above, I showed that there is a *ceteris paribus* downward relationship between the preference for leisure and labor taxation. Here, I investigate whether it holds across countries when I confront the model with differences in the other variables. I calibrate the model outlined above using OECD data for the same set of countries that I use in previous sections and look at the relationship between the theoretically optimal tax rate and the model-based preference for leisure. I do this first in a partial equilibrium (PE) model, keeping wages and unearned income constant when hours worked change, and then in a general equilibrium (GE) setting; the results are qualitatively identical.

The specific data and functional form choices are as follows. A benevolent government solves maximization problem 3.12, with the baseline utility function from Section 3.2.1, and $G(g) = \psi ln(g)$, with ψ chosen so as to match the average model tax rate with the average of actual tax rates across countries.[71] To cali-

[70] I take the derivative with respect to $(1-\tau)$ instead of w as w will be an outcome in general equilibrium.

[71] The functional form of utility from government spending is not crucial.
Using this in the FOC of equation 3.12 above gives the optimality condition

$$FOC: \quad \frac{\psi}{wh^*\tau}\left[wh^* + \frac{\partial h^*}{\partial \tau}w\tau\right] + \frac{w}{wh^*(1-\tau)+T}\left[\frac{\partial h^*}{\partial \tau}(1-\tau)+h\right] - \frac{\gamma}{1-h^*}\frac{\partial h^*}{\partial \tau} = 0 \tag{3.13}$$

brate model wages, I set the U.S. wage rate to a Cobb-Douglas steady state level wage with standard parameter values. All other countries are given the wage $w_i = \frac{\frac{(1-\theta_i)y_i}{h_i}}{\frac{(1-\theta_{US})y_{US}}{h_{US}}} w_{US}$, i.e. I keep relative model wages equal to the corresponding relative empirical wages.[72] Unearned income is set based on the capital share of GDP.[73] Figure 3.2 plots the solution to the partial equilibrium version of the problem, i.e. the country-specific optimal model tax rates (light grey), and the actual tax rates (black) across countries, against the preference for leisure, γ.

In Figure 3.2, the amount of variation generated by preference heterogeneity, measured by the range of fitted values of optimal model taxes, is 8.8 percentage points. That implicitly compares optimal tax rates to a horisontal line where everything across countries is constant. Since that is not the case and other variables (correlated to preferences for leisure) change across countries, optimal tax rates with fixed preferences for leisure but country-specific values for other variables should be the point of reference to judge the magnitude of variation generated by country-specific preferences for leisure. Compared to this alternative baseline, preference for leisure-heterogeneity generates a 23.8 percentage point difference relative to the fitted values of optimal model taxes when preferences are held constant. Figure 3.6 in Appendix 3.D illustrates the difference; it plots both the optimal model taxes calculated with a cross-country constant $\gamma = \bar{\gamma}$, and with country-varying γ.[74]

The qualitative pattern of optimal taxes being decreasing in the preference for leisure remains the same in general equilibrium. There, I allow for wages and unearned income to adjust to their steady state equilibrium values, with T ac-

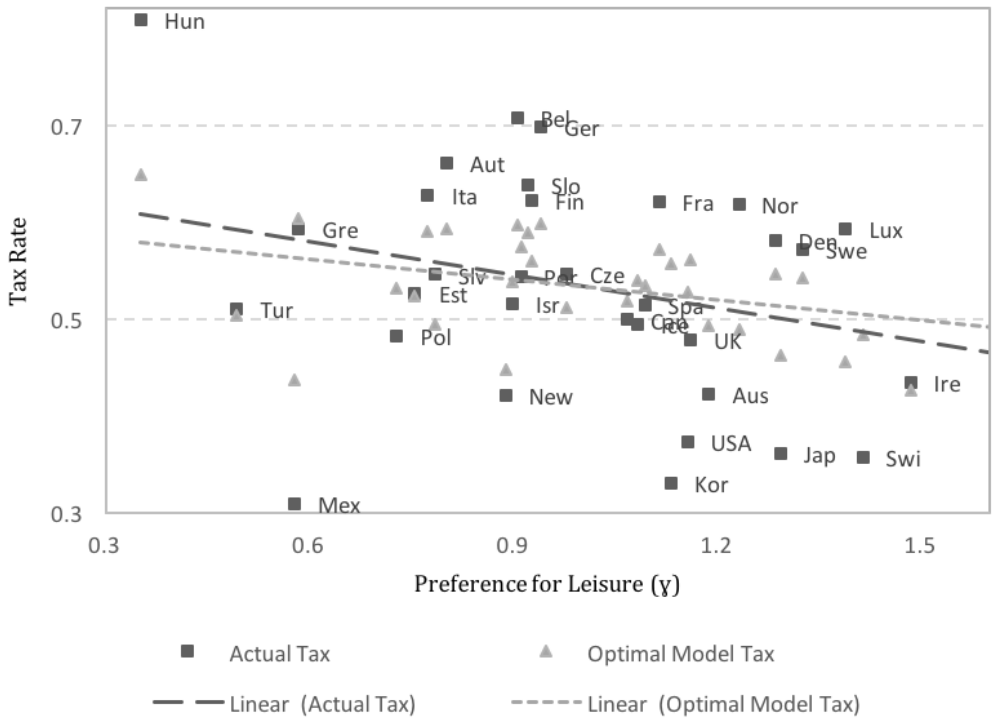
---

[72]Here, y is GDP/Employment, with GDP PPP-adjusted excluding defence expenditure, and h actual average hours worked. Results are not sensitive to including defence employment and expenditure.

[73]Government revenue from taxes are not part of the unearned income here as it is allocated to government spending.

[74]The γ used in the figures is the one calculated when government spending is not included in the consumption figure of equation 3.6 in section 3.2.1. This is because, in this section, government revenue will be spent on a separable public good, and not given back to the consumer. The differences for optimal taxes are marginal, and the results from previous sections also hold with this alternative consumption, as demonstrated in Appendix 3.B.

Figure 3.2: Actual Tax Rates, and Optimal Partial Equilibrium Model Tax Rates with Country Varying γ



Source: Author's calculations, based on OECD data.
Notes: The graph plots two different data points for each country against the country-specific γ:
1. The actual tax wedges, as defined by equation 3.2.
2. The optimal model tax, which will be the τ solving the maximization problem 3.12 (actual FOC given by equation 3.13) with country varying γ.
In addition, the linear fit of these data series are included. Country labels for the model tax rate series are excluded to not overcrowd the center of the graph; countries are identified by their Preference-for-Leisure value being the same for the two series.

cording to $T = \frac{\theta w h^*}{1-\theta}(1-\tau_{cap})$, and add a term, $\tau_{cap}\frac{\theta w h^*}{1-\theta}$, to the governments budget constraint, paid by the capital owner (τ_{cap} is an exogenously given tax on capital income, calculated following Mendoza, Razin and Tesar (1994), and not needed for any of the results).[75] The amount of variation in optimal taxation

[75]The government problem in itself looks very similar, but with a modified FOC, taking into account other variables' responses to changes in hours worked:

$$\max_{g,\tau} \psi ln(g) + v(\tau;p) \quad s.t.\ g \leq wh^*\tau + \tau_{cap}\frac{\theta w h^*}{1-\theta} \implies$$
$$FOC: \quad \frac{\psi}{\tau + \tau_{cap}\frac{\theta}{1-\theta}} + \frac{\partial h^*}{\partial \tau}\frac{\psi}{h^*} - \frac{1}{(1-\tau)+\frac{\theta(1-\tau_{cap})}{1-\theta}} + \frac{\partial h^*}{\partial \tau}\frac{1}{h^*} - \frac{\gamma}{1-h^*}\frac{\partial h^*}{\partial \tau} = 0. \qquad (3.14)$$

With log-log utility, $h^* = \frac{(1-\theta)(1-\tau)}{(\gamma+1)(1-\tau)(1-\theta)+\gamma\theta(1-\tau_{cap})}$, and the indirect utility function $v(\tau;p) = ln[wh^*(1-\tau) + \frac{\theta w}{1-\theta}h^*(1-\tau_{cap})] + \gamma ln[1-h^*]$. Because the wage rate is determined by the capital/labor ratio, and this in turn in the steady state version is pinned down by the primitive

that preference heterogeneity generates, corresponding to the partial equilibrum numbers of 7.8 and 23.8 percentage points, are 4.8 and 7.4 percentage points in general equilibrium (see Appendix 3.D, Figures 3.7 and 3.8 for the general equilibrium pictures corresponding to Figures 3.2 and 3.6).

The move to general equilibrium dampens the negative relationship between the optimal tax rate and the preference for leisure. The intuition is as follows. In partial equilibrium when taxes increase, the corresponding drop in hours worked only harms labor income, which is why the unearned share of total income also increases. The labor supply therefore responds more strongly to tax changes, and this tax change sensitivity is relatively larger for large γ, mirroring the fact that the labor supply elasticity increases with the preference for leisure (and unearned income, T). In general equilibrium, the unearned share of income does not increase as much with a tax increase, making the response in hours worked weaker, and hence less sensitive to differences in γ.[76] The model matches wages (or GDP/Hour and labor shares) by construction in both general and partial equilibrium. The downward relationship between hours and γ is matched, but it is exaggerated due to the failure to match the negative magnitude between tax rates and γ. Appendix 3.D includes plots of actual and predict hours worked against γ, in both partial and general equilibrium.

The theoretical model outlined in this section predicts a negative relationship between preferences for leisure and taxes; this theoretical prediction holds also when the model is confronted with differences in other variables. In the subsequent section, I investigate whether empirical reality is in line with the theory. This constitutes an additional "out-of-sample" test by asking the question of whether the relationship between labor taxation and preferences for leisure is in line with

parameters, the (steady state equilibrium) wage does not respond to changes in hours worked. The expression τ_{cap} is also included in the firm's problem. τ_{cap} is exogenous, estimated based on national accounts data following Mendoza, Razin, and Tesar (1994), and adjusted for consumption taxes, analogously to how the labor tax wedge above is adjusted; other variables are as above. The log-log-log version of the problem does have an analytical solution. Because I conduct sensitivity analysis to different functional forms, I solve it numerically.

[76] In fact, it may theoretically decrease if $\frac{\theta}{1-\theta}(1-\tau_{cap})$ is larger than $(1-\tau)$.

the theoretical prediction generated by preference heterogeneity.

3.5.2 Empirical Relationship

It is not obvious that one would expect to find the negative relationship between the preference for leisure and the labor tax that the theoretical framework above predicts. In cross-country data, basic correlations with hours worked and GDP suggest a positive relationship.[77] Existing research on the interaction between taxes and raw hours worked indeed suggests a positive relationship. For example, Prescott (2004) and Rogerson (2006) note that between the 1970s and the 1990s/2000s, the countries where labor taxes have increased significantly are the same countries where average hours worked have decreased.[78]

However, empirical evidence does line up with the theoretically predicted negative relationship. I regress the labor tax wedge, as defined above in equation 3.2, on preferences for leisure, GDP per capita, government revenue as a share of GDP, and a few labor market indicators, and find a significant and negative relationship between the taste for leisure and labor income taxes.

Table 3.6 and 3.23 in the appendix show the regressions with preferences for leisure as γ and WVS respectively. One reason for the strong correlation between γ and incmoe taxes may be the mechanical effect of labor taxes on γ, where, by construction, high labor taxes will push down γ. This is clearly not the case for the WVS measure, which is the main reason for why I include it. Since I find the same negative correlation with a measure of preferences for leisure that lacks a mechanical relationship with tax rates, that mechanical relationship is insufficient to explain the relationship between preferences for leisure and labor taxes.

[77] Both preferences for leisure and labor taxes are negatively correlated with hours worked, and both are positively correlated with GDP per capita; that is true for both the model-based and the survey-based measure of preferences for leisure, where the latter one does not have a negative mechanical relationship with labor taxes.

[78] In a similar spirit, Michau (2013) gives a theoretical argument showing how tax increases in the past generation may have had an impact on the attitudes of the present generation: when high taxes make it less rewarding for people to work, it is rational for them to pass on a more relaxed attitude towards work to their children.

An interesting note is that these measures for preferences show a stronger correlation with taxes than do other WVS questions meant to more directly capture the preferences for taxes or redistribution. In the tables here, the line "Gov. provide" is question e037 from the World Values Survey, which asks to what extent people themselves or the government "should take more responsibility to ensure that everyone is provided for." Substituting this question with the question asking whether "hard work brings success" or whether "it's more a matter of luck", which Alesina and Glaeser (2004) documented as having power for explaining the level of redistribution, yields similar results.[79]

Section 3.5.1 theoretically answers the question *suppose there were differences in preferences across countries, how would we then expect labor taxation to covary with the preference for leisure?* The fact that labor taxes empirically line up with this theoretical negative prediction reinforces the evidence from previous sections that there exists non-negligible differences in preferences across countries large enough to be picked up at a macro level. It also constitutes an illustration of how policy differences may arise as an endogenous response to cultural differences.

[79]Dropping the Nordics dummy does not alter the results.

Table 3.6: Taxes and Preferences for Leisure (γ)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
γ	−.23	−.42	−.25	−.27	−.32	−.3	−.29	−.35
	(−2.83)	(−4.28)	(−3.95)	(−3.93)	(−4.04)	(−3.49)	(−3.38)	(−4.22)
GDP/Cap		.0062	.0018	.0023	.002	.0025	.0025	−.0022
		(2.89)	(1.26)	(1.39)	(1.19)	(1.32)	(1.32)	(−0.79)
Gov. Rev/GDP			.013	.013	.011	.012	.012	.0077
			(6.99)	(6.58)	(4.21)	(4.00)	(3.95)	(2.30)
Union Memb.				−.00064	−.00028	−.00037	−.00015	.00056
Density				(−0.59)	(−0.24)	(−0.31)	(−0.12)	(0.47)
Unemployment					.15	.14	.15	.16
Benefits					(1.51)	(1.35)	(1.41)	(1.64)
Tax Evasion						.0095	.0027	.007
						(0.73)	(0.16)	(0.46)
Gov. Provide							.019	.014
							(0.68)	(0.53)
GDP/Hour								.0053
								(2.17)
Nordics	.064	.028	−.091	−.061	−.059	−.062	−.069	−.082
	(1.26)	(0.60)	(−2.71)	(−0.99)	(−0.92)	(−0.93)	(−1.01)	(−1.31)
Observations	33	33	33	31	28	27	27	27
R^2	0.232	0.404	0.783	0.790	0.795	0.782	0.787	0.833
Adjusted R^2	0.181	0.342	0.752	0.747	0.736	0.701	0.693	0.745

t statistics in parentheses

$p < 0.1$, $p < 0.05$, $p < 0.01$

Source: Author's calculations based on data from the OECD and the WVS.

Notes: Dependent variable throughout is the tax wedge as defined in equation 3.2. γ is the model-based measure of preferences for leisure from section 3.2.1. Gov Rev./ GDP is total government revenue as a percentage of GDP; Union Memb. Density is the share of employed that are trade union members; unemployment benefits are measured as the replacement rate; the measure of tax evasion is taken from Buehn and Schneider (2012); "Gov. Provide" is the mean response to the WVS question e037: to what extent individuals themselves or the government should take more responsibility to provide for people; Nordics (as above) is included due to the atypical labor supply subsidizing government spending of these countries, which alters the distortionary effects of taxation. The results are not sensitive to excluding the "Nordics" dummy (if anything, they are slightly stronger).

3.6 Conclusion

Insights into potential differences in preferences for leisure are important, not merely to form a better fundamental understanding of the economic realities we study. Knowledge of such differences also impacts interpretations of various other labor market determinants, and delivers distinctive predictions for designing optimal policies. By looking at national accounts data through the lens of a representative agent model, I back out an implied preference parameter and relate it to a survey-based measure of preferences for leisure. The fact that a survey-based measure covaries more strongly with the model-based measure than a host of labor market indicators meant to capture labor market frictions suggests that the model-based measure is in fact picking up meaningful differences in preferences. This interpretation also is supported by micro-level results. Following the epidemiological approach, I find that the preference for leisure associated with an individual's stated country of ancestry has predictive power for the labor supply of U.S. born workers.

Interestingly, public opinion appears to be mistaken concerning which countries are the most leisure-loving. My results suggest that it is northern rather than southern European countries that have the stronger preference for leisure. The United States, according to the proposed measures, is not the work-loving country it is often assumed to be.

Differences in labor taxation line up with what a relatively mainstream theoretical framework predicts based on distortionary differences that arise from differences in preferences. This relationship, between suggested cultural differences and tax policy, constitutes further support of non-negligible cross-country differences in preferences, detectable at the macro level. In addition, the relationship illustrates the error of ignoring the possibility of policy (or institutional) differences being an endogenous response to underlying cultural differences, as this may bias policy impact estimates. The bias caused here would be to understate the distortionary

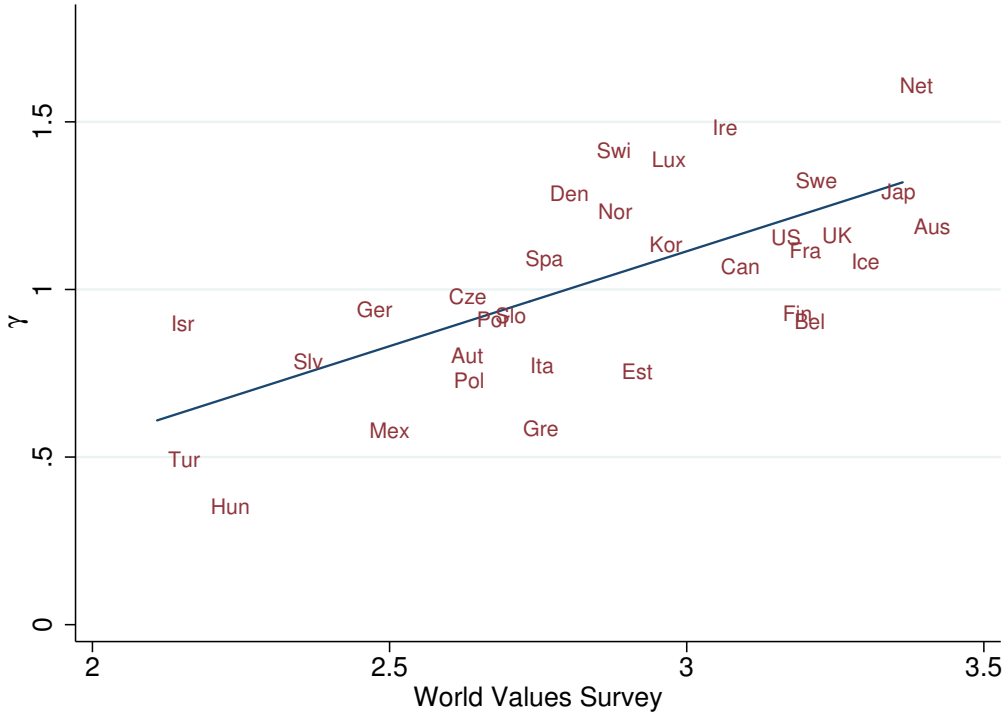
effect that taxation has on labor supply in a cross-country setting, as it is partly mitigated by the on average weaker preference for leisure in high-tax countries.

To what extent institutional and policy differences more generally can be explained partly as country-specific responses to their respective cultural environment is an exciting avenue for future research. Once social multiplier-effects are taken into account, relatively small differences in cultural values, preferences, or beliefs, can cause significant differences in optimal equilibrium responses for both individual agents and policy-makers.

Appendix 3.A Model-Based Preferences

Tabel 3.7 gives the raw data used to construct the model-based preference for leisure, as well as the individual country values of the average response to question c041 from the WVS. Figure 3.3 plots the model-based measure against the survey-based.

Figure 3.3: Consumption/Leisure Utility Across Countries



Source: Author's calculations based on data from the OECD and the WVS.
Notes: Raw correlation between the model-based preference parameter, γ, and the mean answer to question C041 from the WVS: *Work should always come first, even if it means less spare time.*

Table 3.7: Raw Data and Model Variables for the Components of Equation 3.6

Country	γ	Hours	y/c	$1-\theta$	τ	Leisure	Cons.	Wage	WVS
Australia	1.00	1,733	1.46	0.59	0.42	0.67	48,451	24.2	3.36
Austria	0.67	1,786	1.53	0.68	0.66	0.66	48,390	28.1	2.59
Belgium	0.71	1,549	1.52	0.68	0.71	0.70	52,797	35.3	3.16
Canada	0.88	1,758	1.48	0.61	0.50	0.66	45,520	23.3	3.04
Czech Republic	0.80	1,827	1.62	0.59	0.55	0.65	28,188	14.8	2.58
Denmark	0.93	1,579	1.50	0.64	0.58	0.70	43,653	26.7	2.75
Estonia	0.64	1,996	1.51	0.56	0.53	0.62	22,048	9.4	2.87
Finland	0.72	1,723	1.52	0.62	0.62	0.67	45,373	25.0	3.14
France	0.88	1,501	1.39	0.68	0.62	0.71	51,621	32.3	3.15
Germany	0.78	1,436	1.43	0.69	0.70	0.72	49,837	34.3	2.43
Greece	0.54	2,092	1.35	0.66	0.59	0.60	47,506	20.1	2.71
Hungary	0.29	1,986	1.48	0.63	0.81	0.62	29,075	13.6	2.18
Iceland	0.83	1,825	1.35	0.66	0.50	0.65	48,480	23.8	3.26
Ireland	1.20	1,668	1.78	0.56	0.43	0.68	47,155	28.3	3.02
Israel	0.73	1,942	1.43	0.63	0.52	0.63	49,332	22.9	2.11
Italy	0.65	1,826	1.43	0.66	0.63	0.65	52,539	27.1	2.72
Japan	1.10	1,787	1.49	0.61	0.36	0.66	39,865	20.2	3.31
Korea	1.02	2,392	1.72	0.76	0.33	0.54	28,473	15.5	2.92
Luxembourg	1.09	1,607	2.11	0.57	0.59	0.69	47,543	35.3	2.92
Mexico	0.54	2,271	1.40	0.43	0.31	0.56	21,562	5.7	2.45
Netherlands	1.26	1,399	1.59	0.69	0.58	0.73	44,487	34.8	3.34
Norway	0.94	1,420	1.70	0.55	0.62	0.73	51,677	33.8	2.83
Poland	0.63	1,983	1.34	0.56	0.48	0.62	26,938	10.2	2.59
Portugal	0.77	1,790	1.32	0.67	0.54	0.66	31,767	15.7	2.63
Slovak Republic	0.69	1,742	1.54	0.50	0.55	0.66	24,131	10.7	2.32
Slovenia	0.76	1,737	1.51	0.70	0.64	0.67	31,769	19.4	2.66
Spain	0.93	1,704	1.47	0.64	0.52	0.67	42,900	23.5	2.71
Sweden	0.95	1,605	1.48	0.67	0.57	0.69	49,336	30.4	3.16
Switzerland	1.28	1,673	1.49	0.63	0.36	0.68	44,353	25.0	2.83
Turkey	0.47	1,918	1.32	0.42	0.51	0.63	26,497	7.7	2.11
United Kingdom	0.97	1,674	1.30	0.68	0.48	0.68	54,162	28.8	3.21
United States	1.06	1,802	1.36	0.66	0.37	0.65	64,682	32.2	3.12

Source: Author's calculations based on data from the OECD and the WVS.
Notes: Cross-country data for the components of equation 3.6. Data is from 2004, extracted from the OECD Data Library. *Hours* is actual annual hours worked; y/c is the OECD variable "Actual Individual Consumption" measured as share of GDP, where "Actual" refers to the variable including the government expenditure on final good consumption; $1-\theta$ the is labor share; τ is the labor tax wedge as defined in equation 3.2; *Leisure* is $\frac{5200-Hours}{5200}$; *Cons.* is yearly consumption per employed (incl. self-employed) in purchasing power parity in terms of U.S. dollars; *Wage* is the model wage $\frac{y(1-\theta)}{Hours \cdot Employed}$.

3.A.1 Decomposition of Differences in the Preference for Leisure (γ)

Table 3.2 illustrates how individual variables contribute to deviations from an average γ by setting the variable in question to its own average value. Perhaps, a more straightforward way of decomposing γ would be to look at log-deviations from averages. Since γ here is seen as a multiplicative function of four factors, $log(\frac{\gamma}{\bar{\gamma}}) = log(\gamma) - log(\bar{\gamma}) = (log(x_1) - log(\bar{x}_1)) + ... + (log(x_4) - log(\bar{x}_4))$.[80] The advantage of the above approach is mainly that it does not ignore the non-linearities and inter-dependencies in $\gamma(\cdot)$ in the same way as a log-decomposition does. For example, in two countries with a 20 percent above-average labor supply, this "excess" labor supply would be treated as giving the same contribution to the $\frac{\gamma^i}{\bar{\gamma}}$-deviation, regardless of whether one country has low labor taxes and a high labor share, and the other one high taxes and a low labor share. It does appear desirable to treat the former case as one where the above average labor supply constitutes a bigger contribution to a relatively low γ than the latter.

One perhaps problematic aspect of the approach in Section 3.2.1 is that, in general, $\sum_{j \in \mathbf{N}} \Delta(x_j) \neq \Delta$; it will systematically give high values for relatively large γs, and low values for low γs. Outlined below is an approach similar in spirit to the one given in Section 3.2.1, but modified such that the individual deviation contributions actually do sum up to the total contribution. The reason for nevertheless presenting the approach in Section 3.2.1 is mainly its simplicity.

The approach in this section is a compromise between taking non-linearities and interdependencies into account, and still achieving a decomposition into parts that add up to the total deviation. Below, it is stated in general terms. For the special case used in Section 3.2.1, $N = 4$, $\mathbf{x}$ is the individual country i's values for the respective components of $\gamma(\mathbf{x})$, and $y_i = \bar{x}_i = \frac{1}{L} \sum_{j=1}^{L} x_{i,j}$, the average

[80] This would give the same relative picture as only considering the $\frac{\gamma(\bar{x}_{-j}, x_j) - \bar{\gamma}}{\bar{\gamma}}$-term in the proposed weighted average, above.

country value. As such, the decomposition will give an individual argument's contribution to the deviation from a γ of averages (as opposed to the average γ). Table 3.8 presents the decomposition using the approach specified below, with $\mathbf{x} = (h, \frac{y}{c}, (1-\theta), (1-\tau))$.

Table 3.8: Country Percentage Deviation From the "Average" γ, Decomposed Into Individual Argument's Percentage Point Contribution to the Total Percent Deviation.

Country	Total Dev.	Hours	labor Share	GDP/Consump	Tax Wedge
Australia	19.9	4.0	−4.4	−2.9	23.2
Austria	−19.1	−0.9	8.6	2.1	−28.9
Belgium	−14.4	19.0	9.1	1.7	−44.2
Canada	6.2	1.5	−1.6	−0.9	7.2
Czech Republic	−3.7	−4.4	−4.3	7.9	−3.0
Denmark	11.5	18.2	4.6	0.1	−11.4
Estonia	−22.6	−16.3	−8.6	1.0	1.2
Finland	−13.1	4.2	1.0	1.6	−19.8
France	5.6	25.3	9.4	−7.5	−21.6
Germany	−5.8	30.5	11.6	−4.7	−43.1
Greece	−35.6	−21.2	5.0	−8.4	−11.1
Hungary	−65.5	−11.4	1.2	−0.8	−54.5
Iceland	0.3	−4.3	6.9	−10.2	7.9
Ireland	43.8	11.2	−11.3	20.8	23.1
Israel	−12.3	−13.2	1.8	−4.2	3.3
Italy	−22.1	−3.9	6.0	−4.1	−20.1
Japan	32.5	−1.2	−1.7	−0.6	36.1
Korea	23.1	−57.8	23.8	15.9	41.2
Luxembourg	30.7	17.0	−10.1	39.7	−15.9
Mexico	−35.7	−33.3	−29.9	−5.7	33.2
Netherlands	51.9	42.4	13.8	7.6	−11.9
Norway	13.5	34.6	−13.1	13.8	−21.9
Poland	−24.1	−15.2	−8.3	−9.5	9.0
Portugal	−7.6	−1.3	8.2	−12.2	−2.3
Slovak Republic	−16.6	2.6	−19.3	2.7	−2.5
Slovenia	−8.1	3.1	12.6	0.8	−24.7
Spain	11.5	6.4	3.2	−2.2	4.0
Sweden	14.2	15.9	8.4	−0.9	−9.2
Switzerland	53.5	11.1	2.7	−0.1	39.8
Turkey	−44.1	−9.2	−29.1	−9.3	3.5
United Kingdom	17.2	9.5	11.1	−15.3	11.9
United States	27.4	−2.7	7.4	−10.6	33.3

Source: Author's calculations based on data from the OECD.
Notes: Deviations from an average γ, $\frac{\gamma^i - \bar{\gamma}}{\bar{\gamma}}$, decomposed into individual variable contributions, following the approach outlined in this section. A positive number indicates a positive contribution the deviation. Hence, for e.g. hours worked, a positive number is indicative of a below-average labor supply. $\bar{\gamma} = 0.833 \approx 0.835 = \gamma_{av}$.

Consider a continuous, real-valued function $f : \mathbb{R}^N \to \mathbb{R}$, and vectors $\mathbf{x}, \mathbf{y} \in \mathbb{R}^N$.

Let $\Delta \equiv \frac{f(\mathbf{x})-f(\mathbf{y})}{f(\mathbf{y})}$ be the percentage deviation between $f(\mathbf{x})$ and $f(\mathbf{y})$. The aim is to decompose Δ into parts attributable to individual function argument deviations. Let $\Delta(x_i)$ denote the share of Δ attributable to the x_i, y_i-deviation. Denote by $\mathbf{N} = \{1, 2, ..., N\}$, and if $J \subseteq \mathbf{N}$, $\mathbf{z}_J = \{z_i = y_i \text{ for } i \in J;\ z_i = x_i \ for \ \ i \in \mathbf{N} \backslash J\}$

$$\Delta(x_i) \equiv \frac{1}{n_1 N} \sum_{J \in \mathcal{P}(\mathbf{N}_{-i})} n_{|J|+1} \frac{f(\mathbf{z}_J) - f(\mathbf{z}_{J \cup i})}{f(\mathbf{y})}.$$

This will essentially be a weighted average of how much $f(\mathbf{x})$ approach $f(\mathbf{y})$ when changing argument x_i to y_i. To achieve a decomposition of Δ, $n_1, n_2, ..., n_N$ should be chosen such that $\sum_{i=1}^{N} \Delta(x_i) = \Delta = \frac{f(\mathbf{x})}{f(\mathbf{y})} - \frac{f(\mathbf{y})}{f(\mathbf{y})}$. Due to the symmetry of treating every x_i identically, $\sum_{i=1}^{N} \Delta(x_i)$, will contain the same number of terms of $f(\mathbf{z}_J),\ f(\mathbf{z}_K)$ for any $J, K \subset \mathbf{N} : |J| = |K|$. The number of $f(\mathbf{z}_J)$-terms will be according to the following:[81]

$$\#f(\mathbf{z}_J) \in \sum_{i=1}^{N} \Delta(x_i) = \frac{1}{n_1 f(\mathbf{y}) N} \begin{cases} n_1 N & for\ J = \varnothing \\ n_{|J|+1}(N - |J|) - n_{|J|}|J| & \forall\ J \in \mathcal{P}(N) : 1 \leq |J| \leq N-1 \\ n_N N & for\ J = \mathbf{N} \end{cases}.$$

With $n_1 = n_N$, what is left is to set $n_{|J|}$ such that

$$n_{|J|+1}(N - |J|) - n_{|J|}|J| = 0 \ \ \forall \ \ |J| \in \{1, ..., N-1\} \tag{3.15}$$

Let $c = \frac{N}{2}$ for even N ($c = \frac{N+1}{2}$ for odd N). Set $n_c = C$, $C \in \mathbb{R}$. Then, from 3.15 and $n_{1+k} = n_{N-k}$,

[81] For any $J \subseteq \mathbf{N}$, $f(\mathbf{z}_J)$ will appear with a plus-sign in all terms $\Delta(x_i) : i \notin J$ (there will be $N - |J|$ of these, each with the weight $n_{|J|+1}$), and with a minus-sign in all terms $\Delta(x_i) : i \in J$ (there will be $|J|$ of these, each with the weight $n_{|J|}$).

$$n_{c-1} = \frac{c+1}{c-1}C;\ n_{c-2} = \frac{c+2}{c-2}n_{c-1} = \frac{c+2}{c-2}\frac{c+1}{c-1}C;\ ... \Longrightarrow$$
$$n_{c-k} = \prod_{j=1}^{k}\frac{c+j}{c-j}C\ \ \forall\ k\ \in \{1, ..., c-1\}. \tag{3.16}$$

It is straight-forward to show, by induction, that, to fulfil equation 3.15, $n_{1+k} = n_{N-k},\ \forall\ k\ \in \{0, 1, ..., c-1\}$.[82] This, together with 3.16 and $n_c = C$, specify $n_i\ \forall\ i\ \in \{1, ..., N\}$ such that $\sum_{i=1}^{N}\Delta(x_i) = \Delta$ for any positive integer N. In the special case used above with N=4, and setting $C = 1$, this will give $(n_1, n_2, n_3, n_4) = (3, 1, 1, 3)$.

3.A.2 Additional Illustrations of Differences in γ

Figure 3.4 attempts to illustrate γ- (or hour-) differences while taking into account the issue of inter-dependencies between the variables of which γ is a function. It plots the leisure of the representative agent in country i, such that γ would have been observed as constant across countries, while not violating the model's assumptions of an optimising agent respecting its budget constraint. As such, it can also be interpreted as the model's predicted leisure under equal preferences. To be precise it plots $(1 - h_{pred})$ against $(1 - h_{act})$, where

$$h_{pred} = h_{act} + h_\Delta :\ (1 - (h_{act} + h_\Delta))^\phi = \frac{\bar{\gamma}c_{act}}{w(1-\tau)} + \frac{\bar{\gamma}c_\Delta}{w(1-\tau)};$$

$$c_\Delta = h_\Delta w(1-\tau)\kappa; \kappa \equiv \frac{c_{act}}{w(1-\tau)h_{act}}; \exists\delta_1, \delta_2 \in (0,1) : \kappa = [1+\frac{\tau}{1-\tau}\delta_1+\frac{\theta}{(1-\theta)(1-\tau)}\delta_2].$$

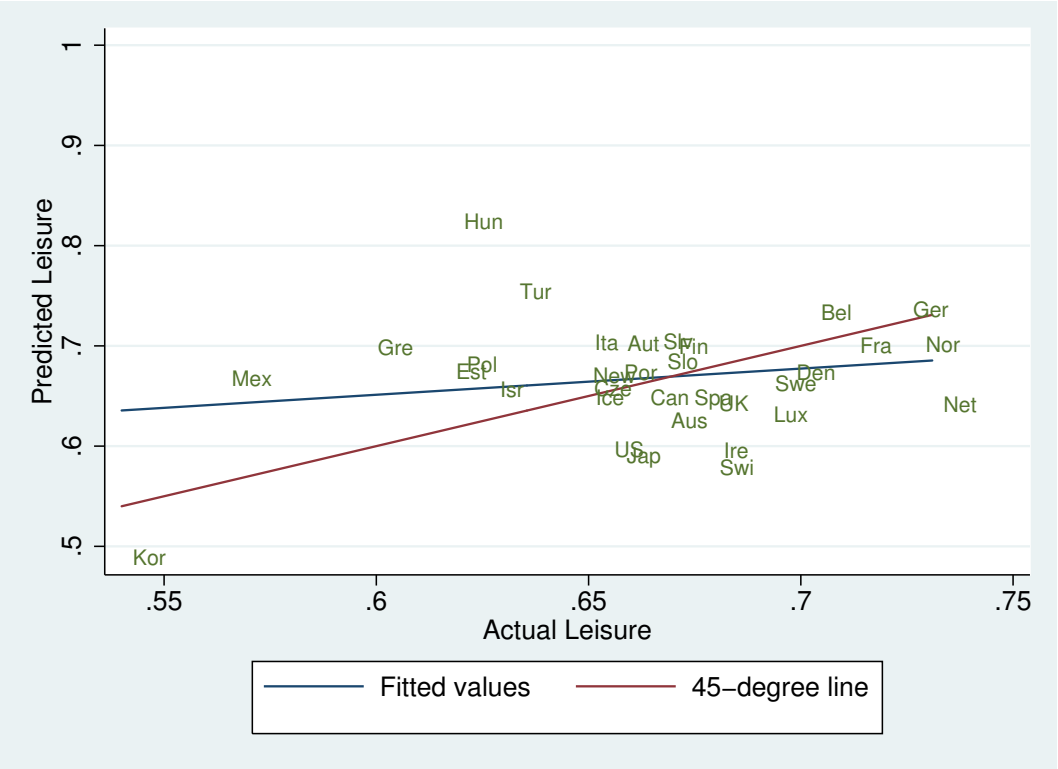
The symbol κ represents the change in possible consumption per unit change of labor supply, resulting from both lost wage income and lower possible unearned income. Although there should be true numbers δ_1, δ_2, representing the share

[82] $n_1 = n_N$. Suppose $n_{1+j} = n_{N-j}$ for some $0 \leq j \leq c-2$. Then, $(1+j)n_{1+j)} = (N-j-1)n_{1+j+1} = (1+j)n_{N-j} = (N-j-1)n_{N-j-1} \implies n_{1+j+1} = n_{N-j-1}$ where the first and third equality follows from 3.15, and the second from the induction assumption.

of tax revenue and capital income allocated towards final consumption, rather than trying to estimate these across countries, κ is chosen to stay true to a more fundamental characteristic of the model, namely that with zero labor input ($h_\Delta = -h_{act}$), there should be zero production and zero consumption, which is why κ is set to $\frac{c_{act}}{w(1-\tau)h_{act}}$. An additional reason for this choice of κ is that the ratio of earned to unearned income remains the same in the model state of predicted leisure under constant cross-country preferences for leisure, as in reality.

If model differences in preferences were negligible in explaining leisure, the fitted values of predicted leisure in Figure 3.4 would be close to the 45-degree line, whereas if there is no correlation at all between actual leisure and predicted leisure with fixed preferences, this would suggest a stronger role for differences in preferences. In line with this reasoning, the decrease in slope, from the 45-degree line towards a horisontal line, is another illustration of the role of differences in preferences. The discrepancy between predicted and actual leisure also give a more tangible illustration of γ-differences, in the more concrete unit of hours. The adjustments range from a 54 percent decrease (1073 hours) in labor supply for Hungary, to a 33 percent and 31 percent increase for the Netherlands and Switzerland (464 and 517 hours respectively).

Figure 3.4: "Predicted" Leisure Plotted Against Actual Leisure.



Source: Author's calculations based on data from the OECD.
Notes: "Predicted" leisure plotted against actual leisure. "Predicted" leisure here is the leisure that would be needed to fulfil equation 3.6, with $\gamma = \bar{\gamma}$ for all countries, while adjusting other choice variables in accordance with the model's optimality conditions.

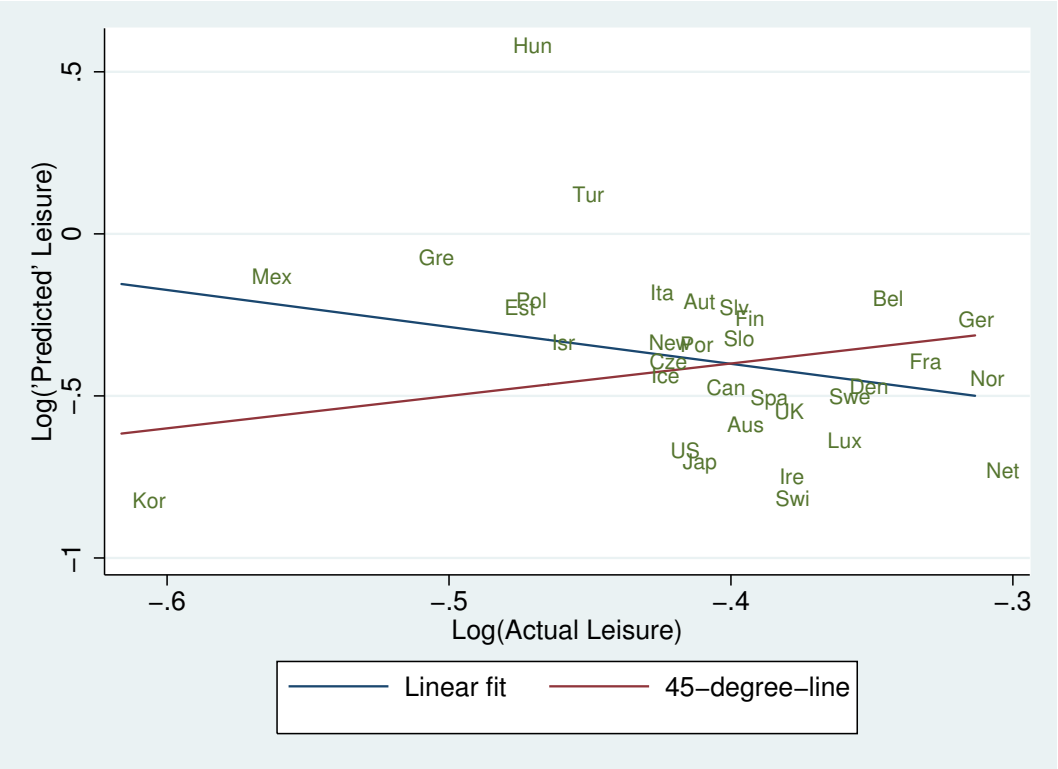
Figure 3.5 shows a plot similar to Figure 3.4, but one where "predicted" leisure is such that only the labor supply adjusts to satisfy equation 3.6 with $\gamma_i = \bar{\gamma}$:[83]

$$log(1 - h_{pred}) = \frac{1}{\phi}[log(c) - log(w) - log(1 - \tau) + log(\bar{\gamma})] \tag{3.17}$$

Here, γ-deviation from $\bar{\gamma}$ is directly proportional to the vertical distance between the "predicted" leisure and the 45-degree line. One illustration of how substantial differences in the model-based preference γ are, is that the model's feasible range of leisure (labor), $[0, 1]$, is insufficient to satisfy equation 3.17 for all countries.

[83]The term "predicted" is somewhat misleading here as there is no actual model predicting the level of leisure in combination with the other variables; it is merely the labor supply that would have needed to be observed for respective country for γ to have been observed constant (and equal to $\bar{\gamma}$) across countries.

Figure 3.5: Log of "Predicted" Leisure Plotted Against Log of Actual Leisure.



Source: Author's calculations based on data from the OECD.
Notes: Log of "predicted" leisure on the Y-axis is leisure according to equation 3.17, where only leisure changes to fulfil the necessary (but not sufficient) optimality condition. Other model variables are not allowed to change. This version of "predicted" leisure is plotted against actual leisure.

Appendix 3.B Robustness, Macro-Level Empirics

This section shows the details of the robustness checks outlined in section 3.4.1.

3.B.1 Theoretical Variations

Preference-Parameter Variations

A first simple theoretical experiment is to vary the preference parameter in the representative consumer's utility function, ϕ, that is not backed out. There is a large literature on the subject of the size of labor supply elasticities, and an unsettled debate about whether one should trust macro or micro estimates. In

the baseline model, a lower labor supply elasticity corresponds to a higher ϕ. I have tried values in the range of 0.5 - 3. The results hold. Table 3.9 presents the results for $\phi = 3$. With typical values for other variables, this corresponds to a Hicksian labor supply elasticity of roughly 0.5, in line with both macro and micro estimates.

Table 3.9: Regression of the Model-Based Preference Parameter γ, Calculated with $\phi = 3$, on Self-Reported Attitudes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
"Work Before Leisure"	0.227	0.158	0.177	0.180	0.167	0.192	0.177	0.167	0.125	0.120
	(4.73)	(2.62)	(2.51)	(2.76)	(2.34)	(3.03)	(2.19)	(2.19)	(2.65)	(2.40)
Emp/Pop-Ratio		0.00432	0.00420	−0.00191	−0.00291	0.000572	0.000265	−0.0165	−0.0237	−0.0239
		(2.01)	(1.81)	(−0.77)	(−1.21)	(0.18)	(0.08)	(−1.07)	(−1.82)	(−1.85)
Union Membership Density			−0.000786	−0.00163	−0.00178	−0.00171	−0.00171	−0.000703	−0.00139	−0.00135
			(−0.44)	(−1.04)	(−1.16)	(−1.23)	(−1.18)	(−0.37)	(−1.03)	(−0.84)
Female Labor Participation				0.00673	0.00728	0.00386	0.00309	0.0208	0.0301	0.0307
				(3.35)	(3.72)	(1.19)	(1.11)	(1.51)	(2.52)	(2.58)
Unemployment					−0.00491	−0.00298	−0.00332	−0.0139	−0.00306	−0.00547
					(−1.14)	(−0.65)	(−0.77)	(−1.48)	(−0.42)	(−0.61)
Unemployment Benefits						0.309	0.306	0.244	0.136	0.112
						(1.80)	(1.88)	(1.36)	(0.65)	(0.57)
Tax Evasion							−0.0280	−0.00822	0.132	0.123
							(−0.59)	(−0.15)	(2.44)	(2.04)
Employment Protection								−0.0157	0.000879	−0.00341
								(−0.41)	(0.03)	(−0.11)
GDP/cap, PPP									0.0178	0.0133
									(3.36)	(1.35)
GDP/Hour										0.00218
										(0.56)
Nordics	−0.00312	−0.0605	−0.0201	0.0372	0.0476	0.0189	0.0433	0.00871	−0.103	−0.102
	(−0.06)	(−1.09)	(−0.20)	(0.37)	(0.50)	(0.19)	(0.38)	(0.06)	(−0.97)	(−0.88)
Observations	32	32	30	30	30	27	26	24	24	24
R^2	0.404	0.475	0.477	0.556	0.571	0.648	0.651	0.670	0.830	0.834
Adjusted R^2	0.363	0.419	0.394	0.463	0.459	0.518	0.487	0.458	0.699	0.681

t statistics in parentheses

Source: Author's calculations based on data from the OECD and the WVS.
Notes: Dependent variable is the model-based preference for leisure measure as described in section 3.2.1, but with $\phi = 3$ instead of 1 as in the baseline. WVS is the survey-based measure, calculated as the country average of the *World Values Survey* response to question c041, "Work should always come first, even if it means less spare time". Unemployment benefits are measured as the replacement ratio; tax evasion is taken from Buehn and Schneider (2012); employment protection is an index calculated by the OECD, including *individual and collective dismissal*.

Subsistence Consumption

A number of recent papers in macroeconomics, both concerned with labor supply and other questions, have modified the consumer's utility function by including a subsistence level.[84] Instead of maximization problem 3.2, the consumer solves 3.19, where $\bar{c}$ is the subsistence level.

$$\begin{aligned} &\max_{c_{i,t},h_{i,t}} \sum_{t=0}^{\infty} ln(c_{i,t} - \bar{c}) + \gamma_i \frac{(1-h_{i,t})^{1-\phi}}{1-\phi} \\ &s.t.\ (1+\tau^c_{i,t})c_{i,t} \leq (1-\tau^h_{i,t})w_{i,t}h_{i,t} + T_{i,t}, \\ &and\ \ c_{i,t} - \bar{c} \geq 0\ \ \forall t. \end{aligned} \tag{3.18}$$

Table 3.10 presents the results for this adjusted version of the model, with $\bar{c}$ set to \$1 (PPP) per day. This is following Bick, Fuchs-Schündeln, and Lagakos (2016), who justifies the level by it being a commonly used poverty threshold. The results hold also for a subsistence level of \$2 per day, another frequently used level of absolute poverty.

[84] See e.g. Ohanian and Rogerson (2008); Restuccia and Vandenbroucke (2014).

Table 3.10: Regression of the Model-Based Preference Parameter γ, Calculated Including a Subsistence Level in the Utility Function, on Self-Reported Attitudes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
"Work Before Leisure"	0.421	0.296	0.371	0.376	0.336	0.375	0.352	0.323	0.269	0.308
	(4.83)	(2.47)	(3.00)	(3.19)	(2.42)	(2.67)	(2.40)	(1.94)	(1.84)	(2.72)
Emp/Pop-Ratio		0.00791	0.00717	−0.00207	−0.00509	0.000136	0.0000789	−0.0285	−0.0378	−0.0363
		(1.84)	(1.58)	(−0.39)	(−1.32)	(0.03)	(0.02)	(−1.16)	(−1.67)	(−1.65)
Union Membership Density			−0.00295	−0.00423	−0.00467	−0.00467	−0.00445	−0.00367	−0.00455	−0.00482
			(−0.92)	(−1.41)	(−1.75)	(−1.63)	(−1.51)	(−0.88)	(−1.14)	(−1.98)
Female Labor Participation				0.0102	0.0119	0.00716	0.00719	0.0346	0.0466	0.0421
				(2.23)	(3.41)	(1.19)	(1.28)	(1.52)	(2.08)	(2.09)
Unemployment					−0.0148	−0.0114	−0.0112	−0.0296	−0.0157	0.00155
					(−1.81)	(−1.13)	(−1.09)	(−1.54)	(−0.84)	(0.08)
Unemployment Benefits						0.444	0.439	0.561	0.422	0.593
						(1.53)	(1.48)	(1.82)	(1.26)	(1.48)
Tax Evasion							−0.00859	0.0597	0.240	0.302
							(−0.12)	(0.54)	(1.83)	(2.67)
Employment Protection								−0.0866	−0.0653	−0.0346
								(−1.13)	(−1.05)	(−0.53)
GDP/Cap, PPP									0.0000229	0.0000548
									(1.66)	(2.61)
GDP/Hour										−0.0156
										(−2.03)
Nordics	−0.0144	−0.119	0.0375	0.124	0.156	0.113	0.114	0.105	−0.0385	−0.0411
	(−0.17)	(−1.28)	(0.20)	(0.67)	(0.96)	(0.64)	(0.57)	(0.43)	(−0.15)	(−0.20)
Observations	32	32	30	30	30	27	26	24	24	24
R^2	0.413	0.483	0.522	0.575	0.615	0.664	0.649	0.679	0.756	0.816
Adjusted R^2	0.372	0.428	0.445	0.486	0.514	0.540	0.483	0.472	0.568	0.648

t statistics in parentheses

Source: Author's calculations based on data from the OECD and the WVS.
Notes: Dependent variable is the model-based preference for leisure measure as described in section 3.2.1, but with the utility function adjusted to include a subsistence level of consumption. WVS is the survey-based measure, calculated as the country average of the *World Values Survey* response to question c041, "Work should always come first, even if it means less spare time". Unemployment benefits are measured as the replacement ratio; tax evasion is taken from Buehn and Schneider (2012); employment protection is an index calculated by the OECD, including *individual and collective dismissal*.

labor Wedge Fluctuations Under Misspecified Preferences

In the baseline regressions, the way I control for differences in the labor wedge is by including control variables typically proposed as explanations for a particularly large labor wedge, e.g. union density and unemployment benefits. By considering what implications misspecified preferences have for labor wedge fluctuations, instead of backing out preferences directly, I allow for the labor wedge to differ between countries.

If preferences across countries were constant, $\gamma_i = \bar{\gamma}$, the labor wedge spread will conform to the description in equation 3.19:

$$(1 - \tau_w^{min}) - (1 - \tau_w^{max}) = \max_t \left\{ \frac{MRS}{MRT} \right\}_{i,t} - \min_t \left\{ \frac{MRS}{MRT} \right\}_{i,t}, \tag{3.19}$$

where the marginal rate of substitution (MRS) and the marginal rate of transformation (MRT) are given by (note the difference between the tax rate τ and post tax-rate labor wedge τ_w)

$$MRS = \frac{\gamma_i c_i}{(1 - h_i)^{\phi}}; \;\; MRT = (1 - \tau_i) w_i.$$

Instead, if preferences are non-constant, and $\gamma_i = \frac{\bar{\gamma}}{\psi_i}$, then what is actually backed out is the left hand side of eqation 3.20:

$$\frac{1}{\psi_i}[(1 - \tau_w^{min}) - (1 - \tau_w^{max})] = \max_t \left\{ \frac{MRS}{MRT} \right\}_{i,t} - \min_t \left\{ \frac{MRS}{MRT} \right\}_{i,t}. \tag{3.20}$$

As we can see, for a country with a below-average preference for leisure (a $\psi_i > 1$), the labor wedge spread is depressed. In line with non-constant preferences, the labor wedge spread turns out to be significantly and negatively correlated with both the model- and survey-based measure of preferences for leisure.[85]

[85] See Table 3.11.

Hence, if preferences are misspecified such that the preference for leisure is assumed to be constant, but the true model is one where the preference for leisure varies across countries, those with a relatively strong preference for leisure will have a relatively high ψ, and therefore a relatively depressed labor wedge spread. In line with this, the wedge spread is significantly negatively correlated to the survey-based measure of preferences for leisure, as Table 3.11 shows.

Table 3.11: Regression of the Labor Wedge Spread Calculated Under the Assumption of Cross-Country Constant Preferences, on Self-Reported Preferences for Leisure and a Number of Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
"Work Before Leisure"	-0.236	-0.316	-0.401	-0.405	-0.395	-0.379	-0.382	-0.378	-0.346	-0.414
	(0.038)	(0.028)	(0.009)	(0.012)	(0.015)	(0.042)	(0.064)	(0.098)	(0.128)	(0.070)
Emp/Pop-Ratio		0.00414	0.00135	0.00122	0.00557	0.0280	0.0418	0.0419	0.0502	0.0477
		(0.340)	(0.772)	(0.802)	(0.486)	(0.477)	(0.298)	(0.352)	(0.271)	(0.276)
Union Membership Density			0.00372	0.00372	0.00379	0.00400	0.00440	0.00436	0.00644	0.00702
			(0.072)	(0.077)	(0.076)	(0.168)	(0.119)	(0.168)	(0.087)	(0.057)
Unemployment				-0.00140	-0.0000121	0.0125	0.00652	0.00655	-0.00320	-0.0234
				(0.907)	(0.999)	(0.648)	(0.816)	(0.831)	(0.919)	(0.484)
Female Labor Participation					-0.00501	-0.0264	-0.0511	-0.0513	-0.0586	-0.0532
					(0.489)	(0.469)	(0.191)	(0.254)	(0.198)	(0.224)
Employment Protection						0.0170	-0.00985	-0.0100	-0.0200	-0.0645
						(0.808)	(0.887)	(0.905)	(0.810)	(0.454)
Unemployment Benefits							-0.0000149	-0.0000149	-0.0000143	-0.00000779
							(0.373)	(0.412)	(0.426)	(0.660)
Tax Evasion								0.000952	-0.129	-0.192
								(0.994)	(0.456)	(0.268)
GDP/Cap, PPP									-0.0000179	-0.0000572
									(0.274)	(0.078)
GDP/Hour										0.0187
										(0.153)
Observations	32	32	30	30	30	27	25	24	24	24
R^2	0.136	0.163	0.312	0.312	0.326	0.348	0.501	0.486	0.529	0.600
Adjusted R^2	0.107	0.106	0.233	0.202	0.186	0.152	0.295	0.211	0.227	0.293

p-values in parentheses
$p < 0.1$, $p < 0.05$, $p < 0.01$

Source: Author's calculations, based on data from the OECD and the WVS.
Notes: Dependent variable is the model-based preference for leisure measure as described in section 3.2.1. "Work Before Leisure" is the survey-based measure, calculated as the country average of the *World Values Survey* response to question c041, "Work should always come first, even if it means less spare time". Unemployment benefits are measured as the replacement ratio; tax evasion is taken from Buehn and Schneider (2012); employment protection is an index calculated by the OECD, including *individual and collective dismissal*.

Utility of Different Functional Forms

The baseline utility function is the one most commonly used in the macro literature on labor supply. Here I present results on three alternative utility function specifications. These are of type

1. Following Greenwood, Hercowitz, and Huffman (1988): $u(c,h) = \frac{\left(c-\gamma\frac{h^{1+\nu}}{1+\nu}\right)^{1-\sigma}-1}{1-\sigma}$, $\sigma \neq 1$
2. Following MaCurdy (1981): $u(c,h) = \frac{c^{1+\sigma}-1}{1+\sigma} - \gamma\frac{h^{1+\psi}}{1+\psi}$
3. CES-preferences: $u(c,h) = \frac{[\gamma c^{\psi}+(1-\gamma)(1-h)^{\psi}]^{\frac{1-\sigma}{\psi}}-1}{1-\sigma}$

In all three cases, γ is the relative consumption/leisure parameter backed out. I study the sensitivity of the chosen baseline utility function by looking at how strongly correlated the model-based preference for leisure using these alternative utility forms are, to the preference measure from the baseline setup. I also look at how the preference ordering of countries change. Table 3.12 presents these results.[86] As we can see, the measures are very strongly correlated. For type (1), parameter values σ, ν, are the same as those chosen by Greenwood, Hercowitz, and Huffman (1988), with $\sigma = 0.6$ and $\nu = 1.7$.[87] For (2), $\sigma = -0.66$, $\psi = 0.16$; this is following MaCurdy (1983). With CES-preferences, I do not find any guidance in the literature, perhaps because CES-preferences are not well-suited for static time-allocation problems. I try parameter values in the range of -0.5–0.5. For typical values of other parameters, this corresponds to Hicksian labor supply elasticites ranging from around zero (or slightly negative) to around 3. The CES correlation in Table 3.12 is based on $\psi = -0.3$. For all four alternative specifications, the model-based preference for leisure is strongly correlated to

[86] In the baseline setup, the FOC used to back out the preference for leisure only includes the ratio of consumption to GDP, there I can avoid some normalization choices that cannot be avoided here. Here, as the "baseline", I use a preference measure calculated consistent with the other utility functions, why this is actually slightly different from what I have used above. The difference is, however, very small quantitatively; the correlation between the two is 0.99.

[87] See Greenwood, Hercowitz, and Huffman (1988) p. 412.

the baseline version. Also the preference-for-leisure-ranking of countries changes little.

Table 3.12: Correlation and median difference in country ranking between the baseline preference for leisure pararmeter, and the corresponding parameter calculated using utility function of different functional form

	Greenwood, Hercowitz, and Huffman (1988)	MaCurdy (1981)	CES	Baseline, $\phi = 5$
Correlation	0.89	0.82	0.96	0.83
Median $\|\Delta\|$ rank	3	4	2	2

Source: Author's calculations based on data from the OECD.

3.B.2 Data Used for Calculating the Preference for Leisure (γ)

In section 3.4.1, hours worked is hours worked per employed (including self-employed), the measure of consumption used, *Actual individual consumption*, includes government final consumption, and the data used is from 2004. Tables 3.13– 3.15 presents robustness checks in each of these dimensions. Table 3.13 shows the results using hours worked per working age population, in Table 3.14, the consumption measure used to calculate γ is *Household final consumption*, and Table 3.15 takes the average values of γ and control variables over the 2001/2002–2007 business cycle.[88]

Two other minor variations are presented. Table 3.16 shows the baseline regression, but with the consumption tax rate calculated following Mendoza, Razin and Tesar (1994), instead of Prescott (2004). Mendoza, Razin and Tesar (1994) calculate the consumption tax as $\tau^c = \frac{5110 + 5121}{c + g - gw - 5110 - 5121}$ where c is household final consumption, g is government final consumption, and is gw government wages. In the OECD's terminology, 5110 is the code for *general taxes on goods and services*, and 5121 for *excise taxes*. Table 3.17 show the baseline regression from Table 3.1, but leaving out the Nordics-dummy.

[88] 2002 is the first full year included in the business cycle.

Table 3.13: Regression of the Model-Based Preference Parameter γ on Self-Reported Attitudes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
"Work Before Leisure"	0.415	0.470	0.634	0.644	0.620	0.673	0.705	0.678	0.613	0.678
	(2.85)	(2.61)	(3.18)	(3.46)	(3.21)	(3.46)	(3.10)	(2.75)	(2.50)	(2.94)
Emp/Pop-Ratio		−0.00347	−0.00534	−0.0230	−0.0249	−0.0182	−0.0176	−0.0374	−0.0485	−0.0460
		(−0.53)	(−0.81)	(−2.27)	(−2.31)	(−1.58)	(−1.44)	(−0.68)	(−0.90)	(−0.92)
Union Membership Density			−0.00507	−0.00752	−0.00779	−0.00783	−0.00783	−0.00781	−0.00886	−0.00930
			(−1.07)	(−1.66)	(−1.68)	(−1.64)	(−1.55)	(−1.23)	(−1.42)	(−1.61)
Female Labor Participation				0.0195	0.0205	0.0103	0.0120	0.0294	0.0437	0.0362
				(2.19)	(2.24)	(0.82)	(0.88)	(0.54)	(0.81)	(0.72)
Unemployment					−0.00887	−0.00772	−0.00697	−0.0201	−0.00347	0.0250
					(−0.59)	(−0.46)	(−0.39)	(−0.53)	(−0.09)	(0.63)
Unemployment Benefits						0.772	0.780	1.010	0.844	1.128
						(1.41)	(1.36)	(1.43)	(1.20)	(1.68)
Tax Evasion							0.0605	0.132	0.347	0.449
							(0.47)	(0.81)	(1.52)	(2.04)
Employment Protection								−0.0999	−0.0745	−0.0237
								(−0.92)	(−0.69)	(−0.23)
GDP/Cap, PPP									0.0273	0.0801
									(1.32)	(2.23)
GDP/Hour										−0.0258
										(−1.75)
Nordics	−0.335	−0.289	−0.0118	0.154	0.173	0.156	0.103	0.126	−0.0454	−0.0497
	(−2.36)	(−1.72)	(−0.04)	(0.54)	(0.59)	(0.51)	(0.30)	(0.31)	(−0.11)	(−0.13)
Observations	32	32	30	30	30	27	26	24	24	24
R^2	0.274	0.282	0.371	0.476	0.484	0.571	0.557	0.506	0.564	0.652
Adjusted R^2	0.224	0.205	0.270	0.367	0.349	0.413	0.349	0.188	0.228	0.333

t statistics in parentheses

Source: Author's calculations based on data from the OECD and the WVS.
Notes: Dependent variable is the model-based preference for leisure measure as described in section 3.2.1, but using hours worked per working age population. WVS is the survey-based measure, calculated as the country average of the *World Values Survey* response to question c041, "Work should always come first, even if it means less spare time". Unemployment benefits are measured as the replacement ratio; tax evasion is taken from Buehn and Schneider (2012); employment protection is an index calculated by the OECD, including *individual and collective dismissal*.

Table 3.14: Regression of the Model-Based Preference Parameter γ on Self-Reported Attitudes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
"Work Before Leisure"	0.553	0.408	0.481	0.489	0.443	0.491	0.502	0.481	0.413	0.429
	(4.84)	(3.05)	(3.11)	(3.36)	(3.05)	(3.53)	(3.06)	(2.72)	(2.56)	(2.55)
Emp/Population-Ratio		0.00920	0.00839	−0.00486	−0.00824	−0.00223	−0.00206	−0.0285	−0.0402	−0.0395
		(1.90)	(1.63)	(−0.61)	(−1.02)	(−0.27)	(−0.23)	(−0.73)	(−1.13)	(−1.08)
Union Membership Density			−0.00157	−0.00340	−0.00390	−0.00392	−0.00395	−0.00226	−0.00336	−0.00347
			(−0.43)	(−0.96)	(−1.12)	(−1.15)	(−1.08)	(−0.50)	(−0.82)	(−0.82)
Female Labor Participation				0.0146	0.0165	0.00824	0.00865	0.0363	0.0513	0.0495
				(2.10)	(2.38)	(0.92)	(0.88)	(0.94)	(1.45)	(1.36)
Unemployment					−0.0165	−0.0147	−0.0145	−0.0315	−0.0141	−0.00704
					(−1.45)	(−1.22)	(−1.14)	(−1.15)	(−0.54)	(−0.24)
Unemployment Benefits						0.650	0.653	0.619	0.445	0.515
						(1.66)	(1.58)	(1.22)	(0.96)	(1.05)
Tax Evasion							0.0161	0.0664	0.291	0.316
							(0.17)	(0.57)	(1.94)	(1.98)
Employment Protection								−0.0487	−0.0221	−0.00958
								(−0.62)	(−0.31)	(−0.13)
GDP/Cap, PPP									0.0286	0.0416
									(2.09)	(1.59)
GDP/Hour										−0.00636
										(−0.59)
Nordics	0.0499	−0.0722	0.0149	0.139	0.174	0.150	0.137	0.0784	−0.101	−0.102
	(0.45)	(−0.58)	(0.06)	(0.62)	(0.79)	(0.68)	(0.56)	(0.27)	(−0.37)	(−0.37)
Observations	32	32	30	30	30	27	26	24	24	24
R^2	0.477	0.537	0.561	0.629	0.660	0.692	0.684	0.687	0.766	0.772
Adjusted R^2	0.441	0.488	0.490	0.552	0.571	0.578	0.535	0.485	0.586	0.564

t statistics in parentheses

Source: Author's calculations based on data from the OECD and the WVS.
Notes: Dependent variable is the model-based preference for leisure measure as described in section 3.2.1, but using a consumption measure not including government consumption. WVS is the survey-based measure, calculated as the country average of the *World Values Survey* response to question c041, "Work should always come first, even if it means less spare time". Unemployment benefits are measured as the replacement ratio; tax evasion is taken from Buehn and Schneider (2012); employment protection is an index calculated by the OECD, including *individual and collective dismissal*.

Table 3.15: Regression of the Model-Based Preference Parameter γ on Self-Reported Attitudes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
"Work Before Leisure"	0.422	0.265	0.320	0.325	0.283	0.313	0.307	0.265	0.216	0.243
	(4.40)	(2.47)	(2.56)	(2.71)	(2.37)	(2.70)	(2.28)	(1.98)	(1.81)	(1.99)
Emp/Population-Ratio		0.00988	0.00936	−0.0000447	−0.00248	0.00213	0.00196	−0.0526	−0.0575	−0.0560
		(2.53)	(2.25)	(−0.01)	(−0.38)	(0.31)	(0.27)	(−1.65)	(−2.05)	(−1.99)
Union Membership Density			−0.00266	−0.00410	−0.00436	−0.00494	−0.00495	−0.00384	−0.00448	−0.00432
			(−0.86)	(−1.34)	(−1.47)	(−1.68)	(−1.58)	(−1.10)	(−1.45)	(−1.40)
Female Labor Participation				0.0103	0.0112	0.00712	0.00665	0.0607	0.0681	0.0650
				(1.81)	(2.03)	(1.00)	(0.85)	(1.91)	(2.42)	(2.30)
Unemployment					−0.0170	−0.0150	−0.0153	−0.0483	−0.0302	−0.0199
					(−1.59)	(−1.30)	(−1.24)	(−2.18)	(−1.44)	(−0.85)
Unemployment Benefits						0.387	0.390	0.313	0.119	0.201
						(1.16)	(1.10)	(0.77)	(0.32)	(0.53)
Tax Evasion							−0.0159	0.0480	0.204	0.225
							(−0.20)	(0.52)	(1.92)	(2.08)
Employment Protection								−0.0813	−0.0540	−0.0380
								(−1.39)	(−1.02)	(−0.69)
GDP/Cap, PPP									0.0200	0.0355
									(2.26)	(2.02)
GDP/Hour										−0.00850
										(−1.02)
Nordics	−0.0646	−0.196	−0.0600	0.0320	0.0511	0.0374	0.0518	0.0321	−0.105	−0.114
	(−0.69)	(−1.95)	(−0.32)	(0.17)	(0.28)	(0.21)	(0.25)	(0.15)	(−0.52)	(−0.57)
Observations	32	32	30	30	30	27	26	24	24	24
R^2	0.403	0.514	0.534	0.590	0.631	0.673	0.664	0.724	0.802	0.818
Adjusted R^2	0.362	0.462	0.460	0.505	0.535	0.553	0.506	0.547	0.650	0.651

t statistics in parentheses

Source: Author's calculations based on data from the OECD and the WVS.
Notes: Dependent variable is the model-based preference for leisure measure as described in section 3.2.1, but the average value over the 2001/2002–2007 business cycle. Also controls are taken as averages, and only included if there is data for at least four of the years. WVS is the survey-based measure, calculated as the country average of the *World Values Survey* response to question c041, "Work should always come first, even if it means less spare time". Unemployment benefits are measured as the replacement ratio; tax evasion is taken from Buehn and Schneider (2012); employment protection is an index calculated by the OECD, including *individual and collective dismissal*.

Table 3.16: Regression of the Model-Based Preference Parameter γ on Self-Reported Attitudes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
"Work Before Leisure"	0.391	0.355	0.449	0.438	0.410	0.428	0.426	0.418	0.344	0.290
	(2.89)	(2.59)	(3.12)	(3.14)	(2.51)	(2.58)	(2.72)	(2.33)	(1.88)	(2.02)
Emp/Pop-Ratio		0.00526	0.00499	−0.000562	−0.00282	0.000264	0.000265	0.00147	−0.0199	−0.0499
		(1.14)	(1.08)	(−0.12)	(−0.66)	(0.06)	(0.06)	(0.04)	(−0.48)	(−1.06)
Union Membership Density			−0.00251	−0.00314	−0.00357	−0.00427	−0.00429	−0.00439	−0.00474	−0.00570
			(−0.77)	(−0.99)	(−1.23)	(−1.33)	(−1.22)	(−0.89)	(−0.93)	(−1.94)
Female Labor Participation				0.00810	0.00831	0.00383	0.00373	0.00257	0.0253	0.0500
				(1.90)	(2.10)	(0.67)	(0.70)	(0.07)	(0.59)	(1.07)
Unemployment					−0.00939	−0.00704	−0.00707	−0.00683	−0.00440	−0.00458
					(−0.89)	(−0.77)	(−0.78)	(−0.28)	(−0.17)	(−0.17)
Unemployment Benefits						0.381	0.378	0.438	0.406	0.849
						(1.08)	(1.02)	(0.97)	(0.72)	(1.15)
Tax Evasion							−0.00493	0.00679	0.169	0.254
							(−0.06)	(0.06)	(1.09)	(1.75)
Employment Protection								−0.0266	−0.0189	−0.0314
								(−0.32)	(−0.25)	(−0.38)
GDP/Cap, PPP									0.0189	0.0590
									(1.31)	(2.37)
GDP/Hour										−0.0184
										(−1.81)
Nordics	−0.0728	−0.154	−0.0387	−0.00947	0.0298	0.0556	0.0596	0.0586	−0.0552	−0.0101
	(−0.87)	(−1.54)	(−0.22)	(−0.05)	(0.18)	(0.33)	(0.29)	(0.20)	(−0.17)	(−0.04)
Observations	25	25	23	23	23	22	22	20	20	20
R^2	0.371	0.396	0.458	0.509	0.531	0.635	0.635	0.622	0.694	0.769
Adjusted R^2	0.313	0.310	0.338	0.364	0.356	0.452	0.410	0.283	0.354	0.451

t statistics in parentheses

Source: Author's calculations based on data from the OECD and the WVS.
Notes: Dependent variable is the model-based preference for leisure measure, following Mendoza, Razin and Tesar (1994) instead of Prescott (2004) when calculating the consumption tax rate. "Work Before Leisure" is the survey-based measure, calculated as the country average of the *World Values Survey* response to question c041, "Work should always come first, even if it means less spare time". Unemployment benefits are measured as the replacement ratio; tax evasion is taken from Buehn and Schneider (2012); employment protection is an index calculated by the OECD, including *individual and collective dismissal*.

Table 3.17: Regression of the Model-Based Preference Parameter γ on Self-Reported Attitudes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Work Before Leisure	0.424	0.336	0.381	0.370	0.331	0.375	0.370	0.347	0.303	0.332
	(5.16)	(2.99)	(3.21)	(3.35)	(2.60)	(2.90)	(2.72)	(2.33)	(2.31)	(2.99)
Emp/Pop-Ratio		0.00454	0.00715	−0.000898	−0.00309	0.00134	0.00132	−0.0289	−0.0399	−0.0388
		(1.36)	(1.75)	(−0.25)	(−1.11)	(0.42)	(0.40)	(−1.37)	(−1.86)	(−1.74)
Union Membership Density			−0.00301	−0.00314	−0.00316	−0.00374	−0.00369	−0.00293	−0.00536	−0.00558
			(−1.87)	(−2.05)	(−2.26)	(−2.84)	(−2.31)	(−1.46)	(−2.61)	(−2.99)
Female Labor Participation				0.00956	0.0108	0.00663	0.00667	0.0362	0.0472	0.0437
				(2.88)	(3.93)	(1.22)	(1.28)	(1.81)	(2.33)	(2.07)
Unemployment					−0.0126	−0.00948	−0.00943	−0.0287	−0.0179	−0.00482
					(−1.62)	(−1.02)	(−0.98)	(−1.76)	(−1.15)	(−0.29)
Unemployment Benefits						0.426	0.424	0.455	0.348	0.479
						(1.46)	(1.39)	(1.42)	(1.05)	(1.22)
Tax Evasion							−0.000933	0.0473	0.193	0.239
							(−0.01)	(0.53)	(1.81)	(2.38)
Employment Protection								−0.0604	−0.0430	−0.0197
								(−0.85)	(−0.74)	(−0.31)
GDP/Cap, PPP									0.0206	0.0448
									(1.74)	(2.12)
GDP/Hour										−0.0119
										(−1.47)
Observations	32	32	30	30	30	27	26	24	24	24
R^2	0.439	0.472	0.547	0.599	0.630	0.676	0.662	0.681	0.753	0.789
Adjusted R^2	0.420	0.435	0.495	0.535	0.553	0.578	0.531	0.511	0.594	0.627

t statistics in parentheses

Source: Author's calculations based on data from the OECD and the WVS.
Notes: The regression table shows the same regression as the baseline in table 3.1, but with the Nordics dummy excluded. Dependent variable is the model-based preference for leisure measure as described in section 3.2.1. "Work Before Leisure" is the survey-based measure, calculated as the country average of the *World Values Survey* response to question c041, "Work should always come first, even if it means less spare time". Unemployment benefits are measured as the replacement ratio; tax evasion is taken from Buehn and Schneider (2012); employment protection is an index calculated by the OECD, including *individual and collective dismissal*.

3.B.3 Variations in Control Variables

In addition to the controls reported above, a few other ones have been tried. Some are just slight modifications of the ones included, while others are distinct variables one could imagine to have an impact on labor supply decisions:

- Full unemployment benefits as percentage of GDP, instead of unemployment benefits as defined above, in relation to average wage
- A broader measure of amount of spending on unemployment as a percentage of GDP, including spending on training programs, employment maintenance and recruitment incentives, job search assistance, start-up incentives, direct job creation, etc, in addition to unemployment benefits
- Length of paid parental leave
- Expected number of years in retirement
- Employment/population ratio restricted to working-age population
- As rough measures of credit constraints, the difference between interest rates and inflation, and *Getting Credit, Distance to the Frontier* from the *World Bank*

None of these controls change the significance of the results. The general pattern for all of them remains the same as above: the variable consistently significantly correlated with γ is the measures of culture, with a few of the other variables some times, and some times not, being significantly correlated with γ.

Alternative Cultural Variables

I try a number of additional explanatory cultural variables from the WVS as "placebo measures." They are listed below, from three broad categories. None of them are significantly correlated to the model-based measure of preferences for leisure (more than one would expect from chance alone).

1. The role of women. C001: *When jobs are scarce, men should have more right to a job than women*; D057: *Do you agree strongly, agree, disagree, or disagree strongly? Being a housewife is just as fulfilling as working for pay*; D060: *A university education is more important for a boy than for a girl*; D062: *A job is alright but what most women really want is a home and children*

2. Materialistic concerns. A038: *[Children should be encouraged to learn] Thrift saving money and things*; C011: *[Important in a job?] Good pay* E014: *[It would be good with] Less emphasis on money and material possessions*

3. Political beliefs/Individual responsibilities. E033: *How would you place your [political] views on [the left/right] scale, generally speaking*;
   To what extent would you agree or disagree with the statement... E035: *Incomes should be made more equal vs We need larger income differences as incentives*; E037: *People should take more responsibility to provide for themselves vs The government should take more responsibility to ensure that everyone is provided for*; E038: *People who are unemployed should have to take any job available or lose their unemployment benefits vs People who are unemployed should have the right to refuse a job they do not want*; E039: *Competition is good. It stimulates people to work hard and develop new ideas vs Competition is harmful. It brings the worst in people*; E040: *Hard work brings success*

Appendix 3.C Microeconomic Evidence

Table 3.18: Summary Statistics for Respective Country of Ancestry

Country	Number of Obs.	Hours Worked	Av. Age	Years of Schooling	Share Married	Unearned Income	Wage Inc.	No. Child < 5
Australia	181	1,387	43.9	14.3	0.51	6,792	36,901	0.13
Austria	3,158	1,132	56.4	14.7	0.59	22,503	37,531	0.06
Belgium	1,763	1,245	52.9	14.0	0.63	14,741	33,945	0.09
Canada	2,236	1,177	51.2	13.8	0.55	12,287	30,866	0.09
Czech Republic	7,319	1,261	52.3	14.3	0.59	14,942	34,041	0.10
Denmark	6,721	1,137	55.1	14.3	0.61	16,756	30,344	0.09
Estonia	108	1,393	48.4	15.1	0.55	11,820	51,299	0.15
Finland	3,716	1,147	52.1	14.0	0.58	12,500	28,721	0.10
France	38,275	1,137	52.4	13.6	0.56	12,394	27,506	0.08
Germany	271,014	1,263	50.9	13.9	0.59	12,797	30,738	0.10
Greece	6,210	1,297	47.9	14.4	0.53	12,833	39,606	0.11
Hungary	6,919	1,188	52.9	14.2	0.59	14,267	34,484	0.10
Iceland	200	1,305	47.8	14.5	0.64	12,993	41,595	0.14
Ireland	165,805	1,219	50.4	14.0	0.55	12,357	32,688	0.10
Israel	233	1,318	37.3	14.8	0.42	10,024	40,255	0.18
Italy	100,342	1,272	48.7	14.0	0.54	11,605	36,189	0.11
Japan	5,639	1,163	51.3	14.5	0.49	14,071	33,339	0.08
Korea	1,936	1,253	30.7	14.8	0.29	4,115	36,931	0.16
Luxembourg	215	1,137	59.0	14.3	0.65	19,701	31,728	0.03
Mexico	52,920	1,209	38.9	12.6	0.39	4,728	21,913	0.17
Netherlands	19,964	1,194	52.5	13.8	0.61	12,844	29,081	0.10
Norway	26,896	1,250	52.1	14.1	0.61	14,605	30,530	0.11
Poland	49,265	1,225	51.2	14.0	0.57	12,718	33,373	0.10
Portugal	5,459	1,233	48.4	13.6	0.52	10,970	31,413	0.12
Slovak Republic	3,959	1,098	57.0	14.1	0.58	14,992	30,817	0.06
Slovenia	936	1,207	55.3	14.4	0.58	16,691	35,955	0.08
Spain	9,700	1,152	47.3	13.3	0.46	9,238	26,951	0.11
Sweden	20,647	1,156	54.0	14.3	0.61	15,835	30,340	0.09
Switzerland	4,821	1,181	54.2	14.2	0.63	18,682	31,951	0.11
Turkey	264	1,194	42.4	14.8	0.44	12,862	38,598	0.14
United Kingdom	194,409	1,080	55.4	14.2	0.61	17,273	29,931	0.08
United States	155,579	1,065	52.6	12.9	0.56	11,401	22,976	0.08
Total	1,166,842	1,184	51.3	13.8	0.57	12,966	29,997	0.10

Source: U.S. Census data from 2013, retrieved from https://usa.ipums.org/usa/.
Notes: Average values for a number of variables split up on country of ancestry. Unearned income is calculated as *Total income* $-$ *Wage Income*.

3.C.1 Robustness

This section presents robustness checks on the micro-level empirical evidence in the dimensions of age, gender, time of migration, However, with life expectancy having increased far more than pension age, decisions to keep working later in life is an increasingly important labor supply margin, which is why in Appendix 3.C, Table 3.20 I present the same regressions on a sample that is unrestricted in terms of age.

As pointed out above, one of the main reasons for studying unmarried and couples separately, is the existing literature on culturally related female labor supply decisions. A different approach is to look separately at the labor supply of males, which is also what much of the labor economics literature has done for separate reasons. Tabel 3.19 shows the OLS estimation of equation 3.8 with the sample restricted to the unmarried male prime working-age population (30–50). The negative relationship between the inherited measure of preferences for leisure and annual labor supply is slightly stronger than the corresponding relationship for unmarried individuals in the same age range. The results also hold for the male population unrestricted in terms of age or marital status.

With life expectancy having increased far more than pension age, decisions to keep working later in life is an increasingly important labor supply margin. For this reason, Tables 3.20–3.21 show the results with a sample that is unrestricted in terms of age.

Table 3.19: Labor Supply and Inherited Preference for Leisure: OLS estimation of equation 3.8 (Unmarried Males; Prime Working Age)

	(1)	(2)	(3)	(4)	(5)	(6)
γ	−140.9	−137.0	−276.7			
	(−2.32)	(−2.22)	(−3.98)			
"Work Before Leisure"				−143.4	−140.4	−167.6
				(−5.15)	(−4.87)	(−11.13)
GDP/Hour			4.148			2.267
			(2.97)			(2.31)
Age; Sex; Education	Yes	Yes	Yes	Yes	Yes	Yes
Unearned; Wage no. child<5	No	Yes	Yes	No	Yes	Yes
Observations	63,330	63,330	63,330	63,330	63,330	63,330
Adjusted R^2	0.749	0.750	0.750	0.750	0.750	0.751

t statistics in parentheses

Standard errors clustered at country level (32 clusters). Dummies for metropolitan area and race included.

Source: Author's calculations, based on U.S. 2013 Census data, retrieved from IPUMS.
Notes: The dependent variable is annual hours worked for unmarried male individuals within the age range of 30–50. Dummy variables for metropolitan area of residence and race are included throughout. Standard errors are calculated allowing for clustering at the country level. If missing, wage is replaced by a predicted wage.

Table 3.20: Labor Supply and Inherited Preference for Leisure: OLS Estimation of Equation 3.8

	(1)	(2)	(3)	(4)	(5)	(6)
γ	−103.0	−98.59	−162.0			
	(−2.49)	(−2.42)	(−2.72)			
"Work Before Leisure"				−88.29	−83.56	−87.88
				(−4.98)	(−5.38)	(−5.80)
GDP/Hour			1.914			1.003
			(2.07)			(2.42)
Age; Sex; Education	Yes	Yes	Yes	Yes	Yes	Yes
Unearned; Wage; No. child<5	No	Yes	Yes	No	Yes	Yes
Observations	502,707	502,707	502,707	502,707	502,707	502,707
Adjusted R^2	0.645	0.652	0.652	0.646	0.652	0.652

t statistics in parentheses

Source: Author's calculations, based on U.S. 2013 Census data, retrieved from IPUMS.
Notes: The dependent variable is annual hours worked for unmarried individuals. Dummy variables for metropolitan area of residence and race are included throughout. Standard errors are calculated allowing for clustering at the country level. If missing, wage is replaced by a predicted wage.

Table 3.21: Labor Supply and Inherited Preference for Leisure: OLS Estimation of Equation 3.8 (Households)

	(1)	(2)	(3)	(4)	(5)	(6)
γ	−148.3	−146.8	−356.7			
	(−1.89)	(−1.81)	(−3.68)			
"Work Before Leisure"				−193.7	−192.2	−232.5
				(−6.26)	(−6.09)	(−11.86)
GDP/Hour			6.90			4.70
			(4.91)			(8.81)
Age; Sex; Education	Yes	Yes	Yes	Yes	Yes	Yes
Unearned; Wage; No. Child<5	No	Yes	Yes	No	Yes	Yes
Observations	547,818	547,818	547,818	547,818	547,818	547,818
Adjusted R^2	0.821	0.827	0.827	0.821	0.827	0.827

t statistics in parentheses

Source: Author's calculations, based on U.S. 2013 Census data, retrieved from IPUMS.
Notes: The Dependent variable is annual hours worked for households. Dummy variables for metropolitan area of residence and race are included throughout. γ and "Work Before Leisure" are calculated as the average of spouses' individual values. Standard errors calculated allowing for clustering at the country level.

Another issue is related to a potential relationship between labor supply decisions and differences related to the time that immigrants come to the United States. If there are systematic differences in how much different generational cohorts of immigrants work, and the time center of gravity of migration for different countries is correlated with γ, this, rather than differences in "ancestral preferences", could explain the relationship between labor supply decisions and country of ancestry. For example, if successive generations of immigrants, work more due to a higher degree of job market integration (work less because more recent generations of immigrants have to fight harder to establish themselves), and people from low-γ countries migrated further back in time (migrated more recently), then this could explain the significant correlation between hours worked and ancestral preference for leisure.[89] However, by choosing to use the 1970 census data, in which I can specifically study the second generation of immigrants across countries, I avert this issue, and other potential issues related to the distribution across generations within a country being different between countries. Table 3.22 shows the regressions corresponding to those shown in Tables 3.20 and 3.21, but using the 1970 sample. The country of ancestry is assigned based on the fathers country of birth because, when both parents are born abroad, the mother's birthplace is not recorded.[90] As we can see in Table 3.22, the results are similar to those above, but instead of the preference measured based on the WVS, γ is showing the stronger relationship to hours worked.[91]

[89]Comparing second generation immigrants to those born in the United States by U.S. born parents, the average number of hours worked are relatively close (1,041 vs. 1,023), and not suggestive of this being a large problem.

[90]Restricting attention to those with both parents born abroad makes the results slightly stronger for γ and slightly weaker for WVS.

[91]A separate reason to consider the 1970 U.S. Census data is that, theoretically, it is possible that the point in time that an ancestor migrated is actually closer to the point in time for constructing the cultural measures, more so than is the case for the 2013 U.S. Census data. In 1970, a 40-year old second generation immigrant was born 1930, meaning her/his parents migrated some time before 1930. The mother was probably not older than 40 years, if she gave birth in 1930, meaning she should have migrated some time between 1890 and 1930. The average point in time that the ancestor of the individuals included from the 2013 U.S. Census could potentially be before 1910. Since data limitations prevent answering this, and both samples likely are significantly off, if the relationships found are not spurious correlations, it has to be the case that some aspect of between-country differences in culture are sufficiently slow-moving. Alternatively, the results could be interpreted as supportive of the slow-moving nature of culture (the slow-moving nature of a culturally related component of preferences for leisure).

Table 3.22: Labor Supply and Inherited Preference for Leisure: OLS Estimation of Equation 3.8 (U.S. Census 1970 Data)

	Unmarried				Couples			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
γ	−110.5	−111.9			−219.7	−200.7		
	(−2.09)	(−2.19)			(−2.97)	(−3.22)		
"Work Before Leisure"			−70.46	−70.86			−107.2	−127.5
			(−1.76)	(−1.81)			(−2.09)	(−2.22)
Age; Sex; Education	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unearned; Wage No. Child>5	No	Yes	No	Yes	No	Yes	No	Yes
Observations	41,017	41,017	41,017	41,017	36,719	36,719	36,719	36,719
Adjusted R^2	0.546	0.561	0.546	0.561	0.790	0.802	0.789	0.798

t statistics in parentheses

Source: Author's calculations, based on U.S. Census data, retrieved from IPUMS.
Notes: Data is from the 1970 US Census, specifically for second generation immigrants. The dependent variable in columns 1–4 is annual hours worked for unmarried individuals, and in columns 5–8 for married couples. Dummy variables for metropolitan area of residence and race are included throughout. For couples, the value of γ and WVS is the average of the two individual values. Standard errors calculated allowing for clustering at the country level (32 clusters).

3.C.2 Micro-Level Empirical Concerns

As stated above, although the epidemiological approach avoids reverse causality issues, there are others. First, there is a timing disconnect between the point being measured and the transmission of cultural values. Since the rationale for using measures of preferences for leisure from peoples' country of ancestry is the existence of an inherited component, most logical would be to have a country of ancestry measure dating from around the time peoples' ancestors actually lived in their respective countries. The U.S. census data does not identify the time of immigration or the country of birth (after 1970), of parents and grandparents of the individuals included, which makes it impossible to distinguish between second and higher generations of immigrants; meaning, for example, people whose ancestors arrived 20 or 200 years ago are treated identically. In addition, the cultural measures identified previously are from the 2000s. Studying labor market decisions in the United States around 2013 means people of working-age were born no later than 1995. Provided not everyone's parents left their home country for the United States immediately before conceiving, one would need data on country of ancestry from the mid 1980s, and preferably earlier to also include U.S. labor market participants who have passed their late teens/early twenties. Due to this (two-sided) timing issue of data availability, inherently it has to be assumed that there is a sufficiently slow moving cultural component of people's preferences.[92] To the extent there is not, one would expect preferences of people being put in the same economic, institutional, and social environment to converge rather than diverge; if anything, this should work against finding a connection between the culturally related preference for leisure and labor market decisions.

Not distinguishing between second and higher generations of immigrants does have some positive implications. One reason for why the literature has focused on second generation immigrants as opposed to first has been to avoid the impact

[92]Or that the between-country difference is sufficiently slow-moving.

of shocks related to the actual migration.[93] It is, however, easy to imagine shocks also related to being the child of migrants, heterogeneous to country of origin.[94] Such potential issues will be mitigated by studying a population where only a small fraction are second generation immigrants.

It could be argued that the correct timing of cultural proxy for descendants of a particular country participating in the U.S. labor market in, say, 2010, is not the point in time when the ancestor(s) of this descendant grew up or left the country, but 2010. If, for example, there is a dynamic component of culture that would change also in an otherwise static environment (or change independently of its economic and institutional environment), and this dynamic component is important enough, then the timing issue outlined is no longer a problem. Exactly what this dynamic component could be is not obvious, but data consistent with this timing logic has been used previously in the literature, e.g. by Fernández (2007) for female labor force participation.[95]

A second issue is related to the nature of the measures of culture used. Since these are essentially scaled country of ancestry fixed effects, these variables may also capture other aspects of culture that affect labor market decisions, but that are not directly related to preferences for leisure. In particular, female labor force participation has been shown to have a fairly strong cultural component, docu-

[93]This is in addition to having preferences, beliefs and values endogenous to precisely the economic and institutional factors of home countries that one would not avoid when studying actual migrants.

[94]Language would be one such thing: having Irish parents would, language-wise, be beneficial from a labor market point of view, compared to having Finish or French parents. Also with a typical American english accent, which is probably true for the majority of second-generation immigrants having grown up in American schools, it is likely harder to develop the same vocabulary level with immigrant parents from a non-english speaking country. Heterogeneity in level of usefulness of the second language that children of immigrant parents most likely will learn would be another source. Unrelated to languages, the reason of migration may be systematically different between different ancestor countries: it is not hard to imagine growing up with parents who migrated due to armed conflict or lucrative job prospects, affect individuals differently (albeit less so than being the actual, war traumatised vs. lucrative financial sector job-offered individual.

[95]Culture has sometimes been defined as the choice of equilibrium in environments containing multiple equilibrias. If cultural values are evolving along a transition path towards an equilibrium, or between two equilibrias, and due to some version of path dependence logic, the cultural values follow this path irrespective of the holders of these values being moved to a different environment, this could provide a justification for the kind of timing choices used (being imposed) here.

mented by Antecol (2000), Fernández (2007), and Fernández and Fogli (2009). As can be seen in Table 3.1 above, the measures of preferences for leisure are positively correlated to female labor force participation. If women from high γ countries work (relatively) more due to culturally related gender roles, this will have a dampening effect on a potential relationship between the measures of preferences for leisure, and hours worked.[96]

Thirdly, there are numerous transmission channels of cultural attitudes, of which parents constitute only one. By studying people in the same economic and institutional setting, living in the same society, going to similar schools, many of the mechanisms that would normally be assumed to be important in forming cultural beliefs, values and norms are effectively shut off, again biasing the approach towards not finding any relationship.

[96]There could of course be other cultural values working the other way. To the best of my knowledge, no other such clearly identified cultural aspect, directly affecting individual labor supply decisions, has been pointed out by the literature.

Appendix 3.D Optimal taxation

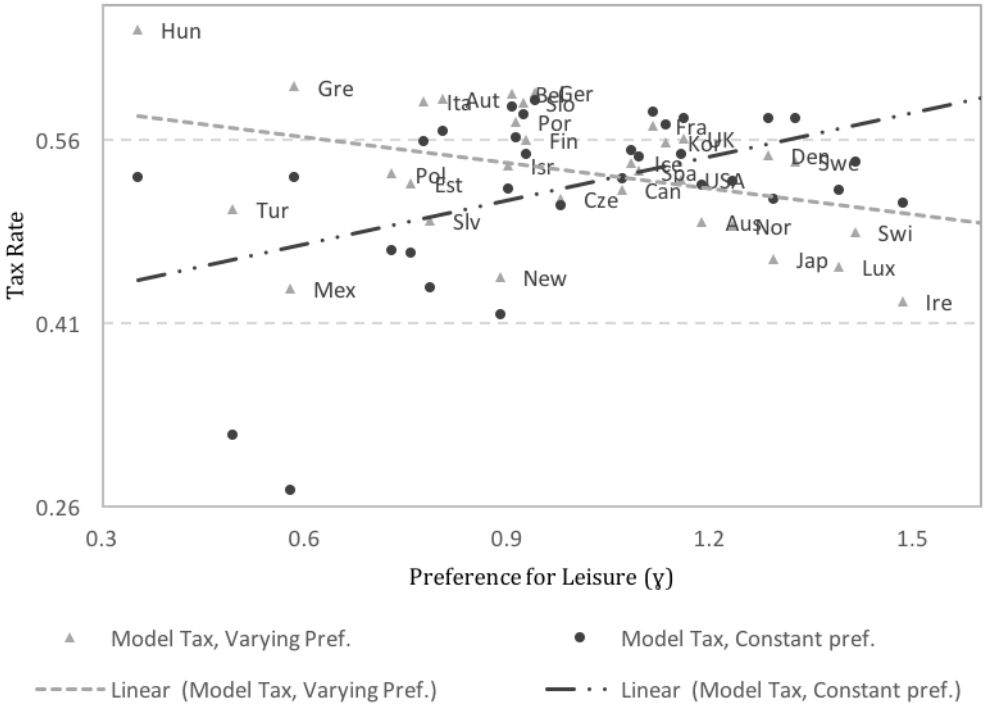
Table 3.23: Taxes and preferences for leisure (WVS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
"Work Before Leisure"	−.079	−.14	−.094	−.12	−.14	−.13	−.13	−.15
	(−1.20)	(−1.85)	(−2.39)	(−2.91)	(−3.07)	(−2.65)	(−2.46)	(−2.66)
GDP/Cap		.0037	−.00035	−.00012	.00027	.0008	.0008	−.0019
		(1.54)	(−0.26)	(−0.09)	(0.17)	(0.42)	(0.42)	(−0.58)
Gov. Rev./GDP			.017	.017	.016	.016	.016	.014
			(8.88)	(8.38)	(6.38)	(5.94)	(5.81)	(4.14)
Union Membership Density				.00044	.00056	.00045	.00059	.0011
				(0.37)	(0.47)	(0.36)	(0.45)	(0.80)
Unemployment Benefits					−.1	−.098	−.087	−.095
					(−0.97)	(−0.87)	(−0.75)	(−0.81)
Tax Evasion						.008	.003	.0076
						(0.58)	(0.17)	(0.42)
Gov. Provide							.014	.0098
							(0.47)	(0.32)
GDP/Hour								.003
								(1.01)
Nordics	.081	.067	−.11	−.13	−.12	−.12	−.12	−.14
	(1.26)	(1.06)	(−2.78)	(−1.96)	(−1.84)	(−1.76)	(−1.77)	(−1.93)
Observations	33	33	33	31	27	26	26	26
R^2	0.074	0.144	0.776	0.797	0.782	0.763	0.766	0.780
Adjusted R^2	0.012	0.056	0.744	0.757	0.717	0.671	0.656	0.657

t statistics in parentheses

Source: Author's calculations based on data from the OECD and the WVS.
Notes: Dependent variable throughout is the tax wedge as defined in equation 3.2. WVS is the survey-based measure of preferences for leisure from section 3.3. Gov Rev./ GDP is total government revenue as a percentage of GDP; Union Memb. Density is the share of employed that are trade union members; unemployment benefits are measured as the replacement rate; the measure of tax evasion is taken from Buehn and Schneider (2012); "Gov. Provide" is the mean response to the WVS question e037: to what extent individuals themselves or the government should take more responsibility to provide for people; Nordics (as above) is included due to the atypical labor supply subsidizing government spending of these countries, which alters the distortionary effects of taxation. The results are robust to excluding the "Nordics" dummy.

Figure 3.6: Optimal Partial Equilibrium Model Tax Rates With and Without Country Varying γ



Source: Author's calculations, based on OECD data.
Notes: The graph plots two different data points for each country against the country-specific γ:
1. The optimal model tax, which will be the τ solving the maximization problem 3.12 (actual FOC given by equation 3.13) with country varying γ.
2. The optimal model tax, solving the maximization problem 3.12 (or 3.13), with $\gamma = \hat{\gamma}$ fixed across countries. This is abusing the x-axis, as γ is not actually varying, but plotted like this for comparison.
In addition, the linear fit of these data series are included. Country labels for the model tax rate series with constant preferences are excluded to not overcrowd the center of the graph; countries are identified by their position in the Preference-for-Leisure dimension.
The purpose of including the optimal tax rate with cross-country constant γ is to illustrate what kind of variation country-varying preferences induces, and that other country-specific factors in the model work against a negative relationship between optimal model taxes and preferences for leisure.

General Equilibrium Elasticity

The dependency of $\epsilon^M \equiv \frac{\partial h}{\partial(1-\tau)}\frac{(1-\tau)}{h}$ on γ has been shown above. In a general equilibrium setting, allowing for unearned income and wages to adjust to hours worked, it is less clear. In general, $\epsilon_{GE} \equiv \frac{h}{(1-\tau)}\frac{(1-\tau)}{h}$ it will be given by

$$\epsilon_{GE} \equiv \frac{dh}{d(1-\tau)}\frac{(1-\tau)}{h} = \frac{(1-\tau)}{h}\left[\frac{\partial h}{\partial(1-\tau)} + \frac{\partial h}{\partial w}\frac{dw}{d(1-\tau)} + \frac{\partial h}{\partial T}\frac{dT}{d(1-\tau)}\right] \tag{3.21}$$

$$= \frac{(1-\tau)}{h}\left[\frac{\partial h}{\partial(1-\tau)} + \frac{\partial h}{\partial w}\frac{\partial w}{\partial h}\frac{dh}{d(1-\tau)} + \frac{\partial h}{\partial T}\frac{\partial T}{\partial h}\frac{dh}{d(1-\tau)}\right] =$$
$$= \epsilon_{PE} + \frac{\partial h}{\partial w}\frac{\partial w}{\partial h}\epsilon_{GE} + \frac{\partial h}{\partial T}\frac{\partial T}{\partial h}\epsilon_{GE} \implies \epsilon_{GE} = \epsilon_{PE}\left[1 - \frac{\partial h}{\partial w}\frac{\partial w}{\partial h} - \frac{\partial h}{\partial T}\frac{\partial T}{\partial h}\right]^{-1}. \tag{3.22}$$

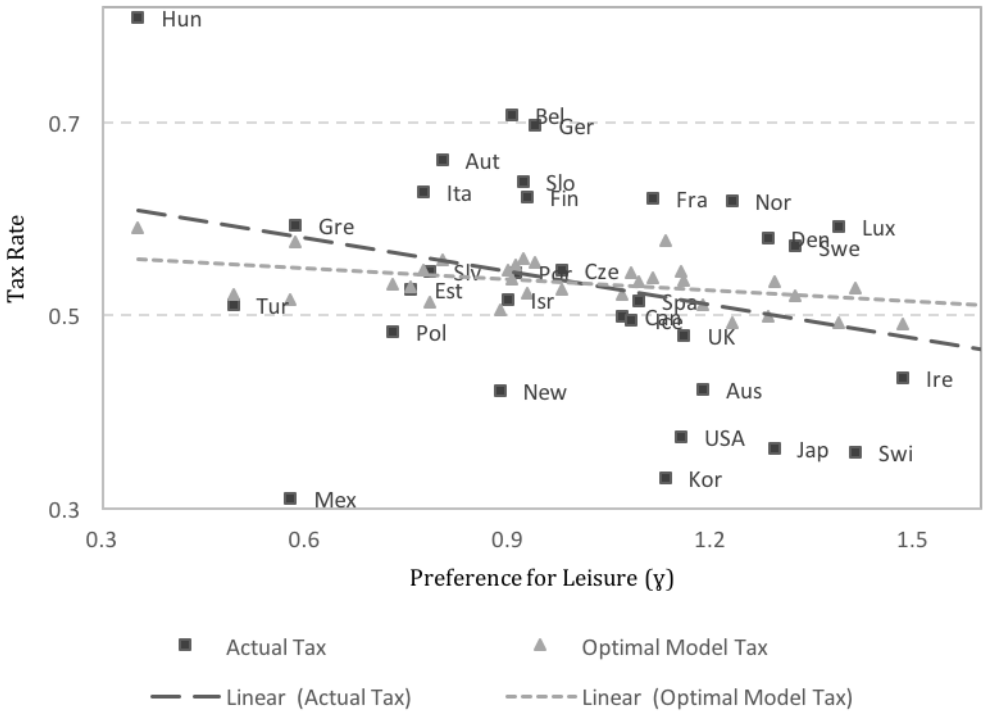
With the model studied in section 3.5.1,

$$\frac{\partial w}{\partial h} = 0; \quad \frac{\partial T}{\partial h} = \frac{\theta w}{(1-\theta)}; \quad \frac{\partial h}{\partial T} = \frac{-\gamma}{(\gamma+1)(1-\theta)(1-\tau)+\gamma\theta} \tag{3.23}$$

$$\implies \epsilon_{GE} = \frac{\gamma\theta}{(\gamma+1)(1-\theta)(1-\tau)+\gamma\theta} \implies \frac{\partial \epsilon_{GE}}{\partial \gamma} > 0. \tag{3.24}$$

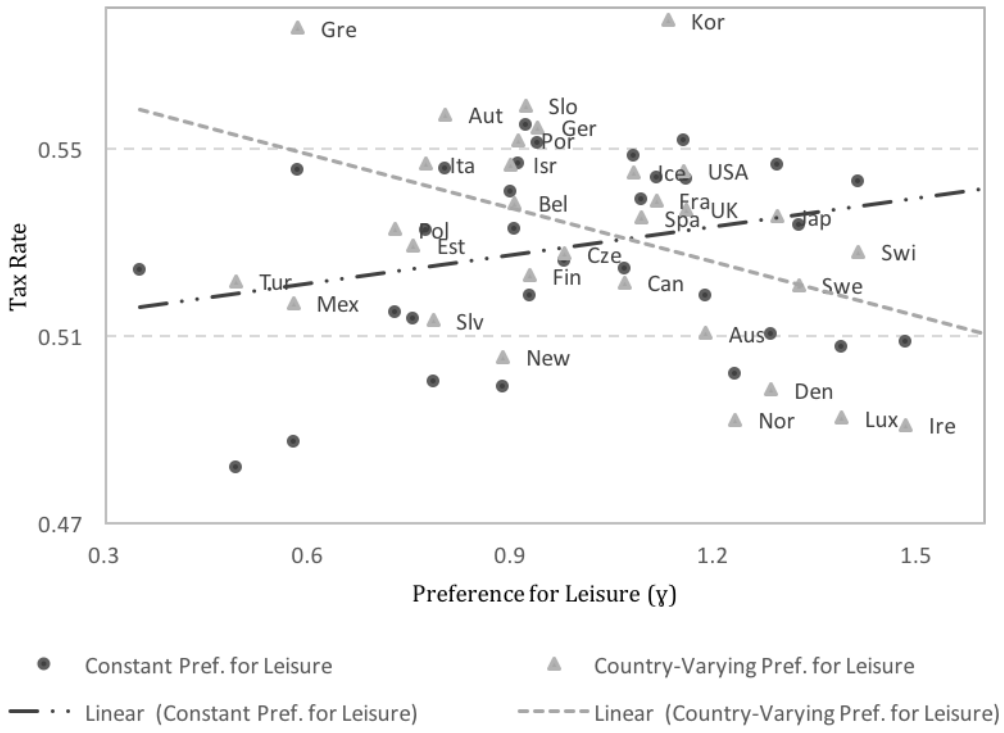
Figures 3.7 and 3.8 show the general equilibrium analog of Figures 3.2–3.6 in the main paper.

Figure 3.7: Actual Tax Rates, and Optimal General Equilibrium Model Tax Rates with Country Varying γ



Source: Author's calculations, based on OECD data.
Notes: The graph plots two different data points for each country against the country-specific γ:
1. The actual tax wedges, as defined by equation 3.2.
2. The optimal model tax, which will be the τ solving the maximization problem 3.12 (actual FOC given by equation 3.13) with country varying γ.
In addition, the linear fit of these data series are included. Country labels for the model tax rate series are excluded to not overcrowd the center of the graph; countries are identified by their Preference-for-Leisure value being the same for the two series.

Figure 3.8: Optimal General Equilibrium Model Tax Rates With and Without Country Varying γ

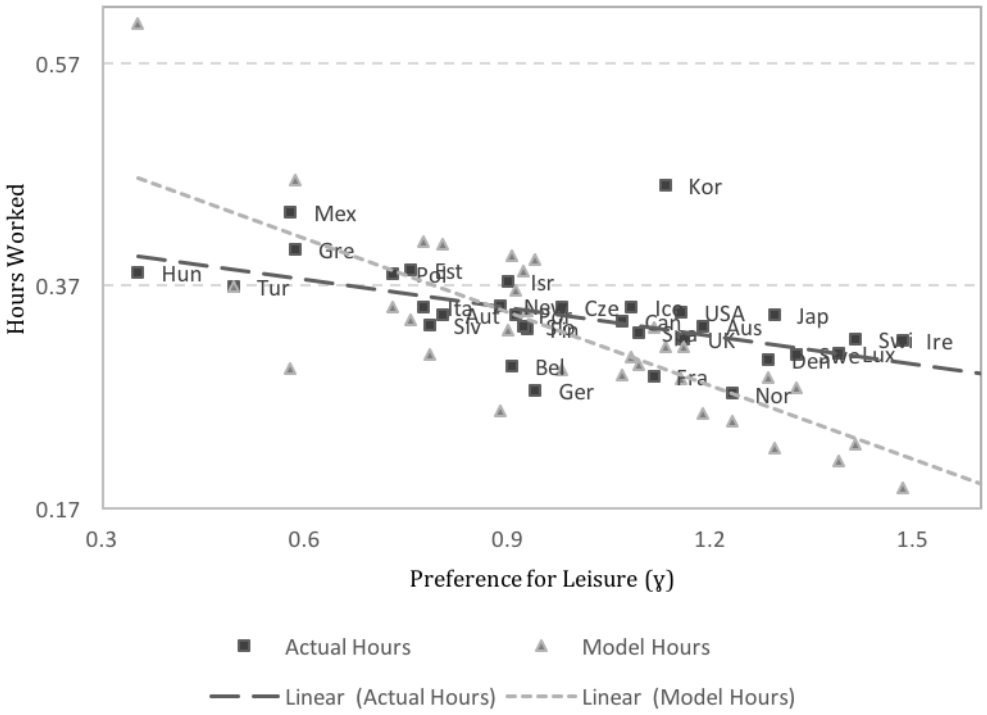


Source: Author's calculations, based on OECD data.
Notes: The graph plots two different data points for each country against the country-specific γ:
1. The optimal model tax, which will be the τ solving the maximization problem 3.12 (actual FOC given by equation 3.13) with country varying γ.
2. The optimal model tax, solving the maximization problem 3.12 (or 3.13), with $\gamma = \hat{\gamma}$ fixed across countries. This is abusing the x-axis, as γ is not actually varying, but plotted like this for comparison.
In addition, the linear fit of these data series are included. Country labels for the model tax rate series with constant preferences are excluded to not overcrowd the center of the graph; countries are identified by their position in the Preference-for-Leisure dimension.
The purpose of including the optimal tax rate with cross-country constant γ is to illustrate what kind of variation country-varying preferences induces, and that other country-specific factors in the model work against a negative relationship between optimal model taxes and preferences for leisure.

Actual and Predicted Hours Worked

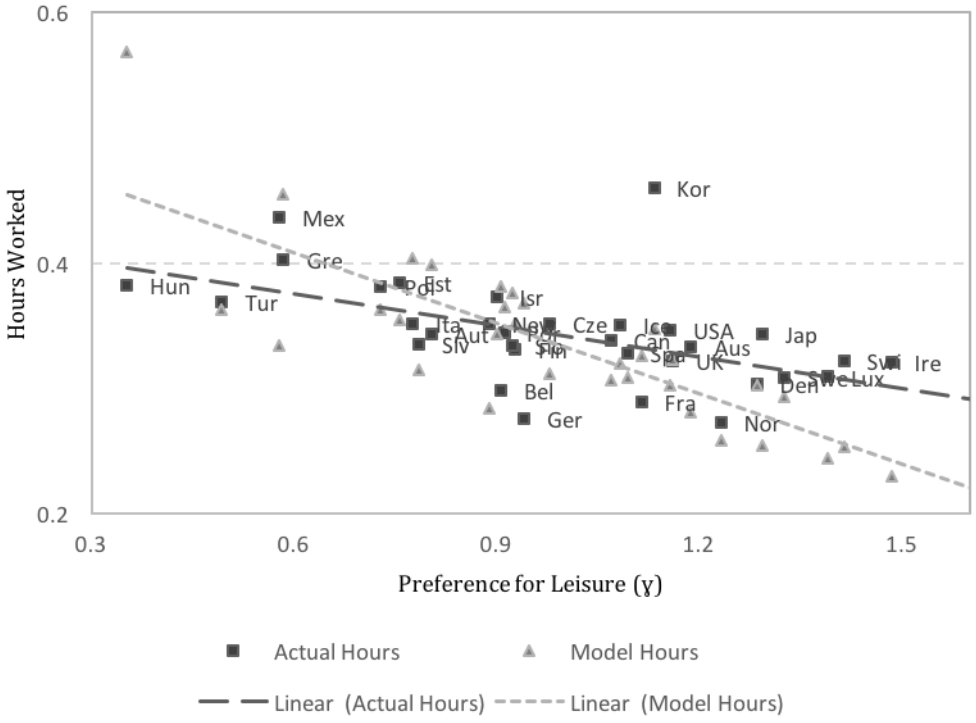
Figures 3.9 and 3.10 plot model hours worked against γ. The steeper negative relationship between γ and model hours relative to actual hours is reflecting the model tax rate being flatter than actual tax rates.

Figure 3.9: Actual hours, and Partial Equilibrium Model Hours



Source: Author's calculations, based on OECD data.
Notes: The graph plots two data points for each country against the country-specific γ:
1. The actual hours worked.
2. The optimal model hours with a country's given γ and the tax rate τ solving 3.13.
In addition, the linear fit of these data series are included. Country labels for the model tax rate series with constant preferences are excluded to not overcrowd the center of the graph; countries are identified by their position in the Preference-for-Leisure dimension.

Figure 3.10: Actual hours, and General Equilibrium Model Hours



Source: Author's calculations, based on OECD data.
Notes: The graph plots two data points for each country against the country-specific γ:
1. The actual hours worked.
2. The optimal model hours with a country's given γ and the tax rate τ solving 3.14.
In addition, the linear fit of these data series are included. Country labels for the model tax rate series with constant preferences are excluded to not overcrowd the center of the graph; countries are identified by their position in the Preference-for-Leisure dimension.

Bibliography

Ackerberg, D. A., Caves, K., and Frazer, G. (2015). Identification properties of recent production function estimators. *Econometrica*, 83(6):2411–2451.

Aguiar, M. and Hurst, E. (2007). Measuring trends in leisure: the allocation of time over five decades. *The Quarterly Journal of Economics*, 122(3):969–1006.

Akerlof, G. A. and Kranton, R. E. (2000). Economics and identity. *The Quarterly Journal of Economics*, 115(3):715–753.

Alesina, A. and Angeletos, G.-M. (2005). Fairness and redistribution. *American Economic Review*, 95(4):960–980.

Alesina, A. and Ferrara, E. L. (2005). Ethnic diversity and economic performance. *Journal of Economic Literature*, 43(3):762–800.

Alesina, A. and Giuliano, P. (2015). Culture and institutions. *Journal of Economic Literature*, 53(4):898–944.

Alesina, A., Giuliano, P., and Nunn, N. (2013). On the origins of gender roles: Women and the plough. *The Quarterly Journal of Economics*, 128(2):469–530.

Alesina, A., Glaeser, E., and Sacerdote, B. (2001). Why doesn't the us have a european-style welfare system? Working Paper 8524, National Bureau of Economic Research.

Alesina, A. and Glaeser, E. L. (2004). *Fighting poverty in the US and Europe: A world of difference*. Oxford University Press.

Alesina, A., Glaeser, E. L., and Sacerdote, B. (2005). Work and leisure in the u.s. and europe: Why so different? Working Paper 11278, National Bureau of Economic Research.

Algan, Y. and Cahuc, P. (2009). Civic virtue and labor market institutions. *American Economic Journal: Macroeconomics*, 1(1):111–45.

Algan, Y. and Cahuc, P. (2010). Inherited trust and growth. *The American Economic Review*, 100(5):2060–2092.

Altonji, J. G. and Blank, R. M. (1999). Race and gender in the labor market. *Handbook of labor economics*, 3:3143–3259.

Antecol, H. (2000). An examination of cross-country differences in the gender gap in labor force participation rates. *Labour Economics*, 7(4):409 – 426.

Arellano, C., Bai, Y., and Kehoe, P. J. (2012). Financial frictions and fluctuations in volatility. *Federal Reserve Bank of Minneapolis Research Department Staff Report*, 466.

Autor, D. H. and Dorn, D. (2013). The growth of low-skill service jobs and the polarization of the us labor market. *American Economic Review*, 103(5):1553–97.

Autor, D. H., Levy, F., and Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly journal of economics*, 118(4):1279–1333.

Avey, J. B., Reichard, R. J., Luthans, F., and Mhatre, K. H. (2011). Meta-analysis of the impact of positive psychological capital on employee attitudes, behaviors, and performance. *Human resource development quarterly*, 22(2):127–152.

Baily, M. N. (1978). Some aspects of optimal unemployment insurance. *Journal of public Economics*, 10(3):379–402.

Barrick, M. R. and Mount, M. K. (1991). The big five personality dimensions and job performance: a meta-analysis. *Personnel psychology*, 44(1):1–26.

Barrick, M. R. and Mount, M. K. (1993). Autonomy as a moderator of the relationships between the big five personality dimensions and job performance. *Journal of applied Psychology*, 78(1):111.

Barro, R. J. and Lee, J. W. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of development economics*, 104:184–198.

Barro, R. J. and McCleary, R. M. (2003). Religion and economic growth across countries. *American Sociological Review*, pages 760–781.

Becker, G. S. and Stigler, G. J. (1977). De gustibus non est disputandum. *The American Economic Review*, 67(2):76–90.

Becker, S. O. and Woessmann, L. (2009). Was weber wrong? A human capital theory of protestant economic history. *The Quarterly Journal of Economics*, pages 531–596.

Belloni, A., Chernozhukov, V., and Wang, L. (2011). Square-root lasso: pivotal recovery of sparse signals via conic programming. *Biometrika*, 98(4):791–806.

Bick, A., Fuchs-Schündeln, N., and Lagakos, D. (2016). How do average hours worked vary with development? Cross-country evidence and implications. Working Paper 21874, National Bureau of Economic Research.

Bisin, A., Topa, G., and Verdier, T. (2004). Cooperation as a transmitted cultural trait. *Rationality and Society*, 16(4):477–507.

Bisin, A. and Verdier, T. (2001). The economics of cultural transmission and the dynamics of preferences. *Journal of Economic theory*, 97(2):298–319.

Bloom, N., Sadun, R., and Van Reenen, J. (2012). The organization of firms across countries. *The quarterly journal of economics*, 127(4):1663–1705.

Booth, A. L., Leigh, A., and Varganova, E. (2012). Does ethnic discrimination vary across minority groups? evidence from a field experiment. *Oxford Bulletin of Economics and Statistics*, 74(4):547–573.

Borghans, L., Duckworth, A. L., Heckman, J. J., and Ter Weel, B. (2008). The economics and psychology of personality traits. *Journal of human Resources*, 43(4):972–1059.

Botticini, M. and Eckstein, Z. (2012). *The chosen few: How education shaped Jewish history, 70-1492*. Princeton University Press.

Bryan, G. T., Choi, J. J., and Karlan, D. (2018). Randomizing religion: The impact of protestant evangelism on economic outcomes. Technical report, National Bureau of Economic Research.

Buehn, A. and Schneider, F. (2012). Size and development of tax evasion in 38 oecd countries: What do we (not) know? *CESifo Working Paper Series*.

Butler, J. V., Giuliano, P., and Guiso, L. (2016). The right amount of trust. *Journal of the European Economic Association*, 14(5):1155–1180.

Caicedo, F. V. (2014). The mission: Human capital transmission, economic persistence and culture in south america. *Unpublished Working Paper*.

Campante, F. and Yanagizawa-Drott, D. (2015). Does religion affect economic growth and happiness? evidence from ramadan. *The Quarterly Journal of Economics*, 130(2):615–658.

Campante, F. R., Chor, D., et al. (2017). Just do your job?: Obedience, routine tasks, and the pattern of specialization. Technical report.

Caselli, F. (2005). Accounting for cross-country income differences. *Handbook of economic growth*, 1:679–741.

Caselli, F. and Ciccone, A. (2019). The human capital stock: a generalized approach: comment. *American Economic Review*, 109(3):1155–74.

Chari, V. V., Kehoe, P. J., and McGrattan, E. R. (2007). Business cycle accounting. *Econometrica*, 75(3):781–836.

Chetty, R. (2006). A general formula for the optimal level of social insurance. *Journal of Public Economics*, 90(10):1879–1901.

Chetty, R. (2012). Bounds on elasticities with optimization frictions: A synthesis of micro and macro evidence on labor supply. *Econometrica*, 80(3):969–1018.

De Philippis, M. and Rossi, F. (2017). Parents, schools and human capital differences across countries.

Diamond, P., McFadden, D., and Rodriguez, M. (1978). Measurement of the elasticity of factor substitution and bias of technical change. In *Contributions to economic analysis*, volume 2, pages 125–147. Elsevier.

Dohmen, T., Falk, A., Huffman, D., and Sunde, U. (2012). The intergenerational transmission of risk and trust attitudes. *The Review of Economic Studies*, 79(2):645–677.

Durlauf, S. N., Kourtellos, A., and Tan, C. M. (2012). Is god in the details? a reexamination of the role of religion in economic growth. *Journal of Applied Econometrics*, 27(7):1059–1075.

Eugster, B., Lalive, R., Steinhauer, A., and Zweimüller, J. (2016). Culture, work attitudes and job search: Evidence from the swiss language border. *Journal of the European Economic Association*.

Falk, A., Becker, A., Dohmen, T. J., Enke, B., and Huffman, D. (2015). The nature and predictive power of preferences: Global evidence.

Fehr, E., Kirchler, E., Weichbold, A., and Gächter, S. (1998). When social norms overpower competition: Gift exchange in experimental labor markets. *Journal of Labor economics*, 16(2):324–351.

Fernandez, R. (2007). Alfred marshall lecture: women, work, and culture. *Journal of the European Economic Association*, 5(2-3):305–332.

Fernandez, R. (2011). Does culture matter? volume 1 of *Handbook of Social Economics*, pages 481 – 510. North-Holland.

Fernandez, R. and Fogli, A. (2009). Culture: An empirical investigation of beliefs, work, and fertility. *American Economic Journal: Macroeconomics*, 1(1):146–177.

Furnival, G. M. and Wilson, R. W. (1974). Regressions by leaps and bounds. *Technometrics*, 16(4):499–511.

Gallen, Y. (2015). The gender productivity gap. *Unpublished Job Market Paper, Economics Department, Northwestern University, Evanston, IL*.

Giavazzi, F., Schiantarelli, F., and Serafinelli, M. (2013). Attitudes, policies, and work. *Journal of the European Economic Association*, 11(6):1256–1289.

Gorodnichenko, Y. and Roland, G. (2011). Which dimensions of culture matter for long-run growth? *American Economic Review*, 101(3):492–98.

Gorodnichenko, Y. and Roland, G. (2017). Culture, institutions, and the wealth of nations. *Review of Economics and Statistics*, 99(3):402–416.

Greenwood, J., Hercowitz, Z., and Huffman, G. W. (1988). Investment, capacity utilization, and the real business cycle. *The American Economic Review*, pages 402–417.

Griffin, M. A., Neal, A., and Parker, S. K. (2007). A new model of work role performance: Positive behavior in uncertain and interdependent contexts. *Academy of management journal*, 50(2):327–347.

Griliches, Z. and Mairesse, J. (1995). Production functions: The search for identification. Working Paper 5067, National Bureau of Economic Research.

Guiso, L., Sapienza, P., and Zingales, L. (2003). People's opium? religion and economic attitudes. *Journal of monetary economics*, 50(1):225–282.

Guiso, L., Sapienza, P., and Zingales, L. (2004). The role of social capital in financial development. *American economic review*, 94(3):526–556.

Guiso, L., Sapienza, P., and Zingales, L. (2006). Does culture affect economic outcomes? *Journal of Economic Perspectives*, 20(2):23–48.

Guiso, L., Sapienza, P., and Zingales, L. (2008). Alfred marshall lecture: Social capital as good culture. *Journal of the European Economic Association*, 6(2-3):295–320.

Guiso, L., Sapienza, P., and Zingales, L. (2009a). Cultural biases in economic exchange? *The Quarterly Journal of Economics*, 124(3):1095–1131.

Guiso, L., Sapienza, P., and Zingales, L. (2009b). Cultural biases in economic exchange? *The Quarterly Journal of Economics*, 124(3):1095–1131.

Guiso, L., Sapienza, P., and Zingales, L. (2011). Chapter 10 - civic capital as the missing link. volume 1 of *Handbook of Social Economics*, pages 417 – 480. North-Holland.

Guiso, L., Sapienza, P., and Zingales, L. (2016). Long-term persistence. *Journal of the European Economic Association*, 14(6):1401–1436.

Hall, R. E. (1997). Macroeconomic fluctuations and the allocation of time. *Journal of Labor Economics*, 15(1):223–250.

Hall, R. E. and Jones, C. I. (1999). Why do some countries produce so much more output per worker than others? *The quarterly journal of economics*, 114(1):83–116.

Hanushek, E. A. and Woessmann, L. (2012). Do better schools lead to more growth? cognitive skills, economic outcomes, and causation. *Journal of Economic Growth*, 17(4):267–321.

Heine, S. J. and Ruby, M. B. (2010). Cultural psychology. *Wiley Interdisciplinary Reviews: Cognitive Science*, 1(2):254–266.

Hellerstein, J. K. and Neumark, D. (2007). Production function and wage equation estimation with heterogeneous labor: Evidence from a new matched employer-employee data set. In *Hard-to-measure goods and services: Essays in honor of Zvi Griliches*, pages 31–71. University of Chicago Press.

Hellerstein, J. K., Neumark, D., and Troske, K. R. (1999). Wages, productivity, and worker characteristics: Evidence from plant-level production functions and wage equations. *Journal of labor economics*, 17(3):409–446.

Hendricks, L. (2002). How important is human capital for development? evidence from immigrant earnings. *American Economic Review*, 92(1):198–219.

Hendricks, L. and Schoellman, T. (2018). Human capital and development accounting: New evidence from immigrant earnings. *Quarterly Journal of Economics*, 133(2):665–700.

Hendry, D. F. and Krolzig, H.-M. (2004). We ran one regression. *Oxford bulletin of Economics and Statistics*, 66(5):799–810.

Hendry, D. F. and Krolzig, H.-M. (2005). The properties of automatic gets modelling. *The Economic Journal*, 115(502).

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations*. Sage publications.

Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments*. Psychological Assessment Resources.

Hoover, K. D. and Perez, S. J. (1999). Data mining reconsidered: encompassing and the general-to-specific approach to specification search. *The econometrics journal*, 2(2):167–191.

Hsieh, C.-T. and Klenow, P. J. (2009). Misallocation and manufacturing tfp in china and india. *The Quarterly journal of economics*, 124(4):1403–1448.

Ilzetzki, E. and Simonelli, S. (2017). Measuring Productivity Dispersion: Lessons from counting one-hundred million ballots. Discussion Papers 1725, Centre for Macroeconomics (CFM).

Imai, S. and Keane, M. P. (2004). Intertemporal labor supply and human capital accumulation. *International Economic Review*, 45(2):601–641.

Inglehart, R. and Baker, W. E. (2000). Modernization, cultural change, and the persistence of traditional values. *American sociological review*, pages 19–51.

Inglehart, R. and Welzel, C. (2005). *Modernization, cultural change, and democracy: The human development sequence*. Cambridge University Press.

Inglehart, R. and Welzel, C. (2010). Changing mass priorities: The link between modernization and democracy. *Perspectives on Politics*, 8(2):551–567.

Jermann, U. and Quadrini, V. (2012). Macroeconomic effects of financial shocks. *The American Economic Review*, 102(1):238–271.

Jones, B. F. (2014). The human capital stock: A generalized approach. *American Economic Review*, 104(11):3752–77.

Karabarbounis, L. (2014). The labor wedge: Mrs vs. mpn. *Review of Economic Dynamics*, 17(2):206–223.

Klenow, P. J. and Rodriguez-Clare, A. (1997). The neoclassical revival in growth economics: Has it gone too far? *NBER macroeconomics annual*, 12:73–103.

Knack, S. and Keefer, P. (1997). Does social capital have an economic payoff? a cross-country investigation. *The Quarterly journal of economics*, 112(4):1251–1288.

La Porta, R., Lopez-de Silanes, F., Shleifer, A., and Vishny, R. W. (1997). Trust in large organizations. *The American Economic Review*, pages 333–338.

Lagakos, D., Moll, B., Porzio, T., Qian, N., and Schoellman, T. (2016). Life-cycle human capital accumulation across countries: Lessons from us immigrants. Technical report, National Bureau of Economic Research.

Landes, D. S. (1998). *The Wealth and poverty of nations: why some are so rich and some so poor*. WW Norton.

Levinsohn, J. and Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *The review of economic studies*, 70(2):317–341.

Lindsey, C. and Sheather, S. (2010). Variable selection in linear regression. *Stata Journal*, 10(4):650–669.

MaCurdy, T. E. (1981). An empirical model of labor supply in a life-cycle setting. *The Journal of Political Economy*, pages 1059–1085.

Malmberg, H. (2017). Human capital and development accounting revisited. *mimeo Institute for International Economic Studies*.

Markus, H. R. and Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological review*, 98(2):224.

Marschak, J. and Andrews, W. H. (1944). Random simultaneous equations and the theory of production. *Econometrica*, 12(3/4):143–205.

Maselko, J. (2016). Culture, genes, and socioemotional neurodevelopment: Searching for clues to common mental disorders. *The Oxford Handbook of Cultural Neuroscience*, page 355.

McCleary, R. M. and Barro, R. J. (2006). Religion and economy. *Journal of Economic Perspectives*, 20(2):49–72.

McDaniel, C. (2011). Forces shaping hours worked in the oecd, 1960-2004. *American Economic Journal: Macroeconomics*, pages 27–52.

Mendoza, E. G. E., Razin, A., and Tesar, L. L. (1994). Effective tax rates in macroeconomics: Cross-country estimates of tax rates on factor incomes and consumption. *Journal of Monetary Economics*, 34:297–323.

Michau, J.-B. (2013). Unemployment insurance and cultural transmission: theory and application to european unemployment. *Journal of the European Economic Association*, 11(6):1320–1347.

Mocan, N. H. and Pogorelova, L. (2015). Why work more? The impact of taxes, and culture of leisure on labor supply in europe. Working Paper 21297, National Bureau of Economic Research.

Morgeson, F. P., Delaney-Klinger, K., and Hemingway, M. A. (2005). The importance of job autonomy, cognitive ability, and job-related skill for predicting role breadth and job performance. *Journal of applied psychology*, 90(2):399.

Moriconi, S. and Peri, G. (2015). Country-specific preferences and employment rates in europe. Working Paper 21561, National Bureau of Economic Research.

Mulligan, C. B. (2002). A century of labor-leisure distortions. Working Paper 8774, National Bureau of Economic Research.

Neumark, D. (2018). Experimental research on labor market discrimination. *Journal of Economic Literature*, 56(3):799–866.

Ohanian, L., Raffo, A., and Rogerson, R. (2008). Long-term changes in labor supply and taxes: Evidence from oecd countries, 1956–2004. *Journal of Monetary Economics*, 55(8):1353–1362.

Olley, G. S. and Pakes, A. (1996). The dynamics of productivity in the telecommunications equipment industry. *Econometrica*, pages 1263–1297.

Oreopoulos, P. (2011). Why do skilled immigrants struggle in the labor market? a field experiment with thirteen thousand resumes. *American Economic Journal: Economic Policy*, 3(4):148–71.

Ottaviano, G. I. and Peri, G. (2006). The economic value of cultural diversity: evidence from us cities. *Journal of Economic geography*, 6(1):9–44.

Parrotta, P., Pozzoli, D., and Pytlikova, M. (2014). Labor diversity and firm productivity. *European Economic Review*, 66:144–179.

Ployhart, R. E. and Moliterno, T. P. (2011). Emergence of the human capital resource: A multilevel model. *Academy of management review*, 36(1):127–150.

Prescott, E. C. (2004). Why do americans work so much more than europeans? *Federal Reserve Bank of Minneapolis Quarterly Review*, 28(1):2–13.

Restuccia, D. and Vandenbroucke, G. (2014). Explaining educational attainment across countries and over time. *Review of Economic Dynamics*, 17(4):824–841.

Rogerson, R. (2003). The employment effects of taxes. Working paper presented at Dynamic Economics Conference in Honor of Edward C. Prescott, 29 April 2003, Federal Reserve Bank of Chicago.

Rogerson, R. (2006). Understanding differences in hours worked. *Review of Economic Dynamics*, 9(3):365–409.

Rogerson, R. (2008). Structural transformation and the deterioration of european labor market outcomes. *Journal of Political Economy*, 116(2):235–259.

Rogerson, R. (2009). Market work, home work, and taxes: A cross-country analysis. *Review of International Economics*, 17(3):588–601.

Roland, G. (2004). Understanding institutional change: Fast-moving and slow-moving institutions. *Studies in comparative international development*, 38(4):109–131.

Rushton, J. P. and Jensen, A. R. (2006). The totality of available evidence shows the race iq gap still remains. *Psychological Science*, 17(10):921.

Sala-i Martin, X. X. (1997). I just ran two million regressions. *The American Economic Review*, 87(2):178.

Schaller, M., Norenzayan, A., Heine, S. J., Yamagishi, T., and Kameda, T. (2011). *Evolution, culture, and the human mind*. Psychology Press.

Schoellman, T. (2012). Education quality and development accounting. *The Review of Economic Studies*, 79(1):388–417.

Schwartz, S. H. (2004). Mapping and interpreting cultural differences around the world. *International studies in sociology and social anthropology*, pages 43–73.

Sevinc, O. (2017). Interpersonal-service tasks and the change in the us employment structure. *Dissertation, Ch. 2–3*.

Shimer, R. (2009). Convergence in macroeconomics: The labor wedge. *American Economic Journal: Macroeconomics*, pages 280–297.

Syverson, C. (2011). What determines productivity? *Journal of Economic literature*, 49(2):326–365.

Tabellini, G. (2008). The scope of cooperation: Values and incentives. *The Quarterly Journal of Economics*, 123(3):905–950.

Tabellini, G. (2010). Culture and institutions: economic development in the regions of europe. *Journal of the European Economic Association*, 8(4):677–716.

Tibshirani, R. (1996). Regression shrinkage and selection via the lasso. *Journal of the Royal Statistical Society. Series B (Methodological)*, 58(1):267–288.

Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological review*, 96(3):506.

Triandis, H. C. (2001). Individualism-collectivism and personality. *Journal of personality*, 69(6):907–924.

Triandis, H. C., Leung, K., Villareal, M. J., and Clack, F. I. (1985). Allocentric versus idiocentric tendencies: Convergent and discriminant validation. *Journal of Research in personality*, 19(4):395–415.

Wallenius, J. (2013). Social security and cross-country differences in hours: A general equilibrium analysis. *Journal of Economic Dynamics and Control*, 37(12):2466–2482.

Weber, M. (1930). *The Protestant ethic and the spirit of capitalism*. Allen & Unwin.

Williams, J. E., Satterwhite, R. C., and Saiz, J. L. (2006). *The importance of psychological traits: A cross-cultural study*. Springer Science & Business Media.

Williams, K. Y. and O'Reilly III, C. A. (1998). Demography and diversity in organizations: A review of 40 years of research. *Research in organizational behavior*, 20:77–140.

Zhang, Z. and Arvey, R. D. (2009). Effects of personality on individual earnings: Leadership role occupancy as a mediator. *Journal of Business and Psychology*, 24(3):271–280.