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Governance and Management of German Universities

Dissertation

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BAföG	Bundesausbildungsförderungsgesetz (Federal Law on Support in Education)
Destatis	Statistischen Bundesamt (German Federal Office of Statistics)
DFG	Deutsche Forschungsgesellschaft (German Research Association)
DHV	Deutscher Hochschulverband (German Association of University Professors and Lecturers)
FH	Fachhochschule, Hochschule für angewandte Wissenschaften (university of applied sciences)
HRG	Hochschulrahmengesetz (Framework Act for Higher Education)
HRK	Hochschulrektorenkonferenz (German Rectors‘ Conference)
LHG	Landeshochschulgesetz (Higher Education Act of a German federal state)
MLQ	Multifactor Leadership Questionnaire
NC	Numerus Clausus
NUTS	Nomenclature des unités territoriales statistiques (Hierarchical classification of territorial units for official statistics of the European Union)
OLS	Ordinary Least Squares
SD	Standard Deviation
WW I	First World War (1914-1918)
WW II	Second World War (1939-1945)

1 Role of universities and their governance in Germany

Why do we pay taxes? How are they spent for the advantage of society? What is happening behind the scenes?

Those are the questions that are interrelating policies, control mechanisms and leadership, which makes them crucial in every public institution of today's knowledge society. Universities and their financing as public institutions are grounded on beliefs about their advantage for society, which itself seeks for joint welfare. Disentangling how a nation, group or institution can create benefits by organizing transactions with a prudent mix of market and hierarchical mechanisms is a key challenge in setting up efficient conditions and fostering progress. A convincing and well-coordinated arrangement of institutions within a society might be the most powerful instrument to confront populistic ideals of isolation.

Smith (1776) identified the cause for welfare in division of labor, specialization and self-interest. Solow elaborated a growth theory based on technological progress and total factor productivity (Solow, 1956, 1957) explaining growth by the exogenously given technological and productivity advantages. Endogenous growth models further developed this perspective e.g. by Romer (1990) or Aghion and Williamson (1998), which try to understand technological progress as endogenous process. Universities as driver of technological progress are important in this context, however, they were considered an exogenous factor (Acs, Audretsch, & Lehmann, 2013; Audretsch & Feldman, 1996; Audretsch, Lehmann, & Warning, 2005; Lehmann & Menter, 2015). Dohmen, Enke, Falk, Huffman, and Sunde (2016) complemented patience as an explanatory factor for welfare recently. This is in line with investments in education and research, neither of which is immediately available on the individual or state level but worthwhile in the future.

Combining these thoughts, the motivation to analyze universities is not only curiosity, but also to explain remaining residuals. Universities are not exogenously given but endogenous institutions, which are also subject to their environments and production processes (Audretsch & Lehmann, 2005; Lehmann, 2015). The way of organizing labor in a society, generating human capital and technological progress, decisions on public good investments and the preferences of human beings (e.g. patience, risk appetite, etc.) are the determinants of inequalities among nations. This is the foundation to open the black box of evaluating internal and external mechanisms in place at universities.

Universities are both different and similar to other known organizational forms. Nowadays, business organizations tend to live and die in the wake of exogenous market movements, fashion trends or management approaches. In contrast, the "business model" of universities is ancient and changes ponderously, the institutions became stable parts of society by providing human capital as well as societal or technical progress. Today, they are considered essential for society, not only reflecting a merit of civilization but also being a contributor to the residual of economic welfare. However, also universities were forced to adapt to contemporary challenges (see chapter *2 History of German universities*). Out of a positive perspective, they survive because they are the most efficient way of fulfilling their purposes: teaching, research and – if considered – innovation as third mission. At the same time, they are institutions that are a human creation and thus, are subject to the same mode of actions as all societal and business organizations in terms of reacting to the needs of groups via motivation and coordination.

Universities in Germany are funded predominantly publicly, using taxes collected from every citizen and redistributing it to a smaller group, intended to contribute to the benefit of all. It is rational to ask and evaluate how current policies are contributing to the university mission, which claims to benefit the society that pays for it, even though not every citizen comes into direct contact with it (for instance craftsmen with a different training route). However, research institutions as a more specialized organization than universities have benefited from a substantial increase in research funding recently (Himmelrath, 2018). Although governance and management mechanisms have been already a topic of discussion when German universities came into existence, they had different from today the risk to fail. This is the reason why they were broadly installed in favor of a collegial design that was subject to market forces and group coherence. Recent developments (strengthening of universities of applied sciences and research institutes) and societal demands call for an application of concepts that are successful in the business context: competition as well as a system of checks and balances, with autonomy and control. Thus, contests are introduced to increase university performance, university boards were installed that should control and give advice and the president got extensive power to manage.

Germany is stuck in the middle as are many Continental European countries. The system is a hybrid of the strongly market-oriented Anglo-American higher education system and the strongly hierarchy-oriented Asian higher education system, which are both leading in the world. In the European context, after the Lisbon agreement, the decision on how to spend the agreed additional money is important not only for the higher education landscape per se but also for reasons of rationalization in the court of public opinion of all European countries. By the changing of external and internal governance mechanisms, financial means are becoming more competitive. As a consequence, universities will need to develop and adopt new strategies to cope with those new structures and to maintain their operational level as in the past.

Thus, to answer the following questions is vital for the beneficial advancement of universities and with this public welfare: What are the path dependencies of universities that shape our modern understanding? How can the performance of universities be influenced beneficially from an external governance and internal management perspective? In particular, how are policy and university structures affecting university performance?

The underlying concepts of those questions are the interplay of management and governance, which are key elements of a Corporate Governance. Corporate Governance as a means to reduce under-investments in specific relations should display the interests of relevant stakeholders (Zingales, 2000). In particular, governance can be seen as the construction of a proper institutional framework, which is dependent on external measures like policy initiatives as well as the design of institutions and their power (may this be boards, management, etc.) in terms of incentives and control. Management is, on the one side the "technical" design of a position comprising a complex of tasks and on the other side dependent on the staffing of this position with a proper person that is able and motivated to fulfill those tasks. A Corporate Governance frame is the interaction of both that are ideally coordinated prudently (Popper, 1945) to ensure the desired conduct of the distinct purposes of universities: research and teaching by a set of selection, control and incentive mechanisms.

This dissertation wants to answer the outlined questions by first tracing the roots and path dependencies of German universities in chapter two. The third chapter helps to understand determinants and theoretical underpinnings of governance and management, in general and in particular, in the German higher education system, comprising policy interventions, institutional mechanisms and individual leadership elements. In the fourth chapter, a sketching systematization of the German higher education system and the dataset is presented

to show the current state and result of the dynamics that were outlined historically and theoretically in chapters two and three. This is followed by three empirical research projects:

First, the German Excellence Initiative – being a political governance instrument – gets evaluated. The analysis is tackling two questions: First, what was the impact of the Excellence Initiative on Excellence Universities as well as on the whole university system? Second, does a differentiation exist in terms of research quantity and research quality? The findings show that the Initiative was a role model in terms of research quantity – raising the quantitative output for the whole system and in particular for the winners – while it created a loosing winners effect in terms of research quality – raising the qualitative output for the system but decreasing it for the winners.

Second, German university boards – being a control and power diffusion mechanism – are questioned in terms of whether and how they differ according to specific frameworks and competences. The testing of the difference hypotheses shows that the participation in deciding who is in the board as well as a president coming from outside or inside the university are related to the representation of societal, scientific or business members.

Third, German university presidents – as personalities entering a management task – are researched. In particular, the research questions of (i) which personality traits influence to be perceived as leader (leadership emergence) and (ii) how leadership behavior contributes to be perceived as good leader (leadership effectiveness) are assessed. The results indicate that based on the Big 5 personality traits the only robust trait, which influences to be considered as a leader, is emotional stability. While considerable leadership behavior does not seem to influence leadership effectiveness, very low and very strong structure-giving behaviors are influencing it positively.

The dissertation will close with a conclusion summing up the different aspects that were addressed in terms of the institutional setting and personal dimensions as well as to outline some limitations. The results are of interest for all groups that have roots or interfaces with higher education – and even for those that do not have direct interrelations. Higher education managers and politicians can benefit from the knowledge on modes of actions and determinants of higher education in order to modify or to put into place efficient strategies and instruments. Members of the system like professors, scientific employees, and university staff can benefit from an understanding of causes, effects and factors that help to generate not only scientific advantages, but also overall economic advantages. Finally yet importantly, every taxpayer can get an insight into what his or her money is used for, and whether or not this investment leads to a satisfactory outcome.

2 History of German universities

2.1 Introduction to the relevance of the history of universities (until 1919)

"Allein nur, indem man dies [Wechselwirkung von Zeitalter, Nationalcharakter, Mannigfaltigkeit der Individuen und Abweichungen durch genievolle Individuen] schrittweise verfolgt und am Ende im Ganzen überschaut, gelangt man dahin, sich vollkommne Rechenschaft abzulegen, wie die Bildung des Menschen durch ein regelmässiges Fortschreiten Dauer gewinnt, ohne doch in die Einförmigkeit auszuarten […]"

"Only if one traces this [interdependency of era, national character, manifoldness of individuals and variations by genius individuals] stepwise and overlooks it in the end aggregated one gets to the point of utterly giving account how formation of human beings wins permanence by regular progress without degenerating to uniformity […]"

(Von Humboldt, 1772, reprint 1960, p. 237, free translation)

The demand for highly skilled workers and priests has always been existent in advanced civilizations – ancient Greece, imperial China or the Aztecs. Most cultures know centralized teaching institutions that were broadly sharing perceptions and research without a deep questioning that was independent of potentates. Extraordinary might be athenaeums and lyceums in ancient Greece similar to universities that had the right to challenge authorities (Perkin, 2007). The benefits of a loosely bundled school dependent on personalities and supporting the regent leading to the previously mentioned teaching institutions outweighed the costs of no more or less central school for students, teachers and regents.

Yet, institutions like universities with a certain degree of autonomy as well as organized in a permanent corporate structure arose first in Europe with the founding of Bologna. The upcoming of universities is tightly interlocked with the power vacuum that many tried to fill, as well as with the medieval rivalries of fragmented territories and the investiture dispute (Perkin, 2007). Consequently, the benefits of one institution providing know-how, permanence and structure overbalanced the costs of loosely bundled, erratic schools. The evolution of universities as institutions that we know today was not due to coincidence but rather due to path dependencies that are shaped by the spirit and need of the respective time. The reason why it is important to understand not only the relations of our current university governance (analyzed in chapter *3 Determinants of Corporate Governance in higher education* and *4 Governance and management in the German higher education system*) but also the history and development of universities lies exactly in those path dependencies. Without knowing how structures evolved over time allowing the concept "university" to spread all over the world (considerably contributing to world-languages like Latin or English), it is not possible to interpret present decisions, effects and consequences.

Universities were not only founded to educate people or conduct research but also used – even if not always meant to be – as an instrument of governance. The motivation to found and maintain of universities had various facets, be it a student-initiated matter of education in language and law like for the oldest university in Bologna 1088 (University of Bologna, 2018), a strategic matter like for Sorbonne supporting the Roman pope and opposing the antipope in 1268, a theological matter like in the oldest university of Germany Heidelberg 1386 (Meusburger & Schuch, 2011, p. 42 ff.), or a pragmatic matter to reunite all sciences to support navigation like in Portugal under Prince Henry the Navigator in 1431 (Davies, 1964). The installation ensured and supported on the one hand the attraction of promising and qualified scholars, the development of the region by expanding administration and prestige for the regent. On the other hand, it was a typical group building phenomenon (like the guilds for craftsmen, the orders for knights or cooperatives for economic, social or cultural needs) in the Middle Age as an end in itself in terms of studying and developing ancient scripts (Burtscheidt, 2010, p. 39 f.).

In this context, the German universities developed starting in the fourteenth century. The foundation of a university had to be officially approved by the Pope. The usual application was issued by a regent like the princes or bishops (e.g. Würzburg, 1402, Rostock, 1419) or more rarely initiated by city councils (e.g. Erfurt, 1379 – one of the biggest cities in medieval times offering a studium generale, Cologne 1288 – a strong bishop and the effects of the reversing French king's decision to support the antipope at the closely located university of Sorbonne might have helped) that hoped for a positive economic development. The organization consisted of in the beginning four hierarchical faculties (theology, law, medicine and arts), a "primus inter pares" was elected to fulfill representative tasks while the council/senate was steering the university according to the collegial principle. In Germany, territorial sovereigns installed a chancellor to control the rector with regards to their financial contributions (Burtscheidt, 2010, p. 42 ff.).

In the territory of the Holy Roman Empire that evolved from the late 12th century struggles for power, resulting uncertainty and inconsistencies made it difficult to ensure permanence for research and teaching activities (and with this steady progress) that were likely to be liable to the respective current ruler (different houses of nobility or church). This supported the upcoming of institutions, which could grant stability and permanence independent and relatively autonomous from the actual power relations. That this uncertainty played a considerable role is retrievable from *Table 1: University foundations and backgrounds in*

Germany It is observable that especially the free and imperial cities[1] did not (or very rarely) have the necessity of establishing a university as they were purely giving account to the not so randomly changing emperor. Except for Cologne and the until today special status cities Bremen and Hamburg, no other free or imperial city established a university. In addition, most of the university foundations in those cities were taking place after the breakdown of the Holy Roman Empire in 1803 (Principal Decree of the Imperial Deputation) and the following dissolution in 1806. The former free or imperial cities were taking advantage later – during the education expansion and as part of location policy. In general, universities were likely to be founded in times of crisis (like during and after the reformation, after the dissolution of the Holy Roman Empire or after World War I), need (industrialization or education expansion) or location policy (also in times of reformation, after World War II in the occupation zones or after the unification of the two Germanies).

[1] They were directly allocated to the emperor and had the same obligations and rights as nobility or church governed territories.

Table 1: University foundations and backgrounds in Germany (own research).

City	Period free or imperial city	Foundation	Closing, re-foundation	City	Period free or imperial city	Foundation	Closing, re-foundation
Heidelberg		1386		Frankfurt am Main	1356-1806, 1815-1866	1914	
Cologne	1288-1794/97	1388	1798, 1919	Hamburg	1510-1806, 1815	1919	
Erfurt		1388	1816, 1994	Weimar		1919	
Würzburg		1402	1430, 1582	Berlin TU		1946	
Leipzig		1409		Hildesheim		1946	
Rostock		1419		Lüneburg		1946	
Greifswald		1456		Berlin FU		1948	
Trier		1473	1798, 1970	Saarbrücken		1948	
Tübingen		1477		Erlangen-Nuremberg	1219-1806 (Nuremberg)	1961 (Nuremberg)	
Mainz		1477	1823, 1946	Regensburg	1207/1230-1803	1962	
Frankfurt (Oder)		1506	1811, 1991	Lübeck	1226-1806	1964	
Marburg		1527		Bochum		1965	
Jena		1558		Düsseldorf		1965	
Giessen		1607		Konstanz	1192-1548	1966	
Kassel		1632	1652, 1971	Mannheim		1967	
Duisburg-Essen	1170-1290	1655	1818, 1972	Ulm	1184-1803	1967	
Kiel		1665		Dortmund TU	1236-1803	1968	
Halle-Wittenberg		1691		Bielefeld		1969	
Bamberg		1733	1803, 1979	Augsburg	1276-1805	1970	
Göttingen		1736		Bayreuth		1970	
Erlangen		1743		Kaiserslautern TU	1276-1313/57	1970	
Braunschweig TU		1745		Coblenz-Landau		1970	
Freiberg TU		1765		Bremen	1186/1646-1806, 1815	1971	
Münster		1773	1818, 1902	Paderborn		1972	
Berlin HU		1810		Siegen		1972	
Bonn		1818		Wuppertal		1972	
Hohenheim		1818		Oldenburg		1973	
Karlsruhe		1825		Osnabrück		1974	
Munich		1826	1848, 1848	Hamburg-Harburg TU		1978	
Dresden		1828		Passau		1978	
Hannover		1831		Chemnitz TU	1290-1308	1986	
Munich TU		1868		Magdeburg		1987	
Aachen TH	1166-1794/97	1870		Cottbus TU		1991	
Stuttgart		1876		Potsdam		1991	
Darmstadt TU		1877		Ilmenau TU		1992	
Freiburg		1889		Flensburg		1994	
Clausthal TU		1912		Vechta		2010	

The financial situation of universities during the time of absolutism was marked by authoritative structures and donations by patrons, as closing of universities were no curiosity as one would consider it nowadays. However, at least officially autonomy from the ruler (who was usually also a financier) was important due to an otherwise negative effect on student attraction (Hüther, 2010, p. 44 ff.). One prominent example for royal despotism and claim for autonomy is the University of Munich: Ludwig I. first moved the university from Landshut to Munich and later reacted on the depreciation of his mistress by student fraternities with its closing, which he had to take back one day later due to protests (Haus der bayerischen Geschichte, 2018). Based on discoveries like the sea route to America, the solar system, or the world being spherical, the concept of science changed to a gaining of knowledge (rather than interpretation of existing knowledge). The mortality of universities (more than 50% of universities were closed between 1792 and 1818) was driven by a loss of prestige as many inventions and discoveries that brought human kind forth were made outside of universities. Universities were acclaimed to be as rigid as guild systems, reflecting a pseudo-punditry, nepotism and educating rude students sticking to outdated theories and knowledge (with the hint that nowadays critique is not so new after all, Burtscheidt, 2010, p. 43 ff.). With the upcoming of utilitarianism, secularization and in the light of the French revolution, Wilhelm von Humboldt[2] shaped our modern understanding of purposeless science and following reformations of universities. He formulated as ideal principles of universities the freedom of science, academic self-governance and the unity of research and teaching (von Humboldt, 1809).

The re-calling of the newer university history is important in order to understand the relevance of universities and their governance nowadays. As universities have been an instrument of power and progress, the picture of universities that we see today has to be interpreted as a result of the influences of various regents and governments. In this context, the quality and performance of universities was a sensible case out of their very nature latest in the tradition of von Humboldt and as integral part of the industrialization.

[2] And his contemporaries Friedrich Schelling, Johann Fichte and Friedrich Schleiermacher.

The status of science in this time was demonstrated by the introduction of the Noble Prize as heritage of Alfred Nobel, a prosperous industrialist, who is up until today one of the most prestigious prizes for scientists and awarded in six categories (see *Table 2: Number of German Nobel Prizes according to field.).* As additionally illustrated in *Figure 1: German Nobel Prize winners 1901-today*. Germany had a considerable contribution to high-class research gaining three times nearly 30% of the 25 prizes in a 5-year period in the first half of the century.

Figure 1: German Nobel Prize winners 1901-today

Including all Nobel Prize Winners that were either born in (in this time) Germany (36), worked for a (in this time) German affiliation when winning the Nobel Prize (25) or both (41) summing up to 102 Nobel Prizes from 1901 to January 2018. The total amount of prizes in a 5-year range sums up to 25 in the years 1901-1968, to 30 from 1969 due to the adding of the economic prize. Source: own illustration based on The Official Web Site of the Nobel Prize (2018).

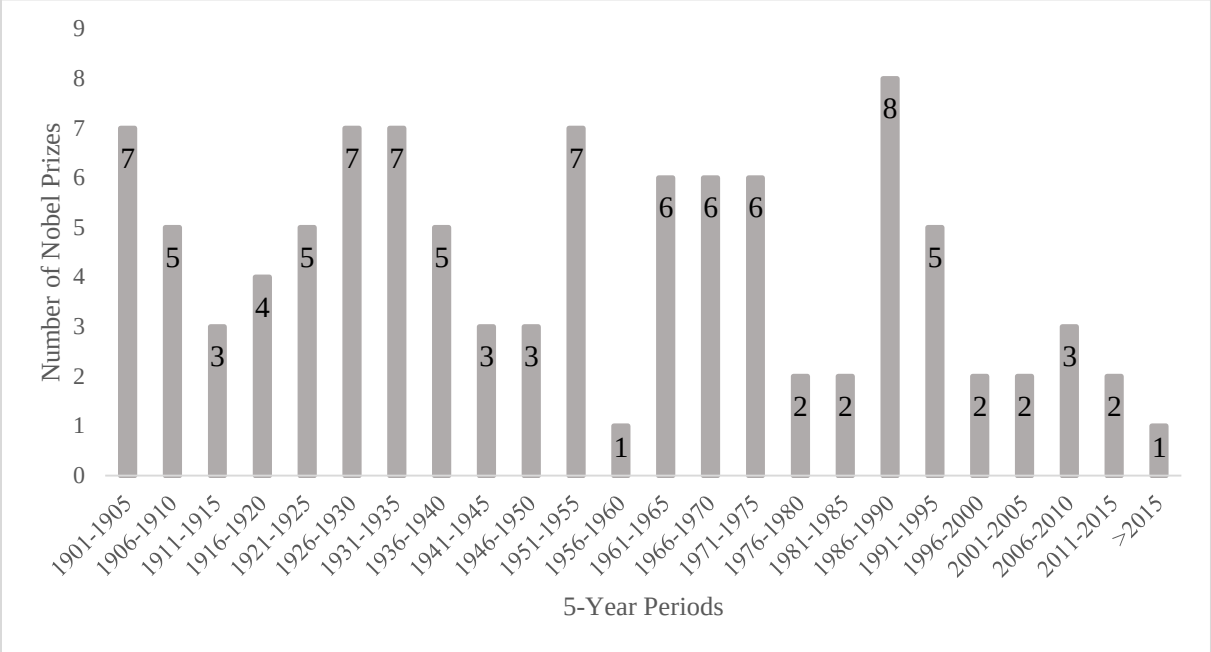


Table 2: Number of German Nobel Prizes according to field.

Including all Nobel Prize Winners that worked for a (in this time) German affiliation when winning the Nobel Prize.

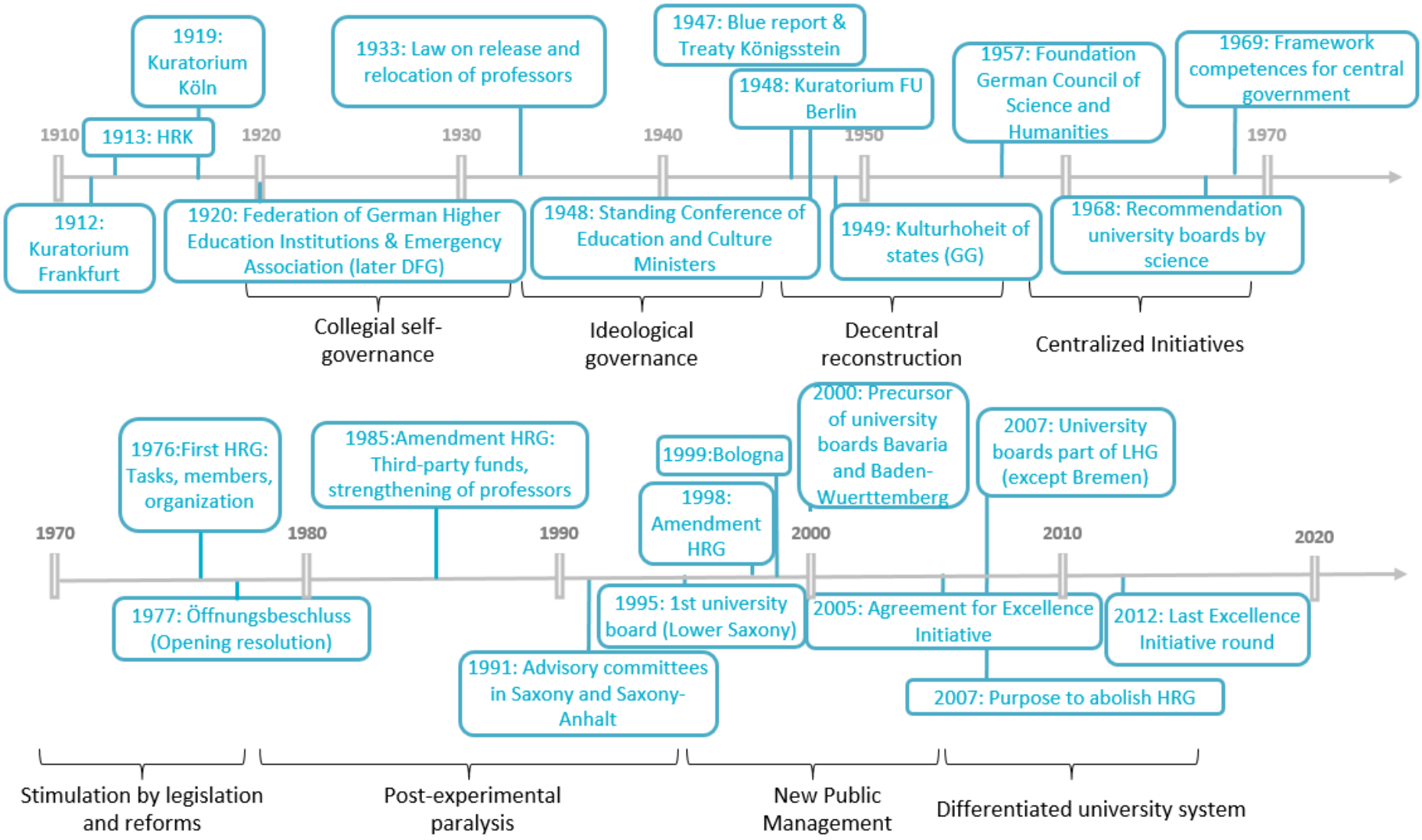
Field	Number of Nobel Prizes and Laureates
Peace	6
Chemistry	31
Literature	10
Physics	28
Physiology or Medicine	24
Economic Sciences (since 1969)	1

Driven by technical progress and nationalism, nearly all German higher education institutions, signed by various professors and docents, clearly demonstrated their unconditional support for the war in the advent of WW I. They indicated that the Prussian militarism was uniting the German army, nation and science, which were supporting war and fighting for cultural superiority in Europe (Erklärung der Hochschullehrer des Deutschen Reiches, 1914).

Figure 2 shows a rough overview of the periods identified after WW I in German university history and some events of importance for this work. I begin highlighting in detail the periods starting in 1919 as this marks the turn from the German Empire with an unelected imperator to the democratic Weimar Republic. Citizens could now participate in politics and arrange the higher education system according to their ideals and needs, independent from an (more or less) unquestionable and powerful regent. The eight phases outlined in *Figure 2* led to the system as we know it today, which is heading to being differentiated and at the same time resistant to change. The reforms came into effect and re-shaped the construction and understanding of universities affecting it externally by governance mechanisms like contests or internally by new management structures.

The different phases will be structured by first introducing to the societal and political situation to understand events in a historical context, major reforms and developments within the higher education context will be outlined. The main content and the interplay of reforms and context will be summarized in a short recapitulation of each phase.

Figure 2: Overview on history of German universities.



2.2 Where did the Emperor go? Collegial self-governance (1919-1933)

"[…] my picture of German universities is confused. It could not be otherwise: the universities and the nation at large are also confused."
(Abraham, 1968, first edition 1930, p.360)

The timespan 1919-1933 is interesting due to the unique mix of lacking resources, freedom and a spirit of optimism with the introduced democracy leading to a golden age of science (see also *Table 2: Number of German Nobel Prizes according to field.*). Apart from the *societal and political situation* this phase will be outlined according to (i) the *internal perception of academia*, as the role and relation of academics to their outside was to be reflected and (ii) *Post-war threats and reactions in the German higher education system* comprising national and international pressures to German academia and respective solution strategies.

Societal and political situation

In the period from 1919 to 1933, Germany was affected economically and socially from the First World War's consequences. Reparation payments that were set in the Treaty of Versailles had to be met in foreign currencies or material assets and were therefore not influenced by the incipient, soon galloping and finally hyperinflation. The societal, industrial and political crisis, e.g. manifested in the Ruhr-crisis, caused a distinct lowering of living standards and an aversion to the young democracy (Berman, 1997; Feldman, 1993, pp., p. 327 ff., p. 327 ff.).

The situation stabilized with the introduction of the Dawes-Plan in 1924 that was endorsed by the American government to support the recovery of the German economy. The plan was intending to enable Germany to pay the full amount of reparations by reducing payments and further connecting them to economic development (Ritschl, 2002, p. 11 ff.). The following Golden Twenties were characterized by a creative, liberal and progressive spirit as well as the artistic avant-garde movement (Kolb, 2004, p. 86 ff.). Aside rose the national socialist ideology that was advanced by the Wall Street Crash in 1929 and a worldwide economic crisis. The dependency on American financial resources particularly affected Germany. Scarce resources and deflation caused mass-unemployment and radicalization, which led to the seizure of power by the Nazis in 1933 (Ritschl, 2002, p. 13 f.).

Internal perception of academia

Academia was influenced by pre-war experiences, when the German higher education system enjoyed a high reputation. This reputation was mainly based on the Humboldtian principles including the ideal of unity of research and teaching and the scientific freedom (Kehm, 2004). Wilhelm II e.g. glorified German universities by seeing them as evidence of an "empire of thought" and the German superiority (Abraham, 1968, p. 312). Universities enjoyed a relatively broad academic freedom that was perceived and used as a measure of participation for the bourgeoisie. At the same time, academic personalities were subject to ideology, values and hierarchies in place, e.g. patriotism or pursuit of truth, etc., and thus, limited by state censorship (Asche & Gerber, 2008; Hammerstein, 1999, p. 22). For the 23 after-war universities (30 including the technical universities; Abraham, 1968, p. 315) in the eight federal states[3] applied the same frame: relative freedom based on the goodwill of the federal states – in particular the ministry of education – which were responsible for higher education policy and administration.

In the course of democratization, the awareness of politicization and external interference rose. Despite sharp criticism, the first national socialist minister in Thuringia, Wilhelm Frick, imposed against the university's will the appointment of a race researcher (Hans Günther) at the University of Jena. Though, assuming that professors were not political would be wrong as they positioned themselves to the Treaty of Versailles, cultural policy, democracy and so forth (Oberdörfer, 1994). As from the late 20's wish for an exclusive academic freedom as fundamental right – rather than a facet of freedom of opinion – rose under the particular influence of Rudolf Smend (Krausnick, 2012, 7 ff.).

Post-war threats and reactions in the German higher education system

The de facto exclusion of German science from the international scientific stage by "The Interallied Conference of Scientific Academies" in 1918 was justified by the political positioning of the German scientific community during WW I. Although the "science embargo" could not fully unfold as intended, the scientific community was ostracized even longer than the political quarantine of Germany lasted (Hammerstein, 1999, p. 28 ff.).

[3] Reichsländer, after WW II Bundesländer or Länder.

German universities and their professors experienced both, international isolation, which enlarged the distance to other countries academically, as well as severe national funding cuts, which enlarged the distance practically. One of the stepwise attempts to burst the isolation and build bridges between academic Europe – especially France – and Germany was the opening of the municipal University of Cologne in 1919 initiated by Konrad Adenauer. The aim was a stronger positioning in the Rhine region and the approximation to the University of Strasbourg and its tradition (Meuthen, 1998). In this context, the powerful and newly introduced Kuratorium – one of the precursors of the German Hochschulräte (university boards) – was chaired by the mayor and included seven municipal representatives and three university representatives (Meuthen, 1998).

Both issues – national funding cuts and isolation – were approached by the scientific community and the founding of several associations such as the "German Rectors' Conference" (Hochschulrektorenkonferenz) in 1913, the "Federation of German Higher Education Institutions" (Verband der deutschen Hochschulen) in 1920, the "Emergency Association" (Notgemeinschaft) in 1920 or the "German Academic Exchange Service" (Deutscher Akademischer Auslandsdienst) in 1925 (Oberdörfer, 1994). The "Emergency Association" – later the "German Research Association" (Deutsche Forschungsgemeinschaft, DFG) – should be mentioned in particular. Its aim was to solicit and promote resources and prevent a collapse of the German university system. During the 1920's the budget of the Emergency Association reached 8 Million Reichsmark, which was more than the university budget of the largest Reichsland. Still, it was not fully recovering the prior funding cuts. The resources were allocated for libraries, travelling and research scholarships as well as experimental research. In general, funds were provided by the central state and federal states as well as occasionally by industrialists. The latter group was skeptical as they wanted to oversee their sponsorships and obtain a right to say. The discussion in society on the influence of industry on science, the disputed benefit of arts and social sciences and the use of basic – not targeted – research was intensified (Hammerstein, 1999, p. 52 ff.).

As from the mid 20's the German academia came back to the international scientific community as Abraham (1968, p. 360) stated:

"And though, amidst economic distress, political turmoil, and social upheaval, the universities have suffered, the intellectual quality of the faculties and the permanent officials in the ministries is so high, the prestige of the universities so great, and their contribution to the nation's life so vital that, even if some problem can never be solved to the satisfaction of all, adjustments will be reached that will restore and perhaps even increase the efficiency of secondary and higher education."

Abraham's compared American, English and German universities with sympathy for the German system. American universities were considered spoiled institutions with focus on the general average not on the extraordinary, English universities as authoritative institutions that show a combination of private and official agencies for public purposes and the German universities as working comparably well given the lack of financial resources (Abraham, 1968, p. 305 f., p. 360).

Recapitulation

This phase was marked by a post-war confusion, academic decline and rise as well as self-organization and the perception of political influence. Universities were organized by management of professors (Ordinarienuniversität) who were appointing a rector for one year and dealing with the business in committees of the faculties. The cultural autonomy as such rested with the states (Abraham, 1968, p. 317). Main challenges were the overcoming of the international isolation of German academia as well as handling funding cuts. Academia faced this situation by a self-governing approach including the founding of associations and attraction of funds from industry, which was accompanied by the recovery in the Golden Twenties. The transformation of the university system started with the seizure of power by the Nazis in 1933.

2.3 Ideological governance (1933-1945)

"[…] und würde die Welt auf einige Jahrhunderte dem deutschen Professor überantwortet, so würden nach einer Million Jahren lauter Kretins bei uns herumwandeln. Riesenköpfe auf einem Nichts von Körper."

„ […] and if the world was given to German professors for some centuries, nothing but Kretins would roam around in a million years. Huge heads on some nothingness of body."
(Adolf Hitler, 1942, cited after Hammerstein, 1999, p. 119, free translation)

The time of collegial self-governance and reflection was followed by ideological governance of the national socialist regime from 1933-1945 that had little use for science and universities except for war preparation and conduct. The restructuring of the university system orientated as in all governmental areas on the *Führerprinzip*. Corresponding re-structuring and personal replacements as well as a re-interpretation of university interests are the visible parts of *ideology in academia*.

Societal and political situation

In 1933, the National Socialist German Workers' Party came to power with the appointment of Adolf Hitler as Reichskanzler by Reichspräsident Hindenburg who hoped for an easing of his radical positions. Paradoxically, this moment was preceded by an easing of the main constraints of the after-war period and the Treaty of Versailles, e.g. the end of reparation payments in the course of the conference of Lausanne in 1932 or the permission of rearmament (Wirsching, 2001, p.54 f.). The hope of moderate political forces remained unfulfilled: In the course of the Reichstag fire in February 1933, Hitler announced the Reichstag Fire Decree (Reichstagsbrandverordnung) followed by the Enabling Act (Ermächtigungsgesetz) in March. This suspended fundamental rights and enabled Hitler to enact laws without the approval of the Reichstag (Wirsching, 2001, p. 58f.).

As from this point, the Nazis centralized and used their power to eliminate groups that were supposed to be "terrorists" like Jews, political opponents or non-compliant journalists. The regime was backed by the strengthening of the Sturmabteilung (SA) and the Schutzstaffel (SS) as well as by the installation of concentration camps. A broad part of society was willing to accept the trade-off between enforced stabilization and loss of freedom. The regime benefitted from elaborated plans that previous governments developed to reduce unemployment and enhance living standards by investments retrieved from economic recovery, e.g. in infrastructure, and leisure facilities like the Hitler Youth (Wirsching, 2001, p. 66 ff.). The internal ideology of superiority combined with the international appeasement policy lead to World War II in 1939 with the attack on Poland and ended with the unconditional surrender of Germany in 1945 (Wirsching, 2001, p. 73 ff.).

Führerprinzip in higher education

With the seizure of power by the Nazis in 1933, the German university system changed from the collegial and decentral self-governance to the centralizing Führer principle (Führerprinzip) (W. Weber, 2002, p. 176). Particularly Jewish students and professors were subject of reprisals and persecution. Fritz Haber can serve as an example, the vice-president of the Notgemeinschaft and Chemistry Nobel Prize winner, who vacated all his offices and emigrated in 1933 due to the pressure he was exposed to (Hammerstein, 1999, p. 93). Research changed according to the regime's ideology and the German Research Association supported new research areas with projects on Germanity or race hygiene (Hammerstein, 1999, p. 103, 107).

However, a central overall national socialist science program was never issued. This might be because of the skepticism of Hitler to the bourgeoisie per se, the particular condemnation of academia or the ongoing conflicts between the competing central institutions that were newly responsible for universities. Nevertheless, he was aware of the usefulness of science in some points – e.g. propaganda, self-contained economy and war optimization (Hammerstein, 1999, p. 118 ff.). The combination of Hitler's disinterest and tolerating science as necessary evil made academia believe that if one only submitted to the principles of the state – science and research will be more or less free due to its objective and apolitical nature (Hammerstein, 1999, p. 143).

Ideology in Academia

The law on release and relocation of professors to reconstruct the German higher education system[4] from 1935 was not shaped particularly ideological but allowed to release or relocate professors easily with the justification of university interests. This resulted in a massive wave of redundancies and a corresponding academic brain drain. 18.6% of the German university teachers were affected by the law (with a high variance from 4% Tübingen – 36.5% Berlin, in total: 939 teachers; Grüttner and Kinas, 2007). They included emeriti, urged "voluntary" resignations and excluded voluntary resignations with a political background in the 23 German universities. The higher resignation rate of – the quantitatively very low number of – women (38.3%, in total: 23 teachers) can be explained parallel to the restriction of admission to study for women by the Nazi politics (Grüttner & Kinas, 2007; Kehm, 2004). The replacement with often young and opportunistic academics loyal to the regime advanced the ideologization of the university system. The increase of national and industrial funds might have appeased criticism as financial measures did for most of the rest of society.

In this context, the regime and industry pushed especially the medical, natural, technical and agricultural sciences as preparation and support for war (Hachtmann, 2010). The selection of war-relevant disciplines combined with ideological steering by ministries resulted also in the advancement and professionalization of young disciplines like psychology or business as well as in the use of e.g. history as source of propaganda (Ash, 1999, p. 48).

In the course of economic recovery and preparation for war universities lost students and junior scientists that preferred a military career. Potential students and staff were restricted by gender or being non-Aryan or simply had good job prospects without an academic education (Hachtmann, 2010). The number of students reduced within five years from 121,000 in 1933 to 56,000 in 1938 (Kehm, 2004). During WW II German academia was convinced to contribute to the victory of Germany, e.g. by the self-initiated "war deployment of social sciences[5]", the funding of armament research initiated by the Reich Research Council (Reichsforschungsrat) or interdisciplinary research supporting the general plan East (Generalplan Ost) supported by the DFG (Wagner, 2010). Student protests like the White Rose in Munich were seldom and operated in the underground (Lippman, 2000).

[4] Gesetz über die Entpflichtung und Versetzung von Hochschullehrern aus Anlaß des Neuaufbaus des deutschen Hochschulwesens.
[5] Kriegseinsatz der Geisteswissenschaften.

Recapitulation

Professors and students were a reflection of the German society itself. They were actively and passively making the Nazi regime possible. Their conduct might be characterized as collaborative alignment. Still, in this phase members of higher education subjugated to contemporary policy and norms while at the same time making use of them. The structural changes that already began in the Weimar Republic were continued, namely with the professionalization and differentiation of new research areas, the use of industry or (semi-) governmental institutions as financiers and place for research as well as the embedding or assimilation of research ambitions into the ambitions by the state (Ash, 1995b). The German university system can be profiled into three important aspects (Hachtmann, 2010; Ash, 1995b): war orientation based on ideology (including personnel decisions and professionalization of research areas), polycratic fragmentation on the governance level as well as a tunneling of resources. To state what this meant: Research programs were mainly orientated on the national socialist ideology, unwanted personnel was systematically excluded affecting on average nearly one fifth of academic personnel and academic self-governance was effectively abolished or at least rendered harmless.

2.4 Occupation and decentral reconstruction of the university system (1945-1956)

„Es ist unmöglich, neue politische Katastrophen zu vermeiden, wenn die Akademiker ihre menschliche Pflicht im Volkskörper nicht zu erfüllen lernen […]. Gegen die zu weit gehende Unzufriedenheit mit der Hochschule ist zu sagen, dass die Hochschulen Träger einer alten und im Kern gesunden Tradition sind."

"It is impossible to avoid new political catastrophes if academics do not learn to fulfill their human duty within the nation […]. With regards to the exaggerated discontent with the university it has to be noticed, that the universities are holding an old and in its core sound tradition."
(The Blue Report, 1948, free translation)

After WW II the university system was – mostly due to the experience of the dictatorship and the fact of occupation – decentrally reconstructed partly under the guidance of the Allies in the time from 1945-1956. In particular, the *Allied higher education policy* aimed at reconstructing a proper standard of science without supporting too much strength with perspective to the future while *War consequences on higher education institutions* needed to be handled by institutions themselves. *The Blue Report* was issued by UK allied forces and consisted of points that continued to have an effect even after the reunification of Germany.

Societal and political situation

After the unconditional surrender of Germany the results of six years of war became apparent: (a) 55 million dead, 11 million of them died in concentration camps, (b) 5.6 million refugees mainly from Eastern Europe alone in 1946 that summed up to 12 million in total, whereas the German population in 1946 counted roughly 39 million (for the three Western allied zones) (c) a halving of the housing space, (d) deficient supply with food and a quasi non-existent economy resulting in black markets (Görtemaker, 2002, p. 11 f.). The reprocessing of the Nazi regime started reserved. The understanding of a systematic mindset in society was widely refused by both Germans and allies (Görtemaker, 2002, p. 11 f.).

The four allied forces – USA, Great Britain, France and UdSSR – divided Germany into four occupation zones. The consequences and socio-economic effects of two wars made the question of Germany and its ability to afford reparations highly controversial. The allies postponed the question to an eventual peace treaty, respectively they handled it as zone-specific question (Wirsching, 2001, p. 87 ff.). The four central aspects of the occupation policy in the Western zones were: demilitarization, denazification, decentralization and democratization (Görtemaker, 2002, p. 18). Only 24 remaining persons were convicted to be major war criminals in the Nuremberg Trials in 1945/46 chaired by the allied forces. In 1949, the Bundesrepublik Deutschland was founded and lead by the first chancellor Konrad Adenauer. The denazification as such was officially closed in 1950 and Germany was released to (partial) sovereignty in 1955 including the accession to NATO.

A crucial role for the economic development of Germany played The European Recovery Program, known as Marshall Plan. It was introduced by the USA in 1947 to support Western Europe with financial and material resources and moderate potential transnational tensions. A spirit of optimism, supported by the win of the soccer world championship, financial support and stability (London Agreement on German External Debts), further expansion of the world market, growing domestic demand and the social market economy were the basis for the German “Wirtschaftswunder” in the 50’s and 60’s (Wirsching, 2001, p. 99 ff.).

Allied higher education policy

Before the founding of the federal republic of Germany, allied policy for higher education was of relatively minor relevance, even though the importance of "re-education" was noted. Two arrangements seem prominent: law number 25 and the Treaty of Königstein. Law number 25 by the Allied Control Council passed in 1946 and determined that fundamental as well as applied research with a military purpose was forbidden. However, the realization was handled comparatively flexible – likely because of the interests of the allied in German researchers (Ash, 1995a). The Treaty of Königstein from 1947 arranged the financing of institutes with national importance like the Max Planck Society (previously Kaiser Wilhelm Society) or the DFG. The Treaty was extended several times before it was replaced in 1975 in the course of the national education planning (Führ, 1998).

The principle of Kulturhoheit was installed with the German constitution in 1949, which made the federal states responsible for education (Pasternack, 2011). The necessity of a certain degree of homogeneity in the three Western zones led to the installation of the Standing Conference of the Ministers of Education and Cultural Affairs of the federal states (Ständige Konferenz der Kultusminister der Länder) in 1948 (Lengwiler, 2010).

Higher education policy in the 16 universities and 9 technical universities (West-Germany) was driven by the respective occupying force (Kehm, 2004). The strategy that most – remaining – scientists had can be characterized as two-sided: externally distancing from the Nazi regime and on the quiet trying to save former reputation and facilities. Mass dismissals at universities in the early after war years were soon withdrawn by practical considerations. Although, universities were part of the denazification process, more than one out of four practicing professors was a former NSDAP member in the late 40's. Yet, they were mostly holding a denazification certificate that classified them as "follower". This development was often explained by the supposed apolitical and universal nature of science, especially the technical sciences (Ash, 2010).

War consequences on higher education institutions

While the question of monetary reparations was postponed, the so-called and until today barely investigated "intellectual reparations" caused a brain drain for the young Republic. Researchers were relocated to diminish their benefit to other forces, e.g. in the Operation Paperclip and the Operations T-Force, or they emigrated due to depressing prospects. This development was accompanied by removals of research facilities. The willing and unwilling emigration of young academics was triggered by strategic and political considerations, a lack of job possibilities as well as by more attractive conditions in the USA (Ash, 1995a, 2010).

The teaching conditions were strongly affected by the destruction and chaos of post-war Germany. Teaching activities were revived restrictively already in winter 1945/46, although reconstruction of buildings was the primary focus (Ash, 1999, p. 60 f.). Student numbers soon reached 100,000 but university places were limited due to reduced physical place and the fear of academic poverty. Yet, veterans and handicapped persons got privileged access. The limitation lead to an under-supply of academic graduates in the following Wirtschaftswunder (C. George, 2010, p. 13).

With the re-installation of a self-governing approach, the focus was on professors and their Chairs as well as on the re-foundation of self-governing institutions like the senates. They had extensive competencies to decide upon questions regarding the university management (Dobbins & Knill, 2015). Further, professors advocated for themselves in institutions like the West-German Rectors' Conference (Westdeutsche Rektorenkonferenz) by the Rectors of the three Western zones (Hochschulrektorenkonferenz, 2016).

The Blue Report

The report to the higher education reform from 1948 was an influential and frequently highlighted contribution to the reconstruction of the German university landscape – due to the cover also called the Blue Report. The British zone issued the report, which initiated e.g. the foundation of the West-German Rectors' Conference (Ash, 2010). The aim was to model a university system suitable for democratized Germany. Although not all recommendations were implemented, the report serves up until today as discussion basis for higher education policy. The characterization of the university system was a balancing act as the quote in the beginning of this chapter shows: On the one hand, partial responsibility of academia for the Nazi regime was exposed; On the other hand, basic integrity of the system was attested (Phillips, 1995, appendix p. 3). In this context, the definition of the Humboldtian freedom of research and teaching was remarkably clarified: Research and teaching must be independent of any political steering. However, this freedom is limited by the responsibility and consideration for others (Phillips, 1995, appendix p. 12 f.).

Further, they formulated recommendations to build a modern university system and prevent a repetition of the role universities played during the Nazi regime. The recommendations included: (1) integration of all social classes to university education including an opening for students with former apprenticeship, no tuition fees and if necessary a subsistence allowance, (2) an independent link between state and university in form of a strong university council consisting of members of society, (3) introduction of a studium generale to acquire general knowledge and critical sagacity, (4) enrichening of the education by including a focus on practice and a strengthening of social sciences especially at the technical universities to generate spillover effects, (5) freedom of international movement for students in order to allow a broadening of their horizon, (6) expansion of the teaching staff to recruit junior scientists and improve teaching ratios (Gutachten zur Hochschulreform, e.g. in Phillips (1995, appendix p.119 ff.)). Not much of it was implemented instantly, still, some pilots like the Kuratorium at the Free University of Berlin were installed (S. Lange, 2010).

Recapitulation

The post-World War II era of higher education was characterized by shortages and a decentral reconstruction of structures and competences. While re-education was a core purpose to democratize Germany and prevent new political catastrophes, the elaboration and realization of reforms proceeded slowly. The main object was to return to a system orientated on the Weimar Republic, namely a professor-centered Ordinarienuniversität and federal responsibilities. This might have been the case due to practical considerations – central institutions were not available – as well as tactical considerations – prevention of new centralism. A discourse on good governance of universities arouse and was presented e.g. in the blue report. Accounting for the past in form of denazification was initially corresponding to mass dismissals whereas returns of "followers" to academia, in other zones or positions, occurred soon and frequent. This was mainly justified by the otherwise missing expertise (due to war victims and intellectual reparations) as well as with the "exculpation" of scientists and disciplines.

2.5 Centralized initiatives and planning euphoria (1956-1969)

"Der bisherige wirtschaftliche Aufschwung wird ein rasches Ende nehmen, wenn uns die qualifizierten Nachwuchskräfte fehlen […]. Es steht uns ein Bildungsnotstand bevor, den sich nur wenige vorstellen können."

"The previous economic boom will come to an abrupt end, when we are lacking qualified junior employees […]. We will be facing an education crisis only few can imagine."
(Picht, 1965, p. 1, free translation)

The following will to draw on the decentral reconstruction a central frame and planning was observable during 1956-1969. *Centralized initiatives* were brought forth which underline the general trend and *Urge for progress* that was felt to be needed.

Societal and political situation

The characterization and success of the Wirtschaftswunder includes several aspects: (a) international (financial) support, not proscription, (b) increasing domestic demand and expansion of the world market, (c) societal advancement opportunities by individual performance allowing leisure time and consumption, (d) the inclusion of refugees and expellees – that counted nearly one fifth of the population – to the labor market, (e) social securities by an expansion of the welfare state including modern social security benefits, child

allowance or the dynamization of pensions that were connected to gross salaries. In this course, full employment was reached in 1958 and the shift of labor to the secondary and tertiary sector accommodated the demand for qualified employees (Görtemaker, 2002, p.101 ff.). The organization in associations of post-World War I was replaced by the pursuit of individual and family interests. This was possible by promotion based on performance (rather than ancestry), social security (rather than "undeserved poverty") and corresponding welfare.

In order to support a peaceful and positive economic development in Western Europe, the European Economic Community and the European Atomic Energy Community were founded in 1957. The aim was to establish a European trading market and administrating nuclear power (Görtemaker, 2002, p. 145 f.). The rivalry of capitalism and communism showed off e.g. with the Sputnik shock, the moon landing and the building of the Berlin Wall (Dickson, 2001, p. 117 f.; Görtemaker, 2002, p. 155 ff.). The dissatisfaction of the after-war generation with the political situation, the economic system and in their eyes missing accounting for the past was a breeding ground for the movement of 1968 (Wirsching 2001, p. 106).

Centralized initiatives

An incremental approach of centralized measures can be detected in the Honnefer model, a precursor of the Federal Law on Support in Education (BAföG). Equal opportunities should have been promoted by providing study grants for disadvantaged students based on the Social State Principle (Flämig et al., 2013). Universities were identified as one factor of economic welfare, which is coherent with rising educational and financial demands. Thus, the need for at least some central coordination was identified to maintain consistent standards and arrange those financial requirements. In the spirit of a cooperative federalism, the German Council of Science and Humanities was initiated, which consists of the administrative commission (representatives of the federal states and federal government) and the scientific commission (scientists and public persons). Until today, recommendations are elaborated and proposed to the federal states and the central government (Wissenschaftsrat, 2015).

The re-naming of the Federal Ministry for Nuclear Affairs to Federal Ministry of Scientific Research in 1963 was based on the finance-function of research with a focus on aerospace research as result of the Sputnik shock (Lengwiler, 2010). An education ministry was not installed due to the constitutionally guaranteed Kulturhoheit. To distribute and use those financial resources by the Bund, associations like the DFG and the Max-Planck Association rose in importance (Ash, 2010; Pfetsch, 1994). The first government participation of the Social Democrats in 1966 might have caused a centralizing policy shift with the "deal" of financing university infrastructure for being able to formulate a general framework. The revision of the constitution in 1969 served as basis for an involvement of the federal government (Pasternack, 2011).

Urge for progress

Higher education was confronted with an overwhelming demand following the economic recovery: Growing request of qualified professionals, the demands of high birthrates, vertical opportunities for advancement and a changing perception of women's place in academia (Dobbins & Knill, 2015). The development was accompanied by the perception of education as a civil right (Dahrendorf, 1965) and the influential statement of Picht (1965) on the "German education catastrophe". The ratio of higher education teachers (15,927) to students (234,621) in 1961 was not considered satisfactory for a modern education policy and the needs of the labor market. Indeed, the massification of the university system can be demonstrated by student numbers that nearly tripled in 25 years: from 239,481 in 1960 to 675,946 in 1975 (Bundesministerium für Bildung und Forschung, 2015). However, the teacher/student ratio at universities improved – also under the influence of the report – positively from ~15 in 1960 to ~9 in 1975 (Teichler, 1993).

The international student protests of 1968 were smoldering already in the beginning and mid 60's but radicalized in Germany with the shooting of the student Benno Ohnesorg as well as with the passing of the emergency constitution (Wirsching, 2001, p. 107). In Germany, the protest was mainly an academic phenomenon that originated from the discontent with the accounting for the national socialist past, from a discomfort with authoritarian structures and lifestyles as well as from the perceived need for radical upheavals fed by international conflicts (Ash, 1999, p. 67 f.). In academic terms the central objective was to initiate reforms of structures that were in their eyes undemocratic and authoritative (Ordinarienuniversität) as well as morally reprehensible. A famous protest in Hamburg (1967) included the banner

saying "Unter den Talaren Muff von 1000 Jahren[6]" (for a picture see NDR, 2007). It became slogan of the movement and depicted both criticisms, on the impermeable and imperious university structures as well as on the Nazi past. However, the following reforms e.g. for university types, a right to a say for non-professors or new legislation were not exclusively inspired by the protests (Führ, 1998).

Recapitulation

In summary, the time from 1956 to 1969 was marked as the beginning of a massification and expansion period of the higher education sector. Higher education reform planning, political changes and societal turmoil initiated fundamental changes in the higher education sector including the plan to introduce universities of applied sciences, reform and group universities. In general, the effects of democracy arrived in university structures and higher education policy resulting in reforms and centralized initiatives.

[6] Free translation: "Under the gowns is the fustiness of a thousand years."

2.6 Stimulation by legislation and reformation (1969-1982)

"Meine Damen und Herren, Bildung und Ausbildung, Wissenschaft und Forschung stehen an der Spitze der Reformen, die es bei uns vorzunehmen gilt."

„Ladies and Gentlemen, education and training, science and research are leading the reforms that we have to get to work on."

(Government statement by chancellor Willy Brandt, 1969, free translation)

Supported by the centralized initiatives and planning euphoria the following legislative acts and reformations were issued in the light of a new social system and need for mass education from 1969-1982. Particularly mentioned should be not only the *legislative changes* but also their *impact on the higher education landscape* in general and *university structures* in particular.

Societal and political situation

Economically, the short recession in the late '60s was resolved by reforms and a growing economy. The vulnerability of the experienced welfare became obvious with the first oil shock in 1973 that caused a recession and high unemployment rates. The economic stimulus package by the government could hardly counteract the development which was soon followed by the second oil shock in 1979 (Görtemaker, 2002, p. 308 f.). In the same year, the NATO Double-Track Decision was issued by the social-liberal government as a reaction to the stationing of intermediate ballistic missiles by the UdSSR. The decision included the stationing of Intermediate Nuclear Forces and the need for bilateral negotiations to limit Intermediate Nuclear Forces.

In this context, the protest culture emerged out of a societal structural transformation that included a new awareness for ecology, general wish for security and peace, changing perception of women, as well as the taken-for-granted state interventions for public welfare. Some protests led to radicalization, e.g. in the left-extremist Red Army Faction (Rote Armee Fraktion) peaking in the German Autumn in 1977 (Görtemaker, 2002, p. 273 ff., 313).

The installation of the European Council is considered one of the most important instruments for the European integration. Thus, following the breakdown of the Bretton-Woods System – the dollar was no longer anchor currency – European countries decided to establish their own currency system. The result was the European Monetary System (Europäisches Währungssystem, EWR) in 1978 – a precursor of the current European Monetary Union and the currency Euro (€) (Görtemaker, 2002, p. 311).

Legislative changes

The revision of the constitution in 1969 made several central initiatives possible that were up to then a matter of theoretical discussion. The aim was to make the financing transparent and avoid broad influence by defining a framework including administrative and executive competences. The Federal Ministry of Education and Science (Bundesministerium für Bildung und Wissenschaft) was often discussed and with the revision finally legally allowed to be founded. However, the realization of the influential Framework Act for Higher Education (Hochschulrahmengesetz, HRG) was not issued before 1976, which included e.g. the status of universities of applied sciences (Fachhochschule, FH) as tertiary institutions (Pasternack, 2011). The federal states had to adjust their legislation to the framework within 3 years. The law included the recommendation of comprehensive universities (Gesamthochschulen), which was not further concretized (explaining why none was founded after 1976); it defined the participation of non-scientific and scientific personnel as well as students; the personnel structure was specified and hierarchy flattened; the organization of admission restrictions where needed (Gieseke, 2012).

The Comprehensive Education Plan (Bildungsgesamtplan) by the Bund-Länder commission (BLK, since 1970) passed in 1973 and worked on several coordinative education issues during the ‘70s. The update failed due to crises and a corresponding rethinking of governmental financing as well as due to political strategies (Führ & Furck, 1998, p. 251 ff.). Thus, the reforms of this time can be characterized as structural reforms based on minimum compromises.

The expansion of the higher education sector and introduction of a governmentally refused numerus clausus (NC) by universities of applied sciences caused tensions. The Federal Constitutional Court confirmed in 1972 on the one hand the claim of a place at university for entitled applicants; on the other hand, they confirmed the legitimacy of a NC to account for capacities and prompted the introduction of a central issuing agency (Bode, 2013).

The “Öffnungsbeschluss” in 1977 was succeeding the NC discussion. Based on demographic forecasts, government decided to generally abolish the NC regulation and the central issuing agency with exceptions like medicine or if freshmen numbers exceeded 15% plus additional load of the calculated study places. At the same time financial endowment was not enlarged based on the following compromise: universities must cope with the expected to be levelled down baby boom generation, due to demographic change student numbers should fall, and universities should continue with the same financing. However, student numbers and shares were constantly growing (Kehm & Lanzendorf, 2005). The upcoming idea of reducing inefficiencies at universities, e.g. by introducing and adhering to standard periods of study, counteracted the discussion on growing student numbers and differences in quality and reputation that rose in the late ‘70s (Oehler & Bradatsch, 1998, p. 431; Teichler, 1993).

Impact on the higher education landscape

The adoption of university-like institutions in place of former schools of engineering or social education to universities of applied sciences was passed based on the HRG with laws from the federal states starting in 1969 (Teichler, 1993). These specialized universities would have a focus on academic teaching with a practical orientation and conducted no research. The period of education was reduced due to the prerequisite of a shortened higher education entrance qualification and a shorter study path. Additionally to the strengthening of research institutions like the Max Planck Association, the adoption of universities of applied sciences marked a further shift towards an institutional differentiation and specialization subverting the Humboldtian tradition in the German university system.

In order to cope with rising student numbers – newly entering students in FHs: 20,600 in 1960 to 51,700 in 1980 – FHs introduced the NC and therefore could not provide the relief that was anticipated. For comparison: Newly entering student numbers at universities rose from 65,000 in 1960 to 138,200 in 1980 (Teichler, 2014, p. 54).

Impact on university structures

Group universities (Gruppenuniversität) were founded and the idea often translated to other traditional Ordinarienuniversitäten: inclusion of interest groups like students, non-professorial teaching staff and technical staff in decision-making faculty councils for a democratized university concept. Resistance came from professorate that criticized an organized irresponsibility caused by the lacking liability of the members, the inflated bureaucratic apparatus and a more complex decision-making. A verdict by the Federal Constitutional Court regulated in 1973 the non-uniform and often wide participative character. It granted professors superior influence in all essential aspects like the appointment of new professors or teaching concerns (Dobbins & Knill, 2015; Pasternack & von Wissel, 2010).

In 1960, a further aspect of the expansion of the university system originated in the recommendation of the German Council of Science and Humanities (Wissenschaftsrat): connecting different study fields to one reform university was considered necessary in order to cope with the massification and the (re-)foundation of universities. The Universities of Bochum and Konstanz are examples of this practice. 33 universities in 1965 were the starting point for expansion, they grew to 49 in 1975 and to 70 in the 90's (Teichler, 1993).

Apart from the political alienation the participative model found its way into the university landscape (Kehm, 2004). This influenced the education of more and more students going through the system. While in 1950 only 5% of the corresponding age group studied, this share reached 15% already in 1970 and 19% in 1980 (Ash, 1999, p. 146). The opening of universities to all societal strata increased the relevance of financial support for lower income brackets. The instrument that was developed and based on the Honnefer model was the Federal Law on Support in Education (BAföG), partially financed by central state and federal states (Lengwiler, 2010).

Recapitulation

Although the communicated goal of the social-liberal government was to focus on education, plans were disrupted by external crises and the beginning strength of legislation. Thus efforts for reformation consisted, especially in the end, of minimum compromises. For the first time, central legislation in form of the HRG (1976) included the Bund to consider vital questions of education policy, including a general framework and e.g. BAföG. Growing student numbers were first counteracted by NCs and should but could not entirely be absorbed by FHs. A crucial turning point was the "Öffnungsbeschluss" that abolished central NC regulation and

opened universities for even higher student numbers with constant financial and personnel resources. Technological and medical progress were key drivers of research under the conservative government that wanted to provide human resources for the Wirtschaftswunder and create knowledge enabling to defend. In contrast, social sciences expanded under the social-liberal government which aimed at securing quality standards in teaching and taking account for the ’68 movement e.g. by participation possibilities.

2.7 Post-experimental paralysis and introduction of competition thinking (1982-1995)

„Wettbewerb statt Bürokratie“

„Competition instead of bureaucracy“

(Official guideline of the Federal Government approved by the German Council of Science and Humanities and the Rectors' Conference, Burtscheidt, 2010, p. 87, free translation)

The late cold war and the fall of the iron curtain was accompanied by an educational post-experimental paralysis and the need to reunite the two Germanies and consequently, introduce mechanisms to make universities efficient and in doing so financeable (1982-1995). Major aspects are subsumed in *Standardizing and confluence tendencies* that tried to sort financing issues following economic distress and the need for becoming more effective which is also connected to the *Rise of competitive thinking* and the *Integration of East German universities to the West German university system.*

Societal and political situation

Helmut Kohl followed the overturned government as leader of the conservative liberal coalition and had to handle critical assignments: persistent high unemployment rate, national debts, inflation and stagnating economic growth (Görtemaker, 2002, p. 325 f.). Government counteracted those developments by reducing collective liability and supporting individual performance by the introduction of market mechanisms. Data on national debt, inflation rate and unemployment improved significantly to the mid ‘80s (Wirsching, 2001, p. 123).

Foreign affairs were held steady by applying the dual strategy to ensure both national security and easing of West-East relations. With the appointment of Michael Gorbatschow as General Secretary in 1985, his policy of Glasnost (openness) and Perestroika (transformation) as well as the end of the Brezhnev doctrine[7] in 1988 was the basis for a peaceful revolution and Fall of the Wall in 1989 (Görtemaker, 2002, p. 342 ff.). In this course, the integration of the former DDR to the BRD was managed e.g. by a stimulus program "Aufschwung Ost", a solidarity tax or a trust institution (Treuhand-Anstalt). The unemployment rate rose from 7.3% in 1990 to 12.7% in 1997 mainly driven by the unemployment in East Germany peaking at around 19% and leading to a movement of labor force towards West Germany (Booth, 2010).

The Two Plus Four Agreement was the official approval by the allies that the two Germanies could reunite. It declared that Germany does not have further territorial claims, that it binds itself to military restraints (e.g. not using ABC-weapons) and regains full sovereignty (Conze, 2009, p. 737 ff.). In this course, the European Union was developed to an increasingly political Union, which resulted in the Treaty of Maastricht in 1992 (Conze, 2009, p. 711).

Standardizing and confluence tendencies

Due to rising expenditures in social policy, higher inflation rates and less income, expenditures in the higher education sector were cut (Fabian & Klebig, 2015). In this context, the discussion about two-stage study degrees including Bachelor and Master or the replacement of six-year by four-year study programs took off in the 80's targeting shortened study times to support the economy and eventually reduce the number of students in a long-term (Teichler, 1993). Further, first intents came up to formalize the PhD-education in so-called *Graduiertenkollegs*, which are graduate schools (Teichler, 1993).

The EU directive of 1988 to accept a European diploma with a minimum of three years study time was in line with the (before outlined) study propositions of the *Wissenschaftsrat* (Oehler & Bradatsch, 1998, p. 441 f.). The signing of the Magna Charta Universitatum in the same year by 388 European university presidents demonstrated the will to establish a close cooperation within the higher education sector in the future (Observatory Magna Charta Universitatum, 2017).

[7] Brezhnev doctrine: Protection of the UdSSR's supremacy by the UdSSR in the Eastern bloc countries including eventual interventions.

The "paralysis" is also reflected in the cautious revision of the Framework Act for Higher Education in 1985 mainly orientating on modern competition thinking. The controlling of professors and how they use competitively acquired funds should be reduced, the founding of private universities be facilitated, bureaucratic processes of coordination of the examination regulations simplified and the concept of the *Gesamthochschule* no longer be considered as prototype (Teichler, 1993).

Rise of competitive thinking

Competitive thinking in the German university system was broadly neglected as politicians were more engaged in the restructuring of the university system, handling the educational expansion and arranging with federalism. The aim of the horizontal differentiation was to establish a homogeneous minimum standard of institutionally differentiated but in doing so institution-wide comparable education and research institutions. With the relative easing of the university system the question of vertical differentiation and consequently, competition was raised (Teichler, 2014, p. 61 ff.). In the Anglo-American countries, competition became a matter of necessity following the neoliberal governments of Thatcher and Ronald Reagan as part of the university market. Competition was increasingly emphasized e.g. by the Ministry of Education and Science that explicitly recommended a policy of differentiation and competition and implicitly condemned the long time claimed equality – with perceived but unspoken differences (Fabian & Klebig, 2015; Krausnick, 2012, p. 21 ff.; Teichler, 1993).

Although, rankings might be traced back until the beginning of the 20th century (R. Lange, 2010), they became most important as an information source in the Anglo-American spirit for students and governments. The first state-delegated research ranking in Germany was already conducted in 1975. However, the public interest in rankings began to rise in the 80's and 90's with magazine published rankings e.g. by *Wirtschaftswoche* or *Manager-Magazin* (R. Lange, 2010; Teichler, 1993). First hinting at the complexity reduction for students and parents, they soon became part of budget negotiations (even if not explicitly incentivized) and connected organizational aims.

Integration of East German universities to the West German university system

A brief overview on East German universities is necessary to understand the further development and to some extent still existent differences. The university system developed following reforms after WW II that introduced socialist educational principles. Central planning abolished the traditional institutional autonomy of universities. Study programs were seen as professional training including obligatory internships. The subsequent expansion in the 60's was detached in the 70's by reducing student numbers according to five-year plans. In the 80's they started to introduce a differentiated system with generic universities that were offering multiple subjects and specialized universities e.g. in engineering sciences (Kehm, 2004). This parallel to the West German system with the introduction of differentiation and specialization that distinguished only by the means not by the goal is allegoric for the entire East-West conflict.

With the reunion, five central restructuring measures were identified by Kehm (2004, see also Oehler & Bradatsch, 1998, p. 437): First, depolitization aimed at eliminating all political Marxist-Leninist faculties and re-foundation of policy-related faculties like business and economy, social sciences or law. Second, research that was conducted outside the university was evaluated and re-introduced to universities. Third, specialized universities were transformed to universities of applied sciences (which were additionally founded new). Fourth, disciplines and subjects were restructured what resulted in curricula that were adjusted to the West German standards. Fifth, scientific personal was assessed out of a political and scientific perspective resulting either in dismissals or in the possibility to apply for the new positions. This merging of two systems lead to a still more teaching oriented self-concept of university members as well as to a stronger openness to experiences by East German universities that did not rely on hardened structures. The positive attitude of East German professors towards evaluations of teaching and research somewhat affected West German universities. It influenced the perception and ultimately permitted the introduction of such mechanisms. The instability of the situation was fueled by the massive necessity to invest in this restructuring, which caused cuts in other fields, e.g. the BAföG, and by the liberal education minister Rainer Ortleb who had to resign in 1994 due to problems with alcoholism (Leinemann, 1994).

Recapitulation

Two poles marked this period: standardization and competition in terms of differentiation as well as by the Fall of the Berlin Wall. New ideas to shorten the study cycles, formalize until then not formalized academic education and the change of the HRG were coming up. The competitive thinking that was unfavored until then was gaining traction following the neoliberal developments in the Anglo-American countries. Rigid bureaucratic structures and protests paralyzed progress. The biggest challenge however, was the reunion, corresponding reconstruction and merging of the two German university systems that were separated for a considerable time. While some spot a missed opportunity of restructuring also the West German university systems, it was basically an integration of the East German universities to the West German system (Kehm, 2004; Oehler & Bradatsch, 1998, p. 437).

2.8 New Public Management (1995-2005)

"[…] Performance Indicators in political competition may be as important as prices in market competition."

(Johnsen, 2005, p.15)

In the light of New Public Management, competitive thinking and new university structures, which were discussed previously, took shape. The legislative basis was laid from 1995-2005 with *Reforms in the New Public Management spirit* and the implementation of the *European harmonization.*

Societal and political situation

Based on the new sovereignty of Germany, the will to stabilize the situation and to become an established international player, a closer cooperation in inter- and supranational organizations like the EU (e.g. expressed will for joint external affairs) and NATO (e.g. military intervention in the Kosovo War) was promoted. Global crisis like in Kosovo, the stock market crash ("Dot-com bubble"), the terroristic attacks in the US on September 11th 2001 and the resulting war in Afghanistan increased insecurity worldwide and resulted in a further claim for peace and safety.

In 1998, government changed to the social democrat Gerhard Schröder who was subsequently chancellor when the Euro as new European currency was introduced in 2002 (Görtemaker, 2002, p. 392 ff.). He initiated and implemented the reforms called "*Agenda 2010*" broadly orientating on innovation policies addressing challenges of knowledge societies and social cohesion. The introduction of job market, education and social security reforms massively influenced economy and society. This curing of Germany, the "sick man of Europe" (The Economist, 1999) aimed to prepare the labor market and social system for upcoming challenges like demographic change or financial crises. In this context, the eastwards enlargement of the European Union in 2004 was not only a result of contemporary political reasoning but also a consequence of both the breakdown of communist regimes and the need to cope with international competition on labor markets (Black, Engbersen, & Okólski, 2010, p. 7 ff.).

Reforms in the New Public Management spirit

Following the big and mostly unexpected upheaval of integrating the East German university system, the late 90's were denoted by a *"Reformstau"*, which became even word of the year in 1997/98 (Conze, 2009, p. 787). The spirit of New Public Management rooted in the Thatcher and Reagan era. It was mainly targeting the introduction of private management measures in public organizations as well as the privatization of many sectors – universities in Germany however, were not affected until the mid or late 90's (Schimank & Lange, 2009). The German university system was considered rigid, inefficient and not competitive. Cost pressure of scarce financial equipment and financial cutbacks as well as new demands in teaching and research quality were planned to be solved by subsidiarity. Politicians tried to counteract this mood of deadlock by some of the most determining decisions for German higher education up until today:

The amendments to the HRG in 1998 and the early 2000s aimed to foster market principles by deregulating the higher education sector and introducing performance related incentives, turning away from state control to more autonomy for universities, junior professorships, quality assurance and comparability of studies or university-owned selection processes for students (Pritchard, 2006; Schimank & Lange, 2009). This caused a number of innovations ranging from (i) the necessary adjustment of professor remunerations to (ii) discussions about study fees, (iii) the establishment of policy measures like the German Excellence Initiative (see chapter *3.1* for the background of higher education policies and *4.3* for the empirical examination of the Excellence Initiative), (iv) the introduction of organization intern control

mechanisms rather than steering from a distance (see chapter *3.2* for the theoretical basis of boards and chapter *4.4* for a descriptive analysis) or (v) the departure from the traditional participative principle to a strengthening of faculty and university management (see also chapter *3.3* for theoretical considerations of power distribution and for the empirical evaluation chapter *4.5*).

European harmonization

The education ministers from France, Germany, Italy and Great Britain issued the joint Declaration of Sorbonne (a specification of the Magna Charta Universitatum) to harmonize the architecture of the European higher education system. The influential Declaration of Bologna in 1999 established the Bologna process to foster mobility, international competitiveness and employability. Based on the Bologna process several changes had to be organized and implemented: two-cycle study programs including a uniform credit system, quality controls including regular study course evaluations and accreditations as well as mobility of students and lecturers (Keeling, 2006). The red-green coalition's core mission for higher education was the sixth amendment to the HRG. It specifically defined the goal for international and European exchange resulting in the support of English course offers and the development and implementation of Bachelor/Master programs (Burtscheidt, 2010, p. 114 ff.). As a consequence, foreign student numbers increased from 1999-2003 by roughly 60% (Pritchard, 2006).

Recapitulation

The end of the Cold War briefly eased the situation, as important but due to integration efforts postponed projects had to be realized. Amendments to the HRG formally introduced principles of New Public Management to the German university system of which the elements were discussed but left aside in the 80's. European states cooperated closer in various other fields, e.g. with a joint currency or the eastward expansion and in particular, in the higher education sector. While Erasmus programs were long established, mobility, quality, employability and comparability were emphasized and implemented.

2.9 Differentiated university system – that should not be called this (2005-today)

„[Deutsche Universitäten] kämpfen im internationalen Vergleich mit sehr kurzen, stumpfen Spießen. […] Mehr Geld ist immer gut! Und ich würde sagen, die deutschen Universitäten haben zum Teil für das was sie leisten zu wenig Geld. […] Es muss soweit kommen, dass man es in Deutschland nicht mehr als tabu sieht, dass unter den knapp hundert Universitäten solche sind, die ein eher elitäres Forschungsprofil im alten Stil pflegen und solche, die eben mehr auf Massenausbildung setzen."

"[German universities] are fighting with very short, dull lances. […] More money is always good! And, I would say that German universities receive too little money for their performance. […] It has to come to the point that it is no longer a taboo in Germany to consider some of the almost one hundred universities to have an elite traditional research profile and some that are focusing mass education."

(Imboden, cited after WirtschaftsWoche, 2018, free translation)

The phases outlined so far led to the system apparent today, which is not meant to be called or discussed like this but still, differentiated through all of the university missions. The aspects mostly influencing German higher education landscape today is found in its *Federalism* making country-spanning changes particularly difficult. The introduction of competitive thinking lead to the *Effects of the reforms: the introduction and withdrawal of study fees* and new initiatives emerged that lead to an observable *Differentiation* of universities.

Societal and political situation

After Gerhard Schröder lost a no-confidence vote, snap elections had to be held. In 2005, Angela Merkel was elected and became new chancellor in a Great Coalition. Starting in 2007, the global financial ("Lehmann"), later economic and government debt crisis hit also Germany and the Euro zone. This lead not only in Germany to the strongest decline of GDP after WW II. As globalized answer international institutions, e.g. the International Monetary Fund, issued supportive programs. The Great Coalition and later the conservative liberal coalition were sustaining German banks and economy by guarantees and economic stimulus packages (e.g. subsidies to promote sales of new cars or to finance reduced working hours) that were financed by credits. Germany coped rather well during the crisis – thanks to prudent policies and previous reforms – while Greece, Ireland and Portugal struggled massively (for German success factors see Audretsch & Lehmann, 2016).

The European Stability and Growth Pact could barely survive. A bailout package was constructed by the European Union, which included rights as well as duties (Deutsche Bundesbank, 2018). If not liability, it certainly shows the dependency that was created over time between the European states. The situation was at the same time posing and stemming the "German question" of supremacy. In 2012, however, the EU was rewarded after more than 50 years of joint policy with the Peace Nobel Prize for engaging in peace, reconciliation, democracy and human rights (European Union, 2018a).

Further global crises erupted, to mention just a few influential ones: the annexation of Crimea by Russia in the course of the Ukraine conflict (2014); Religious extremism in Near East resulting in shooting wars, terroristic attacks (e.g. in the name of the "Islamic State") and corresponding refugee movements towards Europe, which re-strengthened right-populist parties in many European, also the German political scene; The "Brexit" (2016) meaning the withdrawal of UK from the European Union, was made possible by the exit option defined in the Treaty of Lisbon that was coming into force in 2009 (European Union, 2018b).

Despite diverse global crises, the German population started to integrate: For instance, with the World Championship in 2006 that generated a unprecedented situation of social coherence (Ohmann, Jones, & Wilkes, 2006), unemployment rates were and still are consistently declining being comparably marginally affected by the economic crisis (also due to an absent real estate bubble), the German economy recovered quickly, enabled a balanced household and even allowed some costly social policies.

Federalism

After the federalism reform II in 2006 and a corresponding draft law of 2007, the HRG became supposed to be repealed. However, up until today the HRG is held in accordance with central higher education associations that would prefer to actually even enlarge the financial influence of the central government (Gieseke, 2012). The German Basic Law guarantees in article 30 cultural sovereignty to the federal states (including education) which is a de facto ban of cooperation conceived to prevent misuse. Article 91b in the Basic Law was a compromise following the federalism reform II. It allows cooperation in case of fulfilling common tasks (which means help for financially weak municipalities) and reciprocal financing including a consent of the federal states for research funding. The discussion about repealing or holding the cooperation ban is ongoing and the current great coalition included a further loosening in their coalition agreement (Coalition Agreement of CDU CSU and SPD, 2017, p. 28 ff.).

Effects of the reforms: the introduction and withdrawal of study fees

In Germany, general tuition fees were not allowed by the HRG (Bruckmeier, Fischer, & Wigger, 2015). Some exceptions were if students exceeded the duration of studies drastically, if students came from third countries or if studies were extra occupational. In 2005, the Federal Constitutional Court (*Bundesverfassungsgericht*) repealed the respective passage of the HRG (version 2002) as it was interfering legislative powers of federal states.

Kauder and Potrafke (2013) and Bruckmeier et al. (2015) point out the ideological discussion about introducing and abolishing tuition fees. Critiques were concerned about even less freedom to choose among educational paths for students from socio-economic disadvantaged families and about a potential substituting effect for state funding. Most conservative parties saw tuition fees as incentive compatible and fair cost involvement – introducing them in seven federal states – while social democratic parties considered them as socially unjust – abolishing them after a change of or involvement in government (except for Bavaria). However, the political decision on the introduction and abolition was barely if at all based on scientific findings but rather lead by electoral motives. All states withdrew study fees again with Lower Saxony being the last federal state to do so (Fischer & Wigger, 2016).

Operationally, this resulted in states without study fees (Berlin, Brandenburg, Hesse, Mecklenburg-Hither Pomerania, Rhineland-Pfalz, Saxony, Saxony-Anhalt, Thuringia), states with a state-specific general rule with a fix amount of tuition fees to be paid (Baden-Württemberg, Bremen, Hamburg, Niedersachsen) and the allowance of a range where universities could choose (Bavaria, North Rhine-Westphalia, Saarland). The maximum fees for regular studies were €500 per semester while the before mentioned exceptions remained in force without maximum threshold. Those fees were exclusively to be used for teaching purposes. Interestingly, without considering further third-party funds, the contribution by tuition fees ranged on average roughly around 2.8%. Substitution effects could not be found as public university funding seems to be triggered more by competitive mechanisms rather than free-riding on their neighbor's cost or tuition fees (Fischer & Wigger, 2016).

Differentiation

A traditional characteristic of German universities were neither a vertical nor a broad horizontal differentiation. The before mentioned deregulation, power shifts and internationalization resulted in a number of structural changes and initiatives that started to re-shape the whole university system – slowly as they are bureaucratic, policy-dependent institutions – but consistently. While it has been a taboo for a long time, differentiation in the German higher education system was introduced "by the back door" on all three university missions.

The changed payment modalities (former C-wages changed to the new W-wages system including also the possibility of a small share of performance-based pay) had no direct impact on general teaching habits. Still, both groups differ significantly in terms of perceiving themselves as agents and being extrinsically motivated. A differing behavior in the following cohorts is expected (Wilkesmann & Schmid, 2012). The introduced study fees are a further step that opened the possibility to differentiate one university and one federal state from another. Bruckmeier, Fischer, and Wigger (2013) showed the "funding competition" between federal states. Descriptively one can see (see also the mapping in *4.1 Systematization of the current governance system in Germany*), that teaching oriented universities from East Germany are more likely to be above average teaching workload (54% of the East German universities) while only 45% of West German universities teach above average. Competitive proximity of universities and federal states have among other factors the strongest effect on student mobility and corresponding profile (Bruckmeier et al., 2013; Mitze, Burgard, & Alecke, 2015).

The research mission was affected by the introduction of the German Excellence Initiative of which the aim was (and still is) to support some universities in their research activities in order to make them internationally competitive. As unlikely as the Agenda 2010, the idea of establishing elite universities came from the social democratic minister of education. The funding was exclusively intended (i) to support high-class research for economic reasons, (ii) to mobilize and keep talents in the German system for higher education as well as for knowledge intense sectors, (iii) to support interdisciplinary cutting-edge research confronting demographic changes and international competition, and (iv) to improve ranking positions of identified elite institutions to compete with the strong Anglo-American and fast catching up Asian universities (Kehm, 2013). The first round of the initiative tendered additional funding for 40 graduate schools that should bring about a structured education for PhDs (1 Mio. € per year), 30 Clusters of Excellence consisting of differing locational and interdisciplinary cooperation partners (ca. 8 Mio € per year) and if successful in the other two categories an application for ca. 10 institutional development concepts was possible resulting in being named Excellence University (ca. 25 Mio € per year; Kehm, 2013). The initiative started with the first two rounds in 2005/06, and was followed by the third round in 2012. The Excellence Initiative will be replaced by the Excellence Strategy starting in 2019 with only two funding lines – Excellence Clusters and Excellence Universities (DFG, 2018). The initiative (and following strategy) is the most direct indication for a differentiation in the German higher education system.

The third – and most controversial – mission of universities to generate a societal benefit for instance by innovations was also evolving by modified laws and university managements. After the professors' privilege to patent for himself (instead of the employer as usual for job-related inventions) was abolished in 2002, The German Employee Invention Act was further adjusted in 2009 resulting in a legal entitlement of the employer for an invention even after the existent deadline for claim of four months expired (Soudry, 2011, p. 218 f.). The aim is to foster technology transfer and commercialization of knowledge generated by universities (Cuntz, Dauchert, Meurer, & Philipps, 2012). Because of the change in legal frameworks, universities invested in institutional strategies like technology transfer offices that should support innovation and patenting processes. The third mission performance of universities and the employed technology transfer offices still are dependent on the specialized profile of the university (Hülsbeck, Lehmann, & Starnecker, 2013).

Recapitulation

The political and economic situation in Germany supported a further expansion of the higher education system. Strong debates on federalism, competitiveness and benefits of labor division and specialization marks this period. The traditionally homogeneous universities were either indirectly influenced by patenting laws or the introduction of study fees or even directly encouraged by research competitions like the Excellence University to differentiate themselves.

The evolving and development of universities has always been a task of primarily knowledge transfer towards students, the academic circle or for societal application. Academics today need to learn and research differently, adapting to speed, globalization, competition and societal participation. The optimal interplay of political and managerial measures is crucial in dealing with the ongoing challenges. The following will thus, try to map and understand the determinants and mechanisms that were put into place to reform and improve the German higher education system. In particular, policy initiatives, institutional and individual elements, their role in higher education and measurement issues will be discussed

3 Determinants of Corporate Governance in higher education

Higher education in Germany comprises particular institutions that are in the tension of autonomy and state dependency based on three major determinants as parts of its Corporate Governance: Policies, Institutions and Individuals.

First, policies are building the broad framework in which universities and their management are embedded and get granted and designed their room to act. Due to the federal structure and decentral distribution of competences in Germany, this is a particular challenge: decentrality is coming at the cost of potentially uneven resource allocation (e.g. in weak and strong federal states) but also at the benefit of flexibility (e.g. shown in the different handling of study feest). The role of differing policy approaches (sprinkler, subsidizing disadvantage and picking the winners concepts), the measurement of those policy approaches an in particular for the higher education sector in national concerns will be addressed.

Second, institutions are the narrow organization-specific shell in which actors are finding themselves incentivized and/or controlled for the fulfillment of the institution's purpose. The installed institutions like university boards in the higher education context contribute to a balance of interests that were addressed in the New Public Management discourse showing both: an interaction between stakeholder groups inside and outside the university as well as a monitoring body for the university management. After discussing the theoretical basis of boards in Corporate Governance, their role and connected measurement issues will be discussed.

Third, individuals are the manning of organizations which depends on personality and behavior of corresponding leaders inside just as outside the university context. The role of power, power distribution and leadership is in particular intriguing within the specific nature of universities and the state-granted right of freedom in research and teaching. After a discussion on the role of power and leadership, the question on whether leaders are born or made will be addressed and further backed by how to grasp the leaders concept within the Big Five personality measurement framework.

3.1 Policies

Parts of this chapter are orientated on the German Italian comparison made by Civera, Lehmann, and Stockinger (2017).

3.1.1 The role of policy approaches

Governance of universities as state institutions is highly dependent on the context that policy is framing. As could be shown in chapter *2 History of German universities* we observe that path dependencies in higher education systems are highly reliant on the Zeitgeist and respective political decisions. To understand the interdependencies, aims, costs and benefits of differing policy approaches a respective categorization is outlined as follows (for an overview see *Table 3. Approaches of higher education policies by Civera et al. (2017, p.* 29).).

Table 3. Approaches of higher education policies by Civera et al. (2017, p. 29).

	Characteristics	Benefits	Costs	Examples
Sprinkler Approach	Basic financial resources, evenly distributed	Widespread access and availability of education, research and spillover effects	Freeriding, risk of incentivizing the maximization of inputs; costs caused by asymmetric information	First funding source by central or decentral, state-oriented governments
Subsidizing Disadvantage	Compensation of regional, structural or political disadvantages	Securing a minimum standard of quality; Reduction of inequalities	Focus on disadvantaged → above average might not fully exploit possibilities; Asymmetric information causes difficult definition of subsidy-worthy situations	Unification of DDR & BRD, BAföG, Subsidies for regionally weak regions (e.g. during financial crisis)
Picking the winner concept	Competition to trigger and support positive behavior	Supporting high-class research; Enhancing international attractiveness; creating bandwagon effects; Quasi-markets prevent problems of adverse selection and moral hazard	Focus on high performers; Performance linked to the award moment; Damage by loss of title; Might uncouple few from the rest	Excellence Initiative, Rankings

(1) Sprinkler Approach

Ever since the founding of universities, monarchs and/or governments invested in universities to generate knowledge, well-educated human capital, academic and societal discourse, new inventions, reputation, and so forth. The calculus nowadays has not changed and includes the positive balance that is expected for the society per se as well as for the economy (Andersson, Quigley, & Wilhelmsson, 2009; Audretsch & Feldman, 1996; Emrich, Koch, Meyer, & Gassmann, 2016). Thus, politicians are interested in ensuring a basic level of education, whilst in particular knowledge-intense societies additionally rely on higher education. Different shares of taxpayer support in higher education are designed depending on the interpretation of e.g. education as common good vs. individualized benefit. However, most industrialized countries invest at least a minimum of financial resources for public universities that are provided by a sprinkler approach (Ferlie, Musselin, & Andresani, 2008; Salmi & Hauptman, 2006). This funding mechanism is the predominant one in more state-oriented, so-called "idealist" systems like Germany while so-called "functionalist" Anglo-Saxon countries focus on contributions by students and performance-related mechanisms (Auranen & Nieminen, 2010; Ferlie et al., 2008).

In the sprinkler approach, basic resources are allocated evenly to all universities based on history and formula according to e.g. size, functional departments, etc.. The Times Higher Education stated in a German context that "the fact is that egalitarianism has been the watchword of much of German higher education policy […]" (Morgan, 2016). A basic standard of education can be ensured in terms of facilities and teaching resources, research can be realized by investments in equipment or human capital, and thus, spillover effects are made available in an area covering and to some extent standardizing manner.

However, this approach comes at the cost of asymmetric information manifested in freeriding and incentivizing the maximization of inputs instead of performing efficiently (Besley & Coate, 2003). The mechanism is explained by Caillaud, Guesnerie, Rey, and Tirole (1988) who argue that differences of public and private organizations are not only a result of the manager's objectives but rather of differing structures of control. Thus, when we observe a guaranteed input and managers can take advantage of information asymmetry, a moral hazard problem arises. This implies that it would be in the interest of the firm's manager – in this context university – to destroy resources or act inefficiently. The spending rush among universities at the end of the fiscal year to avoid budget cuts in the following year – the so-called December fever –serves as an example to illustrate this problem (Brede, 2005, p. 133 ff.).

(2) Subsidizing Disadvantage

Another mechanism to provide funding to universities is subsidizing disadvantage. It is used to compensate regional or political disadvantages, e.g. after the fall of the Berlin Wall universities located in former East Germany were re-organized and subsidized to adjust to the education system of the Federal Republic of Germany (Kehm, 2004). This policy measure is mainly based on two developments: (a) focus on public welfare including education as elementary and (b) expansion of universities and their role especially after WW II. Inequalities that are too big to be handled by the universities (or states) themselves should be balanced and a minimum standard of quality should be guaranteed regarding personnel, equipment and facilities (Morgan, 2016). Furthermore, in times of education expansion, universities were not solely seen as educational institutions but also as economic factor that could be beneficial for certain regions (Oser & Schroeder, 1995; Pasternack, 2009).

However, this allocation mechanism focuses on disadvantaged institutions or regions. Universities that are above average do not receive any additional support that could help to fully exploit their potentials. The definition of what is considered worthy to be subsidized is a further critical aspect. Asymmetric information between universities and governments or between central government and regions as well as the risk of maximizing input instead of optimizing allocation to institutions in need may question an efficient distribution of resources. Monitoring in this context is even more difficult as universities are predominantly state granted monopolies, which causes a lack of information about really comparable private universities (for instance in the German context if at all comparability is highly questionable), market prices or market pressures (Caillaud et al., 1988).

(3) Picking the Winner

Governments face the challenge to fund universities as key drivers of societal, economic and technological change that brings benefits back to society (Crespi & Geuna, 2008). However, politicians are confronted with the above-mentioned problems when providing resources in a sprinkler or subsidizing disadvantage approach. Asymmetric information creates a university-specific agency problem (Jensen & Meckling, 1976; Kivistö & Zalyevska, 2015). Both of the previously mentioned approaches are mainly based on historical data and the egalitarianism principle. German universities for instance are constitutionally autonomous and self-administered. Politicians (in this case the principal) of the federal states negotiate budgets with the university management (in this case the agent) at a three to five year interval. Still, agreements remain vague and they cannot control or monitor opportunistic behavior (der Smitten & Jaeger, 2012). This is part of the explanation that inefficiency could only be reduced in a long-term perspective (Gralka, 2018).

Thus, in order to avoid inefficient spending of taxpayers' money, many systems introduced market-oriented mechanisms to allocate funding. Linking performance and funding should help to overcome problems of ex-ante adverse selection of inappropriately chosen recipients as well as ex-post moral hazard as a positive performance gets incentivized (Aghion, Dewatripont, Hoxby, Mas-Colell, & Sapir, 2010). While especially the Anglo-American countries have in general more financial dependency and traditionally rely on this funding mechanism, Continental European countries introduced this competitive mechanism more cautiously (Auranen & Nieminen, 2010; Hicks, 2012; Williams, 1997). As an alternative, the Chinese system is based on a central decision made in 1998 on boosting handpicked universities to become or stay world-class within a 10-20 years schedule comprising a huge amount of money (Ngok & Guo, 2008). What seems to be advantageous about the Chinese approach is the prevention of the contest situation (e.g. avoiding a rat race effect) and a concentrated, goal-driven investment, but it comes at the cost of disregarding other potentially world-class institutions and limiting the autonomy and academic freedom of universities (Ngok & Guo, 2008). Interestingly, the Anglo-American as well as the Chinese system create a similar situation in terms of cost and benefits: establishment of world-class universities and the "rest" – reflected by existent (America) or emerging (Chinese) ranking positions (Deem, Mok, & Lucas, 2008).

The Picking the Winner strategy aims to introduce quasi-markets to a traditionally public and thus, non-market sector like higher education. Predecessors of modern research assessments and performance based state funding are third-party funding contests that started with the founding of associations like the DFG in Germany. Based on New Public Management, which emerged roughly within the last 25 years, universities became also part of efficiency considerations (Hicks, 2012; Schimank & Lange, 2009).

The imperative for supporting lighthouses within the German university system expressed Mrs. Quennet-Thielen, state secretary in the Federal German Ministry of Education and Research: "If you want to compete in the research world, you have to have some top universities that play in the first league" (Morgan, 2016). Accordingly, the introduction and support of quasi-market structures that are marked by competitive elements like contests, rankings, etc. should trigger performance of universities. Problems of adverse selection connected to e.g. the December fever or moral hazard can be minimized as positive behavior is incentivized. The competition and will or force to participate should not only have an impact on the high performing universities that win the contest but also on the overall system (Rebora & Turri, 2013). However, the corresponding incentivizing mechanisms have to be chosen appropriately. Otherwise, one runs the risk to observe the paradox that A (e.g. research quality) is expected but B (e.g. research quantity) gets supported and consequently, the initiatives do not lead to the desired outcomes (Butler, 2003; Kerr, 1975). Critics further outline that an uncoupling of few from the rest would harm university systems and that performance efforts are potentially connected to the award moment (Hartmann, 2006, 2010). For instance, a prestigious affiliation of authors biased judgments by referees or editors (Judge, Cable, Colbert, & Rynes, 2007). In the worst case, Non-Excellence Universities might experience discrimination just for not being labelled.

In this Picking the Winner context, the German Excellence Initiative was introduced as additional, non-compulsory, funding source. As the German system is considered a European-Continental hybrid between the two extremes of the market-oriented Anglo-American and the state-oriented Chinese higher education system, this initiative will be the focus of the following public policy evaluation (especially chapter *4.3 Higher Education Policies in Germany: The Excellence Initiative*).

3.1.2 Measurement of policy approaches

> "Whether dealing with monkeys, rats, or human beings, it is hardly controversial to state that most organisms seek information concerning what activities are rewarded, and then seek to do (or at least pretend to do) those things, often to the virtual exclusion of activities not rewarded."
>
> (Kerr, 1975, p. 769)

The role of higher education policies changed especially in the period after WW II roughly until the 80's. Developing from a steering mechanism by restrained interventions – explained in Germany by the experiences from to the National Socialist regime – to the period after 1980 from which on public policy was considered active actor. This included behavior rather than outcome modification by comparably subtle incentive systems. This shift in policy perception represents the change from an interventionist to an evaluative governance (Ferlie et al., 2008). The measurement and evaluation of policy initiatives confronts research with many controversies reflected by discussions on theoretical, methodological, and empirical aspects as well as on normative stances. The questions that have to be asked and answered prior to any evaluation include on a broad level: What is the intention behind policy mechanisms? And, do the implemented higher education policies work?

To be more specific, the process of evaluation is accompanied by questions scrutinizing how criteria are defined according to which policies are measured. The nature of outcome should be questioned as well: Is there a differentiation on a quantitative and qualitative scale and if so, how can we measure outcomes quantitatively and qualitatively? Further, even if one knows what to measure, the question remains how to isolate the pure policy effects from other confounding influences (such as economic distress, changes in laws, etc.). In this context, how should we define "before" and "after"? In addition, to which extent are results comparable and transferable to other contexts (Civera et al., 2017; Ferlie et al., 2008; Izsak, Markianidou, & Radošević, 2015; Lehmann, Meoli, Paleari, & Stockinger, 2018)? Although university missions imply teaching as well as research the performance aspect will be mainly focusing research. This was the major aim of the later evaluated Excellence Initiative due to German legal requirements and is the aim most policy initiatives follow (Auranen & Nieminen, 2010; Bolli & Somogyi, 2011; Bruckmeier, Fischer, & Wigger, 2017; Gawellek & Sunder, 2016; Haeussler & Colyvas, 2011; Menter, Lehmann & Klarl, 2018; Möller, Schmidt, & Hornbostel, 2016; Vogel, Hattke, & Petersen, 2017).

Intention of policies

Due to the autonomous nature of universities, policy makers face a multi-facetted problem: First, they are only able to track performance and usage of measures in a limited way – at least in Continental European systems like in Germany. Ultimately, professors as civil servants cannot be forced to publish or do "good research" whereas in market-oriented systems professors receive mostly performance-linked payments (Auranen & Nieminen, 2010; Shin, 2010). Second, policy makers have a need for information, which they try to fill with data on conventional indicators that allow them to draw conclusions about where and how to react. Those indicators could be graduates or artificial market mechanisms like rankings (Breakwell & Tytherleigh, 2010; Dill & Soo, 2005). Third, information is costly as one typically needs to invest time and effort to obtain it – however, appropriate measures are as important for political competition as prices in market competition (Johnsen, 2005). Fourth, distributing resources through one channel means less resources for remaining channels, which is a specifically complex challenge due to the multi-product character of universities that cannot be broken down on one key objective like profit maximization for shareholders for instance (Schulze-Cleven, Reitz, Maesse, & Angermuller, 2017).

In terms of universities and Picking the Winner approaches, politicians might hope to boost locational advantages by earning international reputation through higher educational quality. Either policy-makers orientate on obligatory evaluation systems based on peer-review that include funding consequences like in the UK, Italy, or Australia (Bornmann, 2017; Rebora & Turri, 2013) or they establish incentive systems that are organized as contest with participation by choice like in Germany or Spain (De Filippo, Casani, & Sanz-Casado, 2016; Menter et al., 2016). The first mechanism includes the benefit that all universities are subject to monitoring while critiques may outline that especially those universities at the bottom of the ranking experience a loss in reputation from which they cannot easily recover. The voluntary mechanism has the advantage that universities are not obliged to participate. Only capable universities should participate while the others might benefit from a political vision that reflects what is required by society/politicians (Haeussler & Colyvas, 2011). However, universities could even fall in efficiency due to lacking resources for the application and they could suffer even more from subsequent negative consequences after being downgraded (Bruckmeier et al., 2017; Zavyalova, Pfarrer, Reger, & Hubbard, 2016).

Thus, the definition of quality is crucial for politicians and university managers alike. While quality of higher education institutions represents international visibility for politicians, the operationalized reality for universities might be to enlarge international reputation e.g. by ranking positions that are not necessarily related to quality but rather quantity (R. Lange, 2010; Olcay & Bulu, 2016; Vinkler, 2017). The perceived benefits and unintended consequences of the resulting "publish or perish" approach are discussed in detail by Moosa (2018). The definition of what quality means, how costly it is to measure and what is really coherent with basic intentions raises the question of effectivity and efficiency of policy measures. Van Raan (2005, p. 140) reports in this context that "[…] responsible science administrators in national governments and in institutions […] are aware of [the] insufficient quality level [*of bibliometric indicators*], but they want it 'fast', in 'main lines', and not 'too expensive'."

Deduction of performance measures in higher education for Picking the Winner approaches

The understanding of policy effects benefits from the differentiation between effectivity, meaning the goal achievement, and efficiency, meaning an economic output production (Kenny, 2017). Policy makers should be more interested in effective initiatives that translate public money to desired outcomes in terms of value for society, but are too often interested in short-time viewable results (Bornmann, 2012, 2017; Ferlie et al., 2008). Initiatives should trigger high-class, internationally renowned universities and bandwagon effects for the system in order to promote locational advantages. As costs for attaining the visibility goal achievement of productivity are lowered (incentivized by the initiative) they try to attain more of it – becoming effective (Downs, 1965; McGrail, Rickard, & Jones, 2006). Additionally not as substitution, besides research productivity rather research quality or impact gets increasingly attention inside the science community and can be seen as efficiency at work (Bertoli-Barsotti & Lando, 2017; Chen, 2017; Fiala, Mareš, & Šesták, 2017; Kenny, 2017; Vinkler, 2017). The outstanding research performance is seen as most important driver of spillovers – illustrated e.g. by the Silicon Valley Model (Audretsch, 2014; Audretsch, Lehmann, & Paleari, 2014).

Thus, one can identify two major measures that are relevant for policy evaluation:

- Visibility by quantity (research productivity, effectiveness according to political criterion)
- Visibility by quality (research impact, effectiveness according to scientific criterion)

3.1.3 Measurement: Research quantity and quality for Picking the Winner policy approaches

Visibility by quantity

Research productivity is frequently used not only as evaluation method (Rebora & Turri, 2013), but also regarding the trade-off of research and teaching (Taylor, Fender, & Burke, 2006), departmental structures and strategies (Fabel, Hein, & Hofmeister, 2008; Lee & Bozeman, 2005; Su, 2011), impact and influencing factors of "stars" or unproductive researchers (Abramo, Cicero, & D'Angelo, 2013a; Ajay Agrawal, McHale, & Oettl, 2017; White, James, Burke, & Allen, 2012), individual characteristics like age or gender inequalities (Abramo, D'Angelo, & Caprasecca, 2009; Oster & Hamermesh, 2006), subject specificities and comparability issues (Abramo, Cicero, & D'Angelo, 2013b; Batista, Campiteli, & Kinouchi, 2006) or national and international policy evaluation (Auranen & Nieminen, 2010; Butler, 2003; Coccia & Rolfo, 2007; Defazio, Lockett, & Wright, 2009; Menter et al., 2018).

In terms of quantity, research productivity is traditionally measured by publications or a publication ratio that reflects research productivity of universities (Auranen & Nieminen, 2010; Vinkler, 2017). Concerning the "publish or perish" paradigm, it is often argued that productivity itself is not an indicator for quality of the work but it is rather a contemporary necessity that leads to higher rankings, additional funds or promotion and potentially to research misconduct (Moosa, 2018, pp. 18 ff., 56 ff.). This is supported by upcoming salami-slicing strategies or incentives to increase the number of publications within a short timeframe. As a respective example might serve the Graduate Schools in the German Excellence Initiative that include structured doctorate programs with small timeframes which lead likely to less monographies and the fastest and not highest-quality publications (Baader & Korff, 2015; Martin, 2013). It is a comparably immediate and controllable measure based on peer-review – at least for the academic world in which citation, publication or patenting activities are rather time-intense. In this context, institutions are unable to measure and maximize what they should or might be achieving – research quality. In consequence, they will increase their efforts to maximize what they can immediately measure and promote – research quantity (S. Lehmann, Jackson, & Lautrup, 2006).

Research Quality

While research quantity is a comparably immediate measure, research quality is more complex to define due to differing quality concepts. The differentiation is a case-specific one, often comprising a qualitative evaluation based on peer review (Hicks, 2012; Moed, 2008; Paul, 2008; Rebora & Turri, 2013) or bibliometric data for instance, which relies on clearly defined measures. Although, relations between peer review and bibliometric evaluation exist, they are not a substitute but rather complementary (Jarwal, Brion, & King, 2009; Van Raan, 2006).

Previous studies considered and discussed collaboration (Franceschet & Costantini, 2010; Lawani, 1986), innovativeness (Stremersch, Camacho, Vanneste, & Verniers, 2015), citation indices like h-index, citation frequency, (contextual) impact factor (Bertoli-Barsotti & Lando, 2017; Chen, 2017; Moed, 2010; Moed et al., 2012; Saha, Saint, & Christakis, 2003) or consolidated ranking data like journal or university rankings (Dill & Soo, 2005; W. Locke, 2014; Paul, 2008; Van Raan, 2005; Vogel et al., 2017). Studies focus on individual papers (Gingras & Khelfaoui, 2017; Jarwal et al., 2009; Tahamtan, Afshar, & Ahamdzadeh, 2016; Vogel et al., 2017), journals (Mingers & Xu, 2010; Moed, 2010; Stremersch et al., 2015; Tahamtan et al., 2016), researchers (Ajay Agrawal et al., 2017; Judge et al., 2007; Tahamtan et al., 2016), departments or research groups (Ajay Agrawal et al., 2017; Franceschet & Costantini, 2010; Van Raan, 2006), universities (Abramo & D'Angelo, 2015; Menter et al., 2018) or countries (Crespi & Geuna, 2008; Lin, Chen, & Yang, 2014).

In particular, citation analyses have become prominent recently. The assumption is that visibility inside the scientific community reflects importance and represents an independent two-stage peer review – first stage publication (including a review process) and second stage visibility inside a research community (Chen, 2017). The evaluation method also comprises dysfunctionalities as higher citation rates are by their nature sensitive to specificities of science, e.g. to elaborated quantitative methods (Antonakis, Bastardoz, Liu, & Schriesheim, 2014; Judge et al., 2007) or review articles (Antonakis et al., 2014; Judge et al., 2007). Citations might be the outcome of supportive behavior by scientists or as negative example so-called "citation cartels" (Tahamtan et al., 2016). The interpretation of measures has to be dealt with cautiously as for example practical relevance and article citations do not necessarily correlate with each other (Flickinger, Tuschke, Gruber-Muecke, & Fiedler, 2014; Judge et al., 2007) and innovative work is hardly identified by any journals (Siler, Lee, & Bero, 2015). Thus, the benefit that politicians expect and which are outlined above can at least be questioned.

Dysfunctionalities in evaluating higher education

All described research policy evaluation measures – efficiency, quantity and quality – have in common that they try to make the complex process of scientific work measurable and interpretable. They are comprehensive measures with a high degree of validity if they are accurately and properly used (Moed et al., 2012). They also reveal dysfunctionalities regarding the risk of manipulation or disorder, misinterpretation or unintended consequences.

Potential forms of manipulation are found in the intentional shift of efforts that could be either undesired but legitimate in terms of the so-called salami slicing, excessive self-citation or even illegitimate in terms of (self-) plagiarism or coercive citations (Butler, 2003; Martin, 2013). Strategic behavior of researchers, managers and editors might lead to manipulated citation rates, impact factors and so forth (Anurag Agrawal, 2005; Reedijk & Moed, 2008; Szklo, 2008). Additionally, exogenously given factors or chosen databases (Tahamtan et al., 2016) influence positions, exemplary the role of proximity towards the predominant US system might create biases (Crespi & Geuna, 2008; Gingras & Khelfaoui, 2017; Van Raan, 2005). Crespi and Geuna (2008, p. 576) explain e.g. the spillover differences from the US to the OECD countries: "[*The greater impact and quality of spillovers in the US*] may be due to the size of the science investment in the US (€ 142 per capita against € 89 per capita in the EU-15 in 1999), but also to the fact that although the EU has a similar or even higher publication output than the US, the EU countries achieve excellence only in a small number of fields […]."

One of the pioneers of bibliometric approaches, Eugene Garfield (1970, p. 137), emphasized the role of interpreting bibliometric measures: "Like most other scientific discoveries, this tool can be used wisely or abused. It is now up to the scientific community to prevent abuse of the SCI by devoting the necessary attention to its proper and judicious exploitation." When interpreting bibliometric measures one should keep in mind that differences among disciplines like nature and social sciences might distort the picture (Abramo, D'Angelo, & Caprasecca, 2009; Nederhof, 2006). For instance, rankings that base their results not only on current bibliometric data are problematic in terms of the specific observed moment, such as Nobel Prize winners and their respective affiliation might introduce biases (Bowden, 2000; Van Raan, 2005). Productivity must be distinguished from impact or quality and vice versa. Extraordinary achievements become often (not always) not visible before a rewarding moment (like a Nobel Prize; Garfield, 1970; Moed, 2008; Siler et al., 2015; Stremersch et al., 2015).

As far as unintended responses and strategic behavior of higher education politicians, managers and researchers is concerned, one should consider the type of incentive including the respective reward. As shown by Butler (2003) in the Australian context, performance-related funding lead to productivity gains which meant more publications in bottom Journals and not top Journals. Another aspect in motivating researchers is a potential crowding out effect: Well-qualified scientists respond less to monetary incentives but rather according to their individual motivation and interests (Frey & Oberholzer-Gee, 1997; Kenny, 2017; Liefner, 2003). This could result in eliminating intrinsic for extrinsic motivation.

3.2 Institutions

3.2.1 Theoretical basis of Corporate Governance

In the previous chapter, I discussed the role of policy for the higher education system as an external governance mechanism to lower transaction costs, namely costs of coordination and motivation, by providing incentives. The outside steering mechanisms of policy were outlined, which assume that inside of the organization actors have the same interests and tastes and are acting against the factual policy framework. The description of this institutional governance mechanism will be the focal point of chapter *3.2 Institutions* and descriptively elaborated and discussed in chapter *4.4 Corporate Governance of higher education in Germany: University boards.*

Corporate Governance can be both positive observing the status quo as well as normative trying to give answers on how a good Corporate Governance should look like. Thus, Corporate Governance theories want essentially to contribute to core questions of organization studies: Why do we observe organizations and organizational problems? In a positive perspective, why and which organizational problems do we observe in terms of coordination and motivation? In a normative perspective, how can organizational problems be solved in accordance with the interests of relevant stakeholders?

The neoclassical economic theory assumed organizations as result of market failure. In general, actors are rational, utility maximizing and markets are perfect. This school of thought is often giving normative answers to reduce state intervention in order to overcome market failure (based on ideas of e.g. Smith (1776, reprint 2007), Ricardo (1817, reprint 2015) or Veblen (1900)). The new institutionalist economist theories are advancing this perspective by examining institutions as a reflection of social and legal norms assuming bounded rationality, utility maximization and imperfect markets (based on ideas of e.g. Coase 1937, 1960; Jensen & Meckling, 1976; Holmström 1999, or Grossman & Hart, 1983). Organizations are a result

of cost advantages of a hierarchical (versus market) design (Hart & Moore, 1990). Thus, the question rises how transactions within a firm differ from those between firms. The fundamental differentiation of both streams of thought is their answer to a chicken-and-egg problem: neoclassical theories assume that organizations are the consequence of imperfect markets, while new institutionalist economist theories assume that imperfect markets are the result of organizations.

Approaches in the new institutionalist economist theories are examining asymmetric information and incomplete contracts, which both are an immanent consequence of the separation of ownership and control: Asymmetric information is the unequal distribution of information between involved parties, potentially benefitting the more informed party at the cost of the more uninformed party. Incomplete contracts are partly determined by asymmetric information and partly by the in general, unpredictable future events and actions. The result is a discretionary room to maneuver and the conduct and/or anticipation of a potential (mis)behavior out of opportunism or simple unknowingness. If it is not possible to perfectly contract a relationship on the one hand and as involved parties can never be fully informed about the motives of the partner on the other hand, all parties run the risk to under-invest in relations and miss out chances. Depending on what focus the analysis takes, differing theories can contribute to the understanding of the organizational problems and possible mechanisms of corporate governance that may help to overcome them by monitoring and incentivizing. In the following I will make use of parts of property rights theory for understanding legal arrangements, transaction cost theory for contextual factors influencing the organizational arrangement and agency theory for performance relationships within the university landscape.

Property rights theory

While neoclassical theories broadly were analyzing organizations entities that are made up by their assets, property rights theory is more distinctive. In this perspective, organizations exist not purely as an accumulation of assets but as a nexus of contracts that help to reduce (contracting) costs and complexity. The question addressed in property rights theory is essentially, whether integration or contracting is the right strategy for a product or working relation based on the allocation of property rights (Hart & Moore, 1990). Transactions between or inside firms are dependent on the value of the bundle of property rights that are exchanged. In general, those rights concern assets of the firm and the control over them. In particular, property rights comprise the right to use, to offer, to advocate, to convert and to transfer (Alchian & Demsetz, 1973). While contracts can help to specify several intensities of

making use of an asset, the purchase of the residual rights guarantees ownership and with it, the right of full control (Hart & Moore, 1990). The integration of e.g. a supplier to a firm can solve problems of asymmetric information, re-negotiations and specific investments. However, integration can potentially lead to harmful effects if property rights are not allocated efficiently or if the size of an organization and with it complexity rises. Namely, a changing over of property rights can create distortion as loosing incentives (e.g. ownership and connected revenues) might change the perspective of the agent causing harmful opportunistic behavior.

The legal arrangement side becomes particularly interesting looking at the so-called *Hochschullehrerprivileg* (privilege of professors) in German universities. After WW II and based on the freedom of teaching and research, inventions that were made by scientific personnel in universities were considered independent inventions (in contrast to job-related inventions). Professors, lecturers or scientific assistants did not have to advice nor to disburse their employer (the respective federal state) and had the full right to dispose and to economically exploit the invention (Deutscher Hochschulverband, 2015). The rationale was that professors were thought to be more motivated to make and exploit important inventions if they have the before mentioned property rights and their personal benefit from it. However, inventions stagnated and experiences with the Bayh-Dole Act in the USA showed that if not the Act per se (Mowery et al., 2001) at least a shift of focus in policy making and legislation can trigger more inventions (Shane, 2004; Cunningham, Lehmann, Menter & Seitz, 2018). In 2002, the law was revised in Germany and persons affiliated to the university must now advice the employer about the invention. This is consequently handing over the right for commercial use of the invention if not rejected within four months by the employer. The right for scientific disposal remains with the scientist (Deutscher Hochschulverband, 2015). Particularly, this is in line with the interest of society to get returns on their investments in universities. Professors in Germany are civil servants (with the benefit of earning less than in industry but having a life-long job perspective) so they tend to be creative for research purposes but not to have an entire entrepreneurial interest as they would otherwise presumably start a business themselves. The costs of coordinating activities in the market are too high within their rationality than within a hierarchy, alluding to the role of transaction costs that may explain why joint ownership might case-wise be optimal.

Transaction cost theory

Transaction cost theory adds to the discussion of "making versus buying" (hierarchy versus market) the dimension of what motivation and coordination costs if a transaction is delivered within or between organizations. Costs are no longer pure production costs but the "costs of running the economic system" (Arrow, 1969, p 501) meaning the sum of costs that need to be put up for coordination and motivation. In contrast to the classical property rights theory that is evaluating ex ante contracting incentives, transaction cost theory takes into account transaction costs that may lead to ex post negotiations (Müller & Schmitz, 2016). Coordination is concerning the structure of transactions, e.g. the organizational structure and processes or the legal arrangements within a market. Motivation consists of (extrinsic and intrinsic) incentives, e.g. bonus payments in the organization or direct returns in the market. The combination of both is contributing to the transactional setting. Organizations exist where the costs of a centralized, hierarchy-oriented coordination and motivation are less than those compared to a decentralized, market-oriented coordination and motivation and vice versa.

On the one hand, coordination within a decentralized setting comprise costs of ex-ante initiating a transaction, in particular searching for and screening the right transaction partner, as well as ex-post contracting costs, namely (re-)negotiating and agreeing on a transaction as well as unintended and inefficient contracting consequences (Arrow, 1969; Williamson 1989, p 20 ff.; Lehmann, 2017). Motivation costs in a decentralized setting are those of securing reputation and contract adaption as well as costs to enforce the contract eventually with a court proceeding. On the other hand, coordination costs within a centralized (or hierarchical) setting are the design, maintenance and change of an organizational structure as well as costs arising within an organization in terms of decisions and information. To motivate involved parties comes at the costs of controlling and monitoring activities, evaluating performance, dealing with consequences of not intended decisions and costs of conflicts inside the organization (ibid.).

Which form of organizing transactions is more beneficial is dependent on specificity, uncertainty and frequency (Williamson 1985, p 52 ff., p. 78 ff.). The more specific an investment – be it specific in terms of facility, location, experience, etc. – the higher the relative dependency. Consequently, the probability of lock-in effects (resulting in high changing costs), hold-up (resulting in re-negotiations) or breach of promise, which is in particular endangering the ex-ante less informed or ex-post more dependent party. The transformation from an ex-ante unspecific to an ex-post specific relation in this context is

called fundamental transformation, which determines the kind and extent of costs, the negotiation power of partners as well as the potential for malfunction or misbehavior (Williamson, 1985, p 61 ff.). The more insecure a transaction is (be it uncertain in terms of behavioral assumptions, exogenous disturbances or their interaction with the before mentioned specificity) the higher the costs to establish a trustful or efficiently contracted transaction (Williamson, 1985, p 56 ff.). A higher frequency of transactions justifies the costs of specialized structures (e.g. in terms of contracting, processes, etc.) which are most suitable for large or very specific transactions which are additionally establishing trusting relationships. As outlined in the previous paragraph, hierarchical mechanism can contribute to handle connected problems of being locked-in, experiencing hold-up and breach of promise by the party that is less informed or more dependent on the transaction. Grossman & Hart (1986) show that integration as a centralized setting is beneficial if one party is particularly dependent on the transaction relative to the other, while contracting should be chosen if both consider the asset or transaction as more or less equally important.

Universities are an institution with the main activities of teaching and research (and increasingly the third mission as engaging with the industry/society). Teaching is characterized by frequent interactions and repetition as well as it is considered specific in terms of codified and subject-specific knowledge. This justifies just as for teachers the costly status of professors as civil servants. Research as well as the third mission are a highly specific and uncertain activity with regards to the produced and disseminated knowledge. Additionally, the outcome cannot be fully determined as innovation is a creative process and cannot be contracted ex-ante (Hart, Shleifer & Vishny, 1997; Hart & Moore, 1990). A certain degree of autonomy, which is granted by the basic law as the freedom of teaching and research, can be considered a measure of motivation (Audretsch, Seitz & Rouch, 2017) for university members, as their activities are barely controllable. However, a certain degree of dependency (ascertained by financing) is desirable out of a state perspective to support and make use of technological and societal progress generated inside universities. Thus, the development of universities as stable institutions between financial dependence and activity freedom within the German society described in Chapter 2 is not surprising out of the theoretical perspective. However, within a hierarchical setting new problems of coordination and motivation arise because the evaluation of the value generated by the transaction (i.e. performance) is difficult and uncertainty rises. Additionally, as goals of the involved parties (society, policy, university managers, scientists) might differ this leads to issues which are examined in detail in agency theory.

Agency theory

While transaction cost theory deals with the questions how economic transactions should best been coordinated – market vs. hierarchy, de-centralized vs centralized – agency theory asks how contracts could and should best been enforced. The core question is connected to how contracted performance relations between an agent and a principal within an organization can be optimized under the assumption of asymmetric information (second-best solution). The principal-agent relation is existent due to the benefits of cooperation and the separation of ownership and control. The principal is the contracting or ordering authority, typically the owner of an organization, i.e. the shareholder. He or she is interested in safeguarding the highest returns on investment (pecuniary and non-pecuniary) of which the necessary actions to do so cannot – or even if at extremely high costs – be completely contracted. The agent is the provider of a contracted activity controlling and deciding upon assets that are owned by the principal, typically the appointed manager of an organization, i.e. a stakeholder (Jensen & Meckling, 1976). His interests lie in maximizing the utility of his work in financial (i.e. compensation) but also non-financial (e.g. reputation, self-fulfillment, work-life balance, etc.) terms. Both, the principal and the agent, seek to maximize their individual utility within the contracted relationship while the individual goals might conflict and lead to an anticipatory under-investment and/or a loss of welfare. The utility of the principal is dependent on a proper management of his or her assets and thus, on the actions of the agent, of whom the efforts are not (or at prohibitively high costs) verifiable. As a result of this dependency and the potential of opportunistic behavior, the principal tries to safeguard his investment while the agent tries to get the best position possible to fulfill his needs at least efforts (i.e. potentially at the cost of the principal; Eisenhardt, 1989). The connected so-called agency costs are the sum of costs of screening by the principal, signaling by the agents and "residual costs" for the welfare loss resulting from the second best to the best solution (Jensen & Meckling, 1976). The reduction of information asymmetry and an alignment of interests for the benefit of those that are considered relevant stakeholders (be it shareholder-centered or including others like employees, society, etc.) can be analyzed and optimized ex-ante or ex-post contracting (Lehmann, 2017).

Ex ante, hidden characteristics can cause problems in the principal agent relation. Agents might hide undesired traits or attributes in order to be selected by the principal and to get a position they might not be particularly suited for. This so-called adverse selection roots in asymmetric information as the principal is the uninformed while the agent is the informed party. The informed party can signal and reassure the principal in his decision by signaling, e.g. with certificates, references or guarantees. The uninformed party might reduce the probability of adverse selection by screening the applicant and setting up self- selecting mechanisms that allow to align interests (counteracting mechanisms are most prominently described with the market for "lemons" by Akerlof, 1970). Exemplary, professors should be highly motivated and committed personalities that like to teach and research in a steady, say risk averse, manner. In order to be selected as professor the agent needs to show previous performance in teaching and research certified by the doctorate and habilitation, which is with 12 years of uncertainty a comparably time consuming and risky investment comprising high changing costs by the agent (i.e. signaling his aptitude and willingness). The selection panel including professors and other stakeholders are responsible for screening his suitability. Further, a self-selection mechanism is system-immanent: professors have the benefit of a high degree of freedom and life-long security as civil servants but at the cost of lower compensations and an uncertain qualification phase, which should attract individuals that are creative and risk-averse but as much committed that they take those costs.

Ex post, the principal can encounter problems of moral hazard and hold up. The work results of the agent are dependent on himself as well as on environmental factors, which opens a discretionary room to maneuver. In case the agent hides his actions (not observable efforts) or information (not knowable factors), the principal can barely disentangle the quality of the output between the agent's effort or the influence of the environment (Holmström, 1999). Monitoring as a hierarchical mechanism can help to sensitize the agent for factors considered relevant and prevent inappropriate behavior such as tunneling, entrenchment strategies or extravagant investments. Fama and Jensen (1983) show the consequences and benefits to separate control, i.e. ratifying and monitoring, from management, i.e. initiating and implementing, and risk bearing of decisions. Decision hierarchies, mutual monitoring systems and boards are general mechanisms, which are outlined to counteract moral hazard behavior. Further, incentivizing as a form of alignment of interests may help to overcome goal conflicts, e.g. by considering human capital development, bonus payments or profit-sharing (Holmström, 1999). Nevertheless, even if characteristics were well-known, actions observable and information available, the intentions of the agent might be hidden. The fundamental

transformation on this individual level implies the risk of hold-up and renegotiations. The principal is locked in due to the already specific investment in the agent (sunk costs), and thus, no or little power to influence the behavior of the agent ex post. Thus, the relation-specific investment and uncertainty about relevant factors opens room for the agent to act on his own benefit at the cost of the principal. This might be counteracted by generating guarantees – which however, could be seen itself a new "contract".

The outcome of universities is highly specific, highly uncertain, involved parties have typically a long-term relationship, and the "owner" is not as definite as e.g. shareholders in the business context are. The agent might be defined as the university management with the president at the top as primus inter pares. The principal is ultimately society and in narrower terms the federal state's government consisting of politicians and bureaucrats. Decision management and control are diffuse in universities with global budgets and its collegial self-governance and thus, the danger of moral hazard behavior is prevalent. Market mechanisms are difficult to implement: disciplining managers by an impending loss of job (Fama, 1980; Manne, 1965) is barely feasible due to the civil servant structure and the university-defined period of office. The introduction of a quasi-market and a resulting competition can be seen as policy instrument making use of measures of the private sector like with the Excellence Initiative (see Chapter 3.1 and 4.3). University boards as an instrument of monitoring can contribute to reduce moral hazard behavior in behavior-based contracts, which exist predominantly in universities (in contrast to outcome-based contracts; Eisenhardt, 1989). First, they make relevant information transparent, and second, the agent is more likely to behave in the interest of the principal if the principal obtains information on the behavior of the agent – what long has not been the case for the "ivory towers" (Eisenhardt, 1989; Fama & Jensen, 1983). In addition, university boards are considered motivated to control decisions, as nonprofit boards consist of members that serve out of willingness to provide expertise, to get prestige and not predominantly due to financial payments (Fama & Jensen, 1983).

Basic Criticism

The assumption of purely opportunistic behavior of actors is one of the major criticisms mainly coming from psychological research. Social norms and influences, assessment of the specific transaction partner and avoidance of dissonance can influence the behavior and attitudes of individuals, which are mostly ignored (Ghoshal & Moran, 1996). However, purely opportunistic behavior, that e.g. successful psychopaths or to some extent "normal narcissists" show, can have considerable job advantages in Western economies and respective governance

systems. Thus, the simplifying assumption that individuals act opportunistic might not be totally misleading at least for the current time and cultural frame (Babiak, Neumann, & Hare, 2010; Boddy, Ladyshewsky, & Galvin, 2010; Hall & Benning, 2006; Sedikides, Rudich, Gregg, Kumashiro, & Rusbult, 2004). Research on human behavior emphasizes that proposed solutions like monitoring and control can even increase the probability of opportunism and misperformance (Faleye, Hoitash, & Hoitash, 2011; Ghoshal & Moran, 1996). The question of who monitors the monitor remains unanswered (if the answer is not the imperfect market). Further might be criticized the pure utility maximization approach. This is firstly touching the distributional question and differentiation between shareholder and stakeholder approach as well as which utility should be maximized. Secondly, philosophical considerations question the normative evaluation and ethical appropriateness[8] of a pure utility maximization approach.

As an interim conclusion, Corporate Governance is a mechanism comprising of a set of instruments that manages the risk of under-investment and welfare loss. The design is dependent on the organization and its stakeholders, because interests, contribution and participation of stakeholders as well as the room for action of university stakeholders are not static. The context and relevant stakeholders determine transaction and agency costs of the organization. The problems arise (i) from the incompleteness of contracts and a discretionary room to maneuver and (ii) from individual or organization goals that might differ with those of other stakeholders or organizations. In the German university landscape we observe an interesting setting: high uncertainty about outcomes and high specificity leading to a high degree of internalization as universities are public organizations as well as to a comparably high degree of autonomy as universities predominantly rely on collegial self-governance. As has been shown, the current university system can partly be explained theoretically, confronting problems of distribution of property rights, transaction costs within a hierarchy, adverse selection, and moral hazard. While chapter 3.1 addressed incentivizing mechanisms in form of policy approaches and chapter 3.3 will address selection processes within universities, the remaining chapter 3.2 will specify the role of boards in higher education institutions and critical measurement issues.

[8] For example pure utilitarists would argue that the death of one (healthy) person could be justified if all organs would be transplanted to people in need so that they can live on (Bartels & Pizarro, 2011). Similarly, one could argue that for the advantage of shareholders, redundancies and illegal behavior was acceptable, neglecting e.g. societal responsibility and compliance.

3.2.2 The role of boards in higher education institutions

Some authors argue that the differentiation between public and private organizations is obsolete if organizational models were more accurate – however, such an abstracted theory does not exist up until now. Parameters set in new institutionalist economic theory are existent in public such as in private organizations but they should be defined and refined according to the specific institutional context. Apart from the definition of principal as investor and agent as manager, the distinction of the uninformed and informed party as well as the detection of goal conflicts should be highlighted in the university context as it will be used in the following categorization. This allows to understand role ambiguities and functions in the decision process.

Theoretical perspective of German university boards

Society as starting point is ultimately the principal of universities indirectly financing them by tax payments (while also those individuals are agents in their role of being employees) in the hope for a proper spending, and resulting security, progress and welfare. However, the spending of taxpayer's money is not fully transparent and they can deliberately choose neither where their money is going nor how it is spent. The government, consisting of politicians and bureaucrats, are in their role as agents controlled by elections and their interest lies in being re-elected and potentially broadening their area of influence by input maximization. They essentially administrate and manage the distribution of tax resources. The university management represented by the president is managing and coordinating the university and is responsible to motivate members of university faculties and departments. Due to the nature of a primus inter pares, the position traditionally promised more non financial rewards like prestige and doing something for the common than a great financial bonus. The president as informed member of the respective university can be considered agent towards the government (and eventually principal towards the remaining organizational members). This chapter focusing on university boards concentrates on the last mentioned interface of public administration (principal) and universities (agents). While universities have the interest to stay with as much autonomy possible, public administration calls for accountability in terms of providing human capital and knowledge (Kivistö, 2008).

This tension was taken into account in the course of new public management evolving in the beginning of the 90's. Incentive-giving initiatives with the Excellence Initiative, more self-responsibility for students with study fees or a more performance-oriented salary concept are just some examples in the German higher education landscape. Autonomous decisions (i.e.

decentralization) were supported by the introduction of global budgets to ensure an efficient resource allocation by organizational experts – namely the president who was considerably strengthened in his position. At the same time behavior rather than a static outcome should be facilitated by incentives, e.g. W-wages of professors, and monitoring, e.g. university boards (Schimank & Lange, 2009; Eisenhardt, 1989). Where Fama & Jensen (1983) suggest to separate decision control and management, the decentralizing policy further disentangled the public controlling function: public controlling split to a framing and monitoring of decisions. Full monitoring of the effect by a central bureau was no longer realizable at justifiable costs. The introduction of university boards was the institutional answer to the self-regulating freedom that was given to universities: they are ratifying and monitoring decisions of the president not at a distance but at proximity (see an overview on the tasks of university boards in Table 11: Overview on the federal state's designs of university boards in 2012.). The new strength of the president and the arising risk of moral hazard behavior was hoped to be governed properly. Apart from making information transparent and with this expecting a positive influence on the behavior of the president, members of society could participate in decision making processes, which was ought to increase acceptance and show an opening of the "ivory towers". In doing so, the senate as internal control committee of academic self-governance was disempowered (Schimank & Lange, 2009; Heinze, Bogumil, Grohs, and Gerber, 2007). Thus, in the university context one needs to differentiate decision framing (policy), decision control (university boards) and decision management (president). However, one has to face new challenges like differing interests, resource dependencies or board composition with the introduction of boards, which will be examined in 4.4 Corporate Governance of higher education in Germany: University boards.

University boards in hybrid, decentral and central systems

The traditional European governance systems relied on autonomy of their comparably big universities and usually – if at all – did not have a powerful board of trustees. A remarkable exception is the oldest European university of Bologna at its beginnings, where a student gilde could force professors not to leave the campus (or only in return for a depository) or that could fine professors for bad lectures (Hermalin, 2002). Funding was connected to "hard" outcome factors like student numbers and control of internal decisions was brought through self-governing committees like the senate, where professors – even if other stakeholders were recently added – essentially had the power to control and manage themselves. With the shift from outcome to behavior steering recently introduced boards, e.g. in Germany and Austria, were seen as advisory and included various types of stakeholders to the "Ivory Tower" (S. Lange, 2010; Röbken & Schütz, 2013). The alternative to control decisions centrally can be observed in France, which fully controls universities and also internal decisions via the responsible ministry (Broadbent, Gallop, & Laughlin, 2010).

The Anglo-American model is traditionally more focused on funding by students and donors – reflected in their use of university boards. The UK employed faculty gildes, e.g. in Oxford before 19th century, and more recently, boards have been implemented to monitor the university (Broadbent, Gallop, & Laughlin, 2010). As from the 17th century the young American faculties employed students to tutor courses and boards exercised considerable control over most and important issues. Those boards did not consider "typically youthful, inexperienced, and transient teaching faculty" to be able to govern themselves (Gerber, 2014, p. 14). Additionally, in light of the strong dependence on donations and religion (rather than state funding like in the continental European model), boards were installed to control by having both, a framing and monitoring function, e.g. in one of the first American universities in Harvard shortly after the founding in 1642. Up until today, their approach is based on intense control, market and shareholder orientation (W. O. Brown, 2014; Hermalin, 2004). This does not only mean considerable influence but also network (Mathies & Slaughter, 2013), gender effects (Ehrenberg, Jakubson, Martin, Main, & Eisenberg, 2012), conflicts and the pursuit of own interests of board members what calls to memory the question who monitors the monitor (Bastedo, 2009a, 2009b). Studies evaluated conceptually and descriptively the work and embeddedness of university councils (Amaral & Magalhaes, 2002; Hermalin, 2004; Mayntz, 2002; Rytmeister, 2009; Trakman, 2008). As for companies, the size of university boards was analyzed (Ashbrook, 1932; W. O. Brown, 2014) finding a

positive relation between university size, religious affiliation and university type. Discussing university and board performance includes a positive relation to board size (W. O. Brown, 2014), private or public nature of a university as well as the interlocks, role perception and conflicts of members (Arslan, 2013; Kezar, 2006; Kretek et al., 2013; Pusser, Slaughter, & Thomas, 2006). The board structure (state-wide vs. individual) is found to be influenced by political shirking strategies (Toma, 1986), and public universities can be influenced positively by governing bodies responsible for only one university (Toma, 1990). The Anglo-American system is strongly decentralized and also a matter of private interests (students, donors, etc.), which explains that powerful boards are partly compensating a lack of steering and partly fulfilling a representation of interests.

The Chinese university system is centralistic after its nationalization and the influence of the Soviets in the 50ies. The central government majorly funds universities as well as the living of students. Personal benefits by economic activity, tuition fees and corresponding supporting programs were introduced lately to cover under-investments. Serving mainly as provider of work force in planned job assignments, universities were structured and specialized according to fields and under supervision of the respective ministry (around 60 ministries involved, not one science ministry). Research institutions were operating independently and organized by the Chinese Academy of Science. Although recent merges and a light market-oriented re-organization of higher education the controlling of them is not – like in the European or Anglo-American institutions – a matter of multiple specificities (Min, 2004). A combination of structural, cultural and political circumstances created observing advisory, so-called "academic councils" with little power. Governance is strictly hierarchical and broadly shaped by a strong dean or president and ultimately by the political guidance (Hao, 2016).

Thus, the European university board is a mechanism between the Anglo-American steering of universities via boards and the Chinese administration via a political agenda. As a consequence of the introduction of more market-oriented measures, boards and their analysis are upcoming for the European context (Kretek, Dragšić, & Kehm, 2013; Röbken & Schütz, 2013). Research is broadly orientating on the Anglo-American context with the most powerful construction. Results are by no means extensive and due to the described path dependencies sometimes misleading (W. O. Brown, 2014; Hermalin, 2004; Pusser et al., 2006; Rytmeister, 2009). The juxtaposition of corporate governance theories to (American) university councils and the proposed research agenda by Hermalin (2004) discusses the most critical aspect of applicability concluding that differences are found in the degree and not in the substance of corresponding boards. This point is valid in particular, for the American boards and their function. Just as the literature of boards distinguishes between one-tier and two-tier boards, the specific function of boards as well as the institutional context needs to be taken into account.

3.2.3 Measurement: Critical issues

Previous research in this context can be divided into shareholder (Fama & Jensen, 1983; Jensen & Meckling, 1976) versus stakeholder orientation (Freeman & Reed, 1983; Luoma & Goodstein, 1999) and hybrid approaches (Aguilera & Jackson, 2003; Rajan & Zingales, 2000; Roe, 1993). The three most discussed questions are as follows: first, whether and what determines size and composition in terms of insider/outsider (Lehmann & Weigand, 2000; Lehn, Patro, & Zhao, 2009; Pfeffer, 1972); second, if applicable at all, what role does the board play for firm performance with measures like strategic performance in mergers, Tobin's Q and other key performance indicators (Bhagat & Black, 2002; Hermalin & Weisbach, 1991; A. Klein, 1998); third, the endogeneity problem (Hermalin & Weisbach, 2003).

Measuring composition, performance or success of boards in higher education is difficult due to theoretical considerations on measurements and corresponding applicability. The questions that define the research agenda: What shall be measured? How should it be measured? Is it in general possible to find appropriate measures? What is reasonable to measure at all?

In particular, no unique goal exists in the university context and thus, no specific performance indicator can be measured. Universities follow the research, teaching and third mission (Keeling, 2006) – which would be the one to be evaluated? Non-parametric approaches like the Data Envelopment Analysis account for this multi-dimensional outcome problem (Agasisti & Pohl, 2012; Lehmann et al., 2018; Lehmann & Warning, 2004; Thursby & Kemp,

2002). However, they are highly sensitive to the "subjective" choice of variables and outliers. Choosing only a single mission one faces the difficult decision that was already discussed in *3.1.3 Measurement: Research quantity and quality for Picking the Winner policy approaches*: What could be an adequate indicator for teaching (graduates per professor, evaluation results, etc.), research (publications per professor, citations, etc.) and third mission (patents, third-party funding, etc.)?

The indicators that should affect performance (or vice versa should be affected by the organizational environment) are also questionable. As Hermalin (2002, p. 5) points out: "many of the board characteristics that have been hypothesized to matter in the corporate context are either not meaningful or difficult to define in the higher-education context." As an example might serve the insider outsider ratio, where presidents are the only director and students cannot be ascribed as internal or external stakeholder.

Nevertheless, even if this discussion was solved to a tolerable extent, the existence of the endogeneity problem and misleading implications from causal relations in this context is crucial (Hermalin & Weisbach, 2003; Schultz, Tan, & Walsh, 2010; Wintoki, Linck, & Netter, 2012). As Adams, Hermalin, and Weisbach (2010) correctly bring forward: Endogeneity is the major pitfall of parametric estimations out of theoretical as well as empirical considerations. Single evidences might separate e.g. the director's role from more general perspectives (A. Klein, 1998), the basic contradiction in logic remains: assume organization A has trouble in terms of goal attainment and – as usually in moments of crisis – involved parties blame a poor board performance (be it out of structural configurations or personal attributes). However, one should ask one more crucial question: why was this structure (or composition or size etc.) initially chosen? If not pure coincidence, one would expect that this solution was the optimal one that organization A could and wanted to realize in order to face its individual governance challenges. Out of the empirical perspective, the afore mentioned governance choices are considered to be unobservedly correlated with the error term in regression estimations and uncertainty of the lag structure that should predict the outcome of governance choice on organizational performance.

3.3 Individuals

3.3.1 The role of power and leadership in Corporate Governance

The previous discussions of Corporate Governance contributed to questions (i) how to allocate scarce (public) resources e.g. with a quasi-market competitive approach and (ii) how institutional structures coming from private industry can help to balance or overcome market imperfections and differing personal interest. Not considered so far was the hierarchical part of governing organizations including cost-advantages of concentrating power at the top level. Universities as hierarchical coordination mechanism include knowledge transfer to students, research and technological progress in an environment independent from (private) market pressures. While in former times universities seemed to rely on collegial self-governance (be it with ordinaries or cooperative committees), the call for a strong leader at the top is not only present in society per se but even more in the university context. If this means that concentration of power at the top is superior to a decentral, collegial steering, it is of crucial interest who gets this position of a primus inter pares and how he leads. The list of leaders which are charismatic but poor in leadership abilities (by intention or inability) causing distress for organizations and subordinates is long. Putting those thoughts together, the last fundamental questions in Corporate Governance and interdisciplinary fields will be addressed: Who rules? And, what is good ruling? The following chapter will first address the basic question on how leaders are constructed. Based on those fundamental considerations I will outline aspects of emerging and effective leaders and differing leadership traits and styles. This is supported by the attempt to formalize and measure these traits with a focus on the Big 5 personality categorization and initiating structure and consideration as categories of leadership behavior. The conceptual framework will be applied to German universities and their presidents in chapter *4.5 Leadership in German universities: Of presidents*.

The definition of leadership is intriguing because it is as intuitive as it is meticulous. Ever since, human mankind organized itself in groups, reducing exclusively selfish interests in order to pool those interests and gain safety generated by pure number of people (Hogan & Kaiser, 2005). The benefits of this organizational approach are the concentration of information at the top, which allows all-embracing beneficial and fast decisions for the group and their implementation. Consequently, group members have a potentially higher identification with the group and expect respective synergy effects. The disadvantages are as follows: a potential misuse of power on the expenses of the groups and the strong dependence on characteristics and abilities of one person.

The question who is or should be leading has been raised and answered in the respective context but always in light of power concentration. The "law of the strongest" was not found suitable for bigger societies, so first democratic principles depending on classes were applied in Greece or Rome. This power distribution was refined by religious, indisputable but formalized power structures that were based on the doctrine of divine right. The experiences and costs of the absolute, sometimes called Machiavellian, leaders resulted in analyses and (normative) theories of social contracts and the state. They evolved at the time of enlightenment, tried to prevent misuse of power and to conceptualize domination, leadership and societal interrelations in the context of absolutistic monarchies. Hobbes (1651, reprint 1972, p. 11), having experienced the English civil war, concentrated on a social contract with a strong but – if not benevolent – potentially dangerous leader (*Leviathan*) that could manage the human nature of "homo homini lupus". (J. Locke, 1698, reprint 2014, p. 89 ff.). The sympathy for people as moral background and people looking for their own individual commercial advantage was basis of Adam Smith's (1776, reprint 2007) influencing work on the Wealth of Nations. The turn away from the mercantilist paradigm to the classical economics paradigm emphasized the market as self-regulating mechanism that is in being self-regulated by people's interests and the invisible hand contributing to the benefit of all. In this line of confronting mercantilist and absolutist structures, Baron de Montesquieu (1748, reprint 2001) referred to the danger of too powerful leaders and argued in favor of checks and balances supporting interests of the population and advocating a restriction of power. One of the most far reaching concepts rejecting constitutional monarchies was developed by Rousseau (1762, reprint 2011) and his concept of direct democracy.

Those theorists show the range of how to deal with hierarchy meaning a concentration of power on the one side and market meaning decentralized power distribution on the other side. During mercantilism, the superior goal was to increase wealth of the absolutist, thus, production of goods was organized in small organizational entities while the largest organizational design was found in the state administration (e.g. feudal system). Although, businesses like those of the Fugger or Welser family existed and had considerable influence, all interventions subordinated to mercantilist ideas. The French revolution resulted in the right to own property and generated new social and market structures. This new distribution of property rights essentially motivated subsequent technical progress during industrialization. Big, economic organizations of today can only be understood in light of the possibility to pursuit self-interests, to capitalize returns and eventually re-invest them. Universities were on the one hand always considered rigid and not progressive in applicable terms. On the other hand, their basic research and stabilization of knowledge played a considerable role of the philosophical, political as well as technological development (see also *2.1 Introduction to the relevance of the history of universities (until 1919)*).

The combination of those theories does not only explain problems and possible solutions of today's Western state constructs but also the way societies try to govern companies. Good leaders were necessary for both to persuade involved individuals for group conform behavior and to realize corresponding group advantages (Hogan & Kaiser, 2005). Himself living in times of social upheaval with the second wave of industrialization and experiencing the upcoming of big bureaucracies in form of corporations as well as witnessing the political change from monarchies to democracies, M. Weber (1925) observed and formulized the resulting socio-economic relations and constructs for the first time including economic bureaucracies.

Organizations are seen as a *stählernes Gehäuse* (iron cage) and can equally be state institutions or non-state corporations that underlie rationalized principles. In contrast to exclusive power[9] he defines *Herrschaft* (in the following: authority) as additionally being dependent on obedience and legitimation. Thus, leading and being lead requires a group of people, the allocation and ascription of power. The creation of authoritative relations is characterized by an interest to obey which might be for whatever reason including habituation or instrumental rationality as well as the belief of legitimation. The belief of legitimation can

[9] Power defined as "every chance to enforce one's own will in a social relation even against resistance, regardless of what this chance is based on." (free translation based on M. Weber, 1925, p. 28)

be justified rationally (based on legal rules), traditionally (based on historical claims) or charismatically (based on exceptionality and trust; M. Weber, 1925, p. 122 ff.). Power and authority as specific form of power are a portrayal of specific interest constellations. The differing kinds of power can be summarized as follows: expert, referent, reward, coercive, or legitimate power in a wider (French, Raven, & Cartwright, 1959) or narrower sense (Hinkin & Schriesheim, 1989).

This more positivistic and functionalist perspective of power and authority was further elaborated by constructivist and postmodern theorists that emphasize the relational and performative side of power as constructed by collective action (Weick, 1995, p. 4 ff.; Weiskopf, 2005). Consequently, power gets distinguished into traditional, visible power that is exercised mainly by surveillance and punishment and disciplinary, subtle power coming to effect by motivation and incentives. This perspective is no longer analyzing "mechanically" the concentration at the top but rather the dynamics and constant negotiation process between and within the ruler and the ruled whilst focusing on knowledge, actual practices and interpretative processes (du Gay, Salaman, & Rees, 1996; Foucault, 1982).

Thus, we observe that the definition of leadership has two sides: the technical one and the ability-based one. Leaders can be defined as those who have formally the position to exert their will and those who are "born" or "made" leaders legitimated without any formal ascription. The allocation and ascription of power and legitimacy is a result of implicit and explicit negotiation processes, which are endogenously dependent on structural factors and vice versa. The outcome is a trade-off: limiting "freedom" of each individual for the group's sake while at the same time this limitation is authorizing leaders to be responsible for the group's advantage. The discussion about the appropriate level of freedom in several aspects is ongoing (Audretsch, Seitz, & Rouch, 2018; Lehmann & Seitz, 2017). In modern organizations, the group's advantage depends on the shareholder or stakeholder perspective. Separation of ownership and control in bureaucracies (be it as state or private enterprise), a frequent call for strong leaders and the possibility to choose the leader motivate the question about the personality and leadership style of the "corporate Leviathan". This examination must include the extent of checks and balances and the levelling of differing interest groups.

3.3.2 *Born or Made: The role of leadership characteristics and style in leadership emergence and effectiveness*

The way of how an organization is lead and the extent of motivation of its employees may have an enormous influence on organizational success or dysfunctionalities, which motivates the necessity to underpin theoretically the evaluation of leadership as concept (Baum, Locke, & Smith, 2001; Kets de Vries & Miller, 1984). It has to be differentiated between (a) leader traits and characteristics which might be found in demographics, task competences or interpersonal attributes leading to leadership emergence, (b) leadership behavior or style which is partly influenced by leader traits and might be classified in various ways, and (c) leadership effectiveness as a result of (a) and (b), which reflects itself in goal attainment for an individual, group or organization (Derue, Nahrgang, Wellman, & Humphrey, 2011). This breakdown is broadly covering the assumptions of being a "born" or "made" leader in a socio-economic context, which is discussed in the following.

Development of leadership research

A vast literature is surrounding leadership that shall be first divided into two main streams: anecdotal evidence, guides or expert opinions (exemplary Iszatt-White & Saunders, 2017; Johnson, 2015; Peter & Waterman, 1982) and research-based evaluations on leadership emergence (who becomes a leader) and effectiveness (how is the leader's performance evaluated, for a qualitative and quantitative review see Judge, Bono, Ilies, & Gerhardt, 2002). A very comprehensive and worthwhile review of the vast leadership theory, research and managerial applications from the beginning of the last century until today was published and is regularly updated by Bass and Bass (2009). Theorists mainly focused on characteristics of the leader or on "great man" theories until the late 40's (Cowley, 1928; Lewin, Lippitt, & White, 1939), which was followed by personal leadership styles (until 60's; Fleishman, 1953b; Prentice, 1961). The emphasis on an interplay of situational and personal characters of the leader and his followers was roughly evolving until the 70's (House, 1976; Tucker, 1968). This was further developed in social sciences to transactional, transformational (Harms & Credé, 2010; Hater & Bass, 1988; Kuhnert & Lewis, 1987) and in economics purely transactional (Baum et al., 2001; Jensen & Meckling, 1976) approaches dealing with how to choose and who is a leader allowing also for indirect effects (Herron & Robinson Jr, 1993; Naffziger, 1995), which are most prominent up until today (Bass & Bass, 2009, p. 46).

Leader traits and characteristics

Traits are defined as "[…] individual characteristics that (a) are measurable (b) vary across individuals, (c) exhibit temporal and situational stability and (d) predict attitudes, decisions, or behaviors and consequently outcomes" (Antonakis, 2011, p. 270). Traits and characteristics of leaders are consistently related to effectiveness and emergence of leadership (Judge, Bono, et al., 2002). With reference to genetic and co-twin studies, personality traits explain roughly 24%-30% of the variance in emergence as leader (Arvey, Rotundo, Johnson, Zhang, & McGue, 2006; De Neve, Mikhaylov, Dawes, Christakis, & Fowler, 2013).

Heritable and partly influenceable traits that are related to leadership were found in several fields: Physical characteristics are related to leadership emergence and performance as it has a positive impact on personal living conditions and social acceptance (Pfann, Biddle, Hamermesh, & Bosman, 2000; Rule & Ambady, 2008). This effect is for instance examined in terms of proactivity (as follower dependent, Grant, Gino, & Hofmann, 2011), appearance (Halford & Hsu, 2014; Judge, Hurst, & Simon, 2009; Pfann et al., 2000), or age (as moderating effect; Ng & Sears, 2012). Intelligence as one of the most valued traits in Western economies was studied frequently: The intelligence of a leader is usually and most conveniently slightly but not massively higher than the average of his followers (Bass & Bass, 2009, p. 84). Good-looking leaders do not have an advantage compared to intelligent ones, but having both is summing up (Judge, Hurst, et al., 2009). However, a meta study by Judge, Colbert, and Ilies (2004) shows that the relation is smaller than often assumed. The differentiation of technical and emotional intelligence in this context is addressed as being correlated to effective leadership (Cherniss, Extein, Goleman, & Weissberg, 2006; L. Gardner & Stough, 2002; J. M. George, 2000). Further personality characteristics like confidence (Judge, Hurst, et al., 2009), humor (Avolio, Howell, & Sosik, 1999; Crawford, 1994), task competence or non-conformity (Ridgeway, 1981) have a positive influence on effective leadership or mediate the relation.

Charisma: Between trait and style

Charismatic leadership overlaps broadly with inspirational or transformational leadership style and might even be used synonymously (Anderson & Sun, 2017; Bass & Avolio, 1989; Conger & Kanungo, 1987). If differentiated at all, transformational leadership considers the "technical" influence on attitudes and building commitment of organization members (sometimes also named "management") while charismatic leadership is more likely an idealization of the leader (G. Yukl, 1989). This concept was evolving from a loose, normative framework (M. Weber, 1925), to localizing a leader's charisma mostly in a political context (Willner, 1984), introducing the importance of the context (Blau, 1963; Friedland, 1964) and developing a theory of relational dynamics (Bass, 1985).

Charisma is one of the contemporarily most discussed leadership traits – be it self- or external assessed. It shows a positive effect on organizational outcomes such as performance and leadership effectiveness (Baum et al., 2001; Chandler & Jansen, 1992; Conger & Kanungo, 1987; Judge & Piccolo, 2004; Nohe, Michaelis, Menges, Zhang, & Sonntag, 2013) or leader-follower relations, e.g. in terms of less psychological threats or higher motivation (Babcock-Roberson & Strickland, 2010; Banks et al., 2017; Howell & Shamir, 2005; Seltzer, Numerof, & Bass, 1989).

Charismatic leaders are considered to generate not only halo-effects but also to motivate their followers better because of their positive and inspiring demeanor, e.g. being eloquent or reflecting positive emotions (Bono & Ilies, 2006; Judge, Bono, et al., 2002; Mio, Riggio, Levin, & Reese, 2005). Being charismatic is associated with expressiveness (Bass & Avolio, 1989), self-confidence and corresponding low level of internal conflict (Conger & Kanungo, 1987; De Cremer & Van Knippenberg, 2004; Howell & Shamir, 2005), showing self-sacrifice (De Cremer & Van Knippenberg, 2004), and a high sense of meaningfulness (Babcock-Roberson & Strickland, 2010).

However, existent evidence is mixed and also does not find any relation e.g. of transformational leadership and organizational performance or emotional intelligence (Agle, Nagarajan, Sonnenfeld, & Srinivasan, 2006; F. W. Brown, Bryant, & Reilly, 2006) or even negative outcomes, which are explained by harming narcissist effects, polarization of employees or misuse of power (Maccoby, 2000; G. Yukl, 1999). As authors assume a positive, negative or no effect of charisma empirical literature discusses this inconsistency in findings mostly at the sidelines (Agle et al., 2006). Usually, the classic argument which was

brought forward by M. Weber (1925, p. 143) is used: Charisma is defined as being extraordinary, transitory and ephemeral such that it is contradictive to stability and has to be either traditionalized or rationalized (legalized) or both if this type of leader wants to establish a stable situation. Thus, charisma is not an attribute to be possessed per se but rather a process in social relationships (Ehrhart & Klein, 2001; Tucker, 1968).

The discussion about the "good and bad theories" or "bright and dark sides of leader traits", which is obviously connected to the differing findings, were addressed occasionally to leave the "holy grail" of charisma describing benefits and costs of the characteristic (Bass & Bass, 2009, p. 46 f.; Judge, Piccolo, & Kosalka, 2009). Some attempts tried to explain those findings by differentiating charismatic leadership as purpose-oriented socialized (serving a collective interest, egalitarian behavior, empowerment) versus personalized (dominance, self-interest, exploitive; House & Howell, 1992), situation-oriented as "office charisma" and personal charisma[10] (Etzioni, 1961, p. 316 ff.), or distance-oriented as close or distant relationship between leader and follower (Shamir, 1995).

Leadership styles

Leader behaviors explain more variance in leadership effectiveness than leadership traits, which is especially true for a moderating effect (Derue et al., 2011). This might be in parts caused by the importance of experience, e.g. in terms of extraversion and neuroticism, which is more determining after the age of 30 than genetics (Viken, Rose, Kaprio, & Koskenvuo, 1994) or the strong mediating effect of social environments (Zhang, Ilies, & Arvey, 2009). The development and training of leadership styles is thus, the side of "making" a leader, which is to some extent possible (Avolio & Bass, 1998; Barling, Weber, & Kelloway, 1996).

A reduced but widely used classification that shows the range of autocratic to democratic, directive to participative, or task- to relations-oriented leadership (Bass & Bass, 2009, p. 439 ff.) includes a hierarchy-driven authoritarian leadership style in which everything is decided by a central authority, a democratic leadership style that allows group discussion and decision-making, and a laissez-faire leadership style which is characterized by a complete nonparticipation of the leader (Lewin et al., 1939). The more recent leadership styles and most important differentiation in terms of economic theories is transactional leadership, as exchange relationship, which incentivizes and contingently rewards positive behavior as well

[10] A nice quote illustrates the idea: "Top executives, heads of state, and kings, who have charisma in the eyes of the public […] may have little or [… none] in the eyes of [their] private secretaries, valets, and cabinet ministers." (Etzioni, 1961, p. 316).

as it manages by exception to satisfy self-interests. Transactional conceptions were most prominent up until the late 80's. This might be complemented or substituted by a transformational or charismatic leadership style, defined as motivational leadership transforming individuals and groups from self-interested goal attainment to self-actualization (Bass, 1985; Bass, Avolio, Jung, & Berson, 2003; Bass & Bass, 2009, p. 618 ff.). The situative combination of methods – based on transactional, transformational and laissez-faire styles – is called the Full Range of Leadership (Antonakis, Avolio, & Sivasubramaniam, 2003). The question on leadership styles in this context remains: should leadership be executed (e.g. by reward motivation, per ordering etc.) or lived out (e.g. by personal motivation, participation, empowerment, etc.).

Which way of leading is considered "appropriate" is strongly dependent on the situation and expectations: An autocratic leadership can have positive effects if team power struggles are low but there are negative effects if team power struggles are high or employees report to experience abusive supervision (De Hoogh, Greer, & Den Hartog, 2015). In times of crises, need of fast (and sometimes unpopular) decisions and discipline (e.g. military) or if knowledge is asymmetrically distributed benefitting the leader, an authoritative style can be beneficial for the overall performance (Bass & Bass, 2009, p. 445 ff.). However, this style comes at the costs of generating potentially groupthink effects, if asymmetrically distributed knowledge is benefitting the subordinate, or if power is executed punitively (Bass & Bass, 2009, p. 445 ff.). The democratic style can have positive effects if leaders are supported by a higher authority and their subordinates as well as if a trustful atmosphere exists. The participative approach can lead to less absenteeism, higher levels of motivation and better health of subordinates (L. Murphy, 2005). The negative effects are adverse to the authoritative style in times of crisis etc. Bass et al. (2003) show a mix of styles and that being adaptive to the situation can have considerable performance advantages but requires flexibility and realistic assessments of the leader.

3.3.3 Measurement: The Big Five

As could be shown in the previous chapter, research on leadership traits brought out numerous studies and empirical findings that are not located in a standardized integrative framework. As charisma is mostly related to personality rather than to management by exception and as executives tend to not to want to reveal their weaknesses a measurement of personality traits seems rational. Theoretical and pragmatic considerations suggest proxies rather than an evaluation of leadership behavior. Among others, one of the most prominent questionnaires to measure leadership-relevant traits is the Multifactor Leadership Questionnaire (MLQ). The general structure of personality is expressed by the five-factor model, which will be briefly outlined in the following.

Many studies use questionnaire-based data to examine personality traits either self- or externally assessed, concluding both leadership emergence and even more likely behavior (Bass et al., 2003; Chandler & Jansen, 1992; Lowe, Kroeck, & Sivasubramaniam, 1996; Nohe et al., 2013). The MLQ measures transformational and transactional leadership behavior on nine scales, which was developed by Bass and Avolio (1989). However, this data provides like most questionnaire-based data problems of correlating scales (especially within the defined leadership behaviors), socially desirable responses, selection biases or misconceptions. It is further challenging or even not possible to get self-report data by executives on a representative scale (Cycyota & Harrison, 2006; Resick, Whitman, Weingarden, & Hiller, 2009).

Already in 1936, Allport and Odbert (1936) proposed a taxonomy of personality traits by making use of a linguistic approach. The upcoming application was connected to the strong evidence of factorial universality of the five personality traits roughly starting in the 90's (McCrae & Costa Jr, 1997). *Table 4* shows the resulting classification, which is called the five-factor model or The Big Five and consists of the following characteristics (for a comprehensive description and evaluation of the five-factor model poles see Goldberg, 1990; or John & Srivastava, 1999):

- Neuroticism: Persons loading high on this factor are pessimistic, anxious and have low self-confidence. Thus, as leaders they are expected to avoid responsibilities or changes (Bono & Judge, 2004).
- Extraversion: Scoring high in this category means that the person is talkative, energetic, socially dominant and seeking excitement. The personality is triggered by affiliation and agency (Bono & Judge, 2004). Extraverted leaders are expected to be charismatic, ambitious and able to generate enthusiasm among their followers (Judge & Bono, 2000).
- Openness to Experience: This category is characterized by curiosity, unconventionality and creativity. An open leader is considered to show creativity and originality as well as the capacity to adapt to the other's perspective (Judge & Bono, 2000).
- Agreeableness: Agreeable persons show a cooperative, affectionate behavior and avoid conflict. As charismatic leaders are also described as concerned about others they might be positively related to this leadership style (Judge & Bono, 2000).
- Conscientiousness: Having a high load on this factor means, that the persons are organized, efficient and self-disciplined. For leadership this hard-working attitude is beneficial as it might include a clear goal setting and taking responsibility (Bono & Judge, 2004).

Table 4: The Big Five.

Table based on Goldberg (1990) and John and Srivastava (1999).

Characteristic	**Pole**	**Positive manifestation**	**Negative manifestation**
Neuroticism	Emotional Stability	anxious, low self-confidence, nervous, emotional	self-reliance, stable, unemotional, calm
Extraversion	Introversion	talkative, outgoing, sociable, bossy, assertive	quiet, reserved, silent, shy
Openness to Experience	Closedness to Experience	wide interests, intelligent, curious, insightful, active, interest in travel	commonplace, narrow interests, simple
Agreeableness	Antagonism	cooperative, sympathetic, appreciative, affectionate, soft-hearted, trusting	unfriendly, stern, cold, aggressive, temper
Conscientiousness	Lack of Direction	organized, planful, efficient, dependable	careless, disorderly, irresponsible, inconsistent

Those personality traits were consistently proved to remain stable among adults and have become standard in personality and leadership research for disciplines like business economics, psychology or biology (Cobb-Clark & Schurer, 2012; Roberts & Del Vecchio, 2000). Using this personality classification is found to predict transformational leadership (and in doing so positive leadership effectiveness) on a decent level (Judge & Bono, 2000; Judge & Piccolo, 2004).

The theoretical basis on determinants of a Corporate Governance with focus on higher education was outlined in this chapter. Policies contribute to setting a framework in which courses of conduct are framed and set. Stakeholders are governed by using differing approaches – namely sprinkler, subsidizing disadvantage and picking the winner. While the more traditional funding in a sprinkler or subsidizing disadvantage approach follows egalitarian claims that are predominant in in many areas of the German welfare state, the picking the winner concept is a direct and recent result of the introduction of competitive thinking in the higher education sector (see also chapter *2.7)*. Thus, traditional measures that are connected to relatively stable university attributes (e.g. student numbers, medical faculties, research orientation and equipment) are no longer core focus in the picking the winner approach and new measures need to be identified in order to be able to evaluate performances on the missions of universities and correspondingly allocate money in a contest and performance-dependent. Institutions are set up to satisfy various interests of stakeholders, which can be observed in the German higher education context exemplary by recently introduced boards. The installation of such a monitoring instrument comprises benefits in terms of stakeholder participation and challenges that can be described as classical principal-agent conflicts. Measurement and corresponding deductions must be reflected thoroughly, in particular, in light of theoretical and empirical measurement complexities. With the difficulties of a proper institutional frame the question of the proper staffing of those positions is consequently aligned. Based on the motives of distributing power the question on who should lead and if this is exogenous or endogenous is crucial and influences the further examination of leadership personalities, qualities and corresponding measurement. The Big Five framework can serve as adequate instrument to grasp personality attributes of leaders.

4 Governance and management in the German higher education system

As the current differentiation in the German university system, which was outlined as consequence of the foregoing decades of higher education policy (see chapter *2*), needs to be considered, a brief systematization of the research object – German universities – will be presented to examine factors that need to be considered in the following analysis. A sketch of the variables and the corresponding dataset specification connected to German higher education will be given in chapter 4.2, described more in detail, and refined according to the specific empirical analyses. Based on the theoretical considerations and observations on the research object, the following chapter will make use of the previously made assumptions and measurement issues to explore the impact and effects on a political (chapter *4.3*), institutional (chapter *4.2*) and individual (chapter *4.5*) level.

4.1 Systematization of the current governance system in Germany

Since the differentiation of the university system is targeting a more professionalized governance of universities, it is advisable to map the status quo at a glance in order to understand the existing structures. If one assumes that universities do not only exist but also actively adapt to their environment, one comes to conclusion that this adaption originates in a mix of strategic decisions of universities and politicians as well as environmental factors like locational advantages. The strategic level is considering the two basic missions of universities: teaching and research. Universities will be categorized according to their teaching and research output into different strategic profiles: stuck-in-the-middle universities (1), teaching (2) or research (3) orientation, as well as being above (4) or below (5) average in both missions. Thus, universities with a high teaching output and low research output are considered teaching universities, universities with a high teaching and high research output are considered peak performing universities and so forth. The reference group stuck-in-the-middle is the group around the means, ranging from the third to the sixth quantile of both dimensions.

The measure of teaching output will be the number of graduates per professor, which is a solid indicator of workload standardized by a size measure like the number of professors (Lehmann et al., 2018). The argument that graduates are not an adequate measure for teaching in terms of quality is correct. It is a quantitative measure that is corresponding to the number of rewarded degrees and thus, indicates the number of (serious) students that had to be supervised. The argument that this ratio is just a number easy to manipulate is confronted with the minimum standards that are to be fulfilled in the German university context. As discussed

previously (see part *3.1.3*) a measure for research quantity (publications per professor) and quality (citations per publications) will be applied for comparison and will outline the differences between the quantity and quality perspectives (for an in depth discussion on performance measurement of research quantity and quality see also *3.1.3*.). In the following, *Figure 3* and *Figure 4* show the strategic mapping of the German university landscape.

Figure 3: Strategic mapping of German universities according to research quantity and teaching.
Research quantity (x-axis, publication/professor) and teaching (y-axis, graduates/professor) in 2012, axes intersect at respective mean values. The box displaying stuck-in-the-middle is placed at lower and upper thirds. Full universities comprising an university hospital are indicated in green, East German universities by a blue border, being an Excellence University (2005/06) by *.

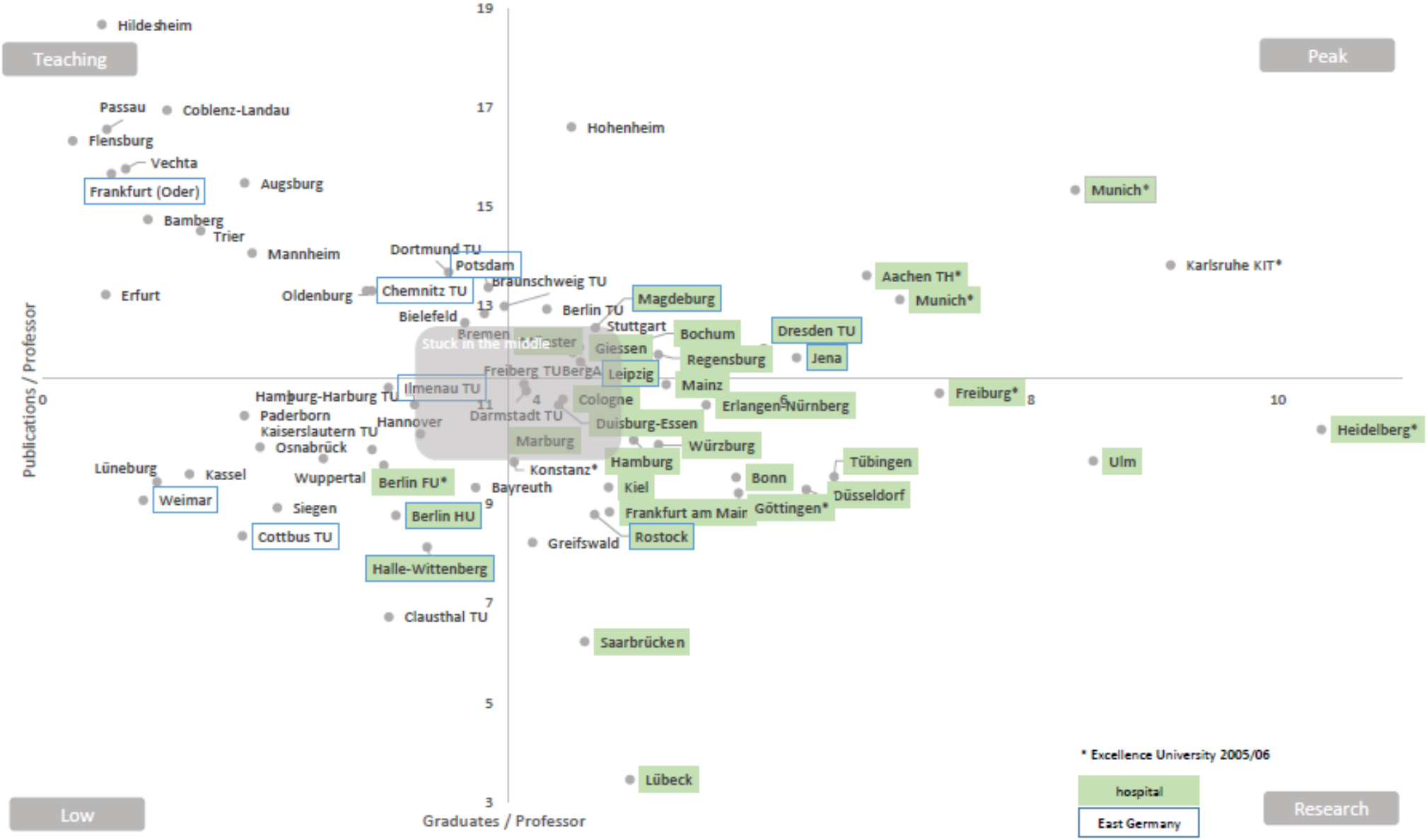
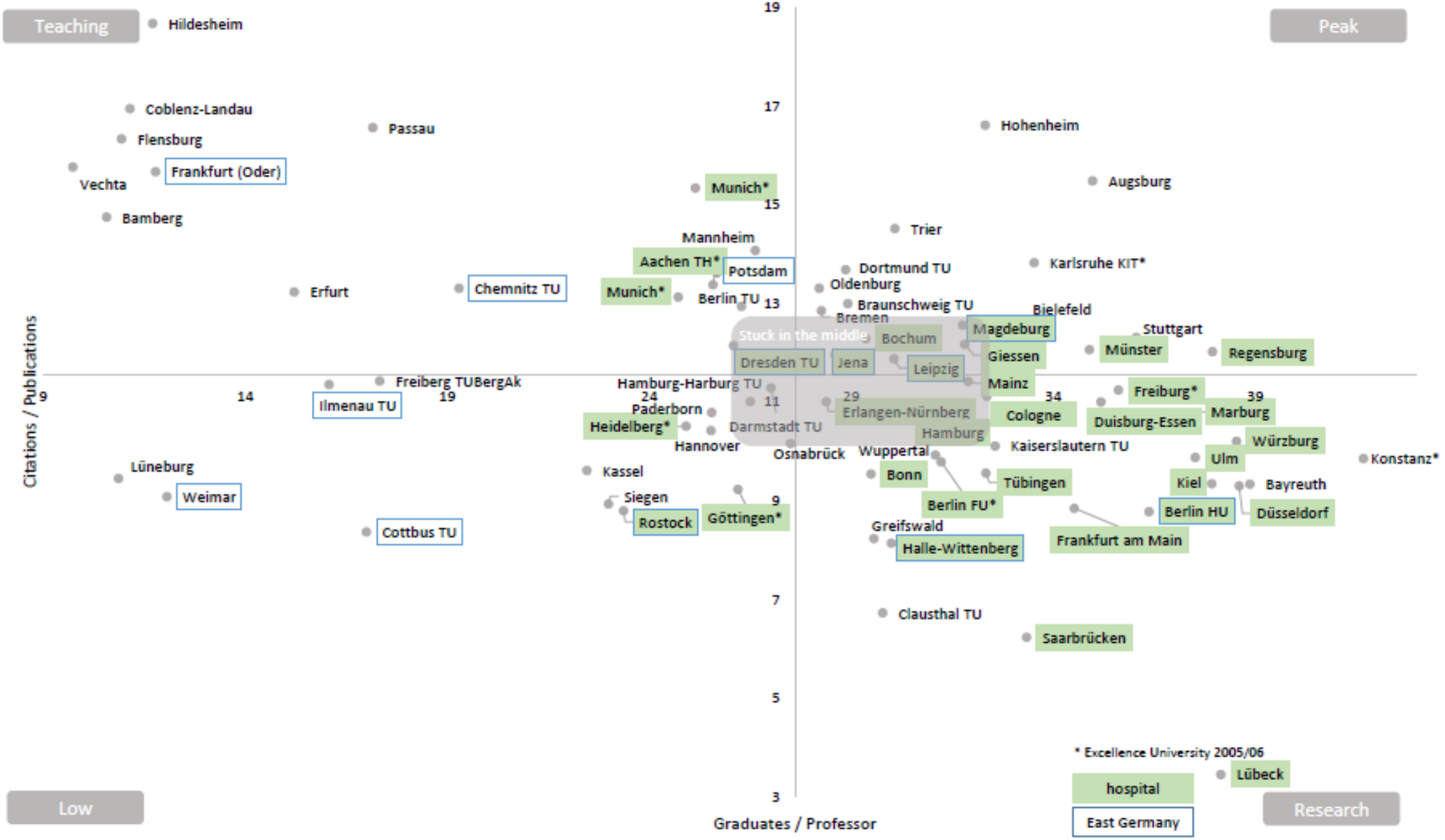


Figure 4: Strategic mapping of German universities according to research quality and teaching in 2012.
Research quantity (x-axis, citation/publication) and teaching (y-axis, graduates/professor) in 2012, axes intersect at respective mean values. The box displaying stuck-in-the-middle is placed at lower and upper thirds. Full universities comprising an university hospital are indicated in green, East German universities by a blue border, being an Excellence University (2005/06) by *.



One could assume that each state (insofar that it has a sufficient number of universities) has an interest in having purely peak universities. However, as this would be costly to achieve, another strategy is specialization, resulting in at least one teaching oriented university that concentrates on the supply with human capital and one research oriented university that concentrates on high-class research activities allowing spillover effects and being beneficial for local progress. Stuck-in-the-middle universities and low performing universities would not be favorable as they cannot take the cost advantages of division of labor and specialization but need to accomplish everything themselves.

German universities are primarily fulfilling two missions that are also protected by the German constitution: research and teaching. In order to evaluate how intense they pursue those goals *Figure 3* and *Figure 4* illustrate the profiling that was outlined before. A list of universities, their respective profile and a statement whether they are consistent in one profile can be found in *Attachment 1: List of university profiles according to research quantity (publications/professor) and teaching (graduates/professor).* and in *Attachment 2: List of university profiles according to research quantity (citation/publication) and teaching (graduates/professor).*

Based on the mappings, German universities in general tend to do both teaching and research. The spread is small for the majority indicating that they follow the Humboldtian principles. Reflecting the results presented chapter *4.3*, roughly half of the universities do not remain in the same category if one considers research quantity or research quality as a criterion. Those with a low profile are most likely to be stuck in this position in both maps (72% of those that are low profiled, 18% of all universities). Those with a research or a teaching profile also tend to hold their position while excellent and stuck-in-the-middle universities are not as resistant to the research perspective. The differing groups can be described as follows:

(1) Stuck-in-the-middle: Those universities do not show any explicit strategic orientation, they are basically following the Humboldtian principle of engaging both, research and teaching activity and thus, are average in both. As an example might be mentioned the university of Leipzig that looks back on a long history and had to readjust after the unification of the two Germanies (Universität Leipzig, 2017).

(2) Teaching orientation: Such a university focuses on teaching as the transfer of scientific knowledge to students who get prepared for a scientific or economic career. The University of Vechta is an example for an institution that developed from a pedagogical school to a university with a clear educative profile (Universität Vechta, 2018).

(3) Research orientation: Research oriented universities concentrate on basic and applied research often connected to a dependence on third-party funds that support extensive research projects. For example, the University of Ulm is in this category. As a relatively young university it specialized in medicine and technology to show their internationally renowned research interest (Universität Ulm, 2018).

(4) Peak performing: In this category universities invest a lot in the education of students as well as they contribute to research. In contrast to the Excellence Universities that will be examined in chapter *4.3*, this category is simply defined as being above average in teaching and research activities. The Karlsruhe Institute of Technology is found here and "coincidentally" it was rewarded excellent in the competition (they lost this status in the last round). Due to the merging of the university and research center both qualities could obviously benefit from their competences and generate the often wished for synergies (Karlsruher Institut für Technologie, 2018).

(5) Low performing: Low performing universities are below average in terms of teaching as well as research output. This category does not intent to devaluate single universities by associating them with it but the categorization is based on the average values within the applicable data. An example might be the technical university of Cottbus, previously a school for building and construction, that suffered from closings and openings dependent on political opportunism and that experienced a merger shortly after completion the survey data (Lassiwe, 2013).

In terms of path dependencies, it is interesting to take a look at the structural differences that universities as institutions can have. Universities that have a university hospital obtain usually a higher amount of subsidies as well as they traditionally contribute to Journal publications. This explains why they show more research intense profiles. This picture is slightly mitigated in the research quality perspective, still, the domination is evident and due to the strong impact focus of medicine faculties (Vahl, 2008). Universities with an East German background are still having a teaching orientation that has its roots in the strong specialization and teaching focus of universities during GDR times (Kehm, 2004). The fear of critics of focusing quantitative rather than qualitative measures in the Excellence Initiative (Münch, 2006) might be to some extent supported: those universities that became excellent in the first round produce a high quantitative research output while this changes considerably in the quality perspective. As an exception can be mentioned the Free University of Berlin that has a low performing profile in the quantity perspective or the university of Konstanz with a stuck-in-the-middle profile. Both have a research intense profile in the quality perspective suggesting that the output they produce is low to medium while the impact they produce is high. The technical university of Munich has a reverse situation that is peak performing or Göttingen that is research intense in the quantity perspective but turning to a teaching (TU Munich) and low performing (Göttingen) categorization using the quality indicator.

How this structure came into being and how it is influenced by governance mechanisms will be evaluated in the following chapters. The general dataset will be described (*4.2*) which is followed by three analyses: first, the policy intervention Excellence Initiative (*4.3*), control mechanisms in form of university boards (*4.4*) and power distribution for presidents that are the leaders of a university (*4.5*).

4.2 Dataset description

The basic dataset that is used for the empirical three studies will be described in the following while central variables that are relevant for the specific project will be outlined in more detail in the respective chapter. An overview on all variables, a short description and the sources can be found in *Table 5: General description of all variables.*

Table 5: General description of all variables.

Dependent and institutional variables are measured yearly by president, university, or environmental variables on NUTS-2 level. SCOPUS is a database by Elsevier. Destatis is the Federal Statistic Office for Germany. DFG is the German Research Foundation (Deutsche Forschungsgemeinschaft) organizing the Excellence Initiative together with the German Council of Science and Humanities (Wissenschaftsrat). DHV is the German Association of universities (Deutscher Hochschulverband). HRK is the German Rectors' Conference (Hochschulrektorenkonferenz). Eurostat is the statistical office of the European Union. Table is sorted by level and alphabetically according to the variables' names.

Variable Name	Operationalization	Variable Description	Type	Usage	Level	Source	Chapter
Age	Age	Age of president. Data retrieved from CVs on the university's webpage or from web search.	Discrete	Control	Individual	hand-collected**	4.5
Agreeableness	Co-authors	Number of co-authors listed in Scopus per president. Indicator for Agreeableness of the Big 5.	Discrete	Independent, Control	Individual	SCOPUS	4.5
Conscientiousness	Citations/publications President	Citations and Publications listed in Scopus per president in the year under evaluation. Indicator for Conscientiousness of the Big 5.	Continuous	Independent, Control	Individual	SCOPUS	4.5
Emotional stability high	Wikipedia with photo	Dummy variable equal to 1 if a president obtains a wikipedia article including a picture of him/her, 0 otherwise. Indicator for high emotional stability as pole to neuroticism of the Big 5.	Binary	Independent, Control	Individual	hand-collected***, wikipedia webpage	4.5
Emotional stability medium	Wikipedia entry	Dummy variable equal to 1 if a president obtains a wikipedia article, 0 otherwise. Indicator for medium emotional stability as pole to neuroticism of the Big 5.	Binary	Independent, Control	Individual	hand-collected***, wikipedia webpage	4.5
Extraversion	Extern	Dummy variable equal to 1 if a president was is coming from outside the university, 0 otherwise. Indicator for Extraversion of the Big 5.	Binary	Independent, Control	Individual	hand-collected**	4.4; 4.5

Leadership effectiveness	Grade of DHV ranking	Average grade rated by at a minimum 30 DHV members indicating leadership effectiveness.	Censored continuous	Dependent	Individual	DHV-Ranking	4.5
Leadership effectiveness (robust)	Rank in the DHV ranking	Rank of a president in the DHV ranking indicating leadership effectiveness.	Ordinal	Dependent	Individual	DHV-Ranking	4.5
Leadership emergence	Mentioning in DHV ranking	Dummy variable equal to 1 if a president is included in the DHV ranking, 0 otherwise. Indicator for leadership emergence.	Binary	Dependent	Individual	DHV-Ranking	4.5
Mobility of President	University changes	Number of universities that the president was prior to his current position.	Discrete	Control	Individual	hand-collected**	4.5
Openness for experience	International experience (in months)	Number of months a president spent abroad. Indicator for Openness for experience of the Big 5.	Discrete	Independent, Control	Individual	hand-collected**	4.5
Policy Frame	Grade education minister	Average grade rated by at a minimum 50 DHV members	Continuous	Control	Individual	DHV-Ranking	4.5
Selection of management personnel	see Extraversion	see Extraversion	Binary		Individual	hand-collected**	4.4
Sex	Sex	Dummy variable equal to 1 if a university president is female, 0 otherwise. Data retrieved from CVs on the university's webpage	Binary	Control	Individual	hand-collected**	4.5
Subject of President	Natural sciences (1)	Natural Sciences include: natural sciences and mathematics, engineering, agricultural sciences, nutrition, sports, veterinary medicine, medicine	Binary	Control	Individual	hand-collected**	4.5
Consideration	Google hits president/ google hits university	Hand-collected data retrieved from google by using a web browser in anonymized, non-tracking mode searching for "first name"+"last name"+"name of university" and divide it by the hits of "name of university".	Continuous	Independent	Institutional	hand-collected**, google webpage	4.5

Dependency on Third-Party Funds	Third-party/state funds	Relation of third-party funds to state-provided funds.	Continuous	Control	Institutional	Destatis*	4.3
Graduate Programs	Graduate Programs	Number of study programs for a subsequent professional qualification that require usually a first professional qualification, e.g. postgraduate programs, complementary studies or consecutive study programs.	Discrete	Control	Institutional	German Rector's Conference (HRK)	4.3
Hospital	Hospital	Dummy variable equal to 1 if a university has an affiliated hospital, 0 otherwise.	Binary	Control	Institutional		4.3
Initiating structure	Third-party funds	Third-party funds in EUR provided by state, Federal Employment Agency, federal states, municipality, further public institutions, German Research Foundation, European Union, international organizations, associations for university funding, charity and industry.	Continuous	Independent	Institutional	Destatis*	4.5
Innovation by university	Patents	Total number of patents listed in Scopus per university per year.	Discrete	Control	Institutional	SCOPUS	4.3
International Students	International students	Number of students coming from abroad registered in the respective winter term.	Discrete	Control	Institutional	Destatis*	4.3
Number of members	Number of members in the university board	Total number of internal and external members that are in the university board.	Discrete		Institutional	hand-collected**	4.4
Personnel Structure	Female/Male Personnel	Share of the head count of full-time female to male scientific or artistic employees.	Continuous	Control	Institutional	Destatis*	4.3
Regional inequality	East/West	Dummy variable equal to 1 if the university is located in the territory of the former German Democratic Republic, 0 otherwise.	Binary	Control	Institutional		4.3
Reputation	see Treatment Group	see Treatment Group.	Binary	Control	Institutional	DFG	4.5
Research Quality	Citations/publications University	Citations recorded by publications listed in Scopus per university per year.		Dependent	Institutional	SCOPUS	4.3, 4.4

Research Quantity	Publications/professors	Number of publications listed in Scopus per professor per university per year.		Dependent	Institutional	SCOPUS; Destatis	4.3, 4.4
Selection mode	Selection mode of university board members	Selection of university board members which is either purely university internally, shared by internal and external committees or purely externally depending on state law or university rules.	Nominal		Institutional	state university laws and/or university rules in 2012	4.4
Share of business representatives	Business representatives/extern members	Share of university board members with a business background by all external members of the university board.	Continuous		Institutional	hand-collected**	4.4
Share of science representatives	Science representatives/extern members	Share of university board members with a scientific background (e.g. extern professors, research institutes, university of applied sciences) by all external members of the university board.	Continuous		Institutional	hand-collected**	4.4
Share of society representatives	Society representatives/extern members	Share of university board members with a societal background (e.g. ministry, association, union, state institute) by all external members of the university board.	Continuous		Institutional	hand-collected**	4.4
Teaching Workload	Graduates/professor	Number of students graduating in the respective year per professor.	Discrete	Control	Institutional	Destatis*	4.3, 4.4
Technical orientation	Share of natural sciences graduates	Share of natural sciences (natural sciences and mathematics, engineering, agricultural sciences, nutrition, sports, veterinary medicine, medicine) of all graduates (diploma, bachelor, master, PhD) per year.	Continuous	Control	Institutional	Destatis*	4.3; 4.5
Technical university	Technical university	Dummy variable equal to 1 if the university is a "Technische Universität", 0 otherwise.	Binary	Control	Institutional		4.3

Treatment Effect	Excellence University x Excellence Initiative	Interaction of the dummy variables Excellence University and Excellence Initiative. Equal to 1 for universities after the Excellence Initiative, 0 otherwise.	Binary	Independent	Institutional		4.3
Treatment Group	Excellence University	Dummy variable equal to 1 if a university is considered an Excellence University, 0 otherwise.	Binary	Independent	Institutional	DFG	4.3; 4.5
Treatment Period	Excellence Initiative	Dummy variable, equal to 1 after 2006, 0 otherwise.	Binary	Independent	Institutional	DFG	4.3
Undergraduate Programs	Undergraduate Programs	Number of study programs for the first professional qualification, e.g. Bachelor programs, regular diploma, magister and state examinations.	Discrete	Control	Institutional	German Rector's Conference (HRK)	4.3
University size	Students	Number of students registered in the respective winter term.	Discrete	Control	Institutional	Destatis*	4.5
Living Quality	m² land prices	Average purchase value of square meters building land in EUR.	Continuous	Control	NUTS-2	Destatis	4.3; 4.5
Regional situation	Unemployment	Number of people unemployed as a percentage of the labor force per year by NUTS 2 level.	Continuous	Control	NUTS-2	Eurostat	4.3
Regional Wealth	GDP/capita	Regional Gross Domestic Product per capita (purchasing power standard).	Continuous	Control	NUTS-2	Eurostat	4.3

*

Charité hospital: belongs to Free University Berlin and Humboldt University Berlin, students must choose their "home university", remaining data from Charité was matched 50%-50% based on information by the Charité Press Office.
Universitätsklinik Schleswig-Holstein: belongs to University of Lübeck and University of Kiel; data from the hospital was matched 40% to Lübeck and 60% to Kiel according to the overall share of medical Chairs presented on the university websites.
Universitätsklinik Gießen & Marburg: belongs to University of Gießen and University of Marburg, data was available subdivided.
** Hand-collected primarily by information available from the University's website (including archive data, Curriculum Vitae, management information), in rare cases by online available Curriculum Vitae or google research.
*** Every wikipedia article is checked by the community according to content and violation of personality rights before publication. The German wikipedia version relies on the quality check of continuously sighted and validated revisions to prevent vandalism. The contributor has to declare that he/she has all copyright permissions necessary for the publication of information, pictures, etc. and forward the approval of the concerned person to Wikipedia (permissions-de@wikimedia.org).

The dataset consists of 73 German public universities partly at the individual (president), institutional (university) and regional (NUTS-2) level. Those universities can be considered "standard universities" according to the fact that they are engaged in teaching as well as research activities, awarding doctoral degrees and being mainly financed by the federal states. Specialized universities like those focusing on arts, theatre or music universities, universities of the German armed forces or church-associated universities were excluded from the sample as supported by previous research and because of different path dependencies, interests and structures (Lehmann et al., 2018; Warning, 2007). The hand-collected data is in a mostly balanced panel structure, generally ranging from 2004-2012 and shortened according to data availability or project logic.

Chapter *4.3 Higher education policies in Germany: The German Excellence Initiative* uses institutional data to evaluate the impact of policy measures, namely the Excellence Initiative on universities as an entity limiting the dataset to 2004-2011. The dependent variables are the performance measures research quality and research quantity. The independent variables are dummies based on the difference-in-differences approach (Treatment Group, Treatment Period, Treatment Effect) and it will be controlled for further institutional (Personnel Structure, International Students, Teaching Workload, Innovation by university, Dependency on Third-Party Funds, Technical orientation, Undergraduate Programs, Graduate Programs, Hospital and Technical University) and environmental variables (Regional inequality, Regional wealth, Living Quality). In chapter *4.4 Corporate Governance of higher education in Germany: University boards* a descriptive analysis of university boards in 2012 will be made based on variables about university boards (Number of members, Share of business, science and society representatives, Selection of management personnel and selection mode) and some performance measures (Teaching Workload, Research Quantity, Research Quality). The last empirical analysis of chapter *4.5 Leadership in German universities: Of presidents.* relies on ranking data that is available since 2009 ranging to 2012. The dependent variables are leadership emergence and leadership effectiveness. The independent variables are the Big 5 personality traits (Openness to experience, Conscientiousness, Extraversion, Agreeableness, Emotional Stability) and leadership behavior (initiating structure, consideration). It will be controlled for further personal characteristics (Sex, Age, Mobility, Subject), institutional variables (University size, Technical orientation, Reputation), environmental variables (Regional situation, Living Quality) and one federal states level variable regarding the policy frame. The corresponding literature, theoretical foundation, methodology and descriptives on the data will be outlined in detail in the respective chapters.

4.3 Higher education policies in Germany: The German Excellence Initiative

Parts of this chapter are orientated on the German Italian comparison made by Civera et al. (2017).

4.3.1 Literature on the Excellence Initiative as a Picking the Winner approach in Germany

As outlined in chapter *3.1 Policies* Picking the Winner approaches are frequently used by policy makers to stimulate single "winning" universities and whole university systems with the introduction of competition for financial measures. Germany introduced in 2005/06 the so-called Excellence Initiative (*Exzellenzinitiative*) exactly in line with the outlined approach.

The aim of the Excellence Initiative is to invigorate attractiveness, international competitiveness and positioning of the German university system by promoting high-quality research as well as excellence of German universities (DFG, 2013). The federal and central governments provided a total of € 1.9 billion to fund successful projects until the end of 2012 in order to support the before outlined objectives. The DFG and the German Council of Science and Humanities (Wissenschaftsrat) organized the initiatives as such and called for three lines of funding: Graduate Schools to foster young scientists and researchers, Clusters of Excellence to promote top-level research, and Institutional Strategies to develop project-based, top-level university research (Bornmann, 2016). The latter had to apply for all three funding lines, received the highest remuneration, and were named unofficially Excellence Universities (Pasternack, 2009).

So far, there is some evidence on descriptive and qualitative outcomes and perceptions of the Excellence Initiative (Möller, Antony, Hinze, & Hornbostel, 2012; Sondermann, Simon, Scholz, & Hornbostel, 2008). Critical voices accompanied the introduction and the process. They deconstructed the concept of elite and claimed a reduction of diversity as every university should focus on the prescribed aims (Hartmann, 2006, 2010; Münch, 2006, 2007). Most other contributions were published as books discussing the concept, practical issues or consequences (Bloch, 2008; Leibfried, 2010; Markova, 2013).

Scarce quantitative evidence exists that assess the effects of the Excellence Initiative. Möller et al. (2016) show in a bibliometric analysis that Clusters of Excellence (the second stream of the initiative) supported exclusively the "winners" of the competition, while the overall German research system did not experience benefits. Those established clusters strengthen existing network clusters and collaboration at least for natural sciences (Bornmann, 2016).

The closest research project to the present study are Bruckmeier et al. (2017), Gawellek & Sunder (2016) and Menter et al. (2018). Menter et al. (2018) give a good overview on the Excellence Initiative as such. Further, they show with a case study approach the announcement effect of the Excellence Initiative. The competition had a positive effect on research quality (citations/professor). Excellence Universities on the contrary, developed worse compared to the non-selected universities after the decision what can be explained by the efforts to win but no further efforts after the award moment.

The working paper presented by Gawellek and Sunder (2016) demonstrates that the label "excellence" comes at high costs. Universities applying to become Excellence Universities lost efficiency compared to non-applying universities. Unsuccessful applicants recuperated from the efficiency loss. Excluding additional funding from the external funds output dimension of the Data Envelopment Analysis shows no further positive effect for winning universities. With this finding, the question on withdrawing the extra funding raises again. This adds to the discussion as universities compete for funds and the title rather than for excellence.

Bruckmeier et al. (2017) – coming from Karlsruhe that recently lost the Excellence University status – analyzed the winning and loss of title. They provide evidence to the striking citation of Laband (1907) that "[…] the award of a title does not nearly elevate the awardee to the extent that the loss of the title debases him" (Bruckmeier et al., 2017, p. 177). Performance is not worsening because of a verifiable decline in university quality.

Yet, it has not been evaluated by the use of bibliometric data if Excellence Universities could realize the aims of the Initiative. If we see an impact of the initiative, we lack understanding if this is true only for the quantitative or also qualitative dimension and whether only the winners of the competition could be triggered or if there exists a signaling effect for the whole university system. Thus, the research questions are as follows:

- Which impact had the first round of the Excellence Initiative on the chosen Excellence Universities and the whole university system?
- In addition, if an impact exists: Does a differentiation exist in terms of research quantity and research quality?

4.3.2 Exploratory hypotheses

By introducing the Excellence Initiative, politicians aimed to trigger international visibility of German universities. The desired outcome "international visibility" is not directly measurable so indicators such as bibliometrics help to assess it. This study evaluates the positive effects and/or adverse effects of the Initiative. Ex-ante, a problem of adverse selection might exist as only those universities apply for becoming excellent that are already operating at the cost of some slacks or inefficiencies allowing them to vacate resources and to prepare three high quality applications – for each funding stream. This would result in a funding of universities that are not yet operating excellent but rather have either the pure size or the resource possibility to apply. Consequently, even if this award was of a pure symbolic nature positive outcomes of symbolic rewards are likely (Gallus, 2016). Ex-post, assigned universities could show moral hazard as most outcomes are not directly measurable by the principal and efforts made for the application might be tunneled towards undesired or unsupported efforts. In this context, one should hint to the discussion on incentive structures in chapter *3.1 Policies* and the question why one should hope for A when one rewards B (Kerr, 1975). It is not clear a priori whether the Excellence Initiative could trigger any effect, motivational or adverse effects. Figure 5 depicts in an explorative way the potential positive and adverse outcomes:

Figure 5: Exploratory framework for the "Picking the Winner" approach outlining possible outcomes for the treated universities and the whole university system.

		Universities with treatment	
		+	o/-
University system	+	Role Model Positive externalities and bandwagon effect (Debackere & Rappa, 1994) (I)	Loosing Winners Academic Ratchet (Massy & Zemsky, 1994) and Probation Period Effect (Riphahn & Thalmaier, 2001; Brogaard et al., 2018) (II)
	o/-	Winners track Picking the winners and adverse system effects (Brown, 2011; Möller et al., 2016) (III)	Dysfunction Misallocation and negative spillovers (Gawellek & Sunder, 2016) (IV)

Positive effects on universities with treatment

Economic theory, in particular signaling and motivation theory, suggests that the stronger a signaling incentive is the more will the winner try to hold this advantage in order to handle information asymmetry and corresponding decision-making by policy makers, students, scientists, international science community, etc. (Connelly, Certo, Ireland, & Reutzel, 2011). First, the strength of the additional reputation incentive is dependent on the visibility of the performance to the relevant audience (Lerner & Tirole, 2002). The German public as well as the international scientific community put attention to the Excellence Initiative. For universities that are operating already excellent and thus, gaining the excellence title this can constitute a strategic complementarity resulting in expanding the "publication fad" (Lerner & Tirole, 2002; Möller et al., 2016; Morgan, 2016). Second, the signal is stronger the higher the impact of effort on performance (Holmström, 1999; Lerner & Tirole, 2002). Applying this for the initiative, universities had to hand in proposals for all three funding lines demonstrating their ex-ante future strategies and will of ex-post performances. Third, the signaling incentive is even stronger the more informative the performance about talent (Lerner & Tirole, 2002). The rationale lies in the assumption that performance in terms of quantitative and qualitative research output informs about the "talent" in terms of competences, structures and strategies of the respective university (Bornmann, 2016).

Theories on awards by psychological economists explain positive outcomes for the "winners" on the individual dimension that sums up in one organization by social identification, which further increases commitment (Gallus, 2016; Ren, Kraut, Kiesler, & Resnick, 2012). Losing the resource "positive reputation" includes for university managers and scientists career options, access to networks and so forth. Thus, extra efforts may be invested by those that already won the competition (Bloch, Lottmann, & Würmann, 2008; Bruckmeier et al., 2017; Huberman, Loch, & Önçüler, 2004). Additional public recognition by before unknown peers – that could be the international science community in this context – can strengthen motivation (Gallus, 2016; Lerner & Tirole, 2002). The evaluation potential theory supports a positive effect of the award as recipients might experience a remuneration of their good performance even if this cannot be exclusively traced back to their person (Gallus, 2016).

Putting the theoretical approaches together with existent empirical evidence positive effects for the winners can be explained by signaling and motivation. Evidence of peer-effects and award-winning effects exist, i.e. "super stars" increase the productivity of the group and rewards strengthen productivity and output quality (Ajay Agrawal et al., 2017; Chan, Frey, Gallus, & Torgler, 2013). On the institutional level, a disciplining effect of public competitively acquired funds for the winners was shown by Bolli and Somogyi (2011). The winners in the competition might benefit from additional reputation and be incentivized to further increase performance and productivity (Autio & Rannikko, 2016; Bolli & Somogyi, 2011; Hegglin & Schäfer, 2015). A so-called halo effect could be expected – the efforts for publication and likelihood of citation should be increased because of the reputational gain for scholars from those universities (Amara, Landry, & Halilem, 2015). The phenomenon of an academic Matthew effect (Cassia, De Massis, Meoli, & Minola, 2014) – meaning that success in the past causes further success – was demonstrated for Nordic countries in centers of excellence (Langfeldt et al., 2015).

Negative effects on universities with treatment

The principal agent theory helps to explain a decrease of performance after winning the competition. The basic assumption is that external motivation – e.g. by competitively achieved funds – has a disciplining effect on agents. Marginal costs of passivity raise and vice versa, monetary benefit of performing raises (Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997). The efforts are increasing out of a rational choice. If intrinsic motivation is ruled out by external interventions this lowers the benefit the agent experiences by participating in the competition. Consequently, this affects the agent's performance level negatively. This phenomenon is called crowding-out effect and can be triggered by two processes: first, the perceived reduction of the agent's self-determination because he or she feels externally controlled. Second, the agent interprets external measures as depreciation or rejection of his or her motivation and competence, which leaves no chance to show the actual dedication resulting in a decrease of efforts (Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997). Thus, scientists of rewarded universities could reduce efforts due to a perceived devaluation of their work – paradoxically because of an intent to appreciate their work. As academic work is highly associated with intrinsic motivation, those motivational aspects might cause scientists to decrease efforts in general or in specific areas as shown by Kenny (2017) and Liefner (2003).

Further, based on the ideas of Kerr (1975), transaction costs of the will to achieve a communicated goal are lowered. Opportunity costs become lower if the reward for the chosen activity becomes higher – for instance due to additional funds. As a rational choice, resources are transferred to this activity. However, doing more of one requires doing less for the other (Butler, 2003; Taylor et al., 2006). As the report of the Excellence Initiative's organizers explicitly presents the development of ranking positions of Excellence Universities, they could rationalize to put efforts to e.g. ranking improvement (DFG & Wissenschaftsrat, 2015). In the case of universities, a multi-product organization, a direct steering of efforts is even more complex.

A classical moral hazard behavior can also explain a decline. Riphahn and Thalmaier (2001) provide evidence for the Probation Period effect, which is discussed in labor economics. Such an effect was already found in academia on an individual level. Research quantity and even more research quality of business and economics professors that recently got tenured decreased significantly (Brogaard, Engelberg, & Van Wesep, 2018). Excellence Universities might have invested efforts to win ex-ante and after this "Probation Period" (in our context the reward of becoming an Excellence University), efforts are reduced due to exhaustion and over-security without further incentives for continuing efforts leading to less performance (Menter et al., 2018).

Adverse effects for research quantity and research quality

Adverse effects could be explained within the two dimensions that will be considered for the analysis: As pointed out in *3.1 Policies* one might observe that what is assumed to be necessary to sustain within the competition – quantity – is experiencing a positive development e.g. to improve ranking positions (DFG & Wissenschaftsrat, 2015). Whereas quality of the output decreases especially for the winning universities. Previous research suggests that research quality is lowered with a rise of research quantity following a competitive funding policy (Butler, 2003). Thus, the incentive triggers fast and many publications rather than long-lasting high-class publications, e.g. by Graduate Schools where Excellence Universities also had to apply for. If this holds, one should observe a positive effect on research quantity and a negative effect on research quality.

Positive effects on the university system

The initiative should incentivize institutions to increase efforts to perform better (Autio & Rannikko, 2016; Gawellek & Sunder, 2016). The perception of scientists of what is valued "good work" and of what generates reputation determines where they put their efforts to (Haeussler & Colyvas, 2011). The Excellence Initiative can be considered role model if Excellence and Non-Excellence Universities will both invest in international visibility resulting in better outcomes. For the entire university system, we could expect the Academic Ratchet effect (Massy & Zemsky, 1994). This phenomenon is explained by game-theoretic assumptions (Ortmann & Squire, 2000). It is the general shift of faculty members' discretionary time from not prestigious teaching or administrative duties to material and immaterial income opportunities realized by research or other prestigious activities (Massy & Zemsky, 1994). As the focus of prestigious and good behavior is clearly set with the Excellence Initiative, we should not only observe a positive effect on the winners but on the system per se. Thus, researchers shift their focus to these beneficial activities of publication – which are under their control – and quality as stated aim rather than e.g. teaching (Haeussler & Colyvas, 2011).

Universities could benefit by an orientation towards societal and political requirements rather than the pure inner-scientific focus (Ajay Agrawal et al., 2017; Aksnes & Rip, 2009; Debackere & Rappa, 1994). This can create a so-called bandwagon effect, a phenomenon in which the probability of individual adoption is increasing with respect to the proportion that have already done so (Colman, 2003). In our case, this bandwagon effect means that the Excellence Initiative exhibits to universities societal and political requirements and does not necessarily have to do with a potential reward as outcome. The evaluation of the Excellence Initiative in the official "Imboden report" outlines that the whole system experiences a new "dynamic" and that an "impressive qualitative performance of Excellence Clusters" is observable. However, the report does not consider concentration effects of already existent capacities (Bargmann et al., 2016). A general positive effect not on university performance but of the success and goal attainment of the Initiative is supported by practitioners, e.g. by Huber (president of LMU in Munich): "If you consider that in the first round they *[federal and central governments]* spent less than € 2 billion, they really got a bang for their buck. […] The Excellence Initiative has changed the perception of German universities all over the world" (Morgan, 2016).

Negative effects on the university system

The whole system could experience negative effects confirming the critics that argued that few Excellence Universities might be uncoupled from the rest, similarly pointed out in discussions about rankings (Bloch et al., 2008; Hartmann, 2006, 2010; Vogel et al., 2017). Losers might be decoupled in terms of attractivity, funding and motivation (J. Brown, 2011; Geuna, 2001).The efforts that losing universities strive are strongly depending on the eventual inequality and the respective perception of the self-efficacy of losing universities. If perceived inequality is interpreted irreversible, the differences created by the Initiative may not only lower but also erase the strain of losers to compete with superstars (Ajay Agrawal et al., 2017; J. Brown, 2011).

Further, we might find a so-called sabotage-effect or unethical behavior (Charness, Masclet, & Villeval, 2013; Shleifer, 2004), as Jauernig, Uhl, and Luetge (2016, p. 14) state: "Apparently it is naive to assume that the mode of competitiveness and the wish to outperform others is switched off after the blow of the referee's whistle at the end of the game, since competition seems to increase the overall level of aggression." Focusing on competition can increase efforts for intense competitive behavior and in doing so reduces efforts for an overall benefit for both treated universities and the university system. Negative effects on the system side could thus, be triggered as untreated universities are showing negative performances in terms of a negative Matthew effect – less success brings less success (Bruckmeier et al., 2017; Jauernig et al., 2016). Benefits on the market are not infinite which could induce that Excellence Universities benefit from better collaboration opportunities, concentration of attention, resources, prestige, and so on while the market for such high-quality rewards and opportunities becomes stratified and Non-Excellence Universities do not have the chance to participate in "high-quality interaction".

Thus, we can derive the following outcomes on the winners and the systems dimension as shown in *Figure 5: Exploratory framework for the "Picking the Winner" approach outlining possible outcomes for the treated universities and the whole university system.*

(I) Role Model:

In the “Role Model”, chosen universities as well as the whole system should experience better performance after the introduction of the Excellence Initiative. On the one hand, winners are evaluated even more by the reward while the system experiences a bandwagon effect (Ajay Agrawal et al., 2017; Aksnes & Rip, 2009; Debackere & Rappa, 1994).

(II) Loosing Winners:

Observing a Loosing Winners outcome, the treated universities show less performance while the untreated universities show higher performance. Winners experience crowding-out effects or show moral hazard behavior while the university system is motivated by competition.

(III) Winners Track:

The receipt of the award could lead to positive effects for the winners by signaling and motivational effects including subsequent performance rise and negative or no impact on the losers due to adverse competition effects (Neckermann & Frey, 2013).

(IV) Dysfunction:

If both, winners and losers, experience a decrease in performance the policy initiative can be labelled dysfunctional. This could be due to adverse effects corresponding to crowding-out, decoupling and moral hazard effects.

The null-hypothesis is that we do not see any effect of the introduction of the Excellence Initiative, neither on the winners nor on the losers.

4.3.3 Dataset and methodology: the Difference-in-Differences approach

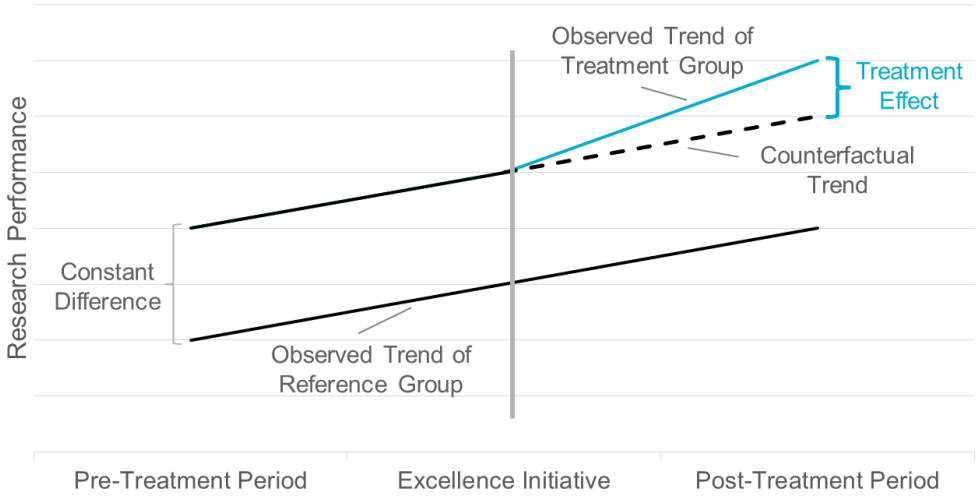
The hand-collected dataset is in a strongly balanced panel structure of 73 public universities observed from 2004-2011 which allows capturing the officially launched Excellence Initiative in 2005 and 2006, becoming effective in 2006/2007 respectively. To analyze the effect of the Excellence Initiative in Germany, I use a Difference-in-Differences analysis like for instance proposed in the books of Angrist and Pischke (2008, pp. 227 ff., 315 ff.) and Greene (2003, p. 195 ff.). This approach is a commonly employed quasi-experimental method, also described as natural experiment. It measures the effects of exogenous shocks – like policy changes, or training impact– on the treated and untreated (i.e. control) group (Ajay Agrawal et al., 2017; Autor, 2003; Card & Krueger, 1993; Feldstein, 1995; LaLonde, 1986; Lehmann & Menter, 2018; Lehmann et al., 2018). The advantage of this method is that one can detect a causal relation between the treatment and the potential outcome – in the Excellence Initiative case research quantity and quality. The basic model can be described like follows:

$$E = (Y_{t+1}^{Ex} - Y_{t+1}^{nEx}) - (Y_t^{Ex} - Y_t^{nEx})$$

Ex= Excellence Universities; nEx= Non-Excellence Universities; t= pre-treatment; t+1= post-treatment

Graphically, the Difference-in-Differences approach is illustrated as in *Figure 6*.

Figure 6: Illustration of the basic Difference-in-Differences idea.



The Difference-in-Differences approach relies on the assumption of a parallel trend, meaning that trends would be the same for the treated as well as for the untreated group if the treatment was absent (as in the Pre-Treatment Period). I define as treatment group the nine chosen universities in the first funding line (see

Attachment 3: List of German Excellence Universities.), and I test with two different control or reference groups: (1) the remaining German universities and (2) the universities that were successful in the application for getting a Graduate School and becoming the speaker of an Excellence Cluster as those were the prerequisite to become Excellence University (see *Attachment 4: List of universities with Graduate School and Excellence Cluster.*). The dummy for the respective treatment group turns 1 being an Excellence University, 0 otherwise. As the first funding period comprised two decisions – for three universities in late 2006, for six universities in 2007 – the treatment period starts in 2007, the respective dummy taking value 0 before 2007 and 1 starting in 2007. The interaction of treatment group and treatment period is the "treatment effect" that measures the additional difference that the treated universities experience to the counterfactual trend.

Thus, *Figure 7* and *Figure 8* show the mean trends of research quantity and quality from 2004-2011 for Excellence and all Non-Excellence Universities. *Figure 9* and *Figure 10* show the mean trend for Excellence and Non-Excellence Universities that were successful in applying for a Graduate School and speaker of an Excellence Cluster.

Figure 7: Mean publications per professor 2004-2011 of Excellence and all Non-Excellence Universities.

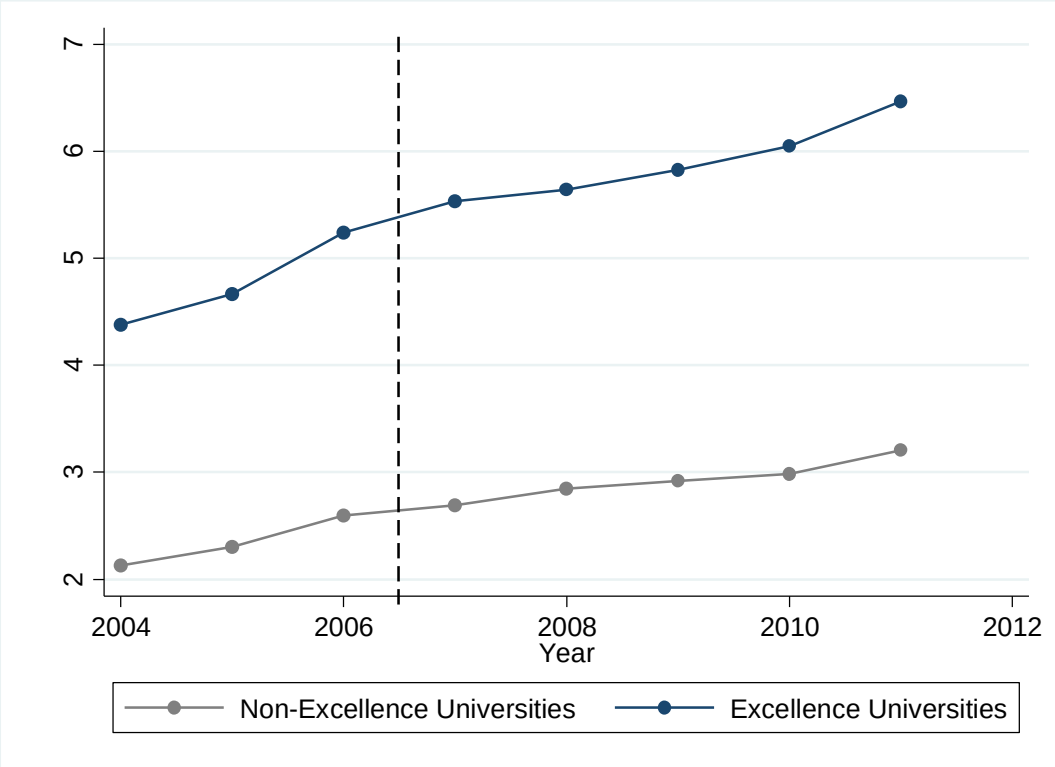


Figure 8: Mean citations per publications 2004-2011 of Excellence and all Non-Excellence Universities.

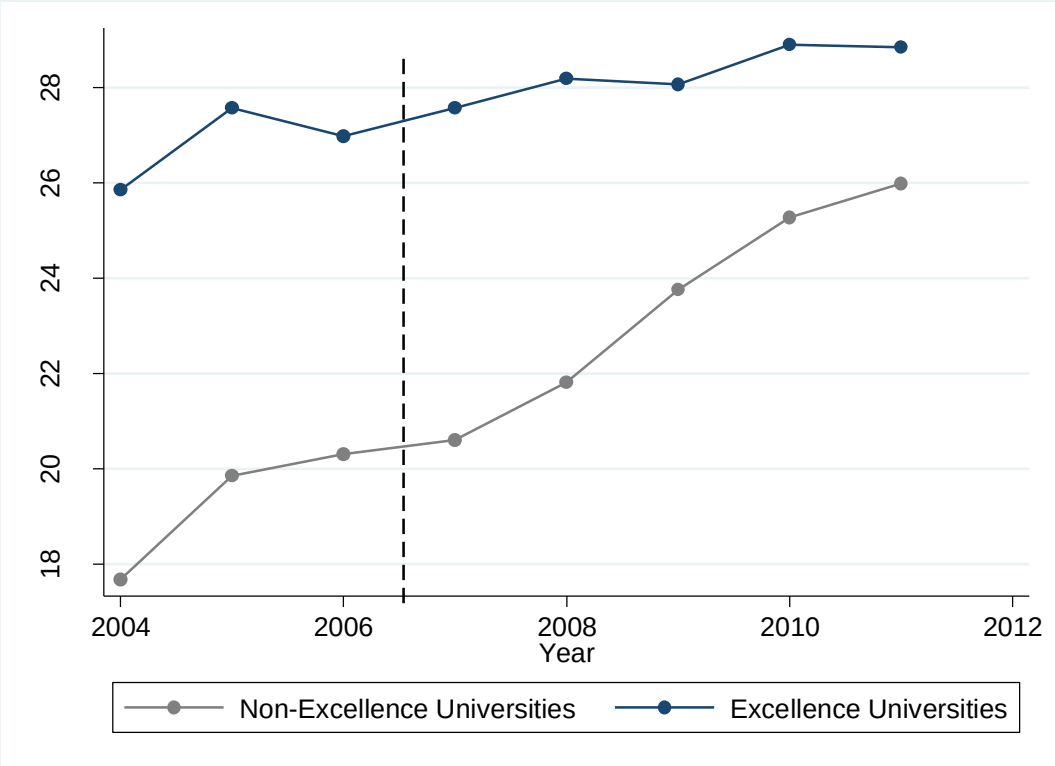


Figure 9: Mean publications per professor 2004-2011 of Excellence and Non-Excellence (Graduate School + Excellence Cluster) Universities.

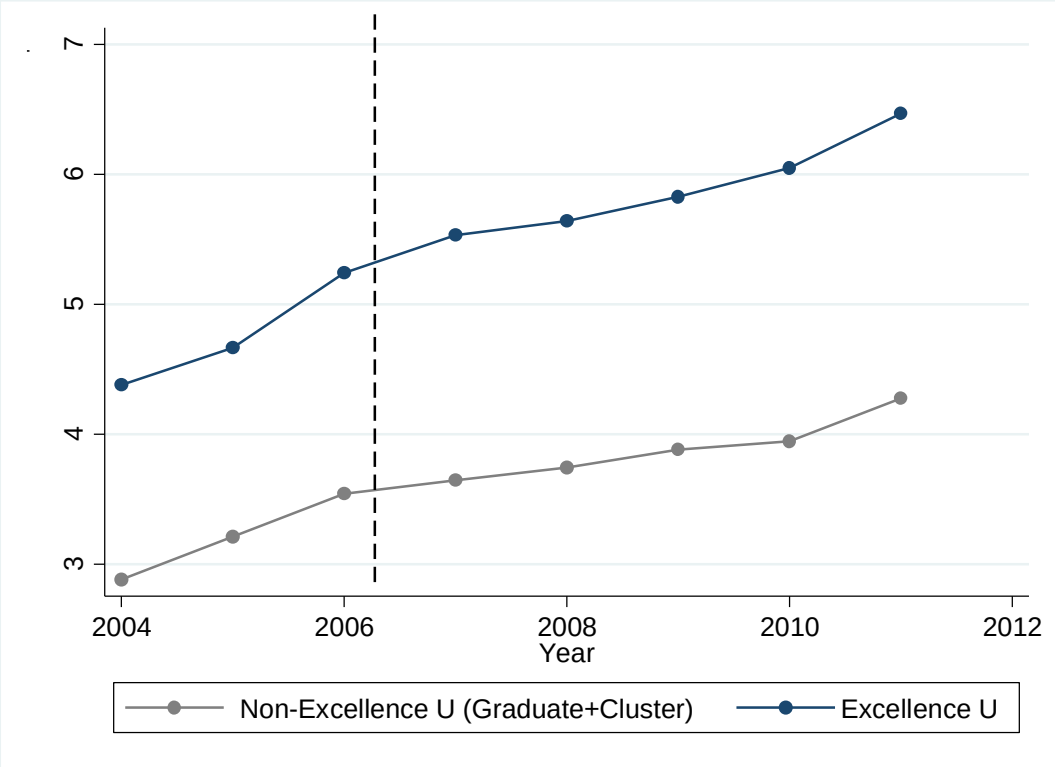
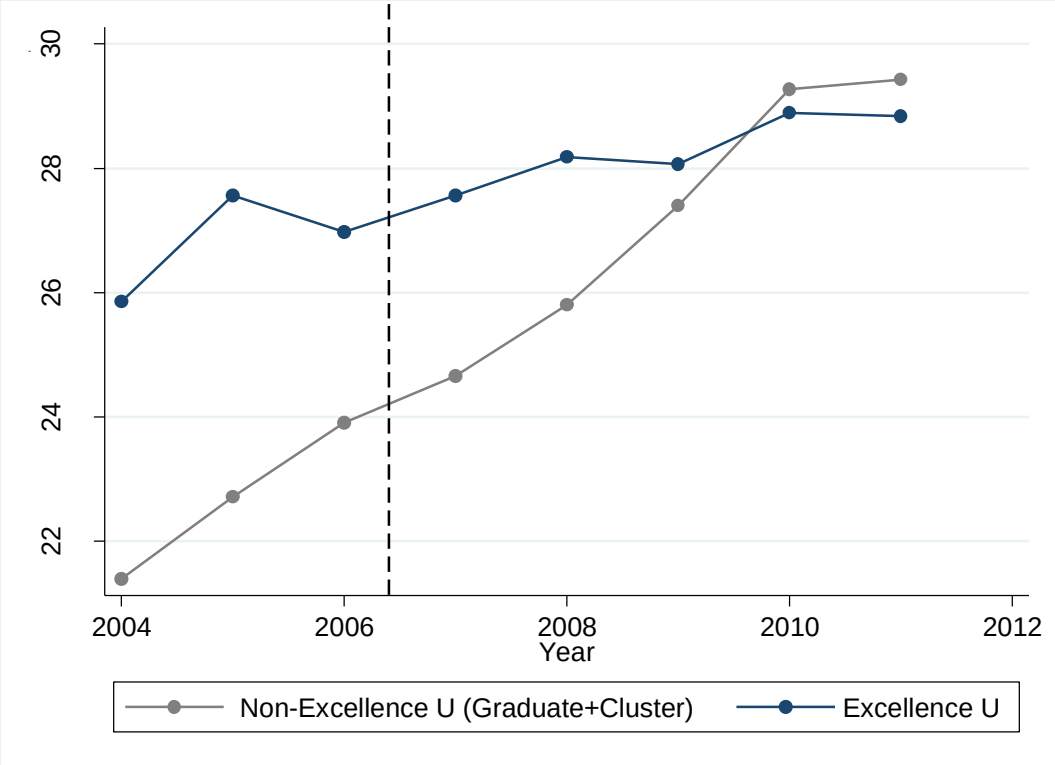


Figure 10: Mean citations per publications 2004-2011 of Excellence and Non-Excellence (Graduate School + Excellence Cluster) Universities.



As the parallel trends give a first insight but might not be fully convincing in the graphical illustration, additionally, the parallel trend assumption test suggested and applied by Autor (2003) was performed and can be found in *Attachment 8: Test on parallel trend assumption with all universities.* and *Attachment 9: Test on parallel trend assumption with selected universities.* The basic idea is that no significant difference between the groups should be existent. Considering all universities: For research quantity this holds especially for the years 2005 and 2004 while for research quality years 2004-2008 do not show significant differences, which might be explained by a minor lag of citations. Considering the selected universities: no significant differences in trends exist at least until 2008 for both, research quantity and quality.

The method brings about two major pitfalls – one methodological, one theoretical – that have to be considered: First, a methodological problem is the probability of serial correlation, meaning that a university tends to be stuck in its path dependencies and thus, observations are not independent from each other during the observed years. The most widely applied approach to confront this problem are cluster-robust standard errors, which I will use in the following models (Angrist & Pischke, 2008, p. 315 ff.) and which is further handling heteroscedasticity issues. A panel estimation approach further helps to take into account the panel structure of the data. Second, as Greene (2003, p. 198) points out it is an important difference if the entities in the treated and control group know or do not know about being in either of the two groups. In the Excellence Initiative the participation was voluntary and thus, determined by the university management. The universities know beforehand about being participant or not and afterwards about being treated or untreated. This could trigger two effects: changing behavior of the untreated universities by demotivation or motivation and what will be measured for the treated universities could be the latent motivation (or demotivation) of the actors rather than the pure effect of the Excellence Initiative itself. We cannot solve this problem statistically, however, one should be cautious by interpreting the results on a German-wide comparison.

The preferable control group would have been the group of applying universities that did not succeed in becoming excellent, but requesting this data of the responsible representative it is unfortunately not accessible (*Attachment 5: Request on applications for future concepts.*). Civera et al. (2017) chose a country-comparative approach in a triple Difference-in-Differences setting to deal with potential institutional differences as Excellence Universities are assumed to be not randomly chosen. As previously outlined, I will use a second control group that has at least the prerequisites and possibly institutional similarities to apply for becoming excellent, those that won the Graduate Schools and Excellence Cluster (DFG & Wissenschaftsrat, 2015).

As pointed out in chapter *3.1.3 Measurement: Research quantity and quality for Picking the Winner policy approaches* the following analysis will be based on two dependent variables measuring research performance: (1) the publications to professor ratio, and (2) the citations to publications ratio. The data is based on the dataset described in *4.2 Dataset description*.

(1) Publications measure the pure quantitative output of a university. The normalization by professor allows excluding eventual size effects and problems of not normally distributed data. It is a measure that is directly influenceable by researchers through additional publications (see for example Menter et al. (2018)).

(2) The ratio of citations to publications measures research quality. The number of citations that a collection of a publication receives is independent of the collection size (Katerattanakul, Han, & Hong, 2003; Katz, 2000). It is further a fair measure that indicates the impact of published research (Chen, 2017).

Controls include institutional variables as well as environmental ones that were identified as triggers in the higher education system and research performance. On the institutional side, I include the personnel structure in order to control if the female share of scientific personnel influences the output (Gulbrandsen & Smeby, 2005; Lewison, 2001), international students as measure of international orientation (Cattaneo, Meoli, & Signori, 2016; Gao, 2017), teaching workload (Cattaneo et al., 2016; Horta, Dautel, & Veloso, 2012), innovation provided by the university (Acs, Anselin, & Varga, 2002; Geuna & Nesta, 2006), relation of third-party to state-provided funds (Bonaccorsi, Secondi, Setteducati, & Ancaiani, 2014; Gulbrandsen & Smeby, 2005), technical orientation (Lehmann et al., 2018), the number of undergraduate and graduate programs (Horta et al., 2012), and institution specificities like having a hospital (Agasisti & Pohl, 2012) or being a technical university (Lehmann et al., 2018). On the environmental side, controls will include a dummy for regional inequality (East/West) (Agasisti & Pohl, 2012), regional wealth (Cattaneo et al., 2016), and living quality measured by m² housing prices (Fabel, Lehmann, & Warning, 2002).

The descriptives for the whole sample can be found in *Table 6: Descriptives of the Excellence Initiative.* Correlation matrices for the whole and the subsample can be found in *Attachment 6: Correlations Excellence Initiative all universities.* and *Attachment 7: Correlations Excellence Initiative selected and Excellence Universities.*

Table 6: Descriptives of the Excellence Initiative.

Dataset consists of 73 universities, observed from 2004-2011.

	All Years			Pre-Treatment						Post-Treatment					
	All Universities			Non-Excellence Universities		Selected Universities		Excellence Universities		Non-Excellence Universities		Selected Universities		Excellence Universities	
VARIABLES	N	Mean	SD	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Research Quantity	584	3.051	1.881	192	2.341	30	3.215	27	4.765	320	2.931	50	3.901	45	5.905
Research Quality	584	22.626	8.311	192	19.278	30	22.67	27	26.794	320	23.484	50	27.311	45	28.308
Publications	584	1,014	901.001	192	711.089	30	1,145	27	1,906	320	906.094	50	1,496	45	2,535
Professors	584	282	157	192	257	30	350	27	407	320	264	50	373	45	435
Citations	584	26,799	25,450	192	16,633	30	25,893	27	49,211	320	25,311	50	40,484	45	67,305
Personnel Structure	584	0.351	0.073	192	0.326	30	0.308	27	0.303	320	0.37	50	0.346	45	0.35
International Students	584	2,280	1,709	192	2,115	30	3,344	27	4,265	320	1,953	50	3,059	45	4,113
Teaching Workload	584	63.364	14.456	192	63.778	30	66.604	27	62.417	320	63.601	50	64.586	45	60.477
Innovation by university	584	46	178	192	29	30	8	27	41	320	51	50	20	45	80
Dependency on Third-Party Funds	584	0.161	0.075	192	0.143	30	0.154	27	0.167	320	0.166	50	0.183	45	0.206
Technical orientation	584	0.358	0.213	192	0.339	30	0.444	27	0.427	320	0.351	50	0.461	45	0.442
Undergraduate Programs	511	68.703	41.524	128	71.172	20	92.45	18	94.611	320	63.872	50	84.64	45	85.667
Graduate Programs	511	35.591	26.783	128	17.547	20	23.85	18	20.389	320	42.256	50	50.06	45	45.6
Hospital	584	0.466	0.499	192	0.422	30	0.6	27	0.778	320	0.422	50	0.6	45	0.778
Technical University	584	0.205	0.404	192	0.188	30	0.3	27	0.333	320	0.188	50	0.3	45	0.333
Regional inequality	584	0.205	0.404	192	0.234	30	0.2	27	0	320	0.234	50	0.2	45	0
Regional Wealth	584	28,232	7,052	192	25,743	30	28,003	27	30,759	320	28,695	50	30,848	45	34,047
Living Quality	569	185.618	181.006	183	149.066	29	226.138	25	334.452	317	169.4	49	232.596	44	369.918

Based on the results of the hausman test (see *Attachment 10: Hausman test Excellence Initiative research quantity for all universities.; Attachment 11: Hausman test Excellence Initiative research quality for all universities.)* a fixed-effects estimator is considered consistent and will be employed with cluster-robust standard errors clustered on the institutional level in order to handle eventual heteroscedasticity for the model including all universities. This estimator is assuming that institution-specific, time-invariant heterogeneity is correlated with independent variables. As the outlined time-invariant variables (in [ ] in the regression equation) will consequently enter the error term in the fixed-effects regression, they need to be included in the following robustness checks.

Making use of the panel structure and employing the Difference-in-Differences method the following regression equation reveals the full model that is used for the whole university system (models 1-10):

$$\textit{Research Performance}_{i,t} = \beta_0 + [\alpha_1\ \textit{Treatment group}_i] + \beta_1\ \textit{Treatment period}_t + \beta_2\ \textit{Treatment effect}_{i,t} + \beta_3\ \textit{Personnel Structure}_{i,t} + \beta_4\ \textit{International Students}_{i,t} + \beta_5\ \textit{Teaching Workload}_{i,t} + \beta_6\ \textit{Innovation by University}_{i,t} + \beta_7\ \textit{Dependency on third-party funds}_{i,t} + \beta_8\ \textit{Technical orientation}_{i,t} + \beta_9\ \textit{Undergraduate Programs}_{i,t} + \beta_{10}\ \textit{Graduate Programs}_{i,t} + [\alpha_2\ \textit{Hospital}_i] + [\alpha_3\ \textit{Technical university}_i] + [\alpha_4\ \textit{Regional inequality}_i] + \beta_{11}\ \textit{Regional wealth}_{i,t} + \beta_{12}\ \textit{Living quality}_{i,t} + \alpha_i + \varepsilon_{i,t}$$

With a_i = university, time − invariant effect ; $\varepsilon_{i,t}$= error term wit unobserved time-variant heterogeneity

The hausman test for the selected universities suggests employing the random-effects model, which will be used accordingly with cluster-robust standard errors to confront eventual heteroscedasticity (see *Attachment 12: Hausman test Excellence Initiative research quantity for selected universities.; Attachment 13: Hausman test Excellence Initiative research quality for selected universities.).* This estimator assumes that the error term is uncorrelated with constant unobserved heterogeneity. Equally employing the Difference-in-Differences method the following regression equation (models 11-20) is retrieved:

$$\textit{Research Performance}_{i,t} = \beta_0 + \beta_1\ \textit{Treatment group}_i + \beta_2\ \textit{Treatment period}_t + \beta_3\ \textit{Treatment effect}_{i,t} + \beta_4\ \textit{Personnel Structure}_{i,t} + \beta_5\ \textit{International Students}_{i,t} + \beta_6\ \textit{Teaching Workload}_{i,t} + \beta_7\ \textit{Innovation by University}_{i,t} + \beta_8\ \textit{Dependency on third-party funds}_{i,t} + \beta_9\ \textit{Technical orientation}_{i,t} + \beta_{10}\ \textit{Undergraduate Programs}_{i,t} + \beta_{11}\ \textit{Graduate Programs}_{i,t} + \beta_{12}\ \textit{Hospital}_i + \beta_{13}\ \textit{Technical university} + \beta_{14}\ \textit{Regional inequality}_i + \beta_{15}\ \textit{Regional wealth}_{i,t} + \beta_{16}\ \textit{Living quality}_{i,t} + u_{i,t}$$

With $u_{i,t}$ = unobserved time − variant heterogeneities

In order to check for robustness an OLS model (that is also used in the user-written STATA command for difference-in-differences estimations) including year dummies, and equally with cluster-robust standard errors, will be presented. In order to track and understand the results of the main model and check for further robustness the dependent variable will be exchanged for the count data that was used for building the ratios publications to professor and citations to publications. As the variables are count data and over-dispersed, a negative binomial estimator will be employed for the whole university dataset – due to the small observation numbers not for the selected universities. As a last robustness check, a made-up treatment starting in 2010 will be tested in an OLS estimation.

4.3.4 Results, robustness and interpretation

Considering all universities against the Excellence Universities, the estimation results for research quantity are shown in *Table 7: The effect of the Excellence Initiative on research quantity (all universities).* and for research quality in *Table 8: The effect of the Excellence Initiative on research quality (all universities).* Results for research quantity show that the treatment period – i.e. the Excellence Initiative – had a positive effect on all universities. Significantly more papers per professor were published after the introduction of the initiative. For the additionally funded universities this effect is even stronger on a highly significant (models (1)-(4)) and in the full model (5) high significant level. This supports the role model argumentation in terms of research quantity – triggering the system and the winners even more. The robustness checks show the stability of the results (see *Attachment 14: Robustness check: OLS estimation of the effect of the Excellence Initiative on research quantity for all universities.* and *Attachment 19: Robustness check Excellence Initiative with made-up treatment including all universities.*).

Table 8: The effect of the Excellence Initiative on research quality (all universities). Illustrates the effect of the Excellence Initiative in terms of research quality and shows a different picture compared to the research quantity dimension. The whole university system benefitted by the introduction of the initiative. Excellence Universities lost research quality following the initiative compared to Non-Excellence Universities. This loosing winners effect is remarkable and partly also in line with previous findings (Menter et al., 2018). The loosing winners effect – if this label is appropriate after being tenured – for tenured individuals of Brogaard et al. (2018) seems to be not only valid on the individual but also on the institutional level. The robustness checks (*Attachment 15: Robustness check: OLS estimation of the effect of the Excellence Initiative on research quality for all universities.; Attachment 19: Robustness check Excellence Initiative with made-up treatment including all universities.)* show that results are stable.

Table 9: The effect of the Excellence Initiative on research quantity (selected universities). and *Table 10: The effect of the Excellence Initiative on research quality (selected universities).* show the results for the 19 universities that fulfill the prerequisites for becoming Excellence Universities and that partly won the competition.

Interestingly, the effect for research quantity is existent in the pure model but not robust against the control variables. Different than the variable treatment group: the significance indicates that – comparing Excellence with quasi-Excellence Universities – path dependencies seem to play a more crucial role than expected (which is only true if the panel structure is considered in the choice of estimator). The loosing winners effect is persistent also for the subsample that comprises selected universities, which is robust also in the OLS model (see *Attachment 16: Robustness check: OLS estimation of the effect of the Excellence Initiative on research quantity for selected universities.* and *Attachment 17: Robustness check: OLS estimation of the effect of the Excellence Initiative on research quality for selected universities.*).

Table 7: The effect of the Excellence Initiative on research quantity (all universities).
The table reports the results of the fixed-effects panel model with cluster-robust standard errors at university level in parentheses (***, **, * indicate significance at the less than 1%, 5%, and 10% levels). The sample consists of 73 German public universities observed from 2004-2011 (model (4) and (5) 2005-2011 due to lacking data availability for study programs). The dependent variable is research quantity measured by publications per professor. The treatment group are the German Excellence Universities, the treatment period ranging from 2007-2011, the treatment effect is the interaction of treatment group and treatment period.

	VARIABLES	(1)	(2)	(3)	(4)	(5)
		Research Quantity				
Difference-in-Differences	Treatment Group	-	-	-	-	-
	Treatment Period	0.590***	0.314***	0.168***	0.084	0.148**
		(0.048)	(0.063)	(0.056)	(0.058)	(0.064)
	Treatment Effect	0.551***	0.512***	0.437***	0.412***	0.432**
		(0.190)	(0.171)	(0.146)	(0.153)	(0.174)
Institutional Variables	Personnel Structure		3.517***	2.611***	1.996**	2.776***
			(0.945)	(0.874)	(0.848)	(0.810)
	International Students		-0.000	-0.000	-0.000	-0.000
			(0.000)	(0.000)	(0.000)	(0.000)
	Teaching Workload		0.018***	0.018***	0.018***	0.017***
			(0.005)	(0.005)	(0.005)	(0.004)
	Innovation by university		0.001***	0.001***	0.001***	0.001***
			(0.000)	(0.000)	(0.000)	(0.000)
	Dependency on Third-Party Funds		2.202***	1.968***	2.024***	2.078***
			(0.640)	(0.699)	(0.690)	(0.645)
	Technical orientation		1.567***	1.127**	0.919**	1.160**
			(0.496)	(0.450)	(0.437)	(0.439)
	Undergraduate Programs			-0.001	-0.002	
				(0.001)	(0.001)	
	Graduate Programs			0.004***	0.004***	
				(0.001)	(0.001)	
	Hospital		-	-	-	-
	Technical University		-	-	-	-
Environmental Variables	Regional inequality				-	-
	Regional Wealth				0.000***	0.000***
					(0.000)	(0.000)
	Living Quality				0.000	0.000
					(0.000)	(0.000)
	Constant	2.640***	-0.153	0.340	-0.442	-1.465***
		(0.030)	(0.528)	(0.475)	(0.513)	(0.546)
	Observations	584	584	511	503	569
	R-squared	0.463	0.578	0.556	0.581	0.613
	Number of Universities	73	73	73	73	73

Fixed-effects panel estimation with cluster-robust standard errors at university level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 8: The effect of the Excellence Initiative on research quality (all universities).
The table reports the results of the fixed-effects panel model with cluster-robust standard errors at university level in parentheses (***, **, * indicate significance at the less than 1%, 5%, and 10% levels). The sample consists of 73 German public universities observed from 2004-2011 (model (18) and (19) 2005-2011 due to lacking data availability for study programs). The dependent variable is research quality measured by citations per publication. The treatment group are the German Excellence Universities, the treatment period ranging from 2007-2011, the treatment effect is the interaction of treatment group and treatment period.

		(6)	(7)	(8)	(9)	(10)
	VARIABLES	Research Quality				
Difference-in-Differences	Treatment Group	-	-	-	-	-
	Treatment Period	4.206***	2.447***	1.546***	1.079**	1.552***
		(0.379)	(0.473)	(0.514)	(0.500)	(0.464)
	Treatment Effect	-2.693***	-2.802***	-2.402***	-2.494***	-2.680***
		(0.801)	(0.758)	(0.763)	(0.803)	(0.786)
Institutional Variables	Personnel Structure		39.907***	29.177***	28.478***	33.912***
			(8.625)	(9.065)	(9.102)	(8.706)
	International Students		0.001	0.001	0.001	0.001
			(0.001)	(0.001)	(0.001)	(0.001)
	Teaching Workload		0.073	0.101	0.104	0.075
			(0.044)	(0.062)	(0.065)	(0.046)
	Innovation by university		0.001	0.003	0.002	0.001
			(0.003)	(0.002)	(0.002)	(0.003)
	Dependency on Third-Party Funds		5.841	3.263	4.051	5.526
			(6.140)	(6.479)	(5.659)	(5.210)
	Technical orientation		3.663	-1.491	-2.571	1.539
			(4.461)	(5.369)	(5.758)	(4.869)
	Undergraduate Programs			0.004	0.001	
				(0.016)	(0.015)	
	Graduate Programs			0.032***	0.029**	
				(0.011)	(0.012)	
	Hospital		-	-	-	-
	Technical University		-	-	-	-
Environmental Variables	Regional inequality				-	-
	Regional Wealth				0.000*	0.000***
					(0.000)	(0.000)
	Living Quality				0.002	0.001
					(0.001)	(0.001)
	Constant	20.205***	-2.352	2.264	-2.561	-10.044**
		(0.214)	(3.725)	(4.294)	(4.809)	(3.930)
	Observations	584	584	511	503	569
	R-squared	0.329	0.419	0.357	0.371	0.442
	Number of Universities	73	73	73	73	73

Fixed-effects panel estimation with cluster-robust standard errors at university level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 9: The effect of the Excellence Initiative on research quantity (selected universities).

The table reports the results of the random-effects panel model with cluster-robust standard errors at university level in parentheses (***, **, * indicate significance at the less than 1%, 5%, and 10% levels). The sample consists of 19 German public universities observed from 2004-2011 (model (13) and (14) 2005-2011 due to lacking data availability for study programs). The dependent variable is research quantity measured by publications per professor. The treatment group are the German Excellence Universities, the treatment period ranging from 2007-2011, the treatment effect is the interaction of treatment group and treatment period.

		(11)	(12)	(13)	(14)	(15)
	VARIABLES	Research Quantity				
Difference-in-Differences	Treatment Group	1.550***	1.625***	1.551**	1.227*	1.319**
		(0.571)	(0.609)	(0.699)	(0.701)	(0.663)
	Treatment Period	0.686***	0.292*	0.141	0.056	0.099
		(0.114)	(0.162)	(0.133)	(0.136)	(0.147)
	Treatment Effect	0.454**	0.330*	0.267	0.225	0.217
		(0.221)	(0.196)	(0.181)	(0.187)	(0.198)
Institutional Variables	Personnel Structure		5.837**	7.260***	6.765***	6.376***
			(2.695)	(2.679)	(2.396)	(1.938)
	International Students		-0.000*	-0.000	-0.000	-0.000
			(0.000)	(0.000)	(0.000)	(0.000)
	Teaching Workload		0.051***	0.046***	0.044***	0.047***
			(0.011)	(0.010)	(0.010)	(0.010)
	Innovation by university		0.002	0.002	0.002	0.002
			(0.002)	(0.002)	(0.002)	(0.002)
	Dependency on Third-Party Funds		5.509**	5.017**	4.865**	4.752**
			(2.337)	(2.285)	(2.184)	(2.229)
	Technical orientation		0.832	0.734	0.541	0.113
			(1.131)	(1.081)	(1.146)	(1.247)
	Undergraduate Programs			-0.003	-0.003	
				(0.002)	(0.002)	
	Graduate Programs			0.001	-0.000	
				(0.003)	(0.003)	
	Hospital		1.625**	1.455**	1.626**	1.583**
			(0.692)	(0.708)	(0.660)	(0.638)
	Technical University		0.478	0.451	0.723	0.871
			(0.844)	(0.878)	(1.185)	(1.095)
Environmental Variables	Regional inequality				-0.835	-0.672
					(1.040)	(1.026)
	Regional Wealth				0.000***	0.000***
					(0.000)	(0.000)
	Living Quality				-0.000	-0.000
					(0.000)	(0.000)
	Constant	3.215***	-3.404***	-3.398***	-4.625***	-5.073***
		(0.186)	(1.162)	(1.186)	(1.173)	(1.002)
	Observations	152	152	133	129	147
	Number of Universities	19	19	19	19	19

Random-effects panel estimation with cluster-robust standard errors at university level in parentheses.

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

Table 10: The effect of the Excellence Initiative on research quality (selected universities).

The table reports the results of the random-effects panel model with cluster-robust standard errors at university level in parentheses (***, **, * indicate significance at the less than 1%, 5%, and 10% levels). The sample consists of 19 German public universities observed from 2004-2011 (model (18) and (19) 2005-2011 due to lacking data availability for study programs). The dependent variable is research quality measured by citations per publication. The treatment group are the German Excellence Universities, the treatment period ranging from 2007-2011, the treatment effect is the interaction of treatment group and treatment period.

		(16)	(17)	(18)	(19)	(20)
	VARIABLES	Research Quality				
Difference-in-Differences	Treatment Group	4.124**	6.188***	6.891***	6.426***	5.602**
		(1.888)	(1.967)	(1.740)	(1.944)	(2.360)
	Treatment Period	4.641***	2.649***	2.500***	2.649***	2.751***
		(0.593)	(0.532)	(0.574)	(0.671)	(0.594)
	Treatment Effect	-3.128***	-3.350***	-2.829***	-2.744***	-3.112***
		(0.938)	(0.846)	(0.826)	(0.878)	(0.879)
Institutional Variables	Personnel Structure		41.721***	21.625*	16.579	37.715***
			(10.406)	(12.235)	(11.179)	(9.815)
	International Students		-0.001*	-0.001***	-0.001***	-0.001*
			(0.000)	(0.000)	(0.001)	(0.000)
	Teaching Workload		0.132***	0.157***	0.156***	0.137***
			(0.045)	(0.042)	(0.045)	(0.046)
	Innovation by university		-0.008	-0.009	-0.009	-0.009
			(0.008)	(0.009)	(0.009)	(0.008)
	Dependency on Third-Party Funds		17.747**	10.601	10.946	17.869*
			(8.738)	(8.892)	(10.415)	(10.227)
	Technical orientation		2.697	0.524	0.186	1.044
			(3.791)	(4.187)	(4.896)	(4.545)
	Undergraduate Programs			0.020**	0.018*	
				(0.009)	(0.010)	
	Graduate Programs			0.030*	0.036**	
				(0.016)	(0.015)	
	Hospital		-1.952	-2.367	-2.326	-1.757
			(2.236)	(1.964)	(2.046)	(2.217)
	Technical University		-5.364***	-4.718**	-4.876**	-4.808**
			(1.731)	(1.896)	(1.903)	(2.161)
Environmental Variables	Regional inequality				-1.241	-0.891
					(3.868)	(3.377)
	Regional Wealth				-0.000	0.000
					(0.000)	(0.000)
	Living Quality				0.002	0.001
					(0.002)	(0.002)
	Constant	22.670***	2.458	9.064	13.482**	3.769
		(1.093)	(4.115)	(5.852)	(6.374)	(4.874)
	Observations	152	152	133	129	147
	Number of Universities	19	19	19	19	19

Random-effects panel estimation with cluster-robust standard errors at university level in parentheses.

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

The question rises whether the ratios we used triggered the effect. *Attachment 18: Robustness check Excellence Initiative with count data.* reveals that publications per se rose significantly during the time of the Excellence Initiative for all universities while no additional effect can be observed for Excellence Universities. A rat race effect as found by Backes-Gellner and Pull (2013) or Menter et al. (2018) is not present in the data – which was intended by the choice of limiting the dataset. The number of citations shows highly significant a loosing winners effect. This leads to the assumption that a loss of research quality cannot be traced back to more publications that could make the ratio smaller but rather to an actual decline in citations after becoming Excellence University. This contrasts previous research to some extent, which suggests that a university with title or a prestigious institution gets citations easier just because of the title (Bartko, 1982; Ceci & Peters, 1984; Miller, 2006). Mentioning again the results for graduate programs, one could interpret that activities rather than titles influence qualitative outcomes and respective external evaluation. The introduction of the Excellence Initiative fostered a loss of research quality mainly due to losses in external evaluation, namely citations, which was presumably connected to the announcement effect and eventual "salami-slicing" resulting in a loss of output quality or innovation.

Control variables reveal potential avenues for further research: female shares in the scientific personnel seem to play a role, however, the impact direction remains unclear. Interestingly, the number of graduate programs have a positive effect on both, research quantity and quality – except for research quantity in the selected universities model. This could indicate two things: first, the feared decoupling of research and teaching stays absent, rather this could be a sign of the beneficial relation between both. As German universities usually employ Master graduates for PhD programs (rather than Bachelor undergraduates like in Anglo-Saxon countries) those students might prepare for their scientific career by supporting publishing projects. Second, graduate programs might be a sign of prestige so the more prestigious a university the more publications and the more citations they collect – what would be in line with previous research (Miller, 2006).

Dependency on third-party funding seems to be important for the selected universities where this variable is reinforcing both research quality and quantity. A higher share of third-party funds considering all universities is only beneficial for research quantity, not quality. This might be explained by the use of the measures for the specific research purpose resulting in more research output but not necessarily more research quality or perception in the academic world. The environmental variables show that for all universities regional wealth determines research quality and quantity, while for the selected universities this is only valid for research quantity.

Concluding one may say that the initiative is beneficial for window dressing purposes as research quantity and corresponding ranking positions might rise for the distinguished universities and the whole university system (DFG & Wissenschaftsrat, 2015; Menter et al., 2018). However, this does not hold if the control group is more homogeneously chosen. The initiative boosted research quality in the university system as well as the immediate peer group of universities. Nevertheless, Excellence Universities invest less effort what could indicate (i) a crowding-out effect (Kenny, 2017; Liefner, 2003), (ii) moral hazard behavior that is demonstrated by a so-called probation period effect (Riphahn & Thalmaier, 2001; Brogaard et al., 2018), and (iii) a consequence of their rat race before the award moment (Menter et al., 2018). The results show that the incentives and installed evaluation mechanism by the Excellence Initiative supported a role model in terms of quantitative output compared to a losing winners effect in terms of qualitative output. The German university system seems to be after all not as lethargic as some would accuse it to be. In particular, those universities that show their "enthusiasm" for winning an Excellence Cluster or Graduate school seem to be rather active and flexible. Future research might tackle the topic of differentiation by further examinations e.g. employing quantile regression as peak universities could show different needs and reactions than more teaching oriented ones for instance.

One might implicate by the results that researchers of Excellence Universities are considering output maximization instead of impact maximization. Who should actually get rewards of such a competition – the one that "sells the most" or the one that "sells the most valuable" should be questioned and consequently answered. Inverting such a trend one has to consider possible policy rationales: If the target of policies is to increase ranking visibility, one should continue to incentivize the maximization of output, as this is a pervasive way to increase e.g. ranking visibility (Vogel et al., 2017). If the target is to increase research impact one should incentivize not "salami-publishing" (Geuna & Martin, 2003; Martin, 2013) but rather to

publish e.g. in high Impact Factor Journals. However, this takes time and is not displayed by the Excellence Initiative in two essential points: first, the time dimension of the funding is too small to experience a sustainable quality improvement and second, the Graduate Schools funded by the Initiative for fast track (mostly cumulative) promotions, are considered as a signal incentivizing the exact opposite, videlicet fast and many publications (Baader & Korff, 2015). This is just in line with the already mentioned striking quote of Kerr (1975, p. 769): "Whether dealing with monkeys, rats, or human beings, it is hardly controversial to state that most organisms seek information concerning what activities are rewarded, and then seek to do (or at least pretend to do) those things, often to the virtual exclusion of activities not rewarded."

Consequently, politicians should consider communicating transparently "hard criteria" and actual aims of the policy intervention according to which they are selecting respective universities. Such a strategy could support even more a beneficial unfolding of existent market powers. As the Excellence Strategy will not further subsidize Graduate Schools and have an extended funding period of seven years, this might be a first sign for concentrating on qualitative aspects rather than time-saving and quantitative measures. In the light of competitive mechanisms and New Public Management principles, one should also consider the probation period effect, which could be counteracted by payouts that are based on milestones.

This study comes at some limitations that are first the choice of variables. Publications are to some extent biased towards traditional publishing sciences like natural sciences. Citations are not an immediate measure of quality and neither does a citation always indicate being cited in a positive context. Observing a university as one entity might further introduce questionable averages as some "star scientists" of one faculty get equalized by a potentially less productive faculty. This might be counteracted by the observation of individual researchers. However, the aim is to show the influence of political strategies on the institutional settings of universities, which justifies the institutional level. Second, the source of main variables is the Scopus database that is constantly updated resulting in changing observations depending on the time of data retrieval. Data from different sources could be a solution and would be interesting to examine – also in terms of differences in databases, as the present results are slightly different from Menter et al. (2018) for research quality. Third, further research might use a bigger timeframe including the third round of the initiative. This could consciously take into account the before (rat race) and after (loosing winners) treatment effects as well as impacts of the belonging to respective peer groups. In particular, the reaction of universities on the possibility, that titles could be lost again, would be an interesting exercise. In this context, migration effects of individual researchers seem to be an equally interesting project. However, data for this timeframe was not accessible yet. Fourth, an even more precise evaluation could be undertaken if one knew the exact reference group. Fifth, the estimation results might further suffer from the omitted variables problem.

4.4 Corporate Governance of higher education in Germany: University boards

4.4.1 Literature on university boards in Germany

External, political steering by market mechanisms like competition in the Excellence Initiative (as shown in the previous chapter) are one part of the New Public Management principles in Germany. With the revision of the Framework Act for Higher Education in 1998, New Public Management principles, which rooted in the Thatcher and Reagan era, were operatively introduced to the German higher education system. The central government's possibilities for influence were reduced (no further competence to design the internal and external organization of a university) and federal states got more competences. Academic self-organization was strengthened what was presumably caused by underinvestment in higher education in the following of the unification of the two Germanies, a not anticipated growth of students (Kehm & Lanzendorf, 2005) as well as the rising criticism of external steering (Behm & Müller, 2010; Bogumil, Heinze, Grohs, & Gerber, 2007). Most federal state

governments introduced university boards[11] as connectors of external political and societal interests with the internal organization of the university. They were considered a control and advise mechanism for the operative president[12] and a counterbalance to the internal senate (controlling function; Borgwardt, 2013). The aims can be summarized as controlling, legitimating and advising function: controlling because autonomy was strengthened, legitimating because of an increased responsiveness of universities to societal expectations, and advising as members should bring management skills to the self-governed, assumed to be non-managerial university system (Jochheim, Bogumil, & Heinze, 2016).

To generate a general understanding for the basic functioning of university boards *Table 11* shows differing designs on state-level in Germany in 2012 (corresponding to the first installation of a board in nearly every observed university at the date of data collection). The arrangements, rights and duties in terms of control and advice are diverse, resulting in purely external to dual to not further specified boards, ranging from 5 to 22 members having no or extensive voting rights as well as being selected by the ministry versus by university intern committees (typically senate) or by a cooperative model. The only federal state without a legal university board is Bremen.

[11] Most commonly named „Hochschulrat“ (other synonymous terms: Universitätsrat, Kuratorium, Landeshochschulrat).

[12] Most commonly named president (Präsident), especially in traditional universities also rector (Rektor), both labels are used interchangeably throughout this book.

Table 11: Overview on the federal state's designs of university boards in 2012.
Based on Behm and Müller (2010) and Hüther (2009)

Federal State	(German) Name	Appointment Procedure	Veto /nominating power	Compo-sition	Size	Voting	Control	Advise and Approval	Period of office	Controlled by
Baden-Wuerttemberg	Aufsichtsrat	Minister of Education	yes	dual (extern > 50%)	7, 9, or 11	election and recall of executives	executives, university constitution, profiling, study programs	structural, developmental and budget plans, resource allocation, university contracts, construction and removal of university institutions, definition of professorates	university con-stitution	States Minister of Education, liability
Bavaria	Hochschulrat	Minister of Education	yes	dual	16	Election and recall of president	report of university administration, budget plan, agreement on objectives	approval of chancellor's election	4 years	not specified
Berlin	Kuratorium	Senate (intern)	yes	dual (extern > 50%)	22	none	structural, and developmental plans	budget plan, construction and removal of university institutions, staff decisions of fundamental importance, statement to election of university executives, definition of professorates	Externals 2 years	Legal supervision by federal state, academic supervision by senate administration
Brandenburg	Landeshoch-schulrat	Minister-President	no	not specified	6-12	none	structural, and developmental plans	proposal of presidential election	4 years	not specified
Bremen	no Board	.	.	.		.	.	.	.	.
Hamburg	Hochschulrat	Senate (intern) and Hamburg Senate	yes	dual (min. 1 extern)	5-9	election and recall of president	profiling	structural, developmental, and budget plans, university constitution, resource allocation	4 years	not specified
Hesse	Hochschulrat	Minister of Education	yes	extern	≤ 10	election and recall of presidium	report, budget plan, study programs, organization of university	approval of chancellor's election	4 years	Minister of Education

Federal State	(German) Name	Appointment Procedure	Veto /nominating power	Compo-sition	Size	Voting	Control	Advise and Approval	Period of office	Controlled by
Lower Saxony	Hochschulrat or Stiftungsrat	Minister of Education and Senate (intern)	yes	dual (min. 1 intern)	7	election and recall of president (involved)	structural, and developmental plans, agreement on objectives, control of presidium, budget plan, legal supervision	Appointment of professors, foundation assets, foundation constitution	5 years	Minister of Education (for extern members)
Mecklenburg-Hither Pomerania	Hochschulrat	Konzil (intern)	no	extern	university constitution	none	-	budget plan, study programs	university con-stitution	not specified
North Rhine-Westphalia	Hochschulrat	Minister of Education	yes	dual (extern > 50%)	6, 8, or 10	election and recall of presidium	report of university administration, research and teaching issues	structural, developmental and budget plans, agreement on objectives	5 years	liability
Rhineland-Palatinate	Hochschulrat	Minister of Education and Senate (intern)	yes	dual (parity)	10	none	university strategy, study programs	structural and developmental plans, construction and removal of university institutions, university constitution, study programs, proposal of presidential election	5 years	not specified
Saarland	Universitäts-rat	Minister-President	yes	extern	7	election and recall of president (involved)	report of university administration, university constitution, definition of professorates	structural, developmental and budget plans, resource allocation, study programs, construction and removal of university institutions	4 years	not specified
Saxony	Hochschulrat	Minister of Education and Senate (intern)	yes	dual (extern > 50%)	5, 7, 9 or 11	recall of rector	discharge of rectorate, structural and developmental plans, budget plan	proposal of rector election, approval of chancellor's election	5 years	Minister of Education

Federal State	(German) Name	Appointment Procedure	Veto /nominating power	Compo-sition	Size	Voting	Control	Advise and Approval	Period of office	Controlled by
Saxony-Anhalt	Kuratorium	Senate (intern)	no	extern	5	none	report of university administration, budget plan	-	5 years	not specified
Schleswig-Holstein	Universitäts-rat (state-wide)	Minister of Education	yes	extern	9	none	report, study programs, agreement on objectives	structural, and developmental plans, resource allocation, university constitution, quality assurance, decision right by consultation of chancellor	3 years	not specified
Thuringia	Hochschulrat	Minister of Education	yes	dual (extern > 66%)	6, 8 or 10	election and recall of president and chancellor	decisions of presidium, agreement on objectives	structural and developmental plans, resource allocation, university constitution	4 years	not specified

University boards in Germany were due to their relative novelty[13] in this area-covering manner evaluated descriptively or theoretically (Borgwardt, 2013; Gerber, Bogumil, Heinze, & Grohs, 2009; Hener, 2001; Kretek & Dragsic, 2012; S. Lange, 2010; Schütz, 2014; Schütz & Röbken, 2012), were internationally compared according to their formal and informal role (Kretek et al., 2013), criticized (Bultmann, 2006; Fittschen, 1998; Nienhüser, 2012), legally (Müller-Terpitz, 2011; Pilniok, 2012) and socio-psychologically assessed (Witte, 2002), as well as discussed practice-oriented in terms of success factors (Behm & Müller, 2010) and instructive guidance (Meyer-Guckel, Winde, & Ziegele, 2010).

Empirically, up until now little research has focused on German university boards. The first attempts are based on a questionnaire in Heinze, Bogumil, Grohs, and Gerber (2007). They find that a dual board system usually leads to more powerful boards, and that the representation of business is mainly dependent on the university form. They resume that university management was strengthened by the introduction of university boards against the multi-level self-governing system. Following up in 2016, the primary activity of university boards is advising rather than supervising (Jochheim et al., 2016). Literature was focusing primarily on university board composition and causes of the composition that are to be found in university characteristics (such as finance structure, subject orientation, etc.) and respective resource dependence (Nienhüser, 2011; Nienhüser & Jacob, 2008a, 2008b). Röbken and Schütz (2013) evaluate the composition and differing personality traits like having a doctoral degree (mostly in full universities), or the subject background. They are contradicting previous studies disproving a disproportional representation of board members with a business background. This contradiction might be rooted in the negligence of structural differences in the legal framework and university characteristics.

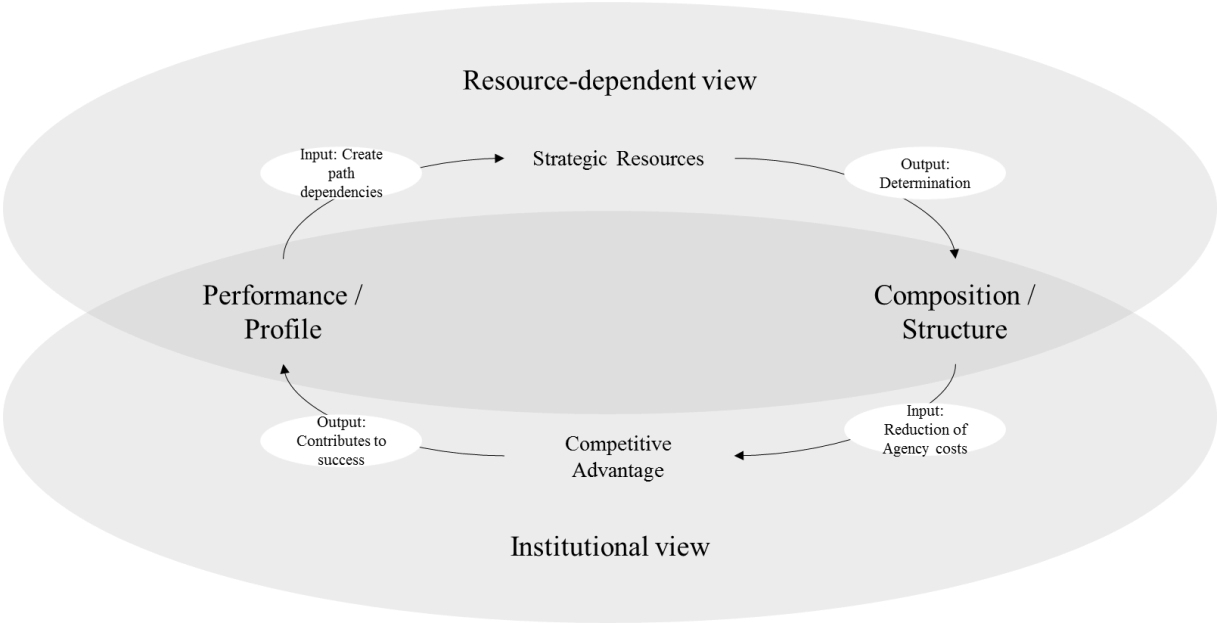
The more market-oriented model of Anglo-American boards had been evaluated comparably analogous to the corporate boards' literature (see *3.2.2 The role of boards in higher education institutions* and *3.2.3 Measurement*). Causes and consequences in a more hierarchy-oriented system like the Germany considering the nature of higher education as well as the endogeneity problem have not been systematically evaluated, yet. The evaluation is interesting as we observe the adoption of a mechanism that evolved out of a different approach (stable, public institutions founded and financed by but independent from rulers/state) than the American one (autonomous organization, supported by other institutions like state, church or alumni; S. Lange, 2010). The tension of reliance and autonomy in

[13] The first German board was founded already in 1912 in Frankfurt as Kuratorium with slightly differing tasks.

Germany was latest shifted in favor of autonomy after WW II. Ordered by the British occupation zone, the Blue Report was indicating the need for a decentral societal supervisory body. The introduction was made possible more than 50 years later with the incremental reduction of state power over universities. A uniform introduction in 15 of 16 federal states at more or less the same point in time exhibits an interesting natural-experiment. Recent discontent on the role of university boards intensify the interest in functionalities and dysfunctionalities of university boards: after a leak in North Rhine-Westphalia, a fast increase of university president's salaries was discussed as boards had the power to negotiate them (NachDenkSeiten, 2014). The power of electing or recalling presidents can be interest based as e.g. in the case of Beate Schücking at the University of Leipzig. She could not candidate again, which was suspected to be driven by personal or political motives (Stange, 2015). Another example is the threatened resignation of 60-88% of business representatives in case of a power loss in Baden-Württemberg (Allgöwer, 2012a, 2012b).

As has been shown for corporate boards also university boards exhibit a problem of endogeneity. Examining causality relations of boards to performance and vice versa are deceptive (Hermalin & Weisbach, 2003; Pfeffer, 1972). While a panel approach could at least handle some problems of endogeneity, none of the existing studies is relying on a panel dataset (due to no availability by the recent introduction; e.g. Nienhüser & Jacob, 2008a). If they do, they exhibit problems of interview biases (Jochheim et al., 2016). The response by organizations to their specific environmental and agency problems causes the future composition (Hillman, Cannella, & Paetzold, 2000) of the board and this composition might influence future performance, profiles, strategies etc. of the organization (Baysinger & Butler, 1985; Yermack, 1996). The relation and both perspectives are depicted simplified in *Figure 11*. also showing the respective theoretical framework.

Figure 11: Endogeneity in performance-composition relation – an evolutionary perspective.



Resource-dependent view

The resource-dependency approach assumes that the context (environmental, social, performing) of an organization can be seen as a strategic resource and determines decisions, possibilities and relations of organizations like e.g. the composition of boards (Pfeffer, 1972; Pfeffer & Salancik, 2003). Thus, the stronger one organization is dependent on a resource in financial, reputational or knowledge terms, the higher will be the representation of adequate board members. Employing OLS regression Nienhüser (2011) evaluates that a relation between the dependence on third-party funds (which are in other contexts a measure for university performance (Hornbostel, 2001)) causes a higher share of board members coming from businesses.

Institutional view

The second approach that discusses boards is the institutional or resource-based (in contrast to dependent) approach assuming that the composition and activities of a board are lowering agency costs and thus, are a kind of competitive advantage compared to other organizations what influences the performance of the organization. It is connected to basic assumptions of agency theory: monitoring is represented by the board and should align the agent's interest with the interest of share- or stakeholders (depending on the chosen perspective). For the German higher education context might be mentioned the standardized questionnaire of Jochheim et al. (2016). It is evaluating the consequences of the introduced boards finding that the effects seem to be overall rather low.

The question on how university boards in Germany work in the interplay of their composition and framework and if this is corresponding to university performance has not been answered satisfactorily yet. The following chapter wants to answer the question whether and how German university boards differ according to specific frameworks and competences.

4.4.2 Difference hypotheses

As a testing of causality hypotheses would be misleading, groups and characteristics in the context of higher education will be defined and tested for differences rather than causalities. Differences in board composition (share of business/science/society representatives, background of chairmen or chairwomen) are expected to be found on two group levels and their interplay: macro in terms of political (intensity of external steering), and micro in terms of intern selection of management personnel (internal vs. external presidents). The political level refers to external selection modes of board members that might influence the theoretically expected actions and benefits of the differing representatives. The internal or external selection of the president (operative management) is an expression of dependence on specific human capital and corresponding strategic positioning in terms of board composition.

<u>Macro: Political level</u>

The selection mode of the board can be purely (1) intern (e.g. Berlin), (2) shared by Ministry and internal committees (e.g. Saxony) or (3) purely extern (e.g. Bavaria, for the overview on all federal states see *Attachment 22: Classification of selection mode.*). The benefit for members is usually not the salary as in most cases they get a compensation of their expenses or are considered an honorary position. Thus, their motives seem to be mainly found in the contribution of their expertise and the prestige of the position. The latter argument to join

should hold especially for business (Nienhüser, 2011) as well as scientific members. Societal members could additionally have a benefit of overseeing the impact and implementation of their work and ideas. In addition, the highly discussed representation of business members in combination with the university board competences could result in influencing study programs, more practice-oriented teaching and research or controlling and adding third-party funding.

Table 12: Simplified overview on expected differences in composition and selection mode.

(Own illustration)

Number	Selection Mode	Interest	Chairman	Board members
1	Intern	Strategic advisory, Prestige, power retention	Science	Business
2	Shared intern/extern	Strategic advisory and monitoring	Business	Science/Society
3	Extern	Monitoring and Controlling	Society	Business

Differing interests are implied for the selectors in each model that are depicted in the simplified overview in *Table 12: Simplified overview on expected differences in composition and selection mode.*:

(1) Intern Selection Mode with prestige as major interest: If the board is purely internally chosen, the members of the internal committee should show an interest in having a not too powerful and at the same time prestigious board. Not too powerful because it should not hinder them in their activities or decrease the existent power. Prestigious because this could increase their reputation and make the board a window-dressing rather than active actor. Thus, one might expect that the chairman has a scientific background as this indicates knowledge about "how science and universities work" and he has the supervision function. The board composition could benefit from a stronger business background, as they should have an interest in the prestigious position and strategy supporting rather than controlling the society's guidelines.

(2) Shared Selection Mode with strategy building as major interest: In the second group, the Ministry and an internal committee select jointly the board members. Combining the monitoring need of the Ministry and the resource need of the internal committee a strategic orientation could be expected. The joint mechanism makes a consensus necessary, which should reflect itself in some sort of diversity. It can be expected that the chairman is from business as they bring the resource "management" and "strategic orientation" and could balance the interests of science and society. By implication, the board members should consist of a mix of scientific and societal members.

(3) Extern Selection Mode with monitoring as major interest: The third group is a purely externally chosen board, reflecting the interests of the Ministry. As they lost influence over universities, they have a special interest in an effective monitoring. Thus, they are expected to aim for a representation of their interests installing a member that represents society as chairman (e.g. a member of the ministry, political party, etc.) supervising the implementation of societal guidelines. At the same time, they could show an interest in management skills supporting strategy building and implementation that are likely to be found in representatives of business.

Usually, a veto right or nominating power in selection mode (1) or (3) is installed (except for Brandenburg, Mecklenburg-Hither Pomerania and Saxony-Anhalt). This right could be interpreted as a consensus invitation because an official scandal is not in the interest of any of the involved parties (except for political reasons that are usually more concerned with the executive leader of the organization).

Micro: Selection of management personnel

The differentiation of external versus internal selection of management personnel is important for business as well as for the university context. Especially with view on the CEO, the probability of recruiting, and corresponding performance in stock companies of extern and intern CEOs has already been evaluated (Huson, Malatesta, & Parrino, 2004; Parrino, 1997; Weisbach, 1988; Zimmermann, 2009, 2010). The argument for internal selection is based on human capital and new institutionalist theory as an internal candidate qualifies himself and lowers uncertainty by his specific human capital including knowledge about internal processes, organizational culture, specificities and so forth. This is beneficial for an organization as transitions are smooth and the risk of adverse selection is reduced. The costs

of employing an internal candidate are organizational blindness (and corresponding suspicion of nepotism) and lower management skills in terms of strategy or innovation (Zimmermann, 2009). The argument for external selection is overall found in low previous performance of an organization and the corresponding desirable change that should be implemented easier by an outsider as well as in "power games" (Zimmermann, 2010). The management of external appearance gains importance and might be better fulfilled by an extern candidate that brings his network and managerial expertise (K. J. Murphy & Zabojnik, 2007). In the case of universities, one could expect that costs for an external selection are lower compared to most business contexts as German universities are comparably homogeneous (Parrino, 1997).

An internal and external process of coordination (with internal committees and political actors) mainly triggers university governance. Selecting an intern or extern candidate for being the operative manager of a university influences the composition of the board and vice versa:

Internally chosen university presidents should reveal specific human capital and be well organized within their own university. The performance of the university should not be in question so an internal solution is favored. The expectation is that he or she contributes university-specific know-how. From a political perspective, it is beneficial to have business representatives that show managerial experience to support the president. The president could also favor business representatives as they bring prestige in form of entrepreneurialism and see their function as advisor rather than controller. A chairman from society or business would fulfill the managerial and controlling needs of policy. Scientists could better fulfill the need for someone who understands decisions that are made in universities compared to a complete outsider.

If the president was chosen externally, the expectation to him would be unspecific human capital in terms of management skills. Thus, not managerial competences, which are coming from business, but rather science or societal networking and their expertise, should be the function of the board. Therefore, members as well as the chairman should rather come from a scientific or societal background also supporting as peer group an external president (that presumably should not have as much internal backing as an internal solution).

The single levels as well as their interplay of the two presented perspectives will be evaluated descriptively.

4.4.3 Methodology and extension of the dataset: Specification of board variables

This chapter will give an overview on the German university performances and the composition of boards with the interplay of the political framework with management decisions. The first step will be a descriptive analysis highlighting university performance structures, board backgrounds, and characteristics of the chairmen and chairwomen. The 73 universities of the general dataset are reduced to 71 as the universities of Bremen and Greifswald did not have a university board at the time of data collection. Data on chairmen, members, functions and characteristics was retrieved from university websites (and less frequently by additional internet search) in the timeframe from November 2011 to March 2012. The groups and chairmen, which will be evaluated, are:

- Business representatives comprising all members that have a business background,
- Science representatives comprising all members that have a science background (like coming from another university, research institute or university of applied sciences),
- Society representatives comprising all members that have a background in a societal institution or fulfilling a societal function (like politicians, science administrators, federal or central institutes, or associations).

The definition of the selection mode groups is summarized in *Attachment 22: Classification of selection mode.* and corresponding descriptives can be found in *Table 13: University board descriptives according to selection mode*. The list of respective universities with intern and extern presidents (management selection) can be found in *Attachment 23: List of universities with internal and external presidents/rectors in 2012.* and corresponding descriptives are presented in *Table 14: Descriptives of universities with internal/external presidents.*

Table 13: University board descriptives according to selection mode.

	Intern selection mode					Shared selection mode					Extern Selection Mode				
VARIABLES	N	mean	SD	min	max	N	mean	SD	min	max	N	mean	SD	min	max
Number of all members	6	7.5	2.81	5	11	19	7.95	1.51	5	10	46	10.02	2.98	5	20
Number of business representatives	6	1.67	0.82	1	3	19	1.90	1.24	0	4	46	2.609	1.44	0	7
Number of extern science representatives	6	1.5	0.84	1	3	19	2.47	1.47	0	6	46	3.283	1.95	0	8
Number of society representatives	6	2.5	0.84	1	3	19	1.63	1.12	0	4	46	1.435	1.22	0	6
Share of business to extern members	6	0.29	0.16	0.17	0.60	19	0.33	0.22	0	0.8	46	0.383	0.2	0	1
Share of business to all members	6	0.25	0.18	0.10	0.60	19	0.25	0.2	0	0.8	46	0.27	0.15	0	0.7
Share of extern science to extern members	6	0.27	0.18	0.14	0.60	19	0.41	0.22	0	0.86	46	0.444	0.22	0	0.89
Share of extern science to all members	6	0.23	0.19	0.09	0.60	19	0.32	0.20	0	0.75	46	0.341	0.22	0	0.89
Share of society to extern members	6	0.43	0.13	0.20	0.60	19	0.27	0.16	0	0.57	46	0.207	0.16	0	0.55
Share of society to all members	6	0.35	0.14	0.20	0.60	19	0.20	0.13	0	0.44	46	0.149	0.12	0	0.55
Share of intern to all members	6	0.16	0.20	0	0.40	19	0.23	0.15	0	0.5	46	0.259	0.22	0	0.53
Chairman business	6	0	0	0	0	19	0.32	0.48	0	1	46	0.457	0.50	0	1
Chairman Science	6	0.83	0.41	0	1	19	0.26	0.45	0	1	46	0.348	0.48	0	1
Chairman Society	6	0.17	0.41	0	1	19	0.42	0.51	0	1	46	0.196	0.40	0	1
Share of females	6	0.38	0.25	0	0.7	19	0.31	0.17	0	0.57	46	0.292	0.11	0	0.5
Teaching Workload	6	10.17	2.07	8.14	12.94	19	12.09	2.89	6.73	18.68	46	11.551	2.70	3.45	16.61
Research Quality	6	29.83	4.54	23.36	36.37	19	23.98	7.97	9.73	32.56	46	28.786	8.47	10.56	41.68
Research Quantity	6	3.63	0.80	2.76	4.47	19	2.96	1.67	0.48	5.84	46	4.127	2.43	0.24	10.35

Table 14: Descriptives of universities with internal/external presidents.

	Internal President					External President				
VARIABLES	N	mean	SD	min	max	N	mean	SD	min	max
Number of all members	49	9.37	3.27	5	20	22	9.00	1.41	7	11
Number of business representatives	49	2.57	1.40	0	7	22	1.82	1.22	0	4
Number of extern science representatives	49	2.55	1.62	0	8	22	3.73	2.05	1	8
Number of society representatives	49	1.55	1.28	0	6	22	1.64	1.00	0	4
Share of business to extern members	49	0.40	0.20	0	1	22	0.27	0.17	0	0.60
Share of business to all members	49	0.29	0.17	0	0.80	22	0.20	0.14	0	0.44
Share of extern science to extern members	49	0.38	0.20	0	0.89	22	0.51	0.22	0.14	0.89
Share of extern science to all members	49	0.28	0.18	0	0.89	22	0.42	0.24	0.11	0.89
Share of society to extern members	49	0.24	0.17	0	0.60	22	0.25	0.16	0	0.50
Share of society to all members	49	0.18	0.14	0	0.60	22	0.19	0.12	0	0.43
Share of intern to all members	49	0.26	0.20	0	0.53	22	0.21	0.19	0	0.50
Chairman business	49	0.45	0.50	0	1	22	0.23	0.43	0	1
Chairman Science	49	0.37	0.49	0	1	22	0.36	0.49	0	1
Chairman Society	49	0.18	0.39	0	1	22	0.41	0.50	0	1
Share of females	49	0.30	0.15	0	0.70	22	0.31	0.14	0	0.57
Teaching Workload	49	11.79	2.82	3.45	18.68	22	11.10	2.47	6.23	16.33
Research Quality	49	27.86	7.86	9.73	41.68	22	26.98	9.36	10.86	38.87
Research Quantity	49	3.94	2.35	0.48	10.35	22	3.40	1.82	0.24	6.18

As a second step, I test the before outlined difference hypotheses. As the political groups partly rely on a comparably small sample size, Fisher's exact test helps to evaluate if the observed distribution of categorical variables is different from the expected one, based on the overall population (Fisher, 1922).

Table 15: Simplification of contingency table.

	Characteristic 1	Characteristic 2	Σ
Group 1	a	b	a+b
Group 2	c	d	c+d
Σ	a+c	b+d	n

Based on the groups, characteristics and overlaps as shown in *Table 15* Fisher's exact test is calculated as follows:

$$p = \frac{\binom{a+b}{a}\binom{c+d}{c}}{\binom{n}{a+c}} = \frac{(a+b)!\,(c+d)!\,(a+c)!\,(b+d)!}{a!\,b!\,c!\,d!\,n!}$$

The null hypothesis is no relation between groups and characteristics.

For completeness and robustness, I will employ a Pearson Chi² Test (Pearson, 1900). For evaluating, the contingency tables three percentiles will be calculated, according to a low, medium or high share of the respective group representation. In order to avoid a bias due to differences between the groups "selection mode" and "management selection" both outlined tests were conducted resulting in no detection of a systematic difference between the groups (see *Attachment 21: Pearson Chi² and Fisher's exact for selection mode and management decision.*).

The third step will be the evaluation of correlations between variables according to the Pearson (1896) product-moment correlation:

Corr (X, Y): $\frac{\sum_{i=1}^{n}(x_i-\bar{x})\,(y_i-\bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i-\bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i-\bar{y})^2}}$

The levels of significance (equal to a t-test) will be presented. However, as the data is comprising variance heterogeneity within the groups the probability of a Type I error rises (null hypothesis is rejected although "true"). This means that the results of correlations' significance are to be taken cautiously and will be of less interest for interpretation.

The alternative of conducting a Wilcoxon rank sum test instead of Fisher's exact or Pearson's Chi^2 is not considered as it needs one grouping variable and for the selection mode three groups are defined. A more advanced and potentially more revealing method like for example an analysis of variances (ANOVA) is rejected as the analysis relies on a comparably small sample size (with view on the respective grouping) and cannot fulfill the assumption of variance homogeneity (tested by Levene, 1960).

4.4.4 Descriptive results and interpretation

Firstly, the descriptives on the German university landscape will be given. Performance indicators like teaching workload, research quantity and quality as well as university board characteristics will be examined according to federal states differences. Secondly, the differences of groups that are expected according to selection mode of university board members (political level) and to the internal vs. external presidents (management selection level) as well as their combination will be outlined and discussed.

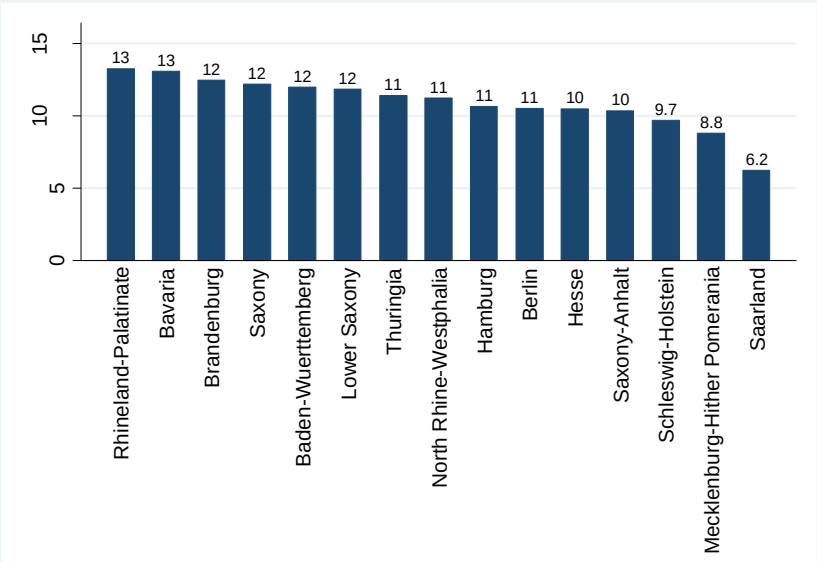
Descriptives of the German university landscape and of the average German university board

The German university landscape is strongly shaped by the Kulturhoheit of the states. A look by states on the basic research and teaching variables that define the strategic orientation later as well as on the shares of representatives in the university board help to understand descriptively systematic differences. The outputs will be standardized by a size factor (professors, publications or number of external members).

The graduate per professor rate is relatively stable across states ranging from 9 to 13 graduates per professor[14] (see *Figure 1*). Due to financing formula that are usually based for a large part on teaching activities (student numbers) this is not surprising.

[14] The exception Saarland might be due to the university hospital that the single university in Saarland has.

Figure 12: Mean graduate per professor by state.



Except for Mecklenburg-Hither Pomerania the majority of states with a tendency to social democratic ideas (like Thuringia, Brandenburg) show lower research quantity output while conservatively governed states show in tendency higher research quantity output (see *Figure 13*). This observation is similarly valid for research quality (see *Figure 14*). It is at least a hint at an incentive structure, which is unsurprisingly more competitive and output-oriented in those conservative states. Leaving aside the top and bottom states, variance is not very high in the mean neither for research quantity, nor for research quality.

The high research quantity in Baden-Wuertemberg can be traced back to the merger of the Technical University of Karlsruhe and the nuclear research center Karlsruhe GmbH. The high citation per publication rates in Baden-Wuertemberg, Saarland and Berlin can again be explained by the merger and relative importance of university hospitals in those small states (with the exception of Hamburg). It can be interpreted as evidence for the functioning of an incentive system extraordinarily dominant in the medical disciplines (Krempkow, Landrock, Neufeld, & Schulz, 2013; Krempkow & Schulz, 2012; Vahl, 2008).

Figure 13: Mean publication per professor by state.

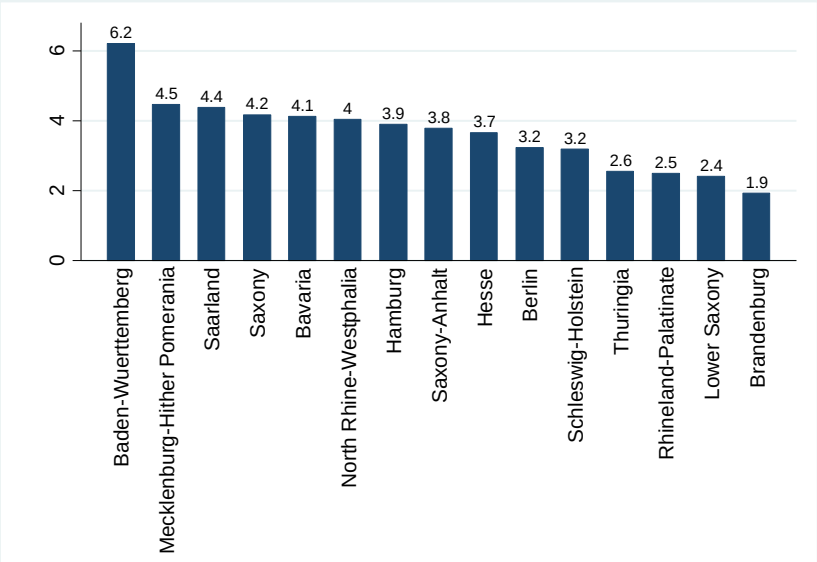
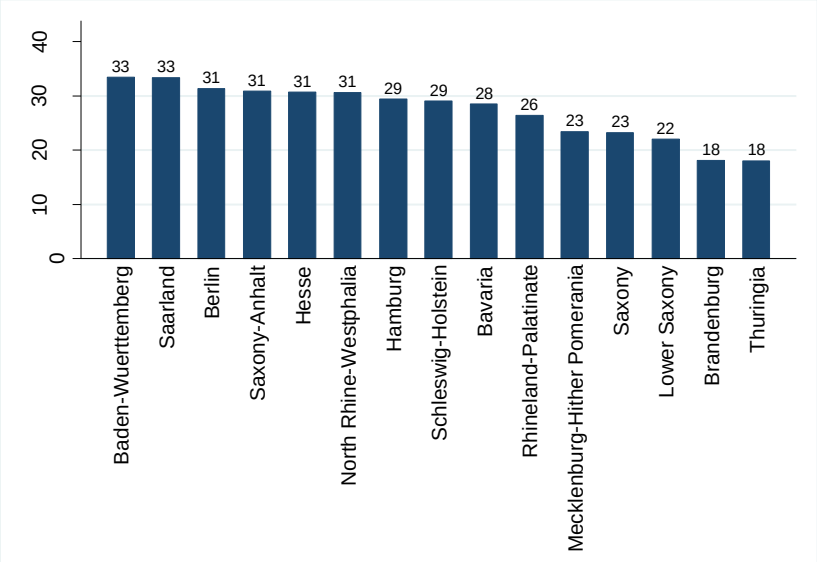


Figure 14: Mean citation per publication by state.



Some states show trends either in favor for business (e.g. Baden Wuertemberg), science (e.g. Schleswig-Holstein with its state-wide board) or society (e.g. Berlin) members. However, in most states the distribution seems to be quite balanced for those three groups (see *Figure 15*, *Figure 16*, and *Figure 17*).

Figure 15: Mean share of business representatives in university boards by state.

Shares are calculated by all external members.

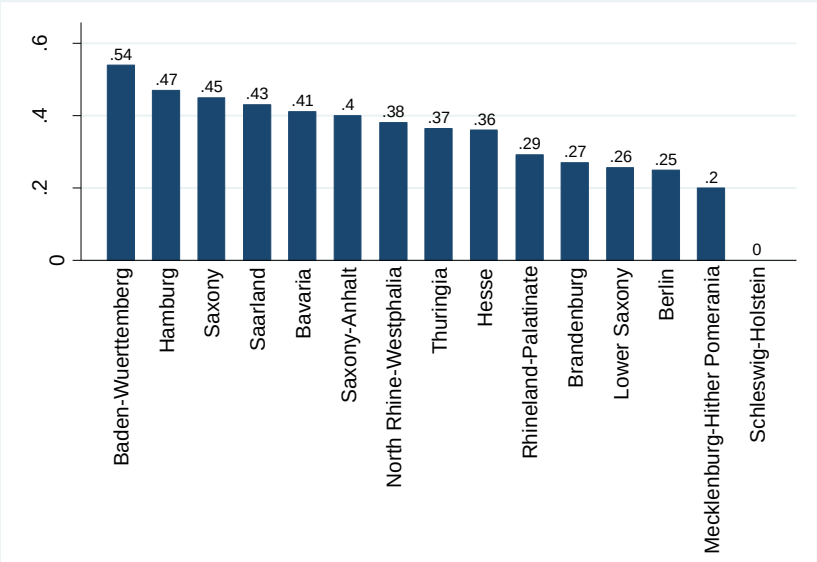


Figure 16: Mean share of science representatives in university boards by state.

Shares are calculated by all external members.

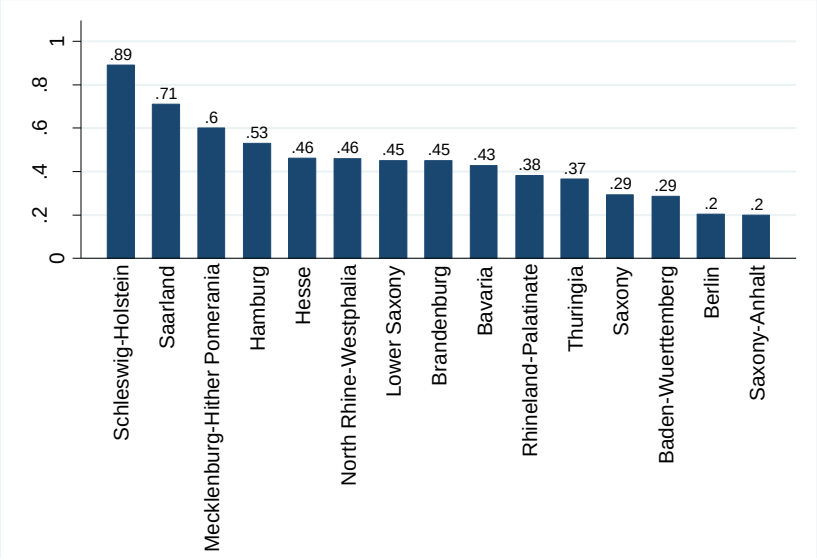


Figure 17: Mean share of society representatives in university boards by state.

Shares are calculated by all external members.

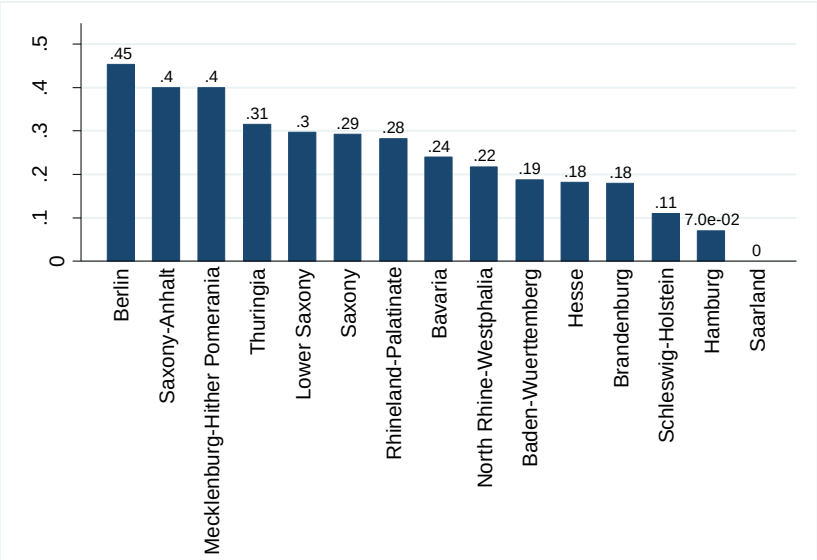


Figure 18: Average representation of external and internal university board members. shows the average German university board. It consists in the majority of external members (73%) in which the scientific group is slightly dominant followed by business representatives and internal professors. Yet, from this perspective the often declared hegemony of business representatives (25%, Nienhüser, 2011, 2012) facing scientific external members (31%) and internal professors (19%) is at a first glance not existent. One might get a different picture from the average distribution of chairmen and chairwomen that are all coming from outside the university. Given the overall distribution, only a slight, not overall share-based bias exists for chairmen coming from business according to all external members (*Figure 19).* Business representatives are 34% (science 43%, society 23%) of all external members but staff 38% of the board chairs (science 37%, society 25%). A possible explanation could be the – especially for the business background important (Allgöwer, 2012b) – prestigious function of the chairman which could be an incentive to join the university board. *Figure 20: Average distribution of external and internal scientific members' subject.* demonstrates the representation of different subjects (within the internal as well as external scientific members group). Except for a slight higher share of natural sciences, the distribution seems balanced when intuitively anticipating by the disciplines' number of graduates.

Figure 18: Average representation of external and internal university board members.

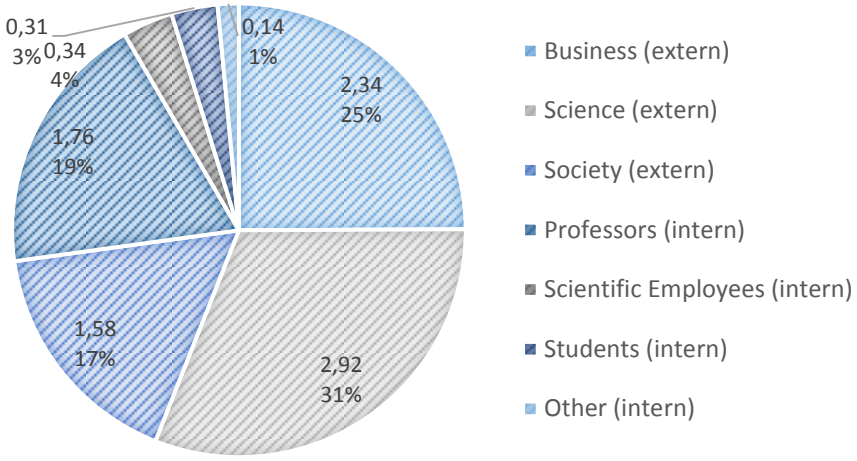


Figure 19: Average representation of the background of chairmen.

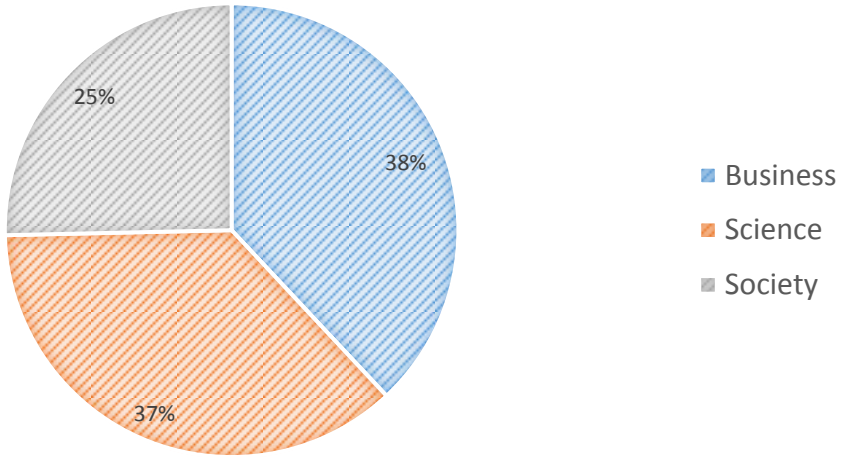
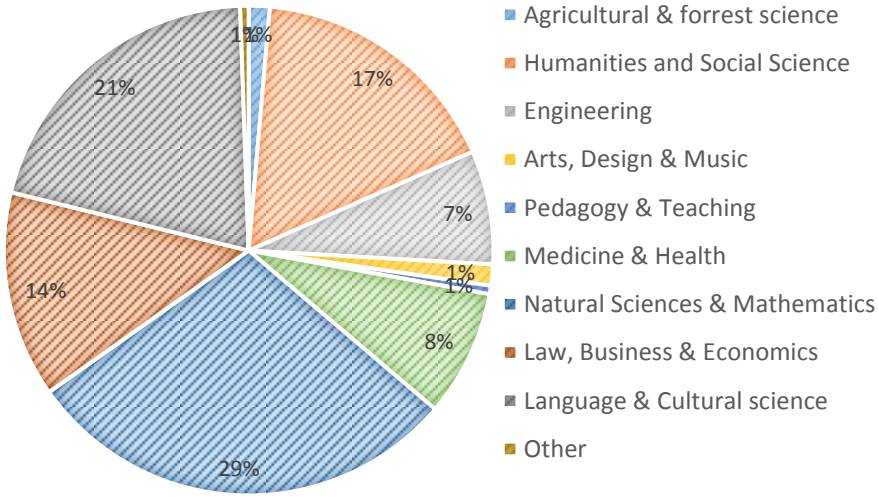


Figure 20: Average distribution of external and internal scientific members' subject.



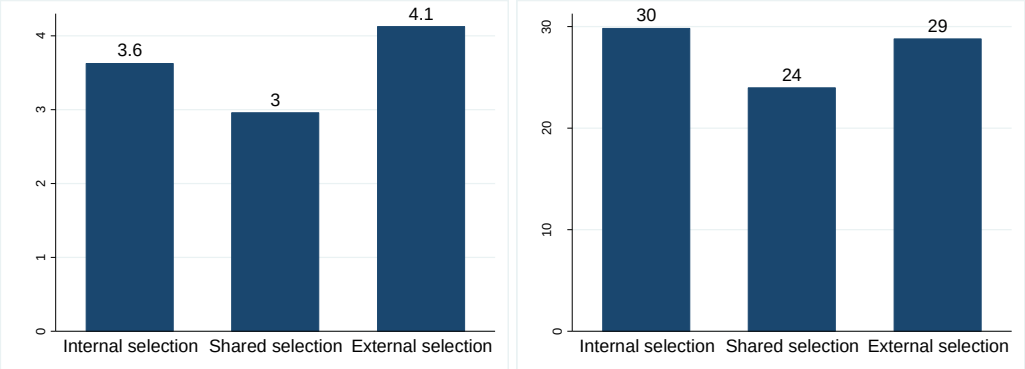
Differences of groups

Political level: Selection mode

The political design of selection modes is the first differentiation category for the composition of university boards. The descriptives for each group can be found in *Table 13* for the selection mode of university board members.

Figure 21 shows research performance measures with regards to the selection mode of university board members. The more extreme selection modes – purely internal or external – the higher the research productivity rates (3.6 and 4.1 mean publications per professor compared to 3) as well as the higher research quality rates (30 and 29 mean citations per publication compared to 24) compared to those with a shared selection mode. While external steering could hint at a production-oriented benefit, an internal steering seems to have slight advantages in terms of research quality. The higher quantitative research output for external selection modes could be explained by political interests that are pushing quantitative research output to improve ranking positions (see also *4.3 Higher education policies in Germany: The German Excellence Initiative*). Universities with an internal selection of board members have in general more freedom and use this freedom to publish with a focus on quality.

Figure 21: Research quantity and quality in universities with internal, shared or external selection mode of university boards.



Interestingly, *Figure 22* shows that we find a high share of society representatives in the group of internal selection procedures where one might have expected a science or business focus. A possible explanation for this result could be the anticipation of a ministerial veto and the preferred selection by the university of society members – rather than externally proposed ones. However, the strong science focus and taking advantage of steering competences becomes evident looking at the choice of the chairman who is in 83% of the cases having a scientific background (*Figure 23*).

In the shared selection mode, we observe a balanced picture with a dominating scientific group followed by business and society representatives. This picture is not surprising as it reveals the shares of all external members: science (here: 41%, overall extern: 43%) as the biggest outsider group, followed by business (here: 33%, overall extern: 34%) and society (here 27%, overall extern: 23%). Assessing the chairmen in the shared selection group is counterintuitive. The group with the lowest share of representatives (27%) commissions the highest share of chairmen: society (here: 42% chairmen, overall share of chairmen: 25%) followed by business (here: 32%, overall: 38%) and science (here: 26%, overall: 37%). Negotiations between the university committee and the ministry could lead to a compromise due to the parity selection mode: a high representation of science is beneficial for the university and a "counterpart" to the chairman who has a powerful position and is representing the desired monitoring function of the federal state.

Figure 22: Mean group shares of representatives according to selection mode.

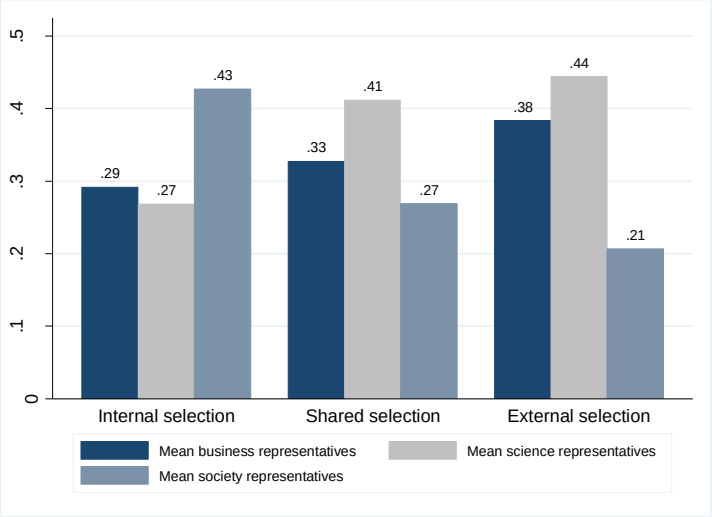
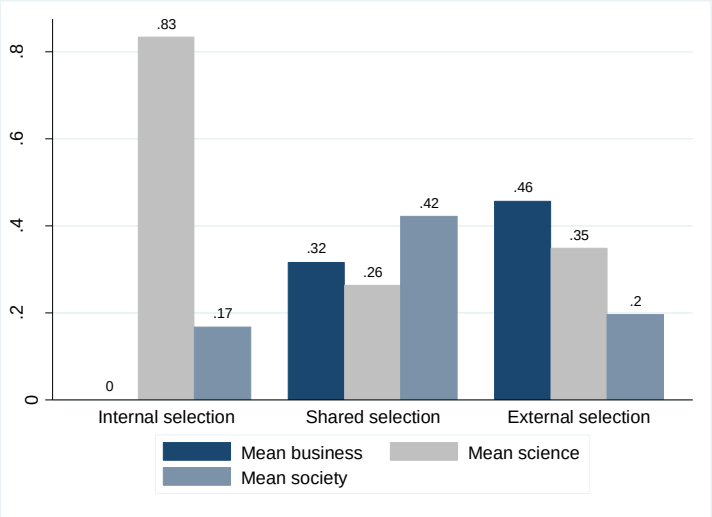


Figure 23: Mean group shares of chairman according to selection mode.



The third selection mode is the purely external selection in which the (in comparison to the other selection modes) highest share of science representatives (44%) can be detected, followed by the (for business) highest share of business representatives (38%) and the lowest of society (21%). Most likely, this selection mode has a businessperson as chairman (46%, overall: 38%), followed by science (35%, overall: 37%) and society (20%, overall 25%). It is rational for the external selectors to show some kind of good will towards the university employing science representatives to avoid a veto. This should be the preferred case to potential controllers from the societal group appointed by the external (not by internal selection). Alternatively, observed members could also reveal the result of an extensive use of the veto right. In both cases – either in order to avoid or with the execution of the veto right the governance mechanism is supposed to influence the decisions that result in the present observation. As most of the chairmen come from a business background this could be seen as diplomatic choice and underlining the original intention of university boards to include more external expertise in management to universities and give strategic advice.

Table 16: Pearson Chi² and Fisher's exact test for business representatives and selection mode.

Share of business representatives	Internal Selection	Shared Selection	External Selection	Total
0%-33%	3	10	14	27
Expected values	2.3	7.2	17.5	27
33%-66%	2	3	17	22
Expected values	1.9	5.9	14.3	22
66%-100%	1	6	15	22
Expected values	1.9	5.9	14.3	22
Total	6	19	46	71
	6	19	46	71
	Pearson chi2(2) =	4.3833	Pr = 0.357	
	Fisher's exact =	0.358		

Table 17: Pearson Chi² and Fisher's exact test for science representatives and selection mode.

Share of science representatives	Internal Selection	Shared Selection	External Selection	Total
0%-33%	5	7	16	28
Expected values	2.4	7.5	18.1	28
33%-66%	0	7	18	25
Expected values	2.1	6.7	16.2	25
66%-100%	1	5	12	18
Expected values	1.5	4.8	11.7	18
Total	6	19	46	71
	6	19	46	71
	Pearson chi2(2) =	5.7397	Pr = 0.219	
	Fisher's exact =	0.253		

Table 18: Pearson Chi² and Fisher's exact test for society representatives and selection mode.

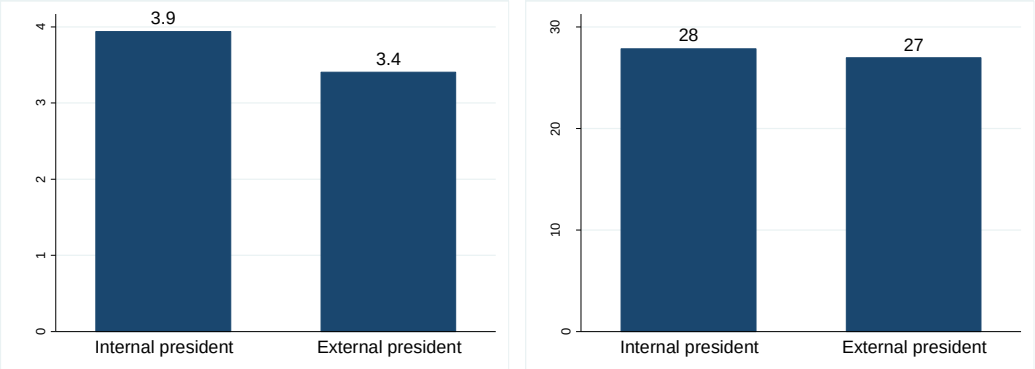
Share of society representatives	Internal Selection	Shared Selection	External Selection	Total
0%-33%	0	7	20	27
Expected values	2.3	7.2	17.5	27
33%-66%	1	7	16	24
Expected values	2	6.4	15.5	24
66%-100%	5	5	10	20
Expected values	1.7	5.4	13	20
Total	6	19	46	71
	6	19	46	71
	Pearson chi2(2) =	10.4143	Pr = 0.034	
	Fisher's exact =	0.058		

The results of the tests of differences in the variance within a group compared to the variance of the overall variance are shown in *Table 16*, *Table 17*, and *Table 18*. The observed difference in representatives is only on a significant level for society representatives. This is in particular interesting because this is the group that would be expected to be the most controversial one not in the public opinion (where those are business background members) but in negotiations between ministries and universities.

Management selection level

Figure 24 supports the assumption that – at least for the directly influenceable research quantity – external presidents are more likely to be chosen if research quantity is low (or vice versa extern presidents cause low research quantity).

Figure 24: Research quantity and quality in universities with internal or external presidents.



The examination of the group shares (see *Figure 25* and *Figure 26*) shows that if a president was already at the university before his election most members have a business background (40%) followed by science (38%) and society (24%). The same distribution is roughly given for chairmen with business as the largest group (45%), science (37%) and society (18%). This can support the assumption that on the one hand, having already a good internal reputation and being selected for president allows having prestigious business members on the board and showing proximity to an entrepreneurial spirit. On the other hand, this can be a sign that universities and science managers (also from the ministries) want to balance specific human capital of the internal president with unspecific human capital. This can support strategic decisions and questions on change management. The higher shares of business for the position of the chairman can be explained by the expected higher willingness especially of exalted personalities of the business context to participate if they are considered for an outstanding position.

The picture changes, if the president was not member of the university when he became president. His average accompanying board is equipped mostly with science members (51%) followed by nearly the same shares of business (27%) and society (25%). Two interpretations are contingent: Either, he supported or needed a board that consists also of his external network. Alternatively, this board has been already loaded with science representatives that bring enough specific knowledge leading to a president with the before described abilities to change, give direction and work on strategic orientation. A look at the chairmen could hint to one of the two directions: The majority of chairman is coming from society (41%, nearly double the mean of 25%), followed by science (36%) and business (23%). Internal members of the university elect a president. Thus, this could reveal an external political steering mechanism for the uncertainty about strategic directions and a corresponding wish for control. It can further show a strategic move by the university to have someone on board that has also a seat in an important political or administrative institution.

Figure 25: Mean group shares of representatives.

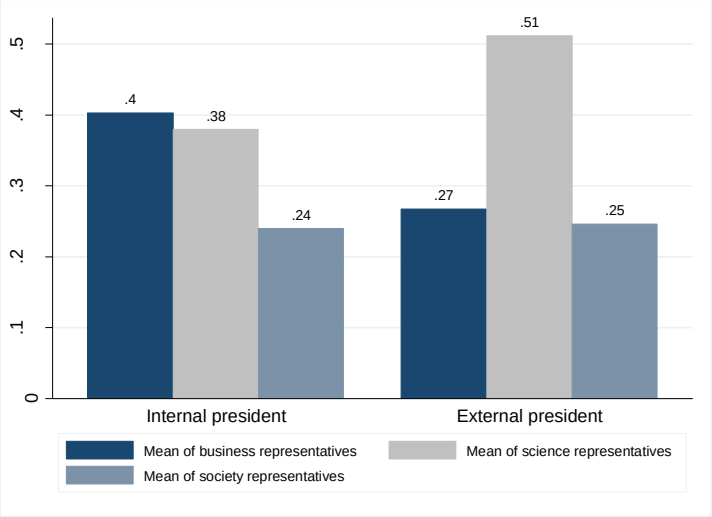


Figure 26: Mean group shares of chairmen.

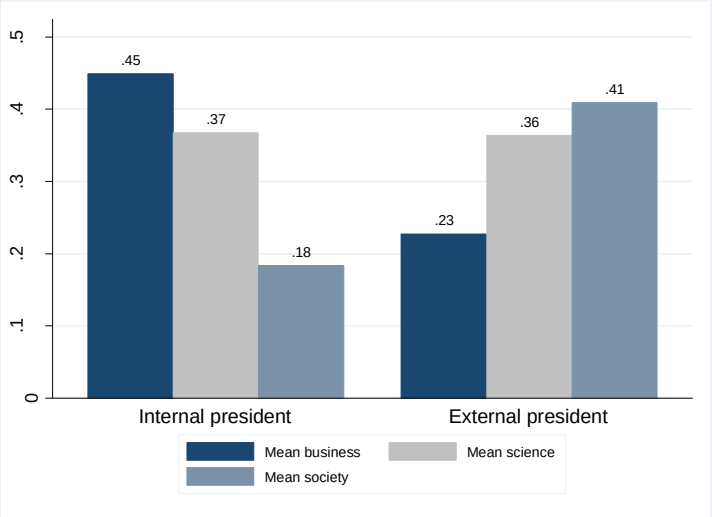


Table 19: Pearson Chi² and Fisher's exact test for business representatives and management selection.

Share of business representatives	Internal President	External President	Total
0%-33%	14	13	27
Expected values	18.6	8.4	27
33%-66%	16	6	22
Expected values	15.2	6.8	22
66%-100%	19	3	22
Expected values	15.2	6.8	22
Total	49	22	71
	49	22	71
	Pearson chi2(2) =	6.9574	Pr = 0.031
	Fisher's exact =	0.034	

Table 20: Pearson Chi² and Fisher's exact test for science representatives and management selection.

Share of society representatives	Internal President	External President	Total
0%-33%	24	4	28
Expected values	19.3	8.7	28
33%-66%	15	10	25
Expected values	17.3	7.7	25
66%-100%	10	8	18
Expected values	12.4	5.6	18
Total	49	22	71
	49	22	71
	Pearson chi2(2) =	6.1263	Pr = 0.047
	Fisher's exact =	0.048	

Table 21: Pearson Chi² and Fisher's exact test for society representatives and management selection.

Share of society representatives	Internal President	External President	Total
0%-33%	20	7	27
Expected values	18.6	8.4	27
33%-66%	16	8	24
Expected values	16.6	7.4	24
66%-100%	13	7	20
Expected values	13.8	6.2	20
Total	49	22	71
	49	22	71
	Pearson chi2(2) =	0.536	Pr = 0.765
	Fisher's exact =	0.808	

Table 19: Pearson Chi² and Fisher's exact test for business representatives and management selection.*, Table 20: Pearson Chi² and Fisher's exact test for science representatives and management selection.,* and *Table 21: Pearson Chi² and Fisher's exact test for society representatives and management selection.* show the expected differences exist on a significant level for business as well as for science representatives. This is not true for the share of society members. In comparison to the result of the political level – with a difference just for society members – this indicates that science and business play a greater role in terms of strategic engagement and internal interest balancing. Societal members have a greater relevance in terms of external interest balancing.

Combination of political and management selection level

The before outlined results reveal a difference between the political selection mode and the choice of management personnel. The societal participation seems to play a role in differing political governance settings. For the latter governance choice business and science participation is determined by (or determines) the internal steering. In order to understand the interplay of these external and internal determinants *Figure 27* and *Figure 28* combine both mechanisms and the respective spread of members and chairmen.

Figure 27: Mean shares of representatives according to selection of board members and president.

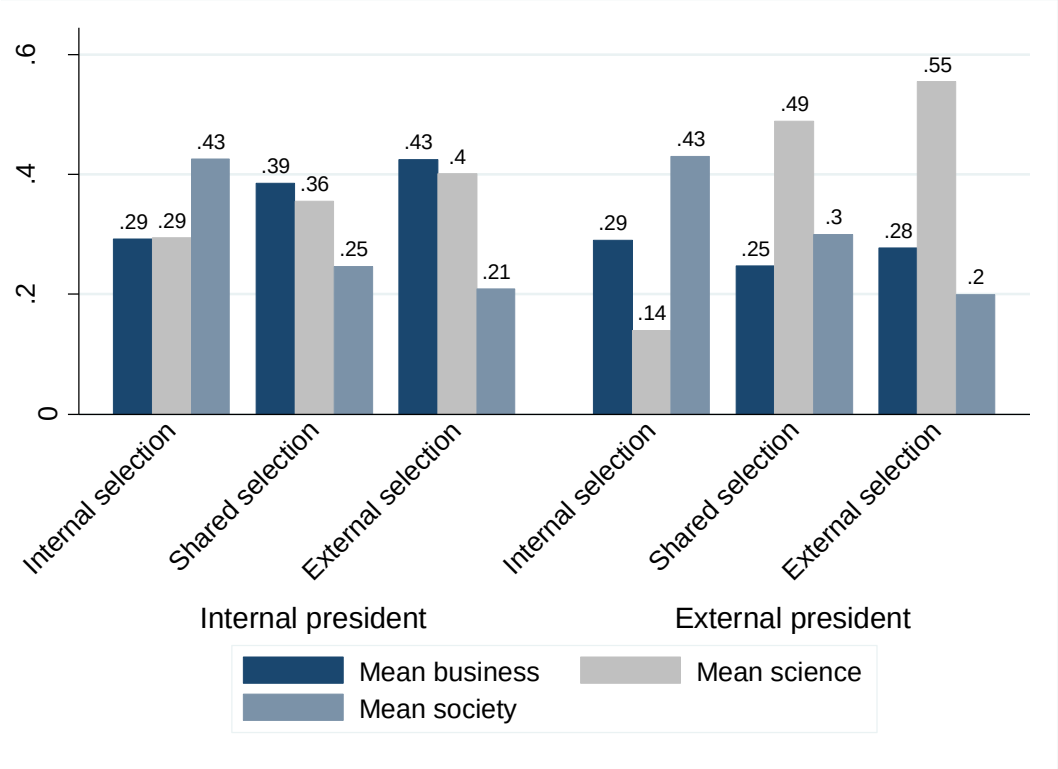
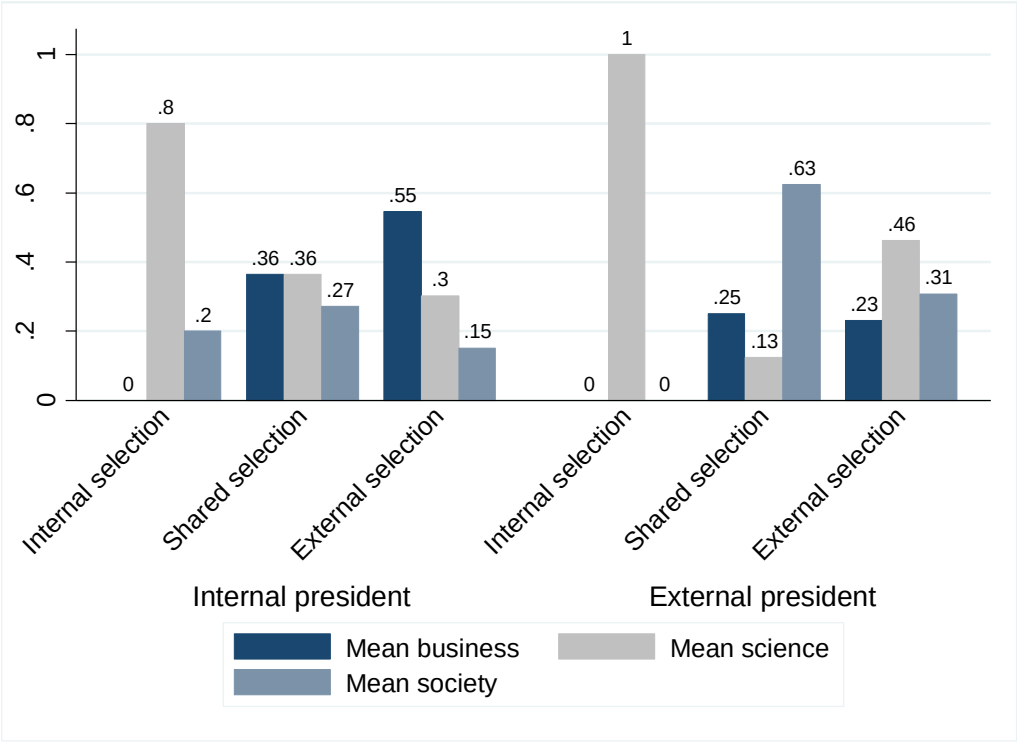


Figure 28: Mean shares of chairmen according to selection of board members and president.



Intern president

For the members of a board accompanying an internal president, business representatives play a considerable role. However, looking at the shares it is interesting that especially in the internal selection mode societal members dominate the boards (43%). The same holds for chairmen except for the observation that in this category a science background dominates. Science experts might be considered a suitable counterpart for the high share of societal members. Interestingly, none of the university boards of the internal presidents that have an internal selection of board members has a business chairman. This could be a sign for the hidden refusal of business influence in universities. The high share of business chairmen (55%) in the external selection mode of board members exposes their dominance in members and can be traced back to the endeavor of attracting prestigious personalities. It could be a further expression of the perceived importance for Ministries to have business representatives or chairmen onboard.

Extern president

The share of societal members in the internal selection of university board members stays high (43%) if the president was selected from the external university environment. In the other two selection modes, science representatives dominate (49% in the shared, 55% in the external selection mode). Chairmen in the internal selection mode are at 100% from a scientific background. In the shared university board member selection mode a society background dominates (63%) and for the external selection science (46%) on a moderate level. This shows the negotiation power in a shared selection procedure. Having the majority of members with a scientific background to support the external president (or vice versa) and having a controlling instance with a societal chairman.

Table 22: Correlation matrix of university board characteristics, selection mode, management selection and performance indicators.

Significance at 10% level are indicated in bold.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Number of members	1																	
2	Business representatives	**0.25**	1																
3	Science representatives (extern)	**0.23**	**-0.25**	1															
4	Society representatives	0.11	**-0.39**	-0.16	1														
5	Share of business to external members	0.02	**0.86**	**-0.52**	**-0.51**	1													
6	Share of science to external members	0.07	**-0.43**	**0.90**	**-0.25**	**-0.56**	1												
7	Share of society to external members	-0.08	**-0.52**	**-0.35**	**0.91**	**-0.50**	**-0.32**	1											
8	Share of internal to all members	**0.53**	-0.02	**-0.36**	-0.06	0.19	-0.19	0.07	1										
9	Chairman business	0.08	**0.44**	**-0.25**	**-0.24**	**0.51**	**-0.24**	**-0.26**	0.19	1									
10	Chairman science	0.01	-0.06	0.18	0.05	-0.16	0.16	0.02	-0.16	**-0.60**	1								
11	Chairman society	-0.11	**-0.43**	0.08	**0.21**	**-0.40**	0.09	**0.26**	-0.03	**-0.46**	**-0.44**	1							
12	Internal selection mode	-0.19	-0.15	**-0.24**	**0.24**	-0.10	**-0.22**	**0.34**	-0.12	**-0.24**	**0.29**	-0.06	1						
13	Shared selection mode	**-0.28**	-0.20	-0.15	0.03	-0.10	-0.03	0.10	-0.04	-0.08	-0.13	**0.23**	-0.18	1					
14	External selection mode	**0.37**	**0.27**	**0.27**	-0.16	0.15	0.15	**-0.29**	0.11	**0.21**	-0.05	-0.18	**-0.41**	**-0.82**	1				
15	Management selection	-0.06	**-0.25**	**0.30**	0.03	**-0.31**	**0.29**	0.02	-0.11	**-0.21**	0.00	**0.24**	-0.09	0.15	-0.08	1			
16	Research Quality	0.01	0.16	-0.08	-0.14	**0.22**	-0.04	-0.14	0.12	**0.22**	**-0.21**	-0.02	0.08	**-0.26**	0.20	-0.05	1		
17	Research Quantity	0.12	**0.29**	-0.09	0.08	**0.24**	-0.17	0.01	0.04	**0.25**	**-0.25**	0.00	-0.02	**-0.22**	**0.22**	-0.11	0.54	1	
18	Teaching Workload	**0.24**	0.15	-0.01	-0.06	0.07	-0.02	-0.09	0.16	-0.02	0.08	-0.06	-0.16	0.12	-0.01	-0.12	**-0.44**	**-0.23**	1

Table 22 reports the correlations of university board's characteristics, selection modes, management selection and performance indicators. The significant and comparably high correlation of board size and share of intern to extern members is a sign that the inclusion of internal members could be a mechanism of a potential power diffusion (such as in the business context, Lehn, Patro, & Zhao, 2009). Complexity, the need for coordination and balancing of interests rises with the number of members. An enlargement with internal university members weakens the power of the board. The relation of teaching workload and size of university board is significant. This indicates that the power diffusion is more likely the case for universities with a teaching focus as research quantity and quality have low and insignificant coefficients. Not surprisingly, the substitution and catalyst patterns of the differing groups exist. The before outlined and descriptively depicted relations of chairmen and members as well as the relations of selection mode, management selection and performance indicators are mostly supported by (partly significant) correlations.

The positive correlation of members and chairmen with a business background and the negative one of a science background with performance indicators is also observable. Either the business background brings in the idea of performance indicators and corresponding incentivizing or universities with a lower research performance cannot attract businesspersons as they themselves seek prestige. Vice versa for the science members performance indicators might not be the main focus as they concentrate on autonomy and freedom of research and teaching, they are considered experts for improving low performance. Alternatively, they could be a second best solution (before societal members) as business partners could not be attracted.

The evaluation comes at some limitations: concerning the definition of selection mode, the selection mechanisms in the states are always relying on the specific cooperation between the concerned parties, interpretation of rights like veto or suggestion and trade-off of all involved interests. The assumptions underlying the choice of an internal or external president are simplified in this context, usually strongly institution specific and seldomly a pure market decision. As data relies on the year 2012, most of the boards were the first ever existent. The collection and evaluation of panel data might exhibit interesting starting points for future research as this could examine also reactions after structural changes in the composition in terms of background. Additionally, it would be interesting to assess the possible changes and respective causes in the positioning of universities over time as well as interpreting potential learning effects based on this first attempt.

4.5 Leadership in German universities: Of presidents

4.5.1 Literature on presidents in Germany

"Who ever experienced a strong university management, will never want to do without it again."[15]
(Dieter Imboden)

"'Good' presidents do not need a presidential system, 'bad' presidents may not get one!"[16]
(Christian Scholz)

The citations above show the ambivalence with which strong university managers – presidents or rectors – are perceived in their role and how it is a matter of stakeholders' expectations. As outlined in chapter *3.3 Individuals,* the same holds for universities: Being strong could on the one hand mean attributed authority and competencies that are bundled at the top allowing for faster and less bureaucratic decisions, situational and flexible resource allocation and possibly higher identification of employees with the university. It might on the other hand be misused in the hands of the wrong person, leading to extravagant investments and expenses potentially at the cost of the rest of the university, showing a dependency on a person rather than the function (e.g. discussed in the context of the presidents' salaries, prestige projects and interest conflicts, Becker, 2013; NachDenkSeiten, 2014). The second citation reveals the relevance of leadership traits and behavior when it comes to being (or becoming) an appreciated and powerful leader in light of a nonexistent structural and legal rights ascription. The crucial point for organizational success and follower satisfaction is connected to the selection and development of the respective leaders. Thus, the age-old questions on who becomes a leader and who rules good are relevant also for the higher education system – even more due to being organized towards consensus. Does he or she have to be a top researcher or should he or she be more agreeable? Is the leader's personality or the way of leading more important? Do we consider exogenous or endogenous factors that determine who becomes a leader and who leads well? The evaluation of those open questions contribute to an understanding of mechanisms based on traits and behavior that drive leadership determinants in higher education.

[15] Free translation of: „Wer je eine starke Universitätsleitung erlebt hat, möchte sie nicht mehr missen." (Imboden & Scholz, 2016, p. 678)
[16] Free translation of: "'Gute' Präsidenten brauchen kein Präsidialsystem, ‚schlechte' Präsidenten dürfen keines bekommen!" (Imboden & Scholz, 2016, p. 679)

The horizontal university management consists usually of the presidium, the academic senate (sometimes enlarged university management) and the university boards while the vertical management consists of the faculty deans. In the German university context, the respective federal state's law and the university constitution define the role and official power of university presidents. The president is the executive for the whole university, in particular for scientific and representative purposes. Vice-presidents for specific topics, for instance innovation, teaching or internationalization, usually support him. Depending on the university constitution, he is elected for four to six years by a joint procedure of the other managing committees. The chancellor is additionally part of the presidium as manager of administrative operations. The democratically elected, collegial committee typically called academic senate (Bieletzki, 2012; Röbken, 2006a) enacts legislative functions like statutory regulations, regulation of study programs or approval of external university board members. University boards are part of the checks and balances for the strengthened executive power and described in detail in chapter *4.4 Corporate Governance of higher education in Germany: University boards*.

Universities got more autonomy but also more responsibilities following reforms connected to the New Public Management. Those responsibilities include reporting of households, target agreements and other strategic management tasks. Consequently, this caused a shift towards the hierarchical upgrading of deans and presidents on costs of the before existent collegial or steering committees (Kehm & Lanzendorf, 2007; Scherm, de Schrevel, & Müller, 2014). Critics assessed that this was not really related to efficiently distributing additional resources in a sprinkler approach but rather that cutbacks are not coming into effect in a lawn mower manner (Becker, 2013; Kleimann, 2015, p. 5).

Presidents were extensively studied (notably more for the Anglo-American system), evaluating the president's profile, selection procedure and leadership style (for a general literature overview on used methods and results about university presidents see Badillo Vega, 2018, p. 67 ff. and 82 ff.). Literature and empirical evidence on German university presidents is scarce. German university presidents qualify for their position based on scientific capital from being a professor and institutional capital from being a dean or a vice president beforehand (Reuter, Berli, & Tischler, 2016, p. 140 f.). It is most likely that the scientific career is suspended for the time being (Bieletzki, 2017). They perceive their role – fitting to the collegial principle – as integrative mediator and change-oriented manager (Kleimann, 2017). Presidents reason their leadership position situationally, emotionally and socially

rather than purely rationally (Reuter et al., 2016, p. 148). Coming from the extern, they describe it as subjective intention moving from scientist to public administrator comprising an "extern logic" while internal presidents emphasize an "inner logic". However, both positions are characterized by the will to contribute to becoming a congruent part of their university. Empirical studies are broadly based on qualitative evaluations, e.g. using discourse deconstruction, qualitative interviews, etc. (Kehm & Lanzendorf, 2007; Kleimann, 2014, 2015, 2017; Scherm, 2014; Wilkesmann, 2017). Quantitative evaluations usually used questionnaire-based data on leadership styles (Scherm & Jackenkroll, 2017), describing profiles of German university presidents (Röbken, 2006b), evaluating the subject-specific background (Wilkesmann, 2017) or effects of top management team diversity (Hattke & Blaschke, 2015).

4.5.2 (Exploratory) Hypotheses

Even after the reforms that strengthened the position of presidents, their situation and sphere of influence is defined much more by their standing and reputation than by the formally ascribed power due to the nature of a university as "loosely coupled expert organization". Consensus legitimation (democratic election, collegial principle), low disciplinary authority (constitutionally guaranteed entitlement for basic resources) and power potential (no power to direct; Freyaldenhoven, 2015; Röbken, 2006b) characterize the structure of leadership positions in universities. Contradicting findings on leadership indicate that the context is an important determinant (De Hoogh et al., 2015), which is expected in particular for the university system. The combination of consensus-seeking factors based on the collegial principle and hierarchy-driven factors based on political upgrading of presidents causes the call for a strong leader that is at the same time reconciling all voices present in a university. Unsurprisingly, strong leadership abilities, respect for the differences in scientific branches and knowledge of university life are considered integral requirements for university presidents (Bryman, 2007; Krüger & Rudinger, 2011).

The relation of leadership characteristics and styles towards leadership emergence and effectiveness was discussed in detail in *3.3.2 Born or Made: The role of leadership characteristics and style in leadership emergence and effectiveness*. Both, characteristics and styles, play a considerable but distinct role in leadership emergence and effectiveness (Derue et al., 2011). Leadership emergence has to be distinguished to formal versus informal power ascription and reflects a potential to dominate in terms of polarization. Leadership effectiveness reflects a potential to persuade in terms of leader and organization performance

(Judge, Bono, et al., 2002). Characteristics like charisma, which is again associated with polarization (Norton, Ueltschy Murfield, & Baucus, 2014) is closely linked to leadership emergence. Leadership effectiveness corresponds to structures and follower motivation, which is related to organizational performance (Braun, Peus, Weisweiler, & Frey, 2013). In times of transparency and rankings, it becomes even more important to understand modes of action as leaders play a substantive role in the strategic and operative governance of universities. In the following, I will outline the factors that are expected to impact leadership emergence and leadership effectiveness. Leadership research in universities is still a black box, so some relations can be hypothesized one directionally but others are pointed out in an exploratory way. *Table 23* gives an overview on influences that remain out of the theoretical perspective unclear (+/-) or where a clear tendency can be derived.

Leadership emergence

As leadership emergence is concerned with factors that make a person being perceived as a leader the main determinants should be found in personality characteristics rather than in the leadership style (Judge, Bono, et al., 2002; Lord, De Vader, & Alliger, 1986). For instance, Zaccaro, Foti, and Kenny (1991) found that 59% of variance in leadership emergence was explained by leadership traits, while other studies found 24-30% of explained variance (Arvey et al., 2006; De Neve et al., 2013). The Big Five personality traits correspond to leadership emergence (Judge, Bono, et al., 2002; Judge, Hurst, et al., 2009). *Table 23* summarizes the expected impact of leadership traits on leadership emergence, with two directional hypotheses for Neuroticism and Extraversion and three explorative hypotheses for Openness to experience, Agreeableness and Conscientiousness. *Table 4* gives an overview on the meaning of each characteristic. Each of the five characteristics is the opposite pole to another manifestation in a personality.

Table 23: Expected impact of leadership traits (Big Five) on leadership emergence and leadership behavior on leadership effectiveness.

Mainly based on Bono and Judge (2004), Judge and Bono (2000), De Hoogh et al. (2015) and Judge, Hurst, et al. (2009).

Characteristic	Pole	Expected impact on characteristic	Measurement Source
	Leadership traits		
Openness to experience	Closedness to Experience	+/-	McCrae & Costa (1997)
Conscientiousness	Lack of Direction	+/-	Barrick et al. (1998)
Extraversion	Introversion	+	Chatterjee & Hambrick (2011)
Agreeableness	Antagonism	+/-	Amichai-Hamburger & Vinitzky (2010)
Neuroticism	Emotional Stability	-	Sedikides et al. (2004)
	Leadership behavior		
Consideration	/	+/o	/
Initiating Structure	/	U-shaped	/

First, for Openness to experience it remains unclear which relation to leadership emergence will be shown, if any. This personality trait is one of the most few examined one with regards to leadership and includes three dimensions: appreciation for culture, need for intellectual stimulation and introspective qualities (Bono & Judge, 2004). Open individuals are considered creative, willing to change and able to put themselves to the perspective of another person (Judge & Bono, 2000). On the one hand, as fear of change might be especially among those that are responsible for deciding if one becomes a leader, this could lower the probability of being selected as leader by the decision-maker. On the other hand, creativity, empathy and intellectual interest (which is especially important in the academic environment) could increase the probability of being selected as a leader (Sosik, Kahai, & Avolio, 1998). However, the competence openness was only ranked 14 out of 18 of desired president competences in the president of the year ranking, which raises the question if one should expect a relation at all (Krüger & Rudinger, 2011).

Second, the trait Conscientiousness is expected to be positively related to leadership emergence while for the university context it might play a differentiated role. This trait is mainly composed of the will to achieve and self-discipline including responsibility, integrity and good organization (Costa Jr & McCrae, 1992). Conscientiousness is positively related to overall job performance (Barrick & Mount, 1991), good organizational citizen behavior (Barrick, Mount, & Strauss, 1993) and people scoring high in this dimension are more likely to fairly deliver on informal contracts and clarify what they expect by their fellows (Bass, 1985; Bono & Judge, 2004). Contrary findings showed that Conscientiousness is weakly correlated with supervisor and follower ratings (Avolio, Dionne, Atwater, Lau, & Camobreco, 1996), because they are more probable to show off less favored transactional leadership behaviors (Judge & Piccolo, 2004). Well or even over-performing persons qualify by their functional skills (Hogan, Curphy, & Hogan, 1994) for leadership positions, so the probability of becoming a leader rises. As the university context is a highly specialization-divergent expert organization, the proficiency in one subject could play a minor role for becoming the president, which is also supported by the third least important leadership competence "high scientific reputation" (Krüger & Rudinger, 2010, 2011).

Third, Extraversion is assumed to be positively related to leadership emergence. Extroverted people comprise two elements: sociability and dominance. They are able to manage interpersonal relationships successfully by adaption. Flexibly, they dominate or take initiative in social situations (Watson & Clark, 1997). Extroverted people are characterized by emotional expressiveness (W. L. Gardner & Avolio, 1998), are more likely to be well evaluated (Gough, 1990) and become social leaders of a group (Costa Jr & McCrae, 1988). The charismatic element inherent in this trait is also supporting Weber's call for charismatic leaders in bureaucratic institutions, which should catch up the limited possibilities of motivation. Although bright and dark sides of charismatic persons exist, most recent studies underlie that extroverts are perceived as "leaderlike" (Judge, Piccolo, et al., 2009, p. 865). They will more likely search actively for leadership as this is part of their personality structure as well as they will be more likely perceived as leader by others (Judge & Bono, 2000). The prospects for extroverted persons in the university context might be fitting to the requirement of having communicative abilities ranked in the top five leadership competences (Krüger & Rudinger, 2010, 2011, 2012).

Fourth, the expectation for Agreeableness is ambiguous. Agreeable persons avoid conflict (Graziano, Jensen-Campbell, & Hair, 1996), appreciate companionship and foster a favorable work environment (Mayer, Bardes, & Piccolo, 2008). The major components of this trait are altruism and corresponding concern for others, cooperativeness as well as modesty (De Hoogh, Den Hartog, & Koopman, 2005). Charismatic leadership tends to be corresponding to Agreeableness (Judge & Bono, 2000). On one side, they show conformity and lack of assertiveness relying too much on affiliation and thus, lower their chance of becoming a leader (Judge, Bono, et al., 2002). On the other side, their trustworthiness, generosity and interest for relations to others, serving as a kind of role model can increase their probability of becoming a leader (Bono & Judge, 2004; Judge, Piccolo, et al., 2009). As university members express their need for problem solving competences and fairness among the top ten leadership competences (Krüger & Rudinger, 2010, 2011), there might be a positive link between agreeable individuals and leadership emergence. This could indicate that this dimension influences leadership effectiveness: Once being perceived as leader, followers value approachability and compassion (Hogan & Shelton, 1998).

Fifth, Neuroticism as characteristic is expected to have a negative impact on leadership emergence and is opposed by Emotional Stability. Neurotic personalities are viewing the world pessimistic and are easy to feel emotional distress (Bono & Judge, 2004) as well as they lack self-efficacy (Judge, Erez, Bono, & Thoresen, 2002). Self-confidence is one of the main requisites of people that emerge as leaders (Northouse, 1997, p. 17). On the one hand, those persons tend to less likely attempt to lead and on the other hand, they are not considered able to be stable enough to lead (Bono & Judge, 2004). Thus, a negative relation of neuroticism on leadership emergence or vice versa a positive relation of Emotional Stability on leadership emergence is expected. President rankings highlight this as leadership attitude and courage for decisions are ranked among the top competences (Krüger & Rudinger, 2010, 2011).

Leadership effectiveness

The two most robust, partly left aside and recently again upcoming concepts that explain leadership effectiveness by leadership behavior is initiating structure and consideration. Initiating structure is the instrumental and task-oriented coordination in organizations. Consideration is appreciation as well as concern for followers resulting in motivation in organizations (Fleishman, 1953a; Judge, Piccolo, & Ilies, 2004; Lambert, Tepper, Carr, Holt, & Barelka, 2012; G. A. Yukl & Yukl, 1989, p. 49 ff.). This differentiation is describing mechanisms of motivation and coordination that are part of every organizational design. In general, one might say that consideration plays an important role especially in the lower or middle management as it is strongly corresponding to follower satisfaction while initiating structure is associated with leader and group-organization performance (Judge, Piccolo, et al., 2004). Contingency theory addressed the contextual aspect, which recent empirical leadership research broadly ignored: A task-oriented leadership style – which is basically corresponding to the concept of "initiating structure" – is most effective if the leader is very supported (favorable situation) or not supported at all (unfavorable situation) by his followers. University presidents get their power in a democratic way. Thus, one would expect a favorable situation for a leader who initiates structure rather than following a relation oriented strategy of consideration (Bass & Bass, 2009, p. 61 f.; Fiedler, 1967). This could mean for presidents that they are evaluated according to the structures they initiate rather than according to their considerable behavior.

Initiating structure is expected to have an impact on leadership effectiveness depending on the intensity of structure. Scoring high in this category was related to performance in a positive as well as negative way (Parker, 1963), which is assumed to be part of differing influences of contextual factors. Path goal theory, derived by motivation and expectation theories is based on the assumption that "[…] an individual chooses the behaviors he engages in on the basis of (1) the valences he perceives to be associated with the outcomes of the behavior under consideration; and (2) his subjective estimate of the probability that this behavior will indeed result in the outcomes" (House, 1971, p. 322). Leaders who set the frame (path) and reinforce desired behavior (goal) of followers increase leadership effectiveness in terms of follower satisfaction and performance (House, 1971; House & Dessler, 1974), which could exemplary be shown in a meta-study by Wofford and Liska (1993).

Higher-level jobs – like professors in academia – are characterized by role autonomy and ambiguities, consist of non-routinized and shapeable tasks, and are intrinsically satisfying. An initiation of structure could thus, not be seen as an imposition of external control but rather as a clarification of path-goal relationship, reducing role ambiguities and support resulting in follower satisfaction and leadership effectiveness (House, 1971). Subordinate ability and task structure is moderating the relation of initiating structure and leadership effectiveness (Wofford & Liska, 1993). Consequently, based on questionnaires, initiating structure behavior is positively related in a research driven Anglo-American context, to leader, group or organizational performance (House, Filley, & Kerr, 1971; Keller, 2006). Using a MLQ-based questionnaire in six universities and relying on precarious causality assumptions[17] Scherm and Jackenkroll (2016, 2017) found that a laissez-faire leadership style has a negative effect for presidents (even though, less negative than for deans) in terms of follower satisfaction. This laissez-faire leadership style is by definition corresponding to low structures. Within research teams, job satisfaction and team performance benefit from a transformational leadership style and a trusting atmosphere with the supervisor (Braun et al., 2013; Scherm & Jackenkroll, 2016, 2017). Still, negative relations of initiating structure on follower job satisfaction are existent (for instance Lok & Crawford, 2004; Pool, 1997). This incongruence of findings might be due to differing samples, industries, job levels and so forth but also due to the fact, that the intensity of structure plays a substantial but under-investigated role. Especially in the university context, where professors have guaranteed academic freedom, it is reasonable to expect a positive influence of a mediocre intensity of structure, which gives them some guidance, but does neither dominate nor hinder them by inaction in their daily work.

[17] Very high correlations of dependent and independent variables, no cluster-robust standard errors, intransparent re-framing and differentiation of questions and non-validation of scales.

Considerable behavior is hypothesized to be – if at all – positively related to leadership effectiveness. Consideration is characterized by prosocial behavior, which is producing and maintaining follower satisfaction and group advantages (Bass & Bass, 2009, p. 129). The before mentioned personality trait Agreeableness is associated with considerable behavior of leaders (Dilchert & Ones, 2009). Consideration shows mixed evidence (House, 1971) with a recent tendency for positive relations: it was found to have positive effects on leadership effectiveness in job and follower satisfaction (Judge, Piccolo, et al., 2004; Pool, 1997) or follower commitment (Lok & Crawford, 2004). Relying on a meta-study Judge, Piccolo, et al. (2004) conclude that consideration predicts follower motivation and leadership effectiveness even more than initiating structure. More recent Lambert et al. (2012) examined the "forgotten but not gone" ones theorizing that even (subjectively) excessive considerate behavior is favored by followers.

Following the path-goal theory, the more satisfaction one gets by work tasks the less dependent is an employee on leader consideration. Social identity theory underlines that social identity, and with it motivational aspects that are part of considerate behavior, supports the identification of employees with their organization and consequent follower satisfaction. Belonging to a social group (stressing similarities, delimiting against other groups) constructs social identity and is based on a normative or structural fit. This satisfies the employees' need for positive self-esteem and reduces subjective uncertainty (Hogg, 2001). Leaders that identify with the organization, as the ones that define identity and mobilize people to achieve organizational goals, are thus, decisive for identification processes of followers – in particular, if they exhibit consideration behavior. Especially in the university context that grants autonomy and requires a high degree of intrinsic motivation, consideration may play a role in a more direct context but not on the top of the hierarchy. Following Lambert et al. (2012) and House (1971) one can expect that if a relation exists at all, due to the low management need of university professors and the characteristics of higher level jobs, it should be low but positive.

4.5.3 Specification of leadership variables and methodology

The dataset consists of 93 presidents in 73 universities observed from 2009-2012. The data is in an unbalanced panel structure depending on data availability in differing data sources. Main data source is the German Association of University Professors and Lecturers (DHV)[18] ranking which is evaluating university presidents and education ministers based on a yearly member survey since 2009. At a minimum 30 DHV members have to fill the questionnaire in order to be included in the ranking, the participation is ranging between 2,052 and 3,166 considered questionnaires.

The dependent variables are measuring (a) leadership emergence or polarization, indicating the strength of informal leadership by being mentioned in the DHV ranking (value 1) or not (value 0), and (b) leadership effectiveness or quality, indicating how well perceived a leader is by followers, by the average grade reported in the DHV ranking (Deutscher Hochschulverband, 2009; Krüger & Rudinger, 2009, 2010, 2011, 2012). Although the leadership emergence variable does not comprise non-leaders in a technical sense of legal and formal power ascription, the far more important part in academia is being recognized and noteworthy as leader, being a symbol that is legitimated by his standing. Being included in the ranking clearly indicates that the leader is important and perceived as activating leader – be it in a negative or positive sense. They are not included if not enough followers could be mobilized or were willing to answer the questionnaires about their leader (which is also the reason why university size needs to be a control variable). Thus, being included means formal as well as informal power of the leader while being not included means having only formal power. The variable measuring leadership effectiveness indicates the satisfaction of followers with the leader. Follower satisfaction as one goal of leadership is a strong predictor of organizational success and consequently, leadership effectiveness in the academia (Braun et al., 2013; Bryman, 2007).

Though, it would have inhibited usual questionnaire problems – e.g. differing interpretations, understanding or tendencies of questions and answers, social desirability and halo effects – the most common and reliable way to measure the five personality traits would have been a psychological test according to the Five-factor model (see also *3.3.3 Measurement: The Big Five*), e.g. by the NEO-PI-R Facet Scale (Bass & Avolio, 1989; Costa Jr & McCrae, 1995; McCrae & Costa Jr, 2004) or the MLQ (Antonakis et al., 2003). Executives are often not willing to participate (Cycyota & Harrison, 2006) and a voluntary participation by presidents

[18] Professional representation of around 30,000 interdisciplinary members of the scientific community.

would introduce further selection biases. Leadership traits variables are used as main independent variables for leadership emergence and as control variables for leadership effectiveness. Leadership behavior variables are the main independent variables for leadership effectiveness. The variables for leadership traits and leadership behavior were operationalized by using the following proxies (see also *Table 23: Expected impact of leadership traits (Big Five) on leadership emergence and leadership behavior on leadership effectiveness.*, for a detailed description of variables see *Table 5 General description of all variables.*).

- Openness to experience means that someone is curiously seeking out for the unfamiliar, in particular, experience and variety seeking is highly related to this trait (McCrae & Costa, 1997) as well as travelling, coping and adjustment or adventures (Konopaske, Robie, & Ivancevich, 2009). This variable will be operationalized by the time that the president spent abroad (in months) as this indicates a spirit of discovery and curiosity about new environments.
- Conscientiousness is a personal factor indicating that the person is planful, organized, disciplined and consistently over-performing at work (Barrick & Mount, 1991; Barrick, Stewart, Neubert, & Mount, 1998; Dudley, Orvis, Lebiecki, & Cortina, 2006). A measure of not only performing in terms of quantity but also in terms of external evaluation in the scientific context is the citations per publications ratio that the president has. The measure is corresponding to the observation that leaders are often chosen due to their technical talent rather than their ability to lead (Hogan et al., 1994) and it is further considered essential performance criteria in science (Braun et al., 2013).
- Extraversion is measured by being an "outsider" president. Coming from the organization-extern as a CEO is connected to being more talkative (Kaplan, Klebanov, & Sorensen, 2012) and assertive (Chatterjee & Hambrick, 2011). While literature suggests that insiders are more likely to become presidents (Badillo Vega, 2018, p. 89 f.) it is an even more decent result for someone to be appointed from outside the university and for sure connected to a charismatic presence which is itself corresponding to extraversion (Judge, Hurst, et al., 2009). Thus, the variable will be operationalized by being a president who was appointed from the extern (Röbken, 2006b).

- Agreeableness is an interpersonal dimension and highly associated with the will to cooperation, being flexible, helpful and network centrality (K. J. Klein, Lim, Saltz, & Mayer, 2004). One of the strategic choices of scientists is with who and how many co-authors they want to collaborate in their publications. Having many co-authors means more coordinative effort but also more networking and cooperation, which is the basis of agreeable behavior. His subject influences the number of co-authors – for which will be controlled. Thus, the total number of co-authors of the president will measure the dimension Agreeableness. As this is influenced by experience, it will be controlled for the age of the president.
- Neuroticism is measured by its pole Emotional Stability as Sedikides et al. (2004) showed the invers relation of neuroticism and over-confidence in form of "narcissism". Photos were used as measure of over-confident behavior in the business context (picture of CEO in annual report) and found that narcissistic CEOS tend to bring more variance of big wins or big losses but are on average not performing better or worse (Chatterjee & Hambrick, 2007). The variable will be operationalized by having a wikipedia entry for medium confidence and having a wikipedia entry with a picture for over-confidence. As personality traits will be included in the evaluation of leadership effectiveness as well, only having a wikipedia entry with photo will be included in the regression[19]. The choice of wikipedia counts that were collected this year (2018) are considered a reliable proxy as personality traits have been consistently proven to remain stable among adults (Roberts & Del Vecchio, 2000). Thus, the bias that might have been existent over time is the same for all included individuals.

Leadership behavior in terms of (i) initiating structure (which is corresponding to the task-oriented literature) and (ii) consideration (corresponding to the relations-oriented literature) is operationalized as follows (Derue et al., 2011; Lambert et al., 2012; Pool, 1997): (i) initiating structure will be measured by third-party funds that are collected by the university. Raising and managing third-party funds is connected to many background processes (acquisition, administration, IT, professionally qualified application preparation, realization and tracking, etc.) as well as central management and steering necessities (Gröger & Schumann, 2014). As outlined in *4.5.2 (Exploratory) Hypotheses,* I expects an U-shaped relation according to the level of steering so the quadratic term is added; (ii) consideration will be measured by the variable identity which is the ratio of the google hits on university name and president's name

[19] As the sample size is reduced to those presidents that are in the ranking (compared to the overall population of presidents).

to the university name indicating the level of individual to collective congruence. The underlying logic is similar to family firms, which comprise social capital and allow for a higher social identification for its members by reciprocal trusting relationships (Arregle, Hitt, Sirmon, & Very, 2007). As leadership behavior and traits are both considered to be connected to leadership effectiveness both will be included in the full model for leadership effectiveness as suggested by Judge, Bono, et al. (2002).

Control variables on the individual president level include sex (Röbken & Mertens, 2015), age (Röbken, 2006b), mobility by number of university changes (Röbken, 2006b) and natural vs. social subject (Röbken, 2006b). At the university level will be controlled for university size and reputation which is assumed to have the greatest impact due to popularity (Menter et al., 2018), as well as for technical orientation (Menter et al., 2018). The ranking of respective federal state ministers will be included to avoid a biased caused by well-perceived politics. The environmental level (NUTS-2) could play a role as a positive basic mood might influence the rating of the evaluators, thus, controls include the regional situation in terms of unemployment (Lehmann & Menter, 2017; Lehmann et al., 2018), and the living quality in terms of land prices (similarily tested by Fabel et al., 2002 who used renting prices as indicator).

Table 24: Descriptives Presidents.

Dataset consists of 93 presidents in 73 universities, observed from 2009-2012.

		Variable	Operationalization	N	Mean	SD	Min	(Example) Min	Max	(Example) Max
Dependent Variables	[1]	Leadership emergence	Mention (1)	292	0.59	0.49	0	Bonn, Chemnitz	1	Aachen, Augsburg
	[2]	Leadership effectiveness	Grade	172	2.87	0.56	1.45	Munich TU	3.58	Berlin HU, Darmstadt TU
	[3]	Leadership effectiveness (robust)	Position	172	18.39	8.30	1	Munich TU, Bochum	31	Braunschweig, Kiel
Five-Factors	[4]	Openness for experience	International experience (months)	291	24.48	39.80	0	Hannover, Greifswald	192	Dresden TU
	[5]	Conscientiousness	Citations/Publications	208	12.22	12.94	0	Lüneburg, Freiburg	52.40	Munich TU
	[6]	Extraversion	Extern (1)	291	0.25	0.43	0	Siegen, Hildesheim	1	Regensburg, Cottbus
	[7]	Agreeableness	Co-authors	226	76.5	67.2	0	Augsburg, Coblenz-Landau	227	Braunschweig TU
	[8]	Narcissism medium	Wikipedia entry (1)	292	0.92	0.27	0	Magdeburg, Lübeck	1	Erlangen-Nuremberg, Siegen
	[9]	Narcissism high	Wikipedia with photo (1)	292	0.53	0.50	0	Erlangen-Nuremberg, Karlsruhe KIT	1	Berlin HU, Gießen
Leadership Behavior	[10]	Initiating Structure	Third-party funds (in TEUR)	292	74.60	63.07	1.15	Vechta	311.41	Munich TU
	[11]	Consideration	Google hits president/ google hits university	292	0.01	0.02	0	Göttingen, Flensburg	0.16	Kaiserslautern TU
Controls individual level	[12]	Sex	Female (1)	292	0.11	0.31	0	Magdeburg, Mannheim	1	Münster, Augsburg
	[13]	Age	Age	292	57.06	6.31	35	Gießen	71	Magdeburg
	[14]	Mobility	Number of university changes	291	2.92	1.82	0	Hannover, Hohenheim	8	Hamburg, Regensburg
	[15]	Subject	Natural sciences (1)	292	0.55	0.50	0	Münster, Augsburg	1	Hohenheim, Karlsruhe KIT
Controls institutional level	[16]	University size	Students	292	19,085	10,952	2,729	Lübeck	50,499	Cologne
	[17]	Technical orientation	Share of technical graduates	292	0.47	0.22	0	Erfurt	1	Lübeck
	[18]	Reputation	Excellence University (1)	292	0.12	0.33	0	Augsburg, Vechta	1	Munich, Göttingen
	[19]	Policy Frame	Grade education minister	270	3.69	0.49	2.00	Saxony-Anhalt	4.82	Schleswig-Holstein
Controls NUTS-2 level	[20]	Regional situation	Unemployment (in %)	292	6.73	2.65	2.70	Munich, Tübingen	13.90	Greifswald, Rostock
	[21]	Living Quality	m² land prices (in TEUR)	289	205	211	2	Freiberg	1334	Munich

A logit model is employed for the binary dependent variable leadership emergence, which is also controlling for year effects and robust standard errors clustered at university level (Wooldridge, 2010, p. 457 ff.). The preconditions of having a sufficient number of observations (due to using a maximum likelihood estimator) and absence of multicollinearity are met by the data. Average marginal effects (for reducing the probability of misinterpretation) are reported to understand the effect size. Robustness is checked by a probit model, by clustering standard errors at federal states level, and reporting conditional marginal effects at means (except for university size no high correlations of the independent variables, see *Attachment 25: Correlations presidents.*).

$$y(leadership\ emergence)^*_i = \beta_0 + \beta_1\, Openness_i + \beta_2\, Conscientiousness_i + \beta_3\, Extraversion_i + \beta_4\, Agreeableness_i + \beta_5\, Emotional\ Stability_i + \sum_{i=1}^{I} \beta\, Controls_i + \sum_{i=1}^{I} \beta\, Years_t + \varepsilon_i$$

With $y(\text{leadership emergence})_i = \begin{cases} 1\ if\ the\ president\ is\ in\ the\ ranking \\ 0\ if\ the\ president\ is\ not\ in\ the\ ranking \end{cases}$;

ε_i= error term with unobserved heterogeneity; i= president-level

A tobit model with standard errors at university level is employed for the second dependent variable leadership effectiveness measured by the grade of the leader (Tobin, 1958; Wooldridge, 2010, p. 519 ff.). This maximum likelihood estimator is designed for linear relationships with left- or right-censored dependent variables. It is a mix of a linear and binary regression as the observed values for the dependent variable should show a linear relation while the censored data gives information about why y_i is in the observed group versus in the censored group (Schild, 2017). This is modelled by assuming a latent variable y_i^*, which is by definition equal to the observed y_i. The lower third of evaluated presidents is not graded but only alphabetically listed in a range from grade A to grade B. For all years, the average lower third grade is between 3.17 and 3.58. Thus, for the upper limit (UL) case:

$$y(leadership\ effectiveness)_i = \begin{cases} y_i^*\ if\ y_i^* < y_{UL} \\ y_{UL}\ if\ y_i^* \geq y_{UL} \end{cases}$$

Consequently, values higher than 3.17 (UL) are censored, as the "true value" might be equal or above this threshold (see also *Attachment 24: Histogram of presidents' grades.*, differing values above three are due to the yearly difference of the average lower third). Average marginal effects at differing points will be presented in steps of 25 (ranging from 1.15 to 311.41) to understand the U-shaped relation of initiating structure. It will be controlled for years. As robustness check will be presented: a model excluding the outliers of the consideration variable (see *Attachment 26: Density of consideration.*), a model reporting clustered standard errors at federal states level, and a model with the rank position (censored at values higher than 21) as dependent variable, and average marginal effects.

$$y(\text{leadership effectiveness})^*_i = \beta_0 + \beta_1\, \text{Initiating structure}_i + \beta_2\, \text{Initiating structure}^2_i + \beta_3\, \text{Consideration}_i + \sum_{i=1}^{I} \beta\, Controls_i + \sum_{i=1}^{I} \beta\, Years_t + \varepsilon_i$$

With ε_i= error term with unobserved time-variant heterogeneity; i= president-level

Pseudo R^2 will be reported for the logistic estimations (model accuracy for the same outcome as suggested by Wooldridge (2010, p. 465 ff.)), R^2 for the tobit estimations (Goodness of fit by correlating predicted and observed values as suggested by Wooldridge (2010, p. 527 ff.)). Chi^2 test (testing the null hypothesis that all coefficients except the constant are jointly "0") will be outlined for both dependent variables to understand how well the models are performing in contrast to each other. The logit index and for the tobit model the predicted values (similar to probit index as tobit estimations are partly based on probit) help to understand the accuracy of the observed and predicted values for leadership emergence and effectiveness.

4.5.4 Results, robustness and interpretation

Table 25 shows the results of the logistic regression for the effect of personality traits (combined Model 6) on leadership emergence: Openness (Model 1), Conscientiousness (Model 2), Extraversion (Model 3), Agreeableness (Model 4), and Emotional Stability (Model 5). The effects are controlled by introducing further president characteristics (Model 7) and university and environmental variables (Model 8). The average marginal effects for Models 1 – 8 can be found in *Table 26.* The outlined robustness checks can be found in *Attachment 28* showing the marginal effect at mean, *Attachment 29* and *Attachment 30* for the probit estimation and average marginal effects as well as *Attachment 31* with standard errors clustered at federal states level.

Table 25: Logit estimation for the effect of personality traits on leadership emergence.
Leadership emergence measured by being included in the VHB Ranking or not.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Openness	-0.007					-0.003	-0.007	-0.000
	(0.006)					(0.006)	(0.007)	(0.008)
Conscientiousness		0.022				0.037	0.043*	-0.004
		(0.016)				(0.024)	(0.024)	(0.035)
Extraversion			-0.290			-0.401	-0.826	-0.525
			(0.459)			(0.689)	(0.788)	(0.789)
Agreeableness				0.003		-0.003	-0.001	-0.002
				(0.003)		(0.005)	(0.006)	(0.006)
Emotional Stability (Ref Low)								
Medium					0.981	1.516***	1.370**	0.999
					(0.822)	(0.504)	(0.649)	(0.871)
High					2.110**	2.978***	2.937***	1.537*
					(0.823)	(0.521)	(0.669)	(0.882)
Sex (female)							-1.172	-2.105**
							(0.762)	(0.937)
Age							0.007	0.009
							(0.041)	(0.045)
Mobility							0.290*	0.111
							(0.169)	(0.252)
Subject							-0.355	-0.256
							(0.683)	(0.792)
University size								0.222***
								(0.044)
Technical orientation								2.516*
								(1.345)
Reputation								0.597
								(0.731)
Policy Frame								0.430
								(0.427)
Regional Situation								0.125
								(0.104)
Living Quality								-1.235
								(1.879)
Years	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
Constant	1.108***	0.853**	1.015***	0.734*	-0.458	-1.047**	-1.917	-6.988*
	(0.285)	(0.378)	(0.269)	(0.383)	(0.773)	(0.530)	(2.396)	(3.775)
Nr. of clusters	58	73	62	73	58	58	58	58
Observations	290	208	291	226	292	206	206	191
Pseudo R^2	0.037	0.034	0.023	0.024	0.100	0.148	0.176	0.453
Prob > Chi^2	0.003	0.066	0.002	0.050	0.001	0.000	0.000	0.000

Robust standard errors clustered at university level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 26: Average marginal effects for leadership emergence (*Table* 25).
Average marginal effects are calculated for each president with their respective observed values of covariates and subsequently averaged across all presidents.

VARIABLES	(1a)	(2a)	(3a)	(4a)	(5a)	(6a)	(7a)	(8a)
Openness	-0.002					-0.001	-0.001	-0.000
	(0.001)					(0.001)	(0.001)	(0.001)
Conscientiousness		0.005				0.007	0.008*	-0.001
		(0.004)				(0.005)	(0.005)	(0.004)
Extraversion			-0.068			-0.077	-0.153	-0.061
			(0.107)			(0.132)	(0.144)	(0.091)
Agreeableness				0.001		-0.001	-0.000	-0.000
				(0.001)		(0.001)	(0.001)	(0.001)
Emotional Stability (Ref Low)								
Medium					0.213	0.291***	0.259**	0.126
					(0.157)	(0.098)	(0.115)	(0.115)
High					0.467***	0.600***	0.575***	0.193*
					(0.151)	(0.080)	(0.103)	(0.115)
Sex (female)							-0.217	-0.246**
							(0.136)	(0.097)
Age							0.001	0.001
							(0.008)	(0.005)
Mobility							0.054*	0.013
							(0.032)	(0.029)
Subject							-0.066	-0.030
							(0.126)	(0.091)
University size								0.026***
								(0.003)
Technical orientation								0.294*
								(0.169)
Reputation								0.070
								(0.088)
Policy Frame								0.050
								(0.046)
Regional Situation								0.015
								(0.012)
Living Quality								-0.144
								(0.224)
Years	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
Nr. of clusters	58	73	62	73	58	58	58	58
Observations	290	208	291	226	292	206	206	191

Average marginal effects, dy/dx for factor levels is the discrete change from the base level;
Robust standard errors clustered at university level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Except for Emotional Stability, no leadership trait shows a positive relation to leadership emergence. The Chi²-test indicates that all models fit significantly better than an empty model with no predictors. Emotional Stability, especially in the high form is positively related on a highly significant (Models 5 – 7) and significant (Model 8) level to leadership emergence. The Pseudo R^2 - which has to be if at all interpreted cautiously – shows consequently, the highest value for a single trait in Emotional Stability (0.100). Most explanatory power is added by including university and environmental factors (Pseudo R^2: 0.453). Especially the highly significant university size makes sense as the bigger the university, the higher the number of potential voters, the higher the probability to be included in the ranking. Thus, being a highly emotionally stable president increases the probability to emerge as leader by 46.7 percentage points (Model 5a) and in the full model by 19.3 percentage points in comparison to being a leader without Emotional Stability. If the university size increases by one student, the probability to emerge as leader rises by 2.6 percentage points.

The result for Emotional Stability is in line with previous findings. As in the business context within in a meta-study, Emotional Stability is the major driver of job performance regardless of job or criteria (Salgado, 1997). A positive perception of the world, trust in self-efficacy and self-confidence is essential part in both striving to and becoming a leader (Bono & Judge, 2004). As the president of a university is the primus inter pares, academics seem to live this out: neither Openness to experience, nor Conscientiousness, Extraversion or Agreeableness show any effect on leadership emergence. Thus, the process of becoming a professor might already select or homogenize the professor population in terms of personality (despite differing subjects) that the only differentiation relevant for being perceived as (either good or bad) leader can be detected in over self-confident behavior.

Table 27 shows the results of the tobit estimation for leadership behavior in terms of initiating structure (Model 25) and consideration (Model 26) on leadership effectiveness[20] (combined in Models 27) as well as control variables on the presidents' traits and characteristics (Model 28), university specificities and environment (Model 29). Marginal effects (at differing data points in 25-steps) for initiating structure on leadership effectiveness can be found in *Table 28* and *Table 29*. Robustness is checked in *Attachment 32* by eliminated outliers of consideration, *Attachment 33* with standard errors clustered at federal states level and *Attachment 34* including the ranking position as dependent variables.

[20] Interpreted out of reasons for simplification, more precisely this means here and in the following on the latent variable.

Table 27: Tobit estimation of leadership behavior on leadership effectiveness.

VARIABLES	(25)	(26)	(27)	(28)	(29)
Initiating structure	0.007**		0.007**	0.009**	0.008*
	(0.003)		(0.003)	(0.004)	(0.005)
Initiating structure²	-0.000**		-0.000**	-0.000***	-0.000***
	(0.000)		(0.000)	(0.000)	(0.000)
Consideration		1.049	0.991	-1.742	-1.842
		(4.071)	(3.605)	(4.181)	(4.322)
Openness				0.000	0.001
				(0.002)	(0.002)
Conscientiousness				-0.008	-0.014**
				(0.006)	(0.007)
Extraversion				0.097	0.189
				(0.193)	(0.170)
Agreeableness				-0.004**	-0.002
				(0.002)	(0.002)
Emotional Stability				0.178	0.140
				(0.201)	(0.176)
Sex				-0.358	-0.431*
				(0.256)	(0.248)
Age				0.006	0.004
				(0.012)	(0.014)
Mobility				0.022	0.005
				(0.070)	(0.066)
Subject				0.419*	0.322
				(0.232)	(0.224)
University size					-0.099
					(0.139)
Technical orientation					-0.002
					(0.011)
Reputation					0.446
					(0.581)
Policy Frame					0.434
					(0.318)
Regional Situation					0.025
					(0.049)
Living Quality					0.709**
					(0.346)
Years	incl.	incl.	incl.	incl.	incl.
Constant	2.810***	3.121***	2.796***	2.360***	2.385**
	(0.175)	(0.117)	(0.193)	(0.893)	(1.194)
Nr. of clusters	58	58	58	46	45
Observations	172	172	172	127	116
Right-censored observations	70	70	70	54	46
R^2	0.192	0.149	0.193	0.317	0.356
Prob > Chi²	0.001	0.002	0.002	0.000	0.001

Robust standard errors clustered at university level in parentheses, observations of leadership effectiveness censored at value "3"
*** p<0.01, ** p<0.05, * p<0.1

Table 28: Marginal effect for initiating structure on leadership effectiveness (*Table 27, Model 25*).
Average marginal effects are calculated at representative values of third-party funding for each president with their respective observed values of covariates in the variable "initiating structure" and subsequently averaged across all presidents.

	Low initiating structure				Medium initiating structure				High initiating structure				
	0	25	50	75	100	125	150	175	200	225	250	275	300
Marginal effect	0.007**	0.006**	0.005**	0.003*	0.002	0.001	-0.001	-0.002	-0.003*	0.005**	-0.006**	-0.007**	-0.009**
Std.err.	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.002	0.002	0.003	0.003	0.004

Average marginal effects with cluster-robust standard errors (172 observations, 58 clusters).

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

Table 29: Marginal effect for initiating structure on leadership effectiveness (*Table 27, Model 29* including all control variables).
Average marginal effects are calculated at representative values of third-party funding for each president with their respective observed values of all covariates and subsequently averaged across all presidents.

	Low initiating structure				Medium initiating structure				High initiating structure				
	0	25	50	75	100	125	150	175	200	225	250	275	300
Marginal effect	0.008*	0.006	0.004	0.002	0.000	-0.002	-0.004*	-0.006***	-0.008***	-0.010***	-.0012***	-0.014***	-0.016***
Std.err.	0.005	0.004	0.004	0.003	0.003	0.002	0.002	0.002	0.003	0.003	0.003	0.004	0.004

Average marginal effects with cluster-robust standard errors (116 observations, 45 clusters).

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

Initiating structure has a U-shaped relation, which is unexpectedly invers and significant at low and high levels of initiating structure. Consideration does not play a role in the present evaluation, which might be explained by the professors' autonomy and missing disciplinary power what could make them indifferent. Initiating structure (Model 25) explains 19.2% of leadership effectiveness while the full model (Model 29) including all control variables explains 35.6% of the variance in leadership effectiveness what comes roughly to the explanatory power that is suggested by leadership literature (Derue et al., 2011). However, as the consideration model shows also 14.9% of explained variance it stands to reason that a year effect seems to be existent. The Chi^2-test indicates that all models fit significantly better than an empty model with no predictors.

The inverse U-shaped relation of initiating structure on leadership effectiveness reveals that having either a high or low level of initiating structure is considered to be well evaluated by the followers while a medium level does not have any impact on leadership effectiveness. As the grading scheme is from one to six with one being the best, six being the worst grade, high grades are considered negative, low grades are positive. If initiating structure raises by one unit in the low initiating structure, the predicted value of leadership effectiveness raises by 0.007 to 0.003 percentage points which shows effectively to lower follower satisfaction (as grades become worse). In the case of high initiating structure, one unit more causes 0.003 to 0.009 percentage points lowering the value of leadership effectiveness meaning that grades become better. The effect size is low but robust, in particular for high initiating structure cases it is reasonable to invest in more structures.

The moderation by the context in terms of task and ability (Wofford & Liska, 1993) could be an explanation for the unexpected invers U-shaped relationship between initiating structure and leadership effectiveness. Academics have no clear task description like for example an assembly line worker, rather is their task broadly defined by the missions of universities: teaching, research and arguably innovation. Thus, this might lead to a paradox situation: On the one hand, dominant styles that initiate structure are experienced as beneficial because committee work and corresponding satisfaction with having participated in the decision process could lead to the need for less bureaucratic and fast decisions and structures at the top. On the other hand, the satisfaction with laissez-faire styles could reflect the motivational aspect of professors. They are highly intrinsically motivated and prefer to be autonomous in their work and working environment. Thus, professors appreciate a low level of structures or pressures, and evaluate a tightening of structures negatively. The margins show that the effect is especially robust for dominant styles with a high degree of structure initiated when controlling for university and environmental variables.

Another explanation is also a limitation of this empirical study: According to expectations about an institution followers select where they want to work, which might possibly introduce a follower evaluation and follower selection bias. Even if more than half of the presidents are in their first term and the average time in office of German university presidents is around 4 years (Röbken, 2006b), it could be that the evaluation for entering or becoming president or rector of the year is biased towards those with long terms in office as professors have more chances to polarize. The application and selection of (potential) employees is corresponding to this: For instance, the president of the Technical University in Munich is already in place over 20 years and "famous" for a dominant managing style (Becker, 2013). A potential employee will only apply and possibly get a job if he complies or even likes the management style, which is true also for the laissez-faire side (for example Godehard Ruppert that is president since year 2000 at the University of Bamberg (Universität Bamberg, 2018)). Considering this thought, it would be interesting for future research to consider a "continuity" evaluation of presidents and respective follower satisfaction following the idea of a "university Leviathan".

The quality of living also influences leadership effectiveness positively and rather robust. Assuming that mostly professors are living and working at the respective university this finding could be caused by two underlying rationales: first, there might not only exist an effect of locational attractivity for students' applications (Fabel et al., 2002) but the same could hold for university presidents. As university presidents are mostly internally appointed and not as mobile as e.g. their American counterparts (Röbken, 2006b), a second explanation is contemplable: the attractive environment and connected atmosphere or leisure facilities could influence the level of "happiness" as well as who is applying and eventually working at the university. On the labor market competition, star scientists have the possibility to be more selective, choosing locations that are more attractive and should consequently be happier with their job. The environment might influence the general level of contentment of people living there as well as of professors. As a side effect, their leadership satisfaction, tolerance or simply non-complaints due to distraction possibilities should be influenced positively.

Despite the explanatory value of the present study, it also has some limitations. Endogeneity could be a problem, as one has to ask: are good leaders in the organization because they are already performing well? Alternatively, are the organizations performing well because of good leaders? A more balanced panel structure would have helped. Although not fully, I rely partly on evaluation-based data what could be biased by strategic voting, personal resentments and selection bias as only university professors that are DHV members are represented. More objective measures that could indicate the "value" of the leader, like his salary, are not publicly available in Germany (like for the soccer context used by Lehmann & Schulze, 2008). The results are not representing those that could be opposing or that might not contribute such as other stakeholders that are influenced by and influence decisions (i.e. students or administrative staff). However, as professors cannot be overruled by law (Dobbins & Knill, 2015; Pasternack & von Wissel, 2010) this can be considered a minor issue. As the analysis does not show evidence for consideration but for initiating structure the question arises whether the results mean just another brick in the wall of weak and inconsistent findings like G. A. Yukl and Yukl (1989, p. 49 ff.) suggest. It should not be claimed that the results are applicable universally or generalizable to each and every industry or environment, however, for the university context they comprise interesting insights and help to shed light on leadership in non-corporate, nontrivial environments.

The results implicate a somewhat fatalistic and promising perspective on leadership in universities: Becoming a recognizable leader depends on leadership traits, especially on being emotionally stable. This is reasonable for anyone who becomes a leader with regards to his mental health as well as for the followers that want someone who gives them security and stability. Personality traits are nothing, which can be trained or changed easily. They are determined by genes, experiences, etc. and are not influenceable directly by individuals. If one became leader, leadership behavior is much more important. Especially a more "technical" and task-oriented leadership style is evaluated well. It is promising that follower satisfaction can be improved by the right strategy as the leadership style can be trained and taught.

As being a president, it is advisable to take care about the specific university setting (being research, teaching oriented, having followers asking for guidance or wanting to be let alone, etc.). Depending on the specific context, follower satisfaction can be increased by either investing in structures that help members to fulfill their tasks more easily or by lowering assistance. Based on the results and their robustness, a well applicable strategy seems to overcome mediocre university structures by investing in more assistance and initiate structures.

As this study is only a first step towards leadership research in universities, further research might include testing moderators as they have been found to be important in leadership contexts (Avolio et al., 1999; De Cremer & Van Knippenberg, 2004; Ng & Sears, 2012). The inclusion of other stakeholder groups would be interesting to test for differences in how a leader is perceived by differing perspectives. The highly interesting effects of a university president's traits and characteristics for instance on salary are up until now not realizable as data is non-transparent in Germany (unlike the US) and only fragmented information exists (NachDenkSeiten, 2014). Another promising evaluation could include "control groups" which consists of full professors that have never been dean or president themselves to see which traits distinguish formal leaders from non-leaders. As a last point an analysis in times of university crisis could be included as Weber suggests that charismatic leaders are beneficial in those times. However, it could be difficult to define a "crisis" for universities. Overall, leadership is an actual topic in particular, within the new governance structures and strengthened university management.

Chapter four served as examination of the determinants in the Corporate Governance of universities. The systematization of the distribution and specificities of German universities in the field of tension of teaching and research activities showed that even if German universities are not particularly scattered, they do show dependencies: on disciplines like having a medical faculty (connected to a sprinkler approach of funding), on location like being located in East Germany (connected to a subsidizing disadvantage approach of funding) or on research performance (connected to a picking the winner approach). The political level of analysis showed that the introduction of a picking the winner approach can have a significant impact on the outcomes of universities – even though evaluation measures need to be picked thoroughly. University boards and their composition, which are the institutional level of analysis, are showing considerable differences according to member selection modes and staffing procedures being result of stakeholder interests and power distribution. The last level of analysis showed that equally to the formal and institutional design of universities, personalities and their way of leading shape the perception of organization members. The consideration of the interplay on all levels contribute to an elaborated Corporate Governance of universities.

5 Conclusion

The aim of this dissertation was to gain knowledge about the residuals that were shown to be eminent in current research. An overview of the questions that were posed in the introduction and the answers that were demonstrated throughout the book will be given.

What are the path dependencies of universities that shape our modern understanding?

Universities evolved out of the necessity to form interest groups in medieval times. Their organizational form had to be approved and supported. However, they were not considered as stable or as a traditional part of society as they are considered today. In particular, the uncertainty in German states was a stimulus and generated the need to organize lecturers and researchers in one institution. Germany, being one of the most influential players in modern global history, developed institutions that were shaped by the freedom of the Weimar Republic, strong centralization activities during the Nazi time and corresponding reconstruction policies after WW II. Centralized initiatives pleased essential requirements of higher education and were followed by legislation that allowed democratic reforms. In the neoclassical spirit, competitive thinking was introduced but not realized before mechanisms of New Public Management were established in Germany. The higher education system today is differentiated and traditional at the same time. While most important financing sources are still the federal states, attempts to adjust to high performing countries have been implemented such as study fees, competitiveness contests and embeddedness in laws.

How can the performance of universities be influenced beneficially from an external governance perspective?

Employing competitive incentives like the Excellence Initiative initiated a process that was not only notable for those winning the contest (Excellence Universities) but for the system as a whole. While a bandwagon effect was preliminary demonstrated for quantitative as well as qualitative indicators, “winners” were incentivized differently. While their research output was significantly rising, their research impact significantly decreased compared to those not being selected as an Excellence University. In particular, the effects of the lost quality of the “winners against the losers” are robust. It is up for the responsible politicians to decide whether this quantitative output maximization should be supported or if a qualitative output should be incentivized for winning institutions. Consequently, measures and initiatives in place should be adjusted to the – after all – not so inflexible German university system.

How can the performance of universities be influenced beneficially from an internal management perspective?

The introduction of university boards and the strengthening of university management are also part of the New Public Management reforms that gave more autonomy and more self-responsibility to universities. The interplay of politics and universities, as well as the president's role, became obvious in the selection of university board members. As soon as data is accessible, an empirical analysis of the effects of university boards is recommended. The preceding selection process of university leaders (that are corresponding to university boards) seems to be triggered upfront by the personal characteristic of emotional stability (versus neuroticism). Performance of presidents is influenced by their ability to introduce structures that give support and barely by considerable behavior. This restricts the emergence as university leader to his (inflexible) traits. For leadership effectiveness, it is encouraging that behavior (trainable) of the leader is decisive for follower satisfaction.

However, one up until now ignored point of the analysis is the scientific background of the author herself. How can someone that is part of the university system remain objective enough to evaluate it? The validity of the results were tried to be shown by the robustness of the presented results, using objective measures and theoretically confronting criticism, which is admittedly valid. The results should be interpreted against the subject-specific background of the thesis, which is socio-economical.

Bringing those analyses together one might conclude that the interplay of internal and external instruments in the higher education sector can influence performance and satisfaction of those that are inside the respective universities. The output of universities is far away from being exogenously given. What implications might be derived? The public opinion is shaping the modes of action of universities, which is the reason to choose carefully performance indicators that are always establishing explicit and implicit expectations. Even if this is uncomfortable for many reasons, the responsibility of politicians is thus: to communicate and appreciate what is considered beneficial. If the incentive is given to those that are quantitatively producing the most (Menter et al., 2018) this should be made transparent and a matter of discussion. The internal mechanisms implicate that university professors have a preference for being their own "foreman" while they need sophisticated and elaborated structures easing their everyday work and the expectations that are brought to their attention.

I wanted to show that universities are institutions that are in their function and meaning changing as well as changeable. The way they act is endogenous and can be framed exogenous according to societal needs. Thus, concluding this research experience, the challenge of trying to grasp some answers might be best encapsulated by the words of Bob Dylan (1963): “The answer, my friend, is blowing in the wind.” Therefore, the answers that I tried to provide within the different parts of my dissertation are temporary stable arrangements that are a result and a part of history, endogenously given and at the same time reactive to exogenous modifications.

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VII Attachment

Attachment 1: List of university profiles according to research quantity (publications/professor) and teaching (graduates/professor).

Universities with the same profile for research quantity and quality are in bold.

1 - STUCK IN THE MIDDLE PROFILE	2 - RESEARCH PROFILE	3 - TEACHING PROFILE	4 - PEAK PROFILE	5 - LOW PROFILE
Darmstadt TU	Augsburg U	Bonn U	Aachen TH	Bayreuth U
Duisburg-Essen U	**Bamberg U**	Bremen U	Berlin TU	**Berlin FU**
Freiberg TUBergAk	Bielefeld U	**Düsseldorf U**	Bochum U	Berlin HU
Giessen U	Braunschweig TU	Erlangen-Nuremberg U	Dresden TU	**Clausthal TU**
Hamburg-Harburg TU	**Chemnitz TU**	**Frankfurt am Main U**	**Hohenheim U**	**Cottbus TU**
Hannover U	Dortmund TU	**Freiburg U**	Jena U	**Halle-Wittenberg U**
Konstanz U	**Erfurt U**	Göttingen U	**Karlsruhe KIT**	**Ilmenau TU**
Leipzig U	**Flensburg U**	Hamburg U	Magdeburg U	Kaiserslautern TU
Marburg U	**Frankfurt (Oder) U**	Heidelberg U	Munich TU	**Kassel U**
Münster U	**Greifswald U**	**Kiel U**	Munich U	Cologne U
Stuttgart U	**Hildesheim U**	**Lübeck U**	**Regensburg U**	**Lüneburg U**
	Coblenz-Landau U	Mainz U		**Osnabrück U**
	Mannheim U	**Tübingen U**		**Paderborn U**
	Oldenburg U	**Ulm U**		**Rostock U**
	Passau U	**Würzburg U**		Saarbrücken U
	Potsdam U			**Siegen U**
	Trier U			**Weimar U**
	Vechta U			**Wuppertal U**

Attachment 2: List of university profiles according to research quantity (citation/publication) and teaching (graduates/professor).

Universities with the same profile for research quantity and quality are in bold.

1 - STUCK IN THE MIDDLE PROFILE	2 - RESEARCH PROFILE	3 - TEACHING PROFILE	4 - PEAK PROFILE	5 - LOW PROFILE
Bochum U	Aachen TH	Bayreuth U	Augsburg U	**Berlin FU**
Darmstadt TU	**Bamberg U**	Berlin HU	Bielefeld U	Bonn U
Dresden TU	Berlin TU	Duisburg-Essen U	Braunschweig TU	**Clausthal TU**
Erlangen-Nuremberg U	**Chemnitz TU**	**Düsseldorf U**	Bremen U	**Cottbus TU**
Giessen U	**Erfurt U**	**Frankfurt am Main U**	Dortmund TU	Freiberg TUBergAk
Hamburg U	**Flensburg U**	**Freiburg U**	**Hohenheim U**	Göttingen U
Hamburg-Harburg TU	**Frankfurt (Oder) U**	Kaiserslautern TU	**Karlsruhe KIT**	**Halle-Wittenberg U**
Jena U	**Greifswald U**	**Kiel U**	Münster U	Hannover U
Leipzig U	**Hildesheim U**	Cologne U	Oldenburg U	Heidelberg U
Magdeburg U	**Coblenz-Landau U**	Konstanz U	**Regensburg U**	**Ilmenau TU**
Mainz U	**Mannheim U**	**Lübeck U**	Stuttgart U	**Kassel U**
	Munich TU	Marburg U	Trier U	**Lüneburg U**
	Munich U	Saarbrücken U		**Osnabrück U**
	Passau U	**Tübingen U**		**Paderborn U**
	Potsdam U	**Ulm U**		**Rostock U**
	Vechta U	**Würzburg U**		**Siegen U**
				Weimar U
				Wuppertal U

Attachment 3: List of German Excellence Universities.

Full name of university	Decision
RWTH Aachen	Okt 07
Freie Universität Berlin	Okt 07
Albert-Ludwigs-Universität Freiburg	Okt 07
Universität Göttingen	Okt 07
Universität Heidelberg	Okt 07
Universität Konstanz	Okt 07
Universität Karlsruhe (Technische Hochschule)	Okt 06
Ludwig-Maximilians-Universität München	Okt 06
Technische Universität München	Okt 06

Source: DFG and Wissenschaftsrat (2007); DFG and Wissenschaftsrat (2006)

Attachment 4: List of universities with Graduate School and Excellence Cluster.

Full name of university
Universität Bielefeld
Rheinische Friedrich-Wilhelms-Universität Bonn
Universität Bremen
Technische Universität Darmstadt
Technische Universität Dresden
Friedrich-Alexander-Universität Erlangen-Nuremberg
Justus-Liebig-Universität Gießen
Christian-Albrechts-Universität zu Kiel
Universität des Saarlandes

Source: DFG and Wissenschaftsrat (2007); DFG and Wissenschaftsrat (2006)

Attachment 5: Request on applications for future concepts.

Sarah Stockinger

Von: [redacted]@wissenschaftsrat.de>
Gesendet: Dienstag, 9. Januar 2018 08:25
An: Sarah Stockinger
Betreff: AW: Dissertation "University Governance in Germany" - Bewerbungen Zukunftskonzepte

Sehr geehrte Frau Stockinger,

vielen Dank für Ihre Anfrage und Ihr Interesse an der Exzellenzinitiative. Es tut mir leid, aber wir können Ihnen keine Informationen über nicht erfolgreiche Antragstellungen mit Nennung der Universitäten zukommen lassen, weil wir eine Beschädigung der Hochschulen vermeiden wollen. WR und DFG können statistische Angaben (Zahl von Skizzen, Anträgen und Erfolgsquoten in den verschiedenen Ausschreibungsrunden) bereitstellen, aber ohne Benennung von Hochschulen. Ich möchte Sie gerne auf die beiden Berichte der Gemeinsamen Kommission hinweisen (2008 und 2015), die auf der Website des WR abrufbar sind und die umfängliche Informationen zum Programm enthalten.

https://www.wissenschaftsrat.de/download/archiv/exini_GWK-Bericht-[1].pdf

http://www.gwk-bonn.de/fileadmin/Papers/DFG-WR-Bericht-Juni2015.pdf

Ferner kann ich noch darauf hinweisen, dass manche Universitäten selbst Informationen über ihr Abschneiden im Wettbewerb auf ihren Homepages bereitgestellt haben.

Ich bitte um Verständnis und wünsche Ihnen viel Erfolg für Ihre Dissertation.

Mit freundlichen Grüßen
[redacted]

[redacted]
Leiterin der Stabsstelle Exzellenzstrategie

WR | WISSENSCHAFTSRAT

Geschäftsstelle des Wissenschaftsrates
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Von: Sarah Stockinger [mailto[redacted]
Gesendet: Mittwoch, 3. Januar 2018 15:02
An: [redacted]
Betreff: Dissertation "University Governance in Germany" - Bewerbungen Zukunftskonzepte

Guten Tag Frau [redacted],

Vermutlich aufgrund der Ferienzeit habe ich Sie eben leider telefonisch nicht erreichen können – in diesem Zusammenhang wünsche ich einen guten Start ins Jahr 2018.

Ich bin wissenschaftliche Mitarbeiterin an der Universität Augsburg (Lehrstuhl für Unternehmensführung und Organisation) und schreibe derzeit meine Dissertation zum Thema „University Governance in Germany" unter der Anleitung meines Doktorvaters Prof. Erik E. Lehmann. Ein Teilbereich beschäftigt sich mit den Universitäten deren Zukunftskonzepte in den ersten beiden Vergaberunden ausgezeichnet wurden. Um eine fundierte Analyse zu ermöglichen, wollte ich fragen, ob es möglich wäre zu erfahren, welche Universitäten sich in der Förderlinie

1

Zukunftskonzepte für die Vergabe 2005/2006 beworben haben – also inklusive derer, die nicht ausgewählt wurden. Falls gewünscht bzw. nötig würde diese Information in der Dissertation natürlich anonymisiert.

Ich wäre Ihnen sehr dankbar, wenn Sie mir hier weiterhelfen könnten, da diese Information meine Forschung sehr unterstützen würde. Sollten Sie Fragen haben stehe ich sehr gerne jederzeit telefonisch oder per e-Mail zur Verfügung.

Mit freundlichen Grüßen

Sarah Stockinger

Sarah Stockinger
Wissenschaftliche Mitarbeiterin

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Attachment 6: Correlations Excellence Initiative all universities.

Number of universities: 73, years 2004-2011.

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]
[1]	Research Quantity	1.00																	
[2]	Research Quality	0.59	1.00																
[3]	Excellence Universities	0.48	0.23	1.00															
[4]	Selected Universities	0.13	0.14	-0.15	1.00														
[5]	Excellence Initiative	0.17	0.23	0.00	0.00	1.00													
[6]	Personnel Structure	-0.10	0.06	-0.10	-0.11	0.29	1.00												
[7]	International Orientation	0.48	0.44	0.42	0.21	-0.05	-0.06	1.00											
[8]	Teaching Workload	-0.14	-0.05	-0.06	0.05	-0.01	0.04	0.30	1.00										
[9]	Innovation by university	0.18	0.04	0.04	-0.07	0.06	0.00	0.21	0.13	1.00									
[10]	Dependency on third-party funds	0.06	-0.06	0.15	0.06	0.16	-0.55	0.07	0.11	0.21	1.00								
[11]	Technical orientation	0.25	-0.06	0.14	0.18	0.03	-0.71	0.09	-0.22	0.02	0.57	1.00							
[12]	Undergraduate Programs	0.30	0.37	0.18	0.17	-0.08	0.17	0.36	0.09	-0.02	-0.30	-0.24	1.00						
[13]	Graduate Programs	0.17	0.30	0.04	0.10	0.42	0.30	0.25	0.06	0.19	0.04	-0.02	0.18	1.00					
[14]	Hospital	0.63	0.49	0.23	0.11	0.00	0.27	0.47	-0.17	0.11	-0.52	-0.18	0.52	0.19	1.00				
[15]	TU	0.09	-0.17	0.12	0.09	0.00	-0.64	0.05	-0.01	-0.02	0.60	0.73	-0.29	-0.09	-0.27	1.00			
[16]	Regional inequality	-0.12	-0.27	-0.19	-0.01	0.00	-0.03	-0.12	-0.02	-0.09	0.00	0.11	-0.06	0.04	0.07	0.16	1.00		
[17]	Regional Wealth	0.38	0.41	0.24	0.09	0.21	-0.09	0.48	0.05	0.11	0.20	0.15	0.14	0.13	0.10	0.08	-0.51	1.00	
[18]	Living Quality	0.44	0.33	0.35	0.10	0.06	-0.08	0.53	0.13	0.00	0.13	0.09	0.22	0.06	0.19	0.04	-0.29	0.69	1.00

Attachment 7: Correlations Excellence Initiative selected and Excellence Universities.

Number of universities: 19, years 2004-2011.

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]
[1]	Research Quantity	1.00																	
[2]	Research Quality	-0.09	1.00																
[3]	Excellence Universities	0.52	0.22	1.00															
[4]	Selected Universities	-0.52	-0.22	-1.00	1.00														
[5]	Excellence Initiative	0.25	0.30	0.00	0.00	1.00													
[6]	Personnel Structure	-0.14	0.28	0.00	0.00	0.29	1.00												
[7]	International Orientation	0.20	-0.31	0.33	-0.33	-0.07	-0.19	1.00											
[8]	Teaching Workload	-0.11	-0.24	-0.22	0.22	-0.10	-0.41	0.38	1.00										
[9]	Innovation by university	0.37	-0.24	0.36	-0.36	0.18	-0.19	0.33	0.28	1.00									
[10]	Dependency on third-party funds	0.15	0.03	0.11	-0.11	0.20	-0.63	0.15	0.52	0.21	1.00								
[11]	Technical orientation	0.35	-0.41	-0.04	0.04	0.04	-0.75	0.29	0.46	0.32	0.65	1.00							
[12]	Undergraduate Programs	0.01	0.13	0.02	-0.02	-0.08	0.37	-0.09	-0.35	-0.12	-0.48	-0.51	1.00						
[13]	Graduate Programs	-0.02	0.10	-0.09	0.09	0.50	0.37	0.03	-0.09	0.05	0.05	-0.01	-0.10	1.00					
[14]	Hospital	0.20	-0.13	0.19	-0.19	0.00	0.51	0.12	-0.54	0.15	-0.80	-0.40	0.44	0.08	1.00				
[15]	TU	0.19	-0.53	0.04	-0.04	0.00	-0.57	0.27	0.41	0.44	0.56	0.74	-0.42	0.11	-0.27	1.00			
[16]	Regional inequality	-0.24	-0.35	-0.33	0.33	0.00	-0.13	0.19	0.33	-0.04	0.21	0.19	-0.12	0.20	-0.14	0.50	1.00		
[17]	Regional Wealth	0.49	-0.10	0.25	-0.25	0.25	-0.25	0.41	0.07	0.21	0.33	0.46	-0.02	0.02	-0.15	0.19	-0.39	1.00	
[18]	Living Quality	0.41	-0.08	0.25	-0.25	0.04	-0.24	0.51	0.06	0.05	0.22	0.35	0.09	0.02	-0.03	0.13	-0.17	0.77	1.00

Attachment 8: Test on parallel trend assumption with all universities.

VARIABLES	(1) Publications per Professor	(2) Citations per Publications
Excellence Universities	2.253***	8.172***
	(0.474)	(1.683)
2005	0.175***	2.165***
	(0.032)	(0.352)
2006	0.467***	2.631***
	(0.053)	(0.381)
2007	0.568***	2.927***
	(0.055)	(0.404)
2008	0.720***	4.127***
	(0.062)	(0.373)
2009	0.794***	6.077***
	(0.073)	(0.412)
2010	0.859***	7.594***
	(0.077)	(0.535)
2011	1.081***	8.299***
	(0.093)	(0.480)
Excellence University#2005	0.114	-0.456
	(0.108)	(1.414)
Excellence University#2006	0.399**	-1.511
	(0.190)	(1.248)
Excellence University#2007	0.587**	-1.218
	(0.254)	(1.399)
Excellence University#2008	0.543**	-1.796
	(0.250)	(1.510)
Excellence University#2009	0.658**	-3.860**
	(0.261)	(1.561)
Excellence University#2010	0.811***	-4.556***
	(0.273)	(1.543)
Excellence University#2011	1.008***	-5.312***
	(0.352)	(1.678)
Constant	2.127***	17.680***
	(0.162)	(0.891)
Observations	584	584
R-squared	0.277	0.147

Test on parallel trend assumption according to Autor (2003); OLS regression with robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Attachment 9: Test on parallel trend assumption with selected universities.

VARIABLES	(1) Publications per Professor	(2) Citations per Publications
Excellence Universities	1.494***	4.455**
	(0.498)	(1.918)
2005	0.330***	1.310***
	(0.051)	(0.223)
2006	0.657***	2.513***
	(0.108)	(0.445)
2007	0.762***	3.266***
	(0.113)	(0.596)
2008	0.862***	4.410***
	(0.112)	(0.558)
2009	0.996***	6.001***
	(0.153)	(0.993)
2010	1.063***	7.874***
	(0.138)	(0.883)
2011	1.393***	8.026***
	(0.186)	(1.003)
Excellence University#2005	-0.041	0.399
	(0.121)	(1.471)
Excellence University#2006	0.209	-1.393
	(0.222)	(1.338)
Excellence University#2007	0.392	-1.558
	(0.286)	(1.541)
Excellence University#2008	0.401	-2.079
	(0.280)	(1.650)
Excellence University#2009	0.455	-3.784**
	(0.307)	(1.881)
Excellence University#2010	0.607*	-4.836***
	(0.310)	(1.771)
Excellence University#2011	0.696*	-5.039**
	(0.406)	(1.980)
Constant	2.886***	21.396***
	(0.158)	(1.175)
Observations	152	152
Number of Universities	19	19

Test on parallel trend assumption according to Autor (2003); Random-effects panel regression with robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Attachment 10: Hausman test Excellence Initiative research quantity for all universities.

Hausman test:

	Coefficients			
	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Excellence Initiative	0.148	0.168	-0.020	0.013
Excellence Universities	0.432	0.430	0.002	0.005
Personnel Structure	2.776	2.071	0.705	0.304
International Students	0.000	0.000	0.000	0.000
Teaching Workload	0.017	0.017	0.000	0.001
Patents	0.001	0.001	0.000	0.000
Dependency on third-party funds	2.078	2.533	-0.455	0.123
Technical orientation	1.160	1.725	-0.564	0.200
Regional Wealth	0.000	0.000	0.000	0.000
Living Quality	0.000	0.001	0.000	0.000

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 24.75
Prob>chi2 = 0.001

Attachment 11: Hausman test Excellence Initiative research quality for all universities.

Hausman test:

	Coefficients			
	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Excellence Initiative	1.552	1.938	-0.386	0.148
Excellence Universities	-2.680	-2.677	-0.002	0.054
Personnel Structure	33.912	24.308	9.604	3.371
International Students	0.001	0.000	0.001	0.000
Teaching Workload	0.075	0.071	0.004	0.008
Patents	0.001	-0.001	0.002	0.002
Dependency on third-party funds	5.526	10.151	-4.625	1.405
Technical orientation	1.539	4.565	-3.026	2.199
Regional Wealth	0.000	0.000	0.000	0.000
Living Quality	0.001	0.000	0.000	0.001

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 37.13
Prob>chi2 = 0.000

Attachment 12: Hausman test Excellence Initiative research quantity for selected universities.

Hausman test:

	Coefficients			
	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Excellence Initiative	0.083	0.099	-0.016	0.016
Excellence Universities	0.201	0.217	-0.015	0.008
Personnel Structure	7.366	6.376	0.990	0.439
International Students	0.000	0.000	0.000	0.000
Teaching Workload	0.047	0.047	0.000	0.001
Patents	0.002	0.002	0.000	0.000
Dependency on third-party funds	4.881	4.752	0.129	0.200
Technical orientation	-0.465	0.113	-0.578	0.260
Regional Wealth	0.000	0.000	0.000	0.000
Living Quality	0.000	0.000	0.000	0.000

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 7.71

Prob>chi2 = 0.3589

Attachment 13: Hausman test Excellence Initiative research quality for selected universities.

Hausman test:

	Coefficients (b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Excellence Initiative	2.422	2.751	-0.328	0.205
Excellence Universities	-3.229	-3.112	-0.118	0.102
Personnel Structure	48.572	37.715	10.858	5.615
International Students	-0.001	-0.001	0.000	0.000
Teaching Workload	0.143	0.137	0.006	0.011
Patents	-0.010	-0.009	-0.001	0.002
Dependency on third-party funds	14.702	17.869	-3.167	2.459
Technical orientation	-0.285	1.044	-1.328	3.294
Regional Wealth	0.000	0.000	0.000	0.000
Living Quality	0.001	0.001	0.000	0.001

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 11.78
Prob>chi2 = 0.1082

Attachment 14: Robustness check: OLS estimation of the effect of the Excellence Initiative on research quantity for all universities.

The table reports the results of the ordinary least squares model with cluster-robust standard errors at university level in parentheses (***, **, * indicate significance at the less than 1%, 5%, and 10% levels). The sample consists of 73 German public universities observed from 2004-2011 (model (8) and (9) 2005-2011 due to lacking data availability for study programs). The dependent variable is research quantity measured by publications per professor. The treatment group are the German Excellence Universities, the treatment period ranging from 2007-2011, the treatment effect is the interaction of treatment group and treatment period. Years were included.

		(1a)	(2a)	(3a)	(4a)	(5a)
	VARIABLES	Research Quantity				
Difference-in-Differences	Treatment Group	2.423***	1.165**	1.193**	0.836	0.765*
		(0.557)	(0.486)	(0.535)	(0.509)	(0.452)
	Treatment Period	1.137***	1.029***	0.977***	0.715**	0.816***
		(0.091)	(0.176)	(0.239)	(0.283)	(0.271)
	Treatment Effect	0.551***	0.444**	0.389***	0.413***	0.493**
		(0.192)	(0.186)	(0.143)	(0.137)	(0.199)
Institutional Variables	Personnel Structure		-3.386*	-3.299*	-2.508	-2.444
			(1.762)	(1.734)	(1.664)	(1.705)
	International Students		-0.000	-0.000	-0.000	-0.000
			(0.000)	(0.000)	(0.000)	(0.000)
	Teaching Workload		0.005	0.006	0.010	0.008
			(0.009)	(0.009)	(0.009)	(0.009)
	Innovation by university		0.000	0.000	0.000	0.000
			(0.000)	(0.000)	(0.000)	(0.000)
	Dependency on Third-Party Funds		7.287***	6.998***	7.801***	7.906***
			(2.178)	(2.421)	(2.156)	(1.999)
	Technical orientation		1.683	1.871	1.779*	1.624*
			(1.074)	(1.146)	(0.913)	(0.868)
	Undergraduate Programs			-0.001	-0.002	
				(0.004)	(0.003)	
	Graduate Programs			-0.003	-0.000	
				(0.004)	(0.003)	
	Hospital		2.983***	3.078***	3.403***	3.249***
			(0.269)	(0.340)	(0.352)	(0.290)
	Technical University		-0.548	-0.590	-0.334	-0.281
			(0.399)	(0.433)	(0.369)	(0.341)
Environmental Variables	Regional inequality				-0.541*	-0.516*
					(0.297)	(0.280)
	Regional Wealth				0.000	0.000
					(0.000)	(0.000)
	Living Quality				0.002***	0.002***
					(0.001)	(0.001)
	Years	included	included	included	included	included
	Constant	2.341***	-1.696***	-1.203***	-1.908***	-2.812***
		(0.177)	(0.433)	(0.406)	(0.440)	(0.434)
	Observations	584	584	511	503	569
	R-squared	0.276	0.701	0.698	0.745	0.745
	Number of Universities	73	73	73	73	73

Ordinary Least Squares estimation with cluster-robust standard errors at university level in parentheses.

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

Attachment 15: Robustness check: OLS estimation of the effect of the Excellence Initiative on research quality for all universities.

The table reports the results of the ordinary least squares model with cluster-robust standard errors at university level in parentheses (***, **, * indicate significance at the less than 1%, 5%, and 10% levels). The sample consists of 73 German public universities observed from 2004-2011 (model (8) and (9) 2005-2011 due to lacking data availability for study programs). The dependent variable is research quality measured by citations per publications. The treatment group are the German Excellence Universities, the treatment period ranging from 2007-2011, the treatment effect is the interaction of treatment group and treatment period. Years were included.

		(6a)	(7a)	(8a)	(9a)	(10a)
	VARIABLES	Research Quality				
Difference-in-Differences	Treatment Group	7.516***	1.817	1.498	0.714	0.893
		(1.773)	(2.292)	(2.337)	(2.665)	(2.671)
	Treatment Period	7.977***	11.226***	7.884***	6.306***	4.379***
		(0.484)	(1.364)	(1.687)	(1.713)	(0.741)
	Treatment Effect	-2.693***	-2.921***	-2.418**	-2.665***	-3.075***
		(0.806)	(0.990)	(0.950)	(0.944)	(0.851)
Institutional Variables	Personnel Structure		-47.472***	-51.884***	-44.863***	-25.925**
			(12.603)	(13.253)	(12.130)	(10.815)
	International Students		0.002***	0.001**	0.001	0.001
			(0.000)	(0.001)	(0.001)	(0.001)
	Teaching Workload		-0.075*	-0.074	-0.038	-0.016
			(0.045)	(0.049)	(0.053)	(0.047)
	Innovation by university		-0.006***	-0.006***	-0.008***	-0.008***
			(0.002)	(0.002)	(0.002)	(0.002)
	Dependency on Third-Party Funds		20.743	18.805	28.758*	39.312**
			(14.339)	(14.619)	(15.456)	(15.455)
	Technical orientation		-10.500*	-11.437*	-10.659**	-6.749
			(5.967)	(6.072)	(4.853)	(4.694)
	Undergraduate Programs			0.011	0.008	
				(0.022)	(0.019)	
	Graduate Programs			0.032	0.039*	
				(0.023)	(0.020)	
	Hospital		7.016***	6.699***	9.137***	10.065***
			(1.873)	(2.169)	(2.192)	(1.944)
	Technical University		-5.380**	-5.154*	-4.267*	-4.745**
			(2.608)	(2.722)	(2.227)	(2.318)
Environmental Variables	Regional inequality				-4.581**	-4.134**
					(1.857)	(1.867)
	Regional Wealth				0.000	0.000*
					(0.000)	(0.000)
	Living Quality				-0.003	-0.003
					(0.004)	(0.004)
	Years	included	included	included	included	included
	Constant	17.760***	33.193***	36.787***	28.573***	17.295***
		(0.896)	(6.753)	(7.134)	(7.518)	(6.423)
	Observations	584	584	511	503	569
	R-squared	0.144	0.498	0.484	0.557	0.518
	Number of Universities	73	73	73	73	73

OLS estimation with cluster-robust standard errors at university level in parentheses.

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

Attachment 16: Robustness check: OLS estimation of the effect of the Excellence Initiative on research quantity for selected universities.

The table reports the results of the ordinary least squares model with cluster-robust standard errors at university level in parentheses (***, **, * indicate significance at the less than 1%, 5%, and 10% levels). The sample consists of 19 German public universities observed from 2004-2011 (model (8) and (9) 2005-2011 due to lacking data availability for study programs). The dependent variable is research quantity measured by publications per professor. The treatment group are the German Excellence Universities, reference group are those universities that were selected to have additional funding for Graduate School and Excellence Cluster, the treatment period ranging from 2007-2011, the treatment effect is the interaction of treatment group and treatment period. Years were included.

		(11a)	(12a)	(13a)	(14a)	(15a)
	VARIABLES	Research Quantity				
Difference-in-Differences	Treatment Group	1.550**	1.788***	1.870**	1.736*	1.743**
		(0.583)	(0.586)	(0.691)	(0.854)	(0.704)
	Treatment Period	1.507***	1.632***	1.738**	1.336	1.002
		(0.171)	(0.333)	(0.635)	(0.876)	(0.610)
	Treatment Effect	0.454*	0.605**	0.549**	0.599**	0.698**
		(0.226)	(0.245)	(0.204)	(0.221)	(0.263)
Institutional Variables	Personnel Structure		-4.105	-1.642	-4.428	-7.142*
			(4.505)	(4.242)	(3.968)	(3.430)
	International Students		-0.000	-0.000	-0.001*	-0.001**
			(0.000)	(0.000)	(0.000)	(0.000)
	Teaching Workload		0.027	0.025	0.048*	0.060**
			(0.029)	(0.034)	(0.025)	(0.027)
	Innovation by university		-0.002	-0.003	-0.002	-0.002
			(0.004)	(0.004)	(0.004)	(0.004)
	Dependency on Third-Party Funds		-1.466	-2.060	0.439	-0.246
			(6.106)	(6.187)	(5.294)	(5.283)
	Technical orientation		5.146**	6.130**	3.299	2.587
			(2.379)	(2.612)	(3.127)	(2.665)
	Undergraduate Programs			0.007	0.001	
				(0.007)	(0.006)	
	Graduate Programs			-0.010	-0.012	
				(0.014)	(0.014)	
	Hospital		1.610*	1.321	2.349***	2.354***
			(0.796)	(0.916)	(0.660)	(0.485)
	Technical University		-0.697	-0.360	-0.521	-0.714
			(0.756)	(0.910)	(1.775)	(1.555)
Environmental Variables	Regional inequality				1.326	1.303
					(2.230)	(2.057)
	Regional Wealth				0.000	0.000
					(0.000)	(0.000)
	Living Quality				0.000	0.000
					(0.002)	(0.002)
	Years	included	included	included	included	included
	Constant	2.860***	0.329	-0.734	-3.194	-3.028
		(0.176)	(3.421)	(3.768)	(3.931)	(3.504)
	Observations	152	152	133	129	147
	R-squared	0.369	0.622	0.640	0.671	0.676

OLS estimation with cluster-robust standard errors at university level in parentheses.

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

Attachment 17: Robustness check: OLS estimation of the effect of the Excellence Initiative on research quality for selected universities.

The table reports the results of the ordinary least squares model with cluster-robust standard errors at university level in parentheses (***, **, * indicate significance at the less than 1%, 5%, and 10% levels). The sample consists of 19 German public universities observed from 2004-2011 (model (8) and (9) 2005-2011 due to lacking data availability for study programs). The dependent variable is research quality measured by citations per publications. The treatment group are the German Excellence Universities, reference group are those universities that were selected to have additional funding for Graduate School and Excellence Cluster, the treatment period ranging from 2007-2011, the treatment effect is the interaction of treatment group and treatment period. Years were included.

		(16a)	(17a)	(18a)	(19a)	(20a)
	VARIABLES	Research Quality				
Difference-in-Differences	Treatment Group	4.124**	5.371***	5.075***	4.283**	3.951**
		(1.927)	(1.373)	(1.552)	(1.564)	(1.675)
	Treatment Period	7.121***	8.396***	6.259***	10.271***	12.883***
		(0.964)	(1.412)	(1.896)	(2.177)	(1.504)
	Treatment Effect	-3.128***	-2.675**	-2.174**	-2.229**	-2.218*
		(0.958)	(1.130)	(0.907)	(0.947)	(1.070)
Institutional Variables	Personnel Structure		-19.396**	-30.059**	-21.658**	-18.888**
			(8.898)	(11.579)	(7.757)	(7.606)
	International Students		-0.001	-0.001*	0.000	0.000
			(0.000)	(0.000)	(0.001)	(0.000)
	Teaching Workload		0.045	0.068	-0.034	-0.044
			(0.070)	(0.080)	(0.056)	(0.057)
	Innovation by university		-0.011	-0.010	-0.009	-0.009
			(0.009)	(0.008)	(0.007)	(0.007)
	Dependency on Third-Party Funds		8.723	9.311	-5.952	-2.848
			(16.338)	(14.041)	(9.299)	(13.008)
	Technical orientation		-8.291*	-11.882**	-5.689	-7.308
			(4.738)	(5.593)	(3.748)	(4.981)
	Undergraduate Programs			-0.003	0.016	
				(0.016)	(0.012)	
	Graduate Programs			0.022	0.021	
				(0.037)	(0.031)	
	Hospital		-1.160	-0.569	-5.991***	-4.937**
			(2.385)	(2.504)	(2.068)	(1.799)
	Technical University		-4.975***	-5.034***	-1.564	-1.901
			(1.321)	(1.518)	(2.063)	(2.059)
Environmental Variables	Regional inequality				-8.953**	-7.023*
					(3.665)	(3.482)
	Regional Wealth				-0.001***	-0.001***
					(0.000)	(0.000)
	Living Quality				0.008**	0.008**
					(0.003)	(0.003)
	Years	included	included	included	included	included
	Constant	21.553***	31.479***	36.531***	58.253***	53.520***
		(1.204)	(5.778)	(6.589)	(5.936)	(5.684)
	Observations	152	152	133	129	147
	R-squared	0.207	0.684	0.694	0.783	0.772

OLS estimation with cluster-robust standard errors at university level in parentheses.

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

Attachment 18: Robustness check Excellence Initiative with count data.

Robustness check with a negative binomial estimation for the dependent variables Publications, Citations and Professor. The treatment group are the German Excellence Universities, the treatment period ranging from 2007-2011, the treatment effect is the interaction of treatment group and treatment period.

VARIABLES	(a) Publications	(b) Citations	(c) Professors
Treatment Group	0.052	0.290	-0.007
	(0.219)	(0.248)	(0.137)
Treatment Period	0.051***	0.171***	0.009
	(0.016)	(0.024)	(0.012)
Treatment Effect	-0.015	-0.178***	-0.000
	(0.020)	(0.026)	(0.016)
Personnel Structure	2.400***	3.222***	0.367**
	(0.261)	(0.344)	(0.183)
International Students	0.000	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Teaching Workload	0.002*	0.005***	-0.011***
	(0.001)	(0.001)	(0.001)
Innovation by university	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Dependency on Third-Party Funds	1.336***	2.088***	0.102
	(0.187)	(0.249)	(0.138)
Technical orientation	0.441***	0.673***	0.047
	(0.125)	(0.163)	(0.097)
Hospital	1.642***	1.755***	0.665***
	(0.173)	(0.170)	(0.098)
Technical University	0.351*	0.857***	0.046
	(0.192)	(0.183)	(0.122)
Regional inequality	-0.346**	-1.189***	0.071
	(0.173)	(0.180)	(0.111)
Regional Wealth	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Living Quality	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Constant	1.912***	-0.278	6.112***
	(0.192)	(0.185)	(0.268)
Observations	569	569	569
Number of Universities	73	73	73

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Attachment 19: Robustness check Excellence Initiative with made-up treatment including all universities.

OLS regression with Research Quantity and Research Quality as dependent variables. Treatment group are the German Excellence Universities, made-up treatment period is starting from 2010-2011 and treatment effect is the interaction of treatment group and period.

VARIABLES	(d) Research Quantity	(e) Research Quality
Treatment Group	2.636***	6.698***
	(0.235)	(1.126)
Treatment Period	1.140***	8.071***
	(0.273)	(1.312)
Treatment Effect	0.526	-3.460
	(0.469)	(2.251)
years	included	included
Constant	2.080***	17.861***
	(0.191)	(0.917)
Observations	584	584
R-squared	0.276	0.145

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Attachment 20: Robustness check Excellence Initiative with made-up treatment including selected universities.

OLS regression with Research Quantity and Research Quality as dependent variables. Treatment group are the German Excellence Universities, reference group are universities that got funding for Graduate Schools and Excellence Clusters, made-up treatment period is starting from 2010-2011 and treatment effect is the interaction of treatment group and period.

VARIABLES	(f) Research Quantity	(g) Research Quality
Treatment Group	1.730***	3.053***
	(0.269)	(0.869)
Treatment Period	1.526***	7.314***
	(0.531)	(1.713)
Treatment Effect	0.416	-3.535**
	(0.539)	(1.737)
years	included	included
Constant	2.774***	22.060***
	(0.353)	(1.139)
Observations	152	152
R-squared	0.367	0.208

Standard errors in parentheses

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

Attachment 21: Pearson Chi² and Fisher's exact for selection mode and management decision.

	Internal selection	Shared selection	External selection	Total
Internal President	5	11	33	49
	4.1	13.1	31.7	49
External President	1	8	13	22
	1.9	5.9	14.3	22
Total	6	19	46	71
	6	19	46	71

Pearson chi2(2) = 1.8336 Pr = 0.400

Fisher's exact = 0.471

Attachment 22: Classification of selection mode.

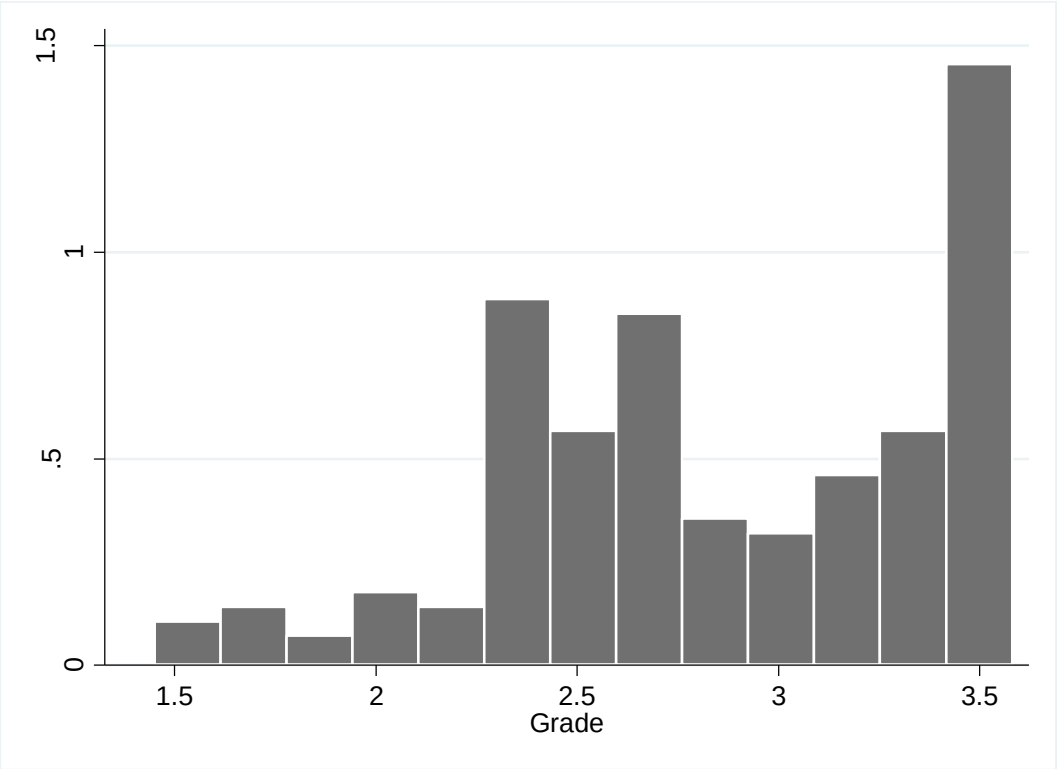
With 1 having an internal selection mode, 2 having a shared selection mode and 3 having an external selection mode.

Federal State	Selection Mode	Veto right
Baden-Wuerttemberg	3	Yes
Bavaria	3	Yes
Berlin	1	Yes
Brandenburg	3	No
Bremen	.	.
Hamburg	2	Yes
Hesse	3	Yes
Lower Saxony	3	Yes
Mecklenburg-Hither Pomerania	1	No
North Rhine-Westphalia	3	Yes
Rhineland-Palatinate	2	Yes
Saarland	3	Yes
Saxony	2	Yes
Saxony-Anhalt	1	No
Schleswig-Holstein	3	Yes
Thuringia	3	Yes

Attachment 23: List of universities with internal and external presidents/rectors in 2012.

Internal President		External President
Aachen TH	Coblenz-Landau U	Bayreuth U
Augsburg U	Cologne U	Berlin HU
Bamberg U	Konstanz U	Chemnitz TU
Berlin FU	Lübeck U	Cottbus TU
Berlin TU	Magdeburg U	Darmstadt TU
Bielefeld U	Mannheim U	Dresden TU
Bochum U	Marburg U	Duisburg-Essen U
Bonn U	Munich TU	Düsseldorf U
Braunschweig TU	Munich U	Erfurt U
Clausthal TU	Münster U	Flensburg U
Dortmund TU	Osnabrück U	Frankfurt (Oder) U
Erlangen-Nuremberg U	Paderborn U	Göttingen U
Frankfurt am Main U	Passau U	Hamburg U
Freiberg TUBergAk	Rostock U	Kiel U
Freiburg U	Stuttgart U	Leipzig U
Giessen U	Trier U	Lüneburg U
Halle-Wittenberg U	Tübingen U	Mainz U
Hamburg-Harburg TU	Ulm U	Oldenburg U
Hannover U	Vechta U	Potsdam U
Heidelberg U	Weimar U	Regensburg U
Hildesheim U	Wuppertal U	Saarbrücken U
Hohenheim U	Würzburg U	Siegen U
Ilmenau TU		
Jena U		
Kaiserslautern TU		
Karlsruhe KIT		
Kassel U		

Attachment 24: Histogram of presidents' grades.

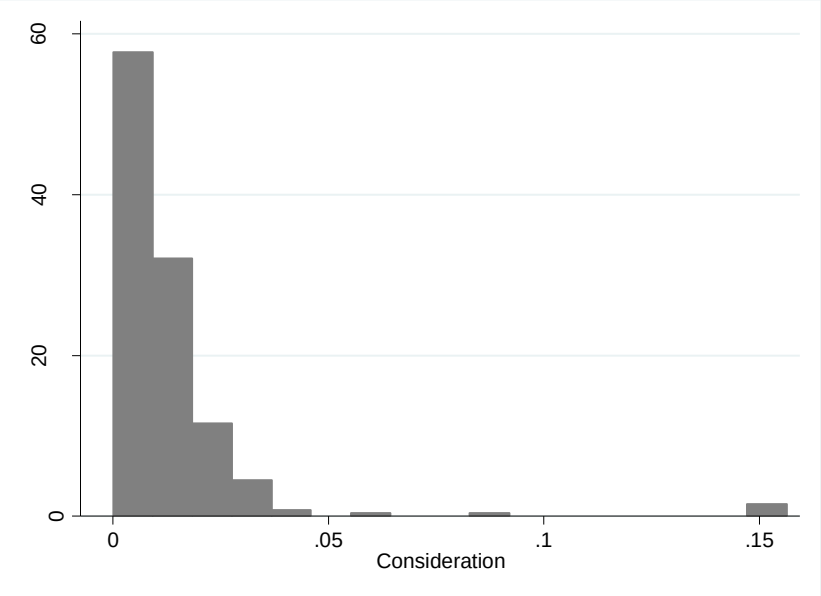


Attachment 25: Correlations presidents.

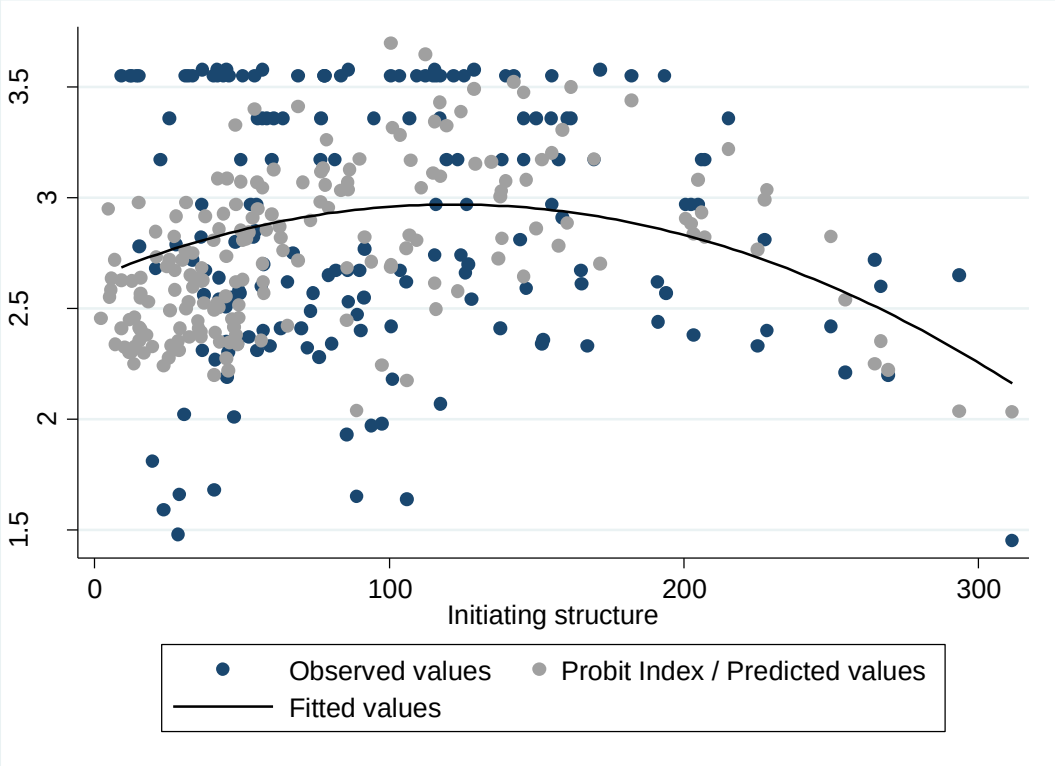
Number of universities: 73, number of presidents 93, years 2009-2012.

		Variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]
Dependent Variables	[1]	Leadership emergence	1.00																				
	[2]	Leadership effectiveness	.	1.00																			
	[3]	Leadership effectiveness (robust)	.	0.78	1.00																		
Five-Factors	[4]	Openness for experience	-0.14	0.02	0.03	1.00																	
	[5]	Conscientiousness	0.12	-0.28	-0.28	0.11	1.00																
	[6]	Extraversion	-0.07	0.07	0.12	0.51	0.18	1.00															
	[7]	Agreeableness	0.08	-0.27	-0.23	-0.09	0.59	-0.08	1.00														
	[8]	Narcissism medium	0.20	-0.01	-0.04	0.06	0.11	0.14	0.07	1.00													
	[9]	Narcissism high	0.29	0.07	0.12	0.09	0.02	0.11	0.07	0.31	1.00												
Leadership Behavior	[10]	Initiating Structure	0.49	-0.07	0.06	-0.09	0.21	-0.10	0.17	0.25	0.44	1.00											
	[11]	Consideration	-0.06	0.05	0.02	0.18	-0.09	-0.09	-0.06	0.06	-0.02	-0.05	1.00										
Controls individual level	[12]	Sex	-0.06	0.02	-0.01	0.09	0.13	0.05	-0.01	-0.10	0.09	-0.10	-0.07	1.00									
	[13]	Age	-0.04	0.01	0.06	-0.14	0.12	-0.12	0.07	-0.19	-0.17	0.00	-0.20	-0.12	1.00								
	[14]	Mobility	0.11	0.02	0.07	0.47	0.05	0.39	-0.21	-0.02	0.15	0.07	0.12	0.23	-0.13	1.00							
	[15]	Subject	0.02	-0.02	-0.04	-0.05	0.40	0.01	0.74	0.07	0.02	0.16	0.09	-0.06	0.04	-0.25	1.00						
Controls institutional level	[16]	University size	0.60	-0.13	0.00	-0.12	0.29	0.00	0.11	0.30	0.41	0.76	-0.07	0.03	-0.10	0.11	0.06	1.00					
	[17]	Technical orientation	0.12	0.00	0.04	-0.15	0.13	-0.18	0.34	0.00	0.02	0.35	0.07	-0.15	0.10	-0.12	0.49	0.02	1.00				
	[18]	Reputation	0.21	0.00	0.05	-0.05	0.22	-0.17	0.15	0.11	0.27	0.62	0.03	-0.06	-0.12	0.06	0.09	0.30	0.17	1.00			
	[19]	Policy Frame	0.05	-0.19	-0.07	-0.08	-0.01	0.05	0.03	0.03	0.01	0.01	-0.03	0.05	-0.08	-0.04	0.05	0.08	0.10	-0.05	1.00		
Controls NUTS-2 level	[20]	Regional situation	0.04	0.06	-0.13	-0.03	-0.13	0.02	-0.05	0.01	0.01	-0.06	-0.08	-0.04	0.12	-0.07	-0.05	-0.02	0.04	-0.19	-0.22	1.00	
	[21]	Living Quality	0.21	0.06	0.10	-0.07	0.28	-0.08	0.04	0.16	0.24	0.53	-0.09	-0.12	-0.01	0.03	0.12	0.43	0.16	0.38	0.07	-0.39	1.00

Attachment 26: Density of consideration.



Attachment 27: Observed values and predicted values for initiating structure (third-party funds) and leadership effectiveness.



Attachment 28: Robustness check conditional marginal effects at mean for leadership emergence.

Marginal effects at the means are calculated by setting the observed values of all covariates to their means within the sample.

VARIABLES	(9a)	(10a)	(11a)	(12a)	(13a)	(14a)	(15a)	(16a)
Openness	-0.002					-0.001	-0.002	-0.000
	(0.001)					(0.001)	(0.002)	(0.001)
Conscientiousness		0.005				0.009	0.010*	-0.001
		(0.004)				(0.006)	(0.006)	(0.007)
Extraversion			-0.070			-0.093	-0.189	-0.101
			(0.111)			(0.160)	(0.182)	(0.151)
Agreeableness				0.001		-0.001	-0.000	-0.000
				(0.001)		(0.001)	(0.001)	(0.001)
Emotional Stability					0.220	0.303***	0.280**	0.239
Medium					(0.161)	(0.099)	(0.119)	(0.215)
					0.483***	0.629***	0.625***	0.341
High					(0.155)	(0.078)	(0.100)	(0.211)
Sex							-0.269	-0.407***
							(0.172)	(0.153)
Age							0.002	0.002
							(0.009)	(0.009)
Mobility							0.066*	0.021
							(0.040)	(0.047)
Subject							-0.081	-0.050
							(0.157)	(0.151)
University size								0.043***
								(0.006)
Technical orientation								0.486*
								(0.281)
Reputation								0.115
								(0.148)
Policy Frame								0.083
								(0.076)
Regional Situation								0.024
								(0.020)
Living Quality								-0.239
								(0.369)
Years	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
Nr. of clusters	58	73	62	73	58	58	58	58
Observations	290	208	291	226	292	206	206	191

Conditional marginal effects at mean, dy/dx for factor levels is the discrete change from the base level;
Robust standard errors clustered at university level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Attachment 29: Robustness check probit estimation for leadership emergence.

VARIABLES	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Openness	-0.004					-0.002	-0.004	0.001
	(0.003)					(0.004)	(0.004)	(0.004)
Conscientiousness		0.014				0.022	0.026*	-0.003
		(0.010)				(0.014)	(0.015)	(0.019)
Extraversion			-0.181			-0.243	-0.494	-0.225
			(0.285)			(0.409)	(0.454)	(0.393)
Agreeableness				0.002		-0.002	-0.001	-0.002
				(0.002)		(0.003)	(0.004)	(0.004)
Emotional Stability					0.589	0.924***	0.825**	0.683
Medium					(0.486)	(0.298)	(0.385)	(0.444)
					1.279***	1.805***	1.760***	0.878*
High					(0.481)	(0.295)	(0.385)	(0.474)
Sex							-0.721	-1.103**
							(0.458)	(0.458)
Age							0.004	0.000
							(0.023)	(0.023)
Mobility							0.178*	0.022
							(0.097)	(0.126)
Subject							-0.192	-0.024
							(0.420)	(0.463)
University size								0.121***
								(0.019)
Technical orientation								1.763**
								(0.730)
Reputation								0.469
								(0.377)
Policy Frame								0.161
								(0.229)
Regional Situation								0.061
								(0.056)
Living Quality								-1.072
								(0.969)
Years	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
Constant	0.680***	0.522**	0.626***	0.453*	-0.281	-0.654**	-1.146	-3.525*
	(0.169)	(0.228)	(0.161)	(0.235)	(0.457)	(0.303)	(1.358)	(1.838)
Nr. of clusters	58	73	62	73	58	58	58	58
Observations	290	208	291	226	292	206	206	191
Pseudo R^2	0.036	0.034	0.027	0.024	0.098	0.148	0.176	0.438
Prob > Chi^2	0.002	0.060	0.002	0.044	0.000	0.000	0.000	0.000

Robust standard errors clustered at university level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Attachment 30: Robustness check average marginal effects for leadership emergence (*Attachment 29*).

Average marginal effects are calculated for each president with their respective observed values of covariates and subsequently averaged across all presidents.

VARIABLES	(9a)	(10a)	(11a)	(12a)	(13a)	(14a)	(15a)	(16a)
Openness	-0.002					-0.001	-0.001	0.000
	(0.001)					(0.001)	(0.001)	(0.001)
Conscientiousness		0.005				0.007	0.008*	-0.001
		(0.004)				(0.005)	(0.005)	(0.004)
Extraversion			-0.068			-0.078	-0.154	-0.049
			(0.107)			(0.131)	(0.139)	(0.085)
Agreeableness				0.001		-0.001	-0.000	-0.000
				(0.001)		(0.001)	(0.001)	(0.001)
Emotional Stability					0.211	0.297***	0.262**	0.157
Medium					(0.158)	(0.097)	(0.116)	(0.107)
					0.464***	0.604***	0.576***	0.202*
High					(0.150)	(0.079)	(0.104)	(0.115)
Sex							-0.224	-0.238**
							(0.138)	(0.094)
Age							0.001	0.000
							(0.007)	(0.005)
Mobility							0.055*	0.005
							(0.030)	(0.027)
Subject							-0.060	-0.005
							(0.131)	(0.100)
University size								0.026***
								(0.003)
Technical orientation								0.381**
								(0.162)
Reputation								0.101
								(0.083)
Policy Frame								0.035
								(0.048)
Regional Situation								0.013
								(0.012)
Living Quality								-0.232
								(0.212)
Years	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
Nr. of clusters	58	73	62	73	58	58	58	58
Observations	290	208	291	226	292	206	206	191

Average marginal effects, dy/dx for factor levels is the discrete change from the base level;
Robust standard errors clustered at university level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Attachment 31: Robustness check logit for leadership emergence with standard errors clustered at federal states level.

VARIABLES	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Openness	-0.007					-0.003	-0.007	-0.000
	(0.006)					(0.008)	(0.007)	(0.008)
Conscientiousness		0.022				0.037	0.043**	-0.004
		(0.016)				(0.025)	(0.021)	(0.040)
Extraversion			-0.290			-0.401	-0.826	-0.525
			(0.460)			(0.502)	(0.563)	(0.977)
Agreeableness				0.003		-0.003	-0.001	-0.002
				(0.004)		(0.005)	(0.007)	(0.006)
Emotional Stability					0.981	1.516**	1.370*	0.999
Medium					(0.804)	(0.625)	(0.729)	(0.771)
					2.110**	2.978***	2.937***	1.537**
High					(0.906)	(0.436)	(0.481)	(0.730)
Sex							-1.172*	-2.105**
							(0.675)	(0.887)
Age							0.007	0.009
							(0.039)	(0.048)
Mobility							0.290**	0.111
							(0.137)	(0.235)
Subject							-0.355	-0.256
							(0.509)	(0.792)
University size								0.222***
								(0.036)
Technical orientation								2.516*
								(1.391)
Reputation								0.597
								(0.814)
Policy Frame								0.430
								(0.434)
Regional Situation								0.125
								(0.099)
Living Quality								-1.235
								(1.549)
Years	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
Constant	0.680***	0.522**	0.626***	0.453*	-0.281	-0.654**	-1.146	-3.525*
	(0.169)	(0.228)	(0.161)	(0.235)	(0.457)	(0.303)	(1.358)	(1.838)
Nr. of clusters	16	16	16	16	16	16	16	16
Observations	290	208	291	226	292	206	206	191
Pseudo R^2	0.036	0.034	0.027	0.024	0.099	0.148	0.176	0.453
Prob > Chi^2	0.000	0.051	0.000	0.002	0.009	0.000	0.000	.

Robust standard errors clustered at federal states level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Attachment 32: Robustness check leadership behavior on leadership effectiveness without consideration outliers.

VARIABLES	(26)	(27)	(28)	(29)	(30)
Initiating structure	0.007**		0.007**	0.009**	0.010**
	(0.003)		(0.004)	(0.004)	(0.005)
Initiating structure²	-0.000**		-0.000**	-0.000***	-0.000***
	(0.000)		(0.000)	(0.000)	(0.000)
Consideration		1.305	-1.016	-8.381	-14.843
		(8.403)	(7.681)	(9.357)	(11.058)
Openness				0.000	0.001
				(0.002)	(0.002)
Conscientiousness				-0.009	-0.017***
				(0.006)	(0.006)
Extraversion				0.116	0.276*
				(0.184)	(0.156)
Agreeableness				-0.004**	-0.002
				(0.002)	(0.002)
Emotional Stability				0.217	0.211
				(0.204)	(0.186)
Sex				-0.362	-0.470*
				(0.261)	(0.245)
Age				0.005	0.001
				(0.014)	(0.017)
Mobility				0.013	-0.011
				(0.070)	(0.061)
Subject				0.398*	0.327
				(0.230)	(0.225)
University size					-0.048
					(0.135)
Technical orientation					-0.008
					(0.013)
Reputation					0.193
					(0.593)
Policy Frame					0.549*
					(0.308)
Regional Situation					0.037
					(0.046)
Living Quality					0.743**
					(0.301)
Years	incl.	incl.	incl.	incl.	incl.
Constant	2.806***	3.127***	2.812***	2.475**	2.527*
	(0.188)	(0.132)	(0.199)	(1.008)	(1.391)
Nr. of clusters	57	57	57	44	43
Observations	170	170	170	125	114
Right-censored observations	69	69	69	53	45
R^2	0.191	0.148	0.191	0.328	0.382
Prob > Chi²	0.001	0.001	0.002	0.000	0.000

Robust standard errors clustered at university level in parentheses, tobit estimation, observations of leadership effectiveness censored at value "3"
*** p<0.01, ** p<0.05, * p<0.1

Attachment 33: Robustness check leadership behavior on leadership effectiveness with standard errors clustered at federal states level.

VARIABLES	(31)	(32)	(33)	(34)	(35)
Initiating structure	0.007*		0.007*	0.009**	0.008
	(0.004)		(0.004)	(0.004)	(0.005)
Initiating structure²	-0.000*		-0.000*	-0.000**	-0.000***
	(0.000)		(0.000)	(0.000)	(0.000)
Consideration		1.049	0.991	-1.742	-1.842
		(2.712)	(2.839)	(4.159)	(4.183)
Openness				0.000	0.001
				(0.002)	(0.001)
Conscientiousness				-0.008*	-0.014*
				(0.004)	(0.008)
Extraversion				0.097	0.189
				(0.295)	(0.228)
Agreeableness				-0.004*	-0.002
				(0.002)	(0.002)
Emotional Stability				0.178	0.140
				(0.178)	(0.198)
Sex				-0.358	-0.431***
				(0.218)	(0.141)
Age				0.006	0.004
				(0.011)	(0.013)
Mobility				0.419**	0.322
				(0.200)	(0.210)
Subject				0.022	0.005
				(0.047)	(0.044)
University size					-0.099
					(0.128)
Technical orientation					-0.002
					(0.009)
Reputation					0.446
					(0.672)
Policy Frame					0.434
					(0.336)
Regional Situation					0.025
					(0.041)
Living Quality					0.709***
					(0.269)
Years	incl.	incl.	incl.	incl.	incl.
Constant	2.810***	3.121***	2.796***	2.360***	2.385*
	(0.125)	(0.154)	(0.130)	(0.839)	(1.336)
Nr. of clusters	16	16	16	15	15
Observations	172	172	172	127	116
Right-censored observations	70	70	70	54	46
R^2	0.192	0.149	0.193	0.317	0.356
Prob > Chi²	0.000	0.000	0.000	.	.

Robust standard errors clustered at federal states level in parentheses, tobit estimation, observations of leadership effectiveness censored at value "3"
*** p<0.01, ** p<0.05, * p<0.1

Attachment 34: Robustness check leadership behavior on leadership effectiveness with ranking position as dependent variable.

VARIABLES	(36)	(37)	(38)	(39)	(40)
Initiating structure	0.146**		0.147**	0.180**	0.153
	(0.072)		(0.071)	(0.079)	(0.096)
Initiating structure²	-0.001*		-0.001*	-0.001**	-0.001***
	(0.000)		(0.000)	(0.000)	(0.000)
Consideration		37.502	40.727	2.424	-1.112
		(94.503)	(83.110)	(77.695)	(79.463)
Openness				-0.023	0.002
				(0.043)	(0.037)
Conscientiousness				-0.207**	-0.353***
				(0.102)	(0.114)
Extraversion				4.772	5.689*
				(3.933)	(3.282)
Agreeableness				-0.106***	-0.086**
				(0.040)	(0.040)
Emotional Stability				2.395	1.411
				(3.719)	(3.197)
Sex				-6.152	-9.859*
				(5.392)	(5.436)
Age				0.087	0.066
				(0.249)	(0.273)
Mobility				11.999**	11.305**
				(4.671)	(4.630)
Subject				-0.032	-0.366
				(1.467)	(1.355)
University size					-3.749
					(2.756)
Technical orientation					0.028
					(0.229)
Reputation					5.655
					(12.073)
Policy Frame					13.061**
					(6.550)
Regional Situation					0.781
					(1.028)
Living Quality					14.953**
					(6.483)
Years	incl.	incl.	incl.	incl.	incl.
Constant	17.161***	23.668***	16.565***	11.174	15.229
	(3.755)	(2.738)	(4.232)	(17.493)	(24.154)
Nr. of clusters	58	58	58	46	45
Observations	172	172	172	127	116
Right-censored observations	96	96	96	71	62
R^2	0.106	0.081	0.105	0.225	0.254
Prob > Chi²	0.129	0.004	0.191	0.000	0.000

Robust standard errors clustered at university level in parentheses, tobit estimation, observations of leadership effectiveness censored at value "21"
*** p<0.01, ** p<0.05, * p<0.1