

# **Corporate Governance in the Private and Public Sector**

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## **Empirical Studies on the Determination of Managerial Incentives in the Private Sector and Efficiency and Quality in the Public Sector**

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# 1 Introduction

## 1.1 German Corporate Governance in the Private and in the Public Sector

Back in 1932, Berle and Means already address the problem of separation between ownership and control in modern corporations by postulating that *“If we are to assume that the desire that the personal profit is the prime force motivating control, we must conclude that the interests of control are different from and often radically opposed to those of ownership; that the owner most emphatically will not be served by a profit-seeking controlling group”* (Berle and Means, 1932, p. 114).

Whereas the owner of a firm generally aims at long term profit maximization provided by efficient resource utilization, management decisions might be rather short term oriented and, at worst case, even on behalf of the owners<sup>1</sup>. The recent emission scandal at Volkswagen AG in 2015 which finally caused a record financial loss of 4.1 billion Euros in 2016 and additionally a severe loss of customer’s trust serves as a standard example for fraudulent management behavior<sup>2</sup>. In academic disciplines the constellation between owner and manager, in particular their divergence of interests, is generally modelled as a principal agent relation (Jensen and Meckling 1976).

The current understanding of corporate governance in the private sector mainly deals with this agency perspective<sup>3</sup>. Thus, the main task of a successful corporate governance system is the efficient alignment of interests between owners and managers, which in turn, guarantee sustainable and profit maximizing management decisions. In order to fulfil this task so called governance instruments (usually represented by economic and legal institutions) are needed. In this context Bushman and Smith (2001) generally differentiate between internal governance mechanisms like “managerial incentive plans”, “director monitoring”, “internal labor market” and external mechanisms like “outside shareholder monitoring”, the “market for corporate control”, “competition in the product market”, “external managerial labor market” and “securities laws” that protect outside investors.

Obviously the agency problem in practice especially applies in stock corporations, where the legal status of the firm per se differentiates between shareholders and managers. As

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<sup>1</sup> See Williamson (1964) for further description of managerial objectives in the context of discretionary behavior.

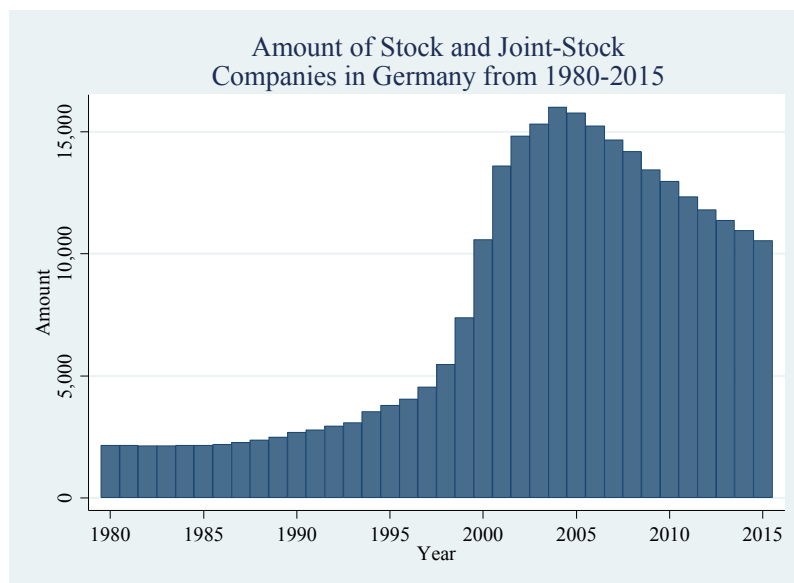
<sup>2</sup> In September 2015 Volkswagen AG admitted software manipulation in millions of cars worldwide in order to cheat on emissions tests.

<sup>3</sup> See Shleifer and Vishny (1997)



the amount of stock corporations in Germany have increased rapidly during the last decades (see figure 1.1) the relevance of the implementation of effective governance instruments in Germany has increased simultaneously.

**Figure 1.1: Stock and Joint-Stock Companies in Germany from 1980-2015<sup>4</sup>**



**Source:** Deutsche Bundesbank, Capital market statistics, Statistical Supplement 2 to Monthly Report

A typical example of the German corporate governance system is the two tier board system. In contrast to the American governance system, where one institution is simultaneously responsible for monitoring and managing, the two tier board system differentiates between a monitoring and a management institution, respectively between a supervisory and an executive board. The supervisory board has the explicit task of controlling executives to ensure that shareholders' interests are upheld, whereas the management board is in charge of the operative decision-making. Amongst other issues, the supervisory board is responsible for setting adequate managerial pay incentives, such that shareholders' and managers' interests are aligned. In this context a recent study by

<sup>4</sup> This graph refers to the sum of stock and joint-stock Companies. Unfortunately, data that explicitly separates between the amount of stock and joint-stock companies is not available. However, the principal agent problem, in particular the discretionary behavior of managers, is present in both legal statuses. Nevertheless, one should take into consideration that most of the following discussed governance tools, especially the legal ones, mainly refer to the legal status of stock corporations.

Fabbri and Marin (2016) documents a 3.5-fold increase of average executive compensation (from 200,000 to almost 700,000 euros<sup>5</sup>) in Germany from 1977 to 2009. However, the authors also state that pay performance sensitivity, and thus the involvement of managerial incentives for performance, is relatively low.

Another particularity of the German governance system is the mandatory representation of labor representatives on the supervisory board. The current version of the German codetermination law was introduced in 1976 and enacts that companies with more than 2000 employees have to fill 50% of the supervisory board seats with employee representatives. Consequently in some stock companies a third interest group (the employees) has a direct impact on managerial compensation setting.

A further example for corporate governance in Germany is the implementation of the German Corporate Governance Code in 2002. This code is based on the concept of “soft laws”, which includes proposals and recommendations for good and responsible corporate governance in listed companies. In particular the recommendations refer to the fields of shareholders, management and supervisory board (and their interaction), transparency, financial reporting and auditing. Although the recommendations are not mandatory, according to §161 of the Stock Corporation Act, a firm has to explain and disclose deviations from the Code. Inspired by the German Corporate Governance Code, in 2006 German jurisdiction introduced a disclosure law (Vorstandsvergütungs-Offenlegungsgesetz (VorstOG)) which aimed for stronger disclosure obligations regarding compensation level and design in German stock companies. Predominantly, this law was implemented in order to provide better monitoring conditions for shareholders and to level inappropriate high executive compensation.

The listed examples point out, that particularly during the last two decades, several institutions and legal changes regarding the optimization of transparency, accountabilities and monitoring processes have been introduced in order to improve corporate governance in the private sector. However, with the implementation of the “new public management” – a global reform in public administration - the idea of corporate governance has even spread to the public sector (Frey and Benz, 2005; Klenk and Nullmeier, 2011). Due to institutional differences between the private and public sectors, other than in private

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<sup>5</sup> Monetary values are at 2006 prices

corporations the predominant aim of this reform is to reach higher effectivities and efficiencies in public administration and public services<sup>6</sup>. In order to fulfill this urgency for higher performance and efficiency, the basic idea of new public management is to adapt management, reporting and accounting approaches from business models to the public sector<sup>7</sup>. In particular, this includes the implementation of business controlling systems and efficient cost-benefit accounting procedures.

In Germany the initiatives to reform public administration started at local government level<sup>8</sup>. The reforms have been motivated by a growing dissatisfaction of city managers with the traditional way of managing local authorities<sup>9</sup>. Consequently, in 1993, the Municipal Association for Administration Management (KGSt<sup>10</sup>) implemented the German variant of new public management, the “new steering model”, which aimed to implement new mechanisms like detailed product descriptions, internal management contracts, decentralized responsibility, product-based budgeting, cost accounting and controlling into local government administration (Reichard, 2003). Later, with the implementation of the Hartz reforms, initiated by the Schröder chancellorship, the German ministry for employment and social affairs started to restructure the public employment services<sup>11</sup>. These reforms were particularly aimed at streamlining public employment services in order to improve effectiveness and efficiency. As an example, the reforms eliminated redundancies by combining employment support and income protection into one single system. From then on so called ”job centers”, held by Joint Local Agencies, are simultaneously responsible for welfare and unemployment

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<sup>6</sup> Instead of “corporate governance in the public sector” sometimes the term “public governance” is used. For a discussion on the differentiation between these two expressions see Bovaird and Löffler (2015).

<sup>7</sup> Hood (1991) summarizes seven main doctrinal components: (1) hands-on professional management, (2) explicit standards and measures of performance, (3) emphasis on output controls (not input controls), (4) disaggregation of units, (5) greater competition, (6) private sector styles of management practice and (7) discipline and parsimony in resource use. For further information on meaning and justification of the seven doctrines see table 1 in Hood (1991).

<sup>8</sup> In Germany the level of administration can be differentiate into federal, state or local level.

<sup>9</sup> Typical for the traditional way of managing was that nobody was really responsible for the end result. Reichard (2003) summarizes it as an “organized irresponsibility“.

<sup>10</sup> “Kommunale Gemeinschaft für Verwaltungsmanagement“

<sup>11</sup> The reforms in the public employment services have been partly inspired by the new steering model.

assistance<sup>12</sup>. As governance in these job centers is based on the new public management approach, it in particular implements a framework for responsible management decisions and effective performance control. Output oriented performance objectives like the reduction of welfare recipients, the increase of job placements and the reduction of long term unemployed persons have been negotiated. In order to reach these targets, job center managers face higher copes for action, which in turn and similar to the private sector, cause the classical principal agent relation between job center managers and higher authorities (Matiaske et al., 2015). Thus, not only in order to provide effective performance control, but also in order to minimize managerial opportunism, the governance reforms in the public sector request the implementation of monitoring and controlling tools.

To sum up, corporate governance in Germany experienced a growing relevance in both the private and public sectors. Therefore, the focus of this dissertation lies on the evaluation of the effectiveness of corporate governance instruments in both sectors. However, whereas in the private sector the general goal of corporate governance is to motivate managers in order to increase the wealth of the corporation, in the public sector the goal is rather to meet performance objectives in an efficient and effective manner (Hodges et al., 1996). Accordingly, analyzing effectiveness of corporate governance instruments in private respectively public sectors will differ from each other:

Regarding the private sector, the main focus lies on the question whether corporate governance instruments indeed lead to a successful alignment of shareholder's and manager's interests. As the alignment of interests is predominantly provided by monetary incentives, this dissertation (chapter 2 to 4) empirically focuses on the impact of three corporate governance mechanisms (foreign competition, the implementation of VorstOG and German codetermination) on level and design of executive compensation.

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<sup>12</sup> In particular the Hartz IV reform aimed at combining welfare and unemployment assistance within one institution. However, the creation of the first joint jobcentres in 2005, a combination of local Public Employment Service and municipal social assistance, called "Arbeitsgemeinschaft (ARGE)" needed to be restructured in 2010 due to new legal regulation. Consequently in 2010, ARGE was replaced by so called Joint Local Agencies which are jointly managed by community representatives and the federal employment agencies (for further information on changes in German employment services see Konle-Seidl (2008) or Matiaske et al. (2013).

According to the new public management approach the general goal of corporate governance in the public sector is rather focusing on efficiency and effectivity. Thus, the corresponding empirical analysis in chapter 5 focuses on the evaluation of efficiency and quality in local public services using the example of German employment offices. Additionally in this context, chapter 5 provides insights on the impact of several new public management characteristics on efficiency and quality in German employment offices.

### **1.1.1 Managerial Incentives in the Private Sector**

#### **The Impact of Competition on Managerial Incentives**

Besides “managerial incentives”, Bushman and Smith (2001) in particular mention “product market competition” as another corporate governance mechanism. The threat of a company’s liquidation, in case of higher competition, might intrinsically motivate managers to increase effort. However, Chapter 2 rather focuses on interdependencies between these two mechanisms that is “**The Impact of Foreign Competition on Executive Compensation in the Manufacturing Industry – A Comparison between Germany and the U.S.A**”<sup>13</sup>.

In particular in times of globalization, companies are not only exposed to national product market competition but also to international competition. Analyzing the impact of competition on managerial incentives without considering its international dimension might thus be insufficient. Therefore, chapter 2 refers to foreign competition, in particular import penetration rates, in order to measure competitive pressure. However, considering imported goods solely as substitutes for domestic products, neglects the fact that imported goods, in particular intermediates, might rather indicate a company’s efficient sourcing strategy. Thus, chapter 2 additionally differentiates between the impact of imported final goods and imported intermediates, in order to disentangle potential efficiency effects the impact of import penetration rates might have.

Previous theoretical literature postulates unambiguous signs regarding the impact of competition on managerial compensation, respectively managerial incentives<sup>14</sup>. Some authors argue that an increase in competition improves the level of the principal’s

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<sup>13</sup> Chapter two is based on joint work with Kornelius Kraft.

<sup>14</sup> E.g. Hart (1983), Nalebuff and Stiglitz (1983), Scharfstein (1988), Hermalin (1992), Schmidt (1997), Raith (2003)

information, such that managers' relative-performance pay sensitivities increase. Other authors state that the impact of competition on managerial incentives is dependent on whether an increase in competition causes an increase or decrease of the firm's value of a cost reduction. For example in case of a decrease of the value of a cost reduction caused by a loss of profits, it might be beneficial to reduce managerial incentives. In case of an increase, on the other side, the principal would benefit from higher managerial effort and thus implement higher incentives.

Cunat and Guadalupe (2005, 2009b) are the only studies using international trade indicators to model the impact of foreign competition on managerial pay incentives. Thus, they are also the most closely related study to the one presented in chapter 2. Cunat and Guadalupe (2005) refer to U.K data and consider the sudden appreciation of the pound in 1996 as a natural experiment in order to model exogenous variation in the degree of foreign competition. Whereas Cunat and Guadalupe (2009b) use U.S manufacturing data and instrument their measurement of competition through imports tariffs and exchange rates. Both studies indicate a positive impact of foreign competition on managerial incentives. However, Cunat and Guadalupe (2009b) point out that foreign competition leads to an increase in pay performance sensitivity and also to a lower level of fix pay, as a trade-off.

Although Cunat and Guadalupe (2005, 2009b) also consider the impact of foreign competition on management compensation, chapter 2 extends and improves this small strand of literature in several dimensions:

(1) Chapter 2 is the only study analyzing the impact of foreign competition on executive compensation using German data. (2) Additionally, chapter 2 presents an international comparison between the U.S. and Germany based on identical estimation specifications and as homogenous data as possible. (3) Furthermore, chapter 2 empirically disentangles potential productivity effects the impact of import penetration might include. This is done by differentiating between the impact of imported intermediates (efficient sourcing strategy) and imported final inputs (competition), using data from German input output tables. Potential endogeneity problems are handled by system generalized moment methods (system GMM).

Similar to previous studies, it turns out that foreign competition leads to an increase in average per head executive compensation in both countries. However, focusing on the

impact of foreign competition on pay performance sensitivity reveals international differences: In the U.S., pay performance sensitivity increases with an increase in foreign competition, given any realistic level of competition intensity. In Germany, pay performance sensitivity only turns out to be positive (and increasing), when a certain degree of competition intensity is reached. Additionally it turns out that the impact of import penetration is not biased by efficiency effects.

### **The Impact of Disclosure Obligations on Managerial Compensation**

Bushman and Smith (2001) further list “director monitoring”, “outside shareholder monitoring” and “securities laws” as corporate governance instruments. Chapter 3, “**The Impact of Disclosure Obligations on Executive Compensation - A Policy Evaluation Using Quantile Treatment Estimators**<sup>15</sup>”, focuses on a combination of these instruments by evaluating the impact of the introduction of stronger mandatory executive compensation disclosure requirements in Germany.

From a theoretical point of view, there are divergent hypotheses suggesting either an increase or decrease of executive compensation due to higher disclosure obligations.

On the one side there is the hypothesis that higher transparency decreases shareholder’s monitoring costs, which in turn might increase the director’s need to justify inappropriate high compensation levels and consequently lead to a decrease in total compensation. Further literature indicates that higher transparency in compensation levels might cause an outrage constraint. Consequently, managers taking care of their own reputation would be reluctant to ask for inappropriate high compensation levels<sup>16</sup>.

Alternatively, higher publication obligations might cause a “ratcheting up effect”. This is an increase in compensation level due to the availability of detailed compensation information about a rival company’s compensation levels. Additionally, managers might want to signal high productivity levels and thus ask for higher compensation levels.

Empirical literature evaluating the impact of stronger disclosure on executive compensation is relatively rare, and respectively does not exist for Germany. However, Andjelkovic et al. (2002), using data from New Zealand, Craighead et al. (2004) using

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<sup>15</sup> Chapter three is based on joined work with Kornelius Kraft.

<sup>16</sup> E.g. Zeckhauser and Pound (1990), Iacobucci (1998), Gordon (2005)

data from Canada, and Clarkson et al. (2011) using data from Australia empirically detect either no impact or an increase in pay-performance relations.

The study presented in chapter 3 is the first to evaluate the effects of the introduction of strongly increased mandatory disclosure requirements in Germany, initiated by the implementation of the VorstOG in 2006. One innovative aspect is the comparison of companies which voluntarily followed a recommendation of the “German Governance Code” before the relevant law was implemented and published detailed information on executive compensation with other firms, which did not. Conditional and unconditional quantile difference-in-differences models are estimated. The companies which refused to publish data before it became mandatory show a reduction in compensation levels for the upper quantiles. Hence, the mandatory requirement to publish detailed information reduced the higher levels of executive compensations, but did not affect executive compensation at lower or medium levels.

### **The Impact of Labor Representation on Managerial Incentives**

As previously stated, one particularity of the German Corporate Governance System is the fact that in companies with more than 2000 employees, half of the supervisory board seats must be filled with labor representatives. Thus, the German legal setting includes a third interest group, the employees, in the compensation setting process. Consequently, the obvious research question in chapter 4 is **“How do Labor Representatives Affect Incentive Orientation of Executive Compensation?”<sup>17</sup>**. From a theoretical point of view there are divergent hypotheses regarding labor’s interests. One strand of literature argues that shareholders’ and employees’ interests are contrary to each other. Thus, employees want to avoid cost minimization strategies, which include wage reductions (or low increases) and fast employment adjustments. In this case, codetermination could exert a negative impact on incentive orientation of executive compensation (Gorton and Schmid, 2004). Contrary to this, one could well argue that shareholders’ and employees’ objective function are similar to one other. In this case, employees would also vote for high managerial pay incentives, in order to avoid excessive risk taking and short-run oriented management decisions.

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<sup>17</sup> Chapter four is based on joined work with Kornelius Kraft.



Empirical evidence on the impact of labor representation on executive compensation is limited to two studies. Gorton and Schmid (2004) use cross section data from 1993 to reveal that the link between executive compensation and firm performance at equal-representation companies is significantly negative. Thus, the authors conclude that management board compensation provides incentives which are not conducive to pursuing shareholders' interests. Secondly, Edwards et al (2009) use panel data covering the years 1983-1993 and find no significant impact of codetermination on pay performance sensitivity. Both studies measure, due to a lack of data, pay performance sensitivity by modelling interaction terms between codetermination dummies and performance indicators. However, the study presented in chapter 4 refers to self-compiled unique panel data on executive compensation, covering the period from 2006 to 2011 for 405 listed companies and is thus able to differentiate between fixed and variable share of total executive compensation. A Hausman-Taylor approach is then used in order to estimate the (potential endogenous) effect of codetermination on the variable share of total compensation. Finally, and contrary to former literature, it turns out that codetermination labor representation has a significantly positive effect on performance-based components, such that labor and shareholders interest regarding managerial incentives might well be similar.

### **1.1.2 Efficiency and Quality in the Public Sector**

As the main goal of corporate governance in the public sector is focusing on effectiveness and efficiency, chapter 5 of this dissertation investigates “**(In)Efficiency of Employment Agencies [...]**<sup>18</sup>”. Existing empirical literature using employment agency level data to measure efficiency in public employment offices is relatively rare, and respectively, does not exist for Germany<sup>19</sup>. Nevertheless, the standard approach of the few existing studies mostly refers to matching efficiency. Hence, an employment office's efficiency is predominantly depending on the quality of the match between the unemployed person and the job requirement. However, one might argue that this interpretation of efficiency is

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<sup>18</sup> The full title of chapter five is “(In)Efficiency of Employment Agencies: A Study on Welfare Benefits Determination – Is there a Trade-off between Time Saving Case Management and Quality of Decisions”. Chapter five is based on joined work with Kornelius Kraft.

<sup>19</sup> USA: Cavin and Stafford (1958); Switzerland: Sheldon (2003), Vassiliev et al. (2006), Ramirez and Vassiliev (2007) ; Sweden: Althin and Behrenz (2005, 2004) , Althin et al. (2010), Andersson et al. (2014)

rather depending on regional particularities, than on individual employee effort. Thus, contrary to the standard approach and due to access to detailed unique job center data, chapter 5 investigates the efficiency of the process of benefit determination for welfare recipients in Germany<sup>20</sup>. Considering that in contrast to matching success, the time an employee needs to determine a recipient's welfare is largely independent of regional labor market conditions, the efficiency measure presented in chapter 5 might serve as a better indicator for managerial efficiency, within employment offices.

In order to check whether there is a trade-off between efficiency and quality, subsequently the quality of the process of welfare benefits determination is considered by analyzing the share of upheld opposition due to a misapplication of the law. Both steps, the determination of efficiency and the determination of quality in job agencies, consider the impact of organizational indicators, for example: accounting, quality management, organizational design. These variables in particular aim to improve organizational efficiency, according to new public management approaches.

The empirical analysis in this chapter is based on stochastic frontier analysis. Finally, no effect of the (in)efficiency term on quality is estimated, which provides evidence for no general trade-off between efficiency and quality in German employment agencies. However, it turns out that treating the newly registered unemployed persons leads to more handling time and simultaneously to less upheld oppositions. Similarly, the implementation of scheduled appointments leads to an increase in time used, but also to an increase in quality. Furthermore, it turns out that better skilled employees need less time for servicing cases and also produce fewer flawed decisions. Unfortunately, this study does not find a lot of evidence for the effectiveness of the new public management variables. On the contrary, it turns out that some of the organizational indicators even increase the ratio of appeals and thus decrease quality. The surprising results regarding the opposed effects of the organizational variables are supported by Matiaske et al (2015). They argue that due to new public management and the higher amount of emotional work, employment office employees experience higher levels of stress than other professional groups. This might be one potential reason explaining inefficiencies in

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<sup>20</sup> As stated earlier due Hartz reforms several changes in the public sector, in particular in employment offices took place. One crucial change was that from then on job agencies are simultaneously responsible for welfare and unemployment assistance.

employment offices, respectively for the ineffectiveness of new public management initiatives which is presented in this study.

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## **2 The Impact of Foreign Competition on Executive Compensation in the Manufacturing Industry – A Comparison between Germany and the U.S.<sup>21</sup>**

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<sup>21</sup> This chapter was written in collaboration with Kornelius Kraft.

## 2.1 Introduction

Although the industrial sectors of Germany and the U.S. share many similarities, differences in the level and structure of management remuneration are a well-known phenomenon. For several decades, the contrasts in management compensation and international wage differences have captured the attention of politics, media and academics all over the world. Above all, the outrageously high remuneration levels, with American executives earning up to ten times their German counterparts, has been a focus of media attention and triggered widespread debate on the proportionality of executive compensation. Thus, a recent study by Fabbri and Marin (2016), for example, delivers a descriptive overview of the trend in total per capita executive pay for the U.S. and Germany. Executive pay in the U.S. increased sevenfold (from one million to seven million dollars during 1977-2003) whereas German executive pay only increased by a factor of three and a half (from EUR200,000 to EUR700,000 during 1977-2007).

One of the most important corporate governance instruments to align the interests of shareholders with those of managers is the implementation of managerial pay incentives. Similarly, competition and the resulting threat of a firm's potential liquidation might exert a disciplining and productivity enhancing impact on managers. Thus, in this study we focus on the direct link between competition and managerial pay incentives. However, in an era of globalization with increased imports and exports the world over, companies are not only exposed to national product market competition but also to international competition. Thus, an analysis of the impact of competition on managerial incentives without considering its international dimension might be inadequate. We therefore argue that foreign competition extends the classic idea of domestic product market competition towards worldwide competition.

Nonetheless, while considering the degree of foreign competition by, for example, referring to import penetration rates one should differentiate whether the imported good is a final good or an intermediate good. Whereas imported final goods might indeed indicate higher competitive pressure, literature provides evidence that imported intermediate goods might rather indicate a firm's greater efficiency and productivity (e.g. Wagner 2011; Schwörer, 2012).

Thus, in this study we (1) empirically consider the impact of foreign competition represented by import penetration rates on managerial pay (sensitivity), we (2) compare

the impact within the two different corporate governance systems of the U.S. and Germany, and we (3) disentangle potential productivity effects that the impact of import penetration might imply by differentiating between the impact of imported final goods and imported intermediates.

Theoretical literature generally points to a direct link between competition and managerial incentives<sup>22</sup>. Eventually, most models predict ambiguous impacts of competition on managerial incentives.

The empirical literature regarding foreign competition mostly considers its impact on firm productivity (Wagner, 2012, Vogel and Wagner, 2010)<sup>23</sup>, worker-level wages and employment (Autor et al. (2014) for the U.S. and Dauth et al. (2016) or Borrs and Knauth (2016) for Germany) or firms' innovation activities (Autor et al. (2016) for the U.S.). However, with the exception of Cunat and Guadalupe (2005, 2009b), who refer to international trade indicators like import penetration or an industry's share of exports as proxy for foreign competition, very little is known about the empirical connection between foreign competition and managerial remuneration or incentives<sup>24</sup>. According to Cunat and Guadalupe (2005, 2009b) it turns out that executives in industries with a high degree of foreign competition experience a stronger increase in pay-performance sensitivities, respectively that import penetration leads to an increase in the sensitivity of pay to performance and a lower level of fixed pay<sup>25</sup>.

Similarly to Cunat and Guadalupe (2009b) we argue that using foreign competition as a general indicator for competition overcomes interpretational problems that other typical

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<sup>22</sup> For example, Hart (1983), Nalebuff and Stiglitz (1983) and Scharfstein (1988) argue that an increase in competition improves the level of the principal's information such that relative performance-pay sensitivities increase. Hermalin (1992), Schmidt (1997) and Raith (2003) differentiate whether an increase in competition causes an increase or a decrease in the value of cost reductions within a firm. While previous models are based on the classical principal agent framework taking competition as an exogenous component, Aggarwal and Samwick (1999) or Beiner et al. (2011) consider competition as a strategic interaction between firms.

<sup>23</sup> See Wagner (2012) for a survey on the link between international trade and firm performance, or Vogel and Wagner (2010) for the relationship between imports and productivity.

<sup>24</sup> Empirical literature that focuses on the impact of product market competition on managerial incentives like, for example, Aggarwal and Samwick (1999), Karuna (2007), Cunat and Guadalupe (2009a), Beiner et al. (2011) will be presented in the next section.

<sup>25</sup> Autor et al. (2014) mention that imports might be correlated with industry, domestic demand or productivity shocks which could cause a simultaneity bias. Cunat and Guadalupe (2005, 2009b) handle potential endogeneity problems that international trade data might imply by either using a natural experiment (Cunat and Guadalupe, 2005) or by using imports tariffs and exchange rates as instrumental variables for import penetration (Cunat and Guadalupe, 2009b).

proxies might deal with<sup>26</sup>. However our study differs from Cunat and Guadalupe (2009b) in several points:

First, our study analyzes the impact of international competition on executive compensation using German data for the first time. Taking into consideration that Germany is one of the most open economies worldwide, this research question has a high relevance for the German corporate governance system.

Second, we provide an international comparison of the impact of foreign competition on managerial incentives between the U.S and Germany by using identical estimation specification and techniques based on data that is as homogenous as possible.

Third, ours is the only study that disentangles potential productivity effects that the impact of import penetration might include. Therefore we use German input-output tables that provide exact information on the value of imported intermediates. Generally, high volumes of imported inputs delivers an indicator for a firm's efficient sourcing strategy. Thus, in order to assure that general import penetration represents an adequate proxy for the degree of foreign competition rather than for productivity we check whether imported intermediates might drive the results. Thus, we re-estimate the impact of import penetration on executive compensation by exclusively considering imported intermediates. Furthermore, we use system generalized moment methods (system GMM) in order to handle potential endogeneity problems.

Our results reveal that, both in Germany and in the U.S., an increase of foreign competition leads to an increase in total per capita executive compensation. Extending the analysis by explicitly modelling the impact of foreign competition on pay-performance sensitivity allows us to differentiate between the impact of foreign competition on fixed and variable pay components. In contrast to Cunat and Guadalupe (2009b), for both countries our results reveal no significant impact on fixed compensation. However, our results point to international differences in the disciplining effect of foreign competition regarding pay-performance sensitivity. Whereas in Germany foreign competition needs to reach a certain intensity before pay-performance sensitivity is positive, in the U.S competition increases managerial incentives at any realistic level of competition intensity. Considering that the overall impact of import penetration on executive compensation is

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<sup>26</sup> In particular, the common use of the concentration index is criticized as a poor proxy for competition due to an unclear relation between concentration and competition (e.g. Raith, 2003 or Karuna, 2007).

positive, negative pay-performance sensitivities for low levels of import penetration in Germany might indicate that in that case fixed pay components simply outweigh variable pay.

By using German input-output table data we additionally present evidence that potential productivity and efficiency effects of imported inputs do not drive general results. In particular, it turns out that imported intermediate goods do not have a significant impact on compensation level or design.

The layout of this study is as follows. Section 2.2 gives an overview of theoretical and empirical literature regarding the impact of competition on management compensation. Afterwards, in section 2.3, we present the German and U.S. sample, followed in section 2.4 by a short introduction to system GMM estimation techniques. In section 2.5 we present our estimation results. In section 2.6 we disentangle the impact of import penetration by splitting it into import penetration based on final goods and outsourcing (import penetration based on imported intermediates). Finally, section 2.7 provides a short conclusion.

## 2.2 Literature

Regarding management compensation, literature mostly focuses on firm-level determinants like performance, firm size and governance mechanisms. However, the impact of competition as an industry-level governance mechanism has recently gained in importance. Basically, there is a differentiation between three different types of competition: labor market competition<sup>27</sup>, product market competition and foreign competition, whereby the latter two are often analyzed simultaneously. Especially in theoretical models the assumption of product substitutability, the growth of market size, entry costs, and concentration could well represent both, product market competition and foreign competition. In the following we will briefly summarize this strand of theoretical and empirical literature.

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<sup>27</sup> For the impact of an increase in labor market competition on executive compensation in the U.S. market consider Bénabou and Tirole (2016) and for the German market see Fabbri and Marin (2016). In both studies an increase in labor market competition results in an increase in executive compensation.



### 2.2.1 Theoretical Contributions

Theoretical literature on the impact of product market competition and foreign competition in a principal agent context started in the early 1980s with, for example, Hart (1983), Nalebuff and Stiglitz (1983) or Scharfstein (1988). In general, these models reveal that an increase in competition changes the information structure of the agency problem and thus improves the availability of market information, resulting in an increase in relative performance-based compensation. Subsequently, Hermalin (1992) criticized previous literature as being too narrow by only considering a change-in-information effect. He expands on this literature by considering additional factors like income effects, risk-adjustment effects and change-in-relative-value-of-actions effects that competition might have on the agency problem. It turns out that all effects have ambiguous impacts on managerial incentives.

Schmidt (1997) focuses on managerial incentives in the case of the “threat of liquidation”. The basic assumption in his model is that the probability of a firm’s liquidation increases with higher competition, resulting in two different effects on managerial incentives:

The first effect is called the “threat-of-liquidation” effect. Given the manager’s participation constraint is binding<sup>28</sup>, managerial effort increases intrinsically in order to improve a firm’s efficiency and decrease the manager’s disutility of liquidation. In that case the model predicts an unambiguous effect, namely that managerial effort increases with an increase in competition.

The second effect is called the “value-of-a-cost-reduction” effect which is of ambiguous sign. Assuming that the participation constraint is not binding, firms would have to pay a rent in excess of the manager’s reservation utility. An increase in competition, which induces a decrease in profits, could affect the value of a cost reduction in both directions<sup>29</sup>. Thus, the impact of competition on managerial incentive pay depends on whether the value of a cost reduction increases or decreases. If, for example, the value of a cost reduction decreases due to a reduction in profits it might well be that the principal’s

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<sup>28</sup> Market for managers clears because wage equals outside option utility such that there is no involuntary unemployment.

<sup>29</sup> Hermalin (1992) refers to this as the change-in-relative-value-of-actions and Raith (2003) refers to an increase in the value of a cost reduction as a “business stealing effect” and decrease in the value of a cost reduction as a “scale effect”.

benefits of a higher level of managerial efforts are reduced such that he is less inclined to pay a high rent to the manager in order to induce high effort. Conversely, an increase in the value of a cost reduction would increase the principal's benefits from managerial effort such that it might be beneficial to implement higher rents for the managers.

Contrary to Schmidt (1997), Raith (2003) theoretically derives an unambiguous effect by assuming an endogenous market structure (free entry and exit). In that case competition leads to a decrease in prices and profits, such that some firms are forced to leave the market until zero profits are reached. For the remaining firms, which now have to provide higher amounts of output for relatively low prices, the value of a cost reduction automatically increases. As a result managerial incentive pay will increase.

A recent study by Andergassen (2016) focuses on the theoretical impact of product market competition on managerial compensation, taking managers' fraudulent behavior into account. The classical asymmetry between principal and agent enables managers to behave fraudulently (e.g. by exerting unobservable cost-cutting effort in order to inflate their wealth) which could in some cases be beneficial and in other cases costly for the firm<sup>30</sup>. In case of the latter, shareholders would gain from managerial effort against fraudulent behavior such that managerial incentive pay increases. In that context, Andergassen (2016) analyzes how the trade-off between fraud and effort changes with an increase in competition. The model predicts that shareholders prefer to endure fraudulent behavior in order to elicit strong managerial effort. Furthermore, fraudulent behavior is more likely in industries with a high degree of competition. Accordingly, the model predicts a positive correlation between managerial incentives and product market competition.

Aggarwal and Samwick (1999) consider the theoretical impact of competition on managerial incentives depending on relative firm performance. This approach is the first one that considers the impact of competition in a strategic interaction between firms. In their model the authors differentiate between product market competition with markets

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<sup>30</sup> For positive effects of fraudulent behavior on profits see Povel et al. (2007); for negative effects see Jensen (2003).

where outputs are either strategic complements or strategic substitutes<sup>31</sup>. In case of strategic complements the model predicts that the ratio of the own-firm pay-performance sensitivity to the rival firm pay-performance sensitivity is a decreasing function of competition whereas in the case of strategic substitutes this ratio is an increasing function of competition.

As Aggarwal and Samwick (1999) consider strategic interaction between firms, and thus ignore the standard principal-agent model, Beiner et al. (2011) present a model on the impact of competition on managerial incentives taking both strategic competition and the principal-agent model into account. Regarding the impact of competition on managerial incentives the authors derive two hypotheses: First, they argue that the impact of competition on incentives is nonlinear (convex) and depends on the degree of competition such that in the case of low competition an increase leads to weaker incentives. Once competition reaches a certain intensity, an increase leads to stronger incentives. Their second hypothesis says that the marginal effect of competition on incentives increases with the level of competition.

Whereas previous literature mostly focuses on competition as product market competition, to our best knowledge Gersbach and Schmutzler (2014) is the only theoretical model that focuses in particular on the impact of globalization on managerial wages and thus considers not only an increase in market size but also an increase in competition in the labor market<sup>32</sup>. It turns out that globalization leads to an increase in the heterogeneity of executive remuneration but not necessarily of the overall wage level. However, the authors argue that this result is still in line with the observed and empirically often discussed increase in average compensation of top executives due to the fact that empirical results usually refer to a small group of top managers.

Eventually, theoretical literature on the impact of competition on managerial incentives predicts ambiguous results. Some authors postulate an unconditional positive impact, others point out that the sign of the impact depends on circumstances like, for example, a

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<sup>31</sup> If the outputs are strategic complements (Bertrand model) and there is an increase in competition, managers receive less incentive to maximize the value of their own firm and more incentive to maximize the value of all firms in the industry when competition increases. If the outputs are strategic substitutes (Cournot model) and there is an increase in competition, managers receive weaker incentives to maximize the value of their own firm and stronger incentives to minimize the value of other firms (the aim is to deter competitors).

<sup>32</sup> The authors model globalization as the simultaneous replacement of national markets by one integrated market with higher demand, a larger number of firms and a larger pool of managers.

decrease or increase in the value of a cost reduction, a high or low level of competition or whether the traded goods are complements or substitutes. Thus, deriving a clear hypothesis regarding the impact of foreign competition on managerial incentives based on theoretical literature is not straightforward. Above all, it becomes necessary to investigate the relation between competition and managerial pay incentives empirically.

### **2.2.2 Empirical Studies**

As we argued earlier, using foreign competition to measure the degree of competitive pressure might, in times of globalization, be a more appropriate indicator than using product market competition. However, as empirical literature on the impact of foreign competition on managerial incentives is only limited to Cunat and Guadalupe (2005, 2009b) we also summarize the closely related literature on product market competition and its impact on managerial incentives. Basically, differences between existing empirical studies are based on differences in the proxy that is used in order to measure the impact of competition.

The first group of literature refers to the Herfindahl index as proxy for competition. Thus, Aggarwal and Samwick (1999) test the implications of their own model empirically by using U.S. data on all S&P 1500 chief executives and executives for 1995. It turns out that an increase in competition increases the sensitivity of compensation to a rival firm's performance and thus supports the strategic complement model instead of the strategic substitute model described above<sup>33</sup>. Beiner et al. (2011) use hand-collected Swiss data from 2002 to 2005 covering 200 firms. Similarly, they also use different versions of the Herfindahl index as proxies for competition<sup>34</sup>. The authors provide empirical evidence for a convex relationship between competition and managerial incentives, meaning that once a certain degree of competition intensity is reached, competition leads to an increase in managers' pay-performance sensitivity. Chen et al. (2015) is the most recent empirical study that uses the Herfindahl index as proxy for competition. The authors focus on the impact of competition intensity and competition type on managerial incentive contracts,

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<sup>33</sup> Further, considering their results the authors refer to previous empirical literature that reveals weak pay-performance sensitivities (e.g. Jensen and Murphy, 1990) and argue that an optimal contract could still exist even in case of small own-firm pay-performance sensitivity as long as the rival firm performance sensitivity is of similar magnitude.

<sup>34</sup> The main proxy in Beiner et al. (2011) is a sales-based Herfindahl index. As robustness the authors also calculate a Herfindahl index based on assets and employees.

in particular the use of customer satisfaction measures in executives' annual bonus contracts<sup>35</sup>. By differentiating between non-price-based and price-based competition, the authors predict that the use of customer satisfaction measurements should be stronger in a non-price-based competition because non-price-based competition is more likely to increase the salience of customer satisfaction than in price-based competition. Using hand-collected information on the use of customer satisfaction measurements as a managerial incentive component in S&P1500 companies, and data on executive compensation and company financials for the years 2006 and 2010, the authors find empirical evidence for their hypothesis. In particular, it turns out that an increase in competition intensity given non-price-based competition increases the probability of the use of customer satisfaction measurements as a component of managerial incentive compensation.

Karuna (2007) expands on previous literature by arguing that competition is multi-dimensional in its relation to incentives and that the simple consideration of concentration indices is insufficient. The author refers to Raith (2003) and argues that market structures are not exogenous and that competition encompasses other dimensions given a certain level of market concentration, such as product substitutability, market size and entry costs. Thus he provides three measures of competition in order to differentiate between the incremental effect each determinant might have on incentives<sup>36</sup>. Using U.S. data from 1992-2003 it turns out that overall competition has a positive impact on managerial incentives. In particular, product substitutability and market size have a positive impact, whereas entry costs have a negative impact on managerial incentives.

Ko et al. (2016) extends Karuna's (2007) approach. Again, the authors analyze the impact of product substitutability, market size and entry costs but now they also consider the ownership structure. They are especially interested in the impact of the multi-dimension of competition given a certain ownership structure (e.g. widely-held firms vs. family- or state-controlled firms). The authors use a sample including data on China, Hong Kong, Singapore and Taiwan, and covering the period from 2001 to 2012. In contrast to closely

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<sup>35</sup> The authors state that customer satisfaction is the most commonly used nonfinancial performance measure.

<sup>36</sup> Product substitutability is represented by the price-cost margin calculated as sales divided by operating costs on industry level, market size is measured as industry sales, and entry costs are measured as the weighted average gross value of the cost of property, plant and equipment.

held firms, it turns out that the pay sensitivity of widely-held firms increases with higher competition.

Cunat and Guadalupe (2009a) consider U.S. product market competition in the banking and financial sectors and its effects on executive compensation using yearly data from 1992 to 2002. In contrast to previous literature, they use banking sector deregulation and a financial services deregulation act as quasi-natural experiments in order to model the impact of differences in the degree of competition on managerial pay<sup>37</sup>. For the banking and financial sector it turns out that post-deregulation total pay stayed constant, whereas the composition of compensation changed essentially with a decrease in fixed components and an increase in performance-based pay. Again, the authors conclude that an increase in product market competition causes a stronger incentive-orientated executive pay.

Cunat and Guadalupe (2005, 2009b) are the studies most closely related to ours, using international trade shocks as a source of variation in competition and their impact on compensation structure. Cunat and Guadalupe (2005) use a sample of UK firms covering the period from 1992 to 2000 and similarly to Cunat and Guadalupe (2009a), they consider a natural experiment (the sudden appreciation of the pound in 1996) in order to model exogenous variation in the degree of openness in different sectors. Although openness is measured on industry level as either import penetration (import at sector level as a proportion of total output plus net imports) or the share of export in total output (sector export divided by sector output). It turns out that sectors that were more exposed to foreign competition experienced a stronger increase in pay-performance sensitivities for the highest and average-paid directors after the appreciation of the pound in 1996 than sectors with relatively low levels of foreign competition.

Cunat and Guadalupe (2009b) focus on the impact of foreign competition on changes in executives' incentive structures. Similarly to us, they use import penetration as a proxy for competition intensity and argue that this may overcome endogeneity problems that arise from the use of standard measures of competition like Herfindahl indices or price-cost margins. Furthermore, they use exchange rates and tariffs in order to solve potential

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<sup>37</sup> The first deregulation is the 1994 Riegel-Neal Banking and Branching Efficiency Act and the second one is the 1999 Gramm-Leach-Bliley Act. Both deregulation acts basically lowered entry barriers such that competition in the North American banking and financial sectors increased.

endogeneity problems when using import penetration as a proxy for competition. Their sample consists of all manufacturing firms in the S&P 500 index for the period from 1992 until 2000. A main finding is that an increase in import penetration implied a 23% fall in the fixed component of compensation and a 3.5% increase in performance-pay sensitivity. To sum up, empirical literature predominantly reveals that an increase in competition (either measured by product market competition or foreign competition) leads to an increase in managerial pay-performance sensitivity. However, only a small fraction considers foreign competition as a proxy for competitive pressure. We argue that, particularly in times of globalization, neglecting international competitive pressure is insufficient. Thus, to the best of our knowledge our study is the first one that analyzes the impact of foreign competition on German executive compensation and additionally provides a comparison with the U.S. Furthermore, in contrast to Cunat and Guadalupe (2005, 2009b) our study is the first one that considers the two dimensions of foreign competition. Literature provides evidence that a high amount of imported intermediates might rather indicate a company's efficient sourcing strategy or productivity instead of competitive pressure<sup>38</sup>. By differentiating between imported final goods and imported inputs we are able to check whether the estimated results are indeed driven by competitive pressure or rather by potential efficiency effects due to imported intermediates.

### **2.3 Data**

In order to provide an international comparison of the impact of foreign competition on executive compensation between the U.S. and Germany, data for both countries is needed. As international trade mostly applies to the manufacturing sector both datasets are restricted to the manufacturing industry. For both countries we had to combine different data sources. Thus, the German sample basically consists of two different sources. First, the basic information on company financials and average per capita executive compensation is provided by a self-collected unbalanced panel dataset on a huge number of relevant German manufacturing firms (predominantly stock-listed companies). In detail, our dataset covers 316 firms during the periods from 1984 until

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<sup>38</sup> This strand of literature will be extensively discussed in section 2.6.

2010. Firms are identified by a two-digit industry classification<sup>39</sup>. This is used in order to combine the basic data with foreign trade information on industry level provided by the Federal Statistical Office of Germany<sup>40</sup>. In particular, we derived industry level information on imports, exports and total sector sales. Furthermore, we add yearly data on the CDAX price index and GDP provided by the German central bank.

Our basic U.S. data is provided by Compustat's ExecuComp. This dataset provides individual compensation information on the five highest paid executives and on company financials. In order to provide the best possible and thus homogenous comparison between the U.S and Germany we calculate the average total per capita executive compensation based on the five highest paid executives<sup>41</sup>. Furthermore, we restrict the U.S sample to S&P500 companies from the manufacturing sector. Additionally, we match import and export data on a three-digit industry level<sup>42</sup> provided by Schott (2008)<sup>43</sup>. Similarly to Schott (2010) we use information on the total value of shipment<sup>44</sup> on industry level from the NBER-CES manufacturing industry database provided by Becker et al. (2013)<sup>45</sup>. We obtain yearly GDP data from Federal Reserve Bank of St. Louis and yearly S&P500 price index from boerse.de. Thus, our unbalanced U.S sample covers 180 firms over the period from 1992 until 2011<sup>46</sup>.

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<sup>39</sup> The two-digit industry classification refers to the classification of economic activities provided by the Federal Statistical Office of Germany. Over the sample period there have been several revisions (WZ93, WZ03, WZ08), all of which we accounted for.

<sup>40</sup> We digitalized relevant information from the relevant statistical yearbook. Information on total sector sales is provided in chapter 9 "Industry, Manufacturing" until 2003. From 2004 onward this information was provided in chapter 14. Information on the value of imports and exports is provided in chapter 12 "Foreign Trade". Old statistical yearbooks are available at "DigiZeitschriften".

<sup>41</sup> In order to calculate the average per capita executive compensation we use the Compustat variable tdc2. This variable represents the realized compensation including exercised stock options. According to Mishel and Davis (2014) this is the most frequently used indicator for executive compensation used by economists.

<sup>42</sup> We refer to the NAICS classification. The three digit NAICS classification resembles the two digit WZ classification.

<sup>43</sup> The data is available at Schott's International Economics Resource Page Trade Data and Concordances ([http://faculty.som.yale.edu/peterschott/sub\\_international.htm](http://faculty.som.yale.edu/peterschott/sub_international.htm), accessed 4<sup>th</sup> of May 2017)

<sup>44</sup> Total value of shipment is based on net selling values and is thus comparable to the German equivalent, namely total sector sales.

<sup>45</sup> <http://www.nber.org/nberces/>, accessed May 4, 2017

<sup>46</sup> Currently the NBER-CES dataset is only available until 2011 such that the whole sample is restricted to 2011.



Tables 2.1 and 2.2 present summary statistics for both the German and the U.S. datasets<sup>47</sup>. Apparently, at \$4.453 million, the average U.S. per capita executive compensation is higher than the average per capita executive compensation in Germany, at EUR377,000. Although our sample only focuses on the manufacturing industries, the magnitude of differences in compensation levels is consistent with Fabbri and Marin (2016), which indicates the representability of both samples. The sales variable is used as a representor for company size. As expected, the average U.S. firm in our sample is, at \$16.507 billion net sales, clearly much larger than an average German firm at EUR1.488 billion sales. Regarding the return on equity (ROE) we also observe differences between the two samples. For the German sample the average return on equity lies at almost 7 percent, whereas it is 16 percent for the U.S. sample. Furthermore, we provide summary statistics for the yearly GDP (measured in EUR billion and \$ billion) and the yearly stock CDAX (CDAXPI) and S&P500 (S&P500PI) stock price indices (measured in points).

**Table 2.1: Summary Statistics – German Sample 1985-2010**

	mean	sd
Comp	377.3505	377.5204
Sales	1487.829	5518.051
ROE	6.980323	16.59519
CDAXPI	234.6043	83.6604
GDP	1767.14	286.008
ImportPen	.3548993	.1798333
<i>N</i>	2478	

Due to currency change in 2001 from DMark to Euro all monetary values have been transformed into Euro values by dividing with factor 1.95583. All monetary values are consumer price index deflated and reported in 1995 Euro.

<sup>47</sup> Because of our estimation specification, which will be described later, one observation year was lost. Although both samples cover one earlier period, the summary statistics refer to the dataset that was finally used in the following econometric analysis.

**Table 2.2: Summary Statistics – U.S. Sample 1993-2011**

	mean	sd
Comp	4453.85	5198.874
Sales	16507.33	34052.51
ROE	16.59848	18.29658
S&P500PI	1276.418	311.7273
GDP	13391.5	1554.513
ImportPen	.3039063	.1982494
<i>N</i>	2802	

All monetary values are consumer price index deflated and reported in 2010 Dollar.

The variable of highest interest in both samples is import penetration. As mentioned earlier, the construction of our measurement refers to international trade literature, for example Autor et al. (2014).

For the German data, import penetration on the two-digit WZ industry level is defined as:

$$ImportPen_{j,t} = \frac{imports_{j,t}}{total\ sector\ sales_{j,t} + imports_{j,t} - exports_{j,t}} \quad (2.1)$$

The equivalent for the U.S. data on the three digit NAICS industry level is defined as:

$$ImportPen_{j,t} = \frac{imports_{j,t}}{total\ value\ of\ shipment_{j,t} + imports_{j,t} - exports_{j,t}} \quad (2.2)$$

The index  $j$  shows that our measurement for foreign competition only varies on industry level. However, as competition takes place, in particular within an industry, we argue that variation on industry level is sufficient<sup>48</sup>. Tables 2.1 and 2.2 reveal that the sample average degree of import penetration in Germany is only slightly higher than in the U.S. at 0.35 compared to 0.30.

<sup>48</sup> Cunat and Guadalupe (2009b) account for the fact that firms might operate in more than just one industry. Thus, they use weights that correspond to the fraction of total sales in which the firm operates in order to calculate a weighted average of import penetration which finally leads to firm level variation. Due to a lack of data we are not able to reproduce this measurement. However, we argue that the main industry in which a company operates is still sufficiently representative of the competition intensity. This industry will in all likelihood be the most important one regarding strategic management decisions.

## 2.4 Econometric Model

The aim of our study is to evaluate the impact of foreign competition on executive compensation levels and pay-performance sensitivity. Therefore we set up the two following basic estimation equations:

$$\begin{aligned} \ln Comp_{i,j,t} = & \pi_1 \ln Comp_{i,j,t-1} + \beta_1 \ln Sales_{i,j,t} + \beta_2 ROE_{i,j,t} \\ & + \beta_3 \ln ImportPen_{i,j,t} + \lambda_t + \alpha_i + \varepsilon_{i,j,t} \end{aligned} \quad (2.3)$$

$$\begin{aligned} \ln Comp_{i,j,t} = & \pi_1 \ln Comp_{i,j,t-1} + \beta_1 \ln Sales_{i,j,t} + \beta_2 ROE_{i,j,t} \\ & + \beta_3 \ln ImportPen_{i,j,t} + \beta_4 \ln ImportPen_{j,t} * ROE_{i,j,t} + \lambda_t + \alpha_i \\ & + \varepsilon_{i,j,t} \end{aligned} \quad (2.4)$$

In both models the dependent variable  $\ln Comp_{i,j,t}$  represents the log of average per capita executive compensation for company  $i$  in industry  $j$  during time period  $t$ . As usual in a panel data context our model includes time fixed effects  $\lambda_t$ , company fixed effects  $\alpha_i$ , and an idiosyncratic error component  $\varepsilon_{i,j,t}$ . As the focus of this study lies on the impact of import penetration on management compensation we model the log of import penetration ( $\ln ImportPen_{j,t}$ ) on two-digit industry level  $j$  at time period  $t$  as explanatory variable. Because we are primarily interested in the impact of foreign competition on pay-performance sensitivity we extend model (3) by adding an interaction term between our performance indicator return on equity ( $ROE_{i,j,t}$ ) and import penetration in equation (2.4).

Using import penetration as an indicator for foreign competition is accompanied by endogeneity problems. In particular, there might be a correlation between industry imports and industry domestic demand or productivity shocks. Given that these endogenous and unobservable fluctuations in import penetration also influence management compensation there might be a classical omitted variable bias in  $\beta_3$  (e.g. Cunat and Guadalupe, 2009b), Autor et al. (2014)). In order to account for this kind of

bias previous studies use exogenous instruments for import penetration<sup>49</sup>. Blundell and Bond (1998) introduce a system GMM estimation technique which refers to lags of the endogenous variables as internal instruments provided that the error term  $\varepsilon_{i,j,t}$  is not serially correlated. Thus, valid instruments outside the dataset are no longer needed. Unlike previous studies, we handle import penetration as an endogenous variable within the system GMM framework where lags of import penetration are used as valid instruments<sup>50</sup>.

Apart from endogeneity problems regarding import penetration it might be reasonable to assume further simultaneity problems regarding other control variables. In particular the causality between classical covariates like firm performance ( $ROE_{i,j,t}$ ) and company size ( $\ln Sales_{i,j,t}$ ) might apply in both directions. Thus, an increase in management compensation might well cause higher firm performance or growth in company size. Using system GMM additionally allows us to control for this simultaneity problem.

A second advantage of system GMM estimation techniques is the possibility to model dynamic relations, meaning that the current realization of the dependent variable might well be influenced by past ones. Considering the general consistency of management compensation over time it might be useful to insert the lagged dependent variable  $\ln Comp_{i,j,t-1}$  as an additional explanatory variable in order to control for serial dependences.

Due to the fact that there is no trade-off between lag length and sample length in GMM estimation techniques, theoretically one could include all valid lags as instruments. However, in order to limit the weak instrument problem we restrict the lag range for our endogenous variables to lag two for the transformed equation and lag one for the levels equation<sup>51</sup>. As mentioned earlier, a necessary condition for the validity of the system

<sup>49</sup> Cunat and Guadalupe (2009b) instrument import penetration by using import tariffs and exchange rates. Autor et al. (2014) instrument changes in U.S. imports from China using import growth in other high income countries.

<sup>50</sup> In Arellano-Bond's difference GMM estimator endogeneity is solved by removing the fixed effect by differencing it out (or by using orthogonal deviations) and instrumenting endogenous differences with levels. Conversely, Blundell and Bond's system GMM approach uses lagged differences as instruments for levels and lagged levels as instruments for equations in first differences such that all regressors are exogenous to the fixed effects. In comparison to difference GMM, system GMM produces efficiency gains particularly in autoregressive models with persistent series (e.g. Baltagi, 2013, pp. 167, Blundell and Bond 1998, Roodman 2009).

<sup>51</sup> As a rule of thumb, Roodman (2009) reports that the number of instruments should not outnumber individual units in the panel. We aim to comply with this rule.

GMM approach is the absence of second-order autocorrelation. Therefore we present the Arellano-Bond autocorrelation test results for second-order serial correlation. Furthermore, we test the validity of our instruments by presenting Hansen test statistics indicating whether the over-identification moment conditions in the presence of robust standard errors are valid. Additionally, we apply robust two-step estimation with Windmeijer-corrected standard errors<sup>52</sup>. Furthermore, we include time dummies in order to remove universal time-related shocks from the error preventing contemporaneous correlations between individuals<sup>53</sup>. As it is standard in GMM estimation techniques we assume time dummies to be strictly exogenous.

## 2.5 Econometric Results

Tables 2.3 and 2.4 present estimation results for the German and the U.S sample respectively. Due to the dynamic model specification it has to be considered that all presented coefficients represent short-run coefficients<sup>54</sup>. In both tables, column (1) matches our first basic specification in equation (2.3). For both countries it turns out that import penetration has a significant positive impact on total average per capita executive compensation. Thus, in the German manufacturing industry an increase in import penetration of 1% leads to a short-term increase in average per capita executive compensation of 0.0989%. In comparison, the impact on the U.S manufacturing industry is almost twice as high as in Germany with a short-term elasticity of 0.184%.

Column (2) in both tables matches our second basic specification from equation (2.4). By adding an interaction term between import penetration and ROE this specification reveals whether the increasing impact of competition on total level of executive compensation is due to an increase in the fixed or the incentive-based component. The estimated coefficients of import penetration and the interaction term present ambiguous signs in both countries. In particular, the coefficient of the interaction term turns out to be significantly positive whereas the coefficient of the pure import penetration variable

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<sup>52</sup> Windmeijer (2005) presents a finite sample correction to the standard errors which leads to more accurate estimations than cluster-robust one-step estimations (e.g. Roodman, 2009).

<sup>53</sup> Roodman (2009) mentions that no correlation across individuals are basic assumptions on the autocorrelation test and the robust estimates of the standard errors. Thus, implementing time dummies makes this assumption more reliable.

<sup>54</sup> In order to receive long-run coefficients, each coefficient has to be divided by  $(1 - \pi_1)$  in equations (2.3) and (2.4).

remains insignificant. Hence, in contrast to Cunat and Guadalupe (2009b) we conclude that there is no significant impact of foreign competition on fixed components, but that the increasing overall effect observed in column (1) might be basically driven by changes in the performance-based part of executive compensation.

As stated earlier, the performance sensitivity in model (2) now depends on a given level of import penetration. Thus, in order to quantify the performance sensitivity we first have to derive the marginal effect of ROE on the dependent variable:

$$\frac{\partial \ln Comp_{i,j,t}}{\partial ROE_{i,j,t}} = \beta_2 + \beta_4 * \ln ImportPen_{j,t} \quad (2.5)$$

Due to the fact that import penetration is measured as a ratio, equation (2.5) reveals that the marginal effect of ROE on executive compensation for the German case only turns out to be positive for a degree of import penetration that is higher than 0.3769<sup>55</sup>. Thus, given the degree of import penetration is lower than 0.3796 (which is quite realistic considering that the sample mean of import penetration is 0.356) the marginal effect of the performance indicator is negative. However, given the degree of import penetration is higher than 0.3796 the marginal effect of ROE is positive and increases with a higher degree of competition. Such a nonlinear relationship between competition and managerial pay performance sensitivity is consistent with the theoretical model derived by Beiner et al. (2011). In particular, the authors postulate that “a higher intensity of product market competition [...] leads to weaker incentive schemes for the manager if the intensity is weak, and a higher intensity of product market competition leads to stronger incentive schemes for the manager in case the intensity exceeds a certain level” (Beiner et al., 2011, p. 339). Additionally, the authors state that the impact of competition on pay sensitivity increases with the intensity of product market competition. Beiner et al. (2011) already provide empirical support for their hypothesis by analyzing the impact of product market competition on managerial incentives using Swiss data. In particular, the authors provide evidence for a convex relationship between competition intensity and the strength of managerial incentives. Our results in table 2.3 provide further empirical support for their hypotheses by revealing that pay performance sensitivity only exerts a wage increasing

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<sup>55</sup>  $\beta_2 + \beta_4 * \ln ImportPen_{j,t} \geq 0 \Leftrightarrow ImportPen_{j,t} \geq e^{-\frac{\beta_2}{\beta_4}}$

impact provided that a certain degree of competition intensity is reached. However, considering that the elasticity of import penetration in column (1) is significantly positive, we conclude that on average the increasing impact of foreign competition on managerial incentives must outweigh the decreasing impact. In particular, the negative pay-performance sensitivity for low levels of import penetration and at the same time the positive overall effect of import penetration on executive compensation might indicate that the fixed component of executive compensation plays a dominant role in cases of low competition levels.

Considering the U.S. case, the marginal effect in column (2) of table 2.4 turns out to be positive for a level of import penetration that is higher than 0.0522. As the minimum value of import penetration for the U.S. sample lies at 0.033 (table 2.2) it is reasonable to presume a general positive marginal effect of ROE on executive compensation even for small degrees of competition intensities. Thus, the pay performance sensitivity in the U.S. case is positive, and increases with a higher degree of competition.

Accordingly, a quantitative comparison of the marginal effect of ROE at any given level of import penetration reveals that the magnitude of the pay-performance sensitivity is always higher in the U.S case than in the German case. In contrast to the U.S. market, German stock listed companies are often controlled by families or dominant legal entities (e.g. Becht and Boehmer, 2003)<sup>56</sup>. The high degree of shareholder voting concentration in Germany provides better monitoring possibilities such that high incentive pay packages in Germany might be less necessary. Conversely, the widely spread share ownership structure in the U.S intensifies the agency problem such that high pay-performance incentives are needed in order to align the interests of owner and manager. These differences in ownership structures between the two countries might explain the differences in the impact of foreign competition on pay-performance sensitivity. The lower the possibility of intense monitoring, the stronger the disciplining impact of foreign competition on executive compensation. Whereas in Germany there is only a need for the disciplining effect in cases of relative high competition levels, U.S executives need to be

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<sup>56</sup> For an international comparison of blockholdings see Becht and Röell (1999).

incentivized much earlier<sup>57</sup>. Furthermore, the international difference determined here regarding the impact of competition on managerial incentives are partly in line with Ko et al. (2016) who provide empirical evidence for an increasing impact of competition on managerial incentives given a widely held ownership structure.

Previous literature<sup>58</sup> points out that a basic difference between German and U.S. compensation practices is the stock-based component which is much more distinctive in the U.S. case. Thus, U.S. studies, like Cunat and Guadalupe (2009b) for example, mostly refer to performance indicators based on the market value of the firm. Unfortunately, such information is not available for the German dataset. Nonetheless, in order to maintain comparability of the estimation specification between the two countries and yet control for stock market performance we decided to include in columns (3) and (4) the yearly price index of CDAX for Germany and the yearly price index of S&P500 for the U.S as an additional explanatory variable. As expected, variation in a stock-based indicator has a stronger positive short-run impact on executive compensation in the U.S. (0.483 and 0.429 percent) than in Germany (0.191 and 0.154 percent). Furthermore, the results reveal that the impact of import penetration observed earlier remains robust regarding magnitude, sign and significance. As an alternative and probably as a higher aggregated indicator for cyclical trends including fluctuations on the capital market, columns (5) and (6) present estimation results using GDP as an additional explanatory variable. The results are very similar to models (3) and (4). Again we find support for a higher positive short run impact of cyclical trends in the U.S. than in Germany. The impact of import penetration in columns (5) and (6) remains robust for both countries.

All specifications include a full set of time dummies. As we define the base year as 2007 the coefficients of *dyear\_08* and *dyear\_09* represent the impact of the recent financial crisis. In almost all specifications we find a significant negative impact of the crises on

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<sup>57</sup> The international differences just identified regarding the impact of competition on managerial incentives are partly in line with Ko et al. (2016). Ko et al (2016) provide empirical evidence for an increasing impact of competition on managerial incentives given a widely held ownership structure. However, the authors also state that competition has no impact if the firm is family- or state-controlled. By generalizing and assuming that the U.S sample represents widely held firms and that the German sample represents family- or state-controlled firms we indeed observe that managerial incentives increase more strongly in the U.S. However, we also observe an increasing impact in Germany, provided that a certain level of competition intensity is reached.

<sup>58</sup> Abwod and Bognanno (1995), Kaplan (1999) or Fernandes et al. (2012)



executive compensation. However, the short-run effect of the crisis is generally of greater magnitude in the U.S. than in Germany.

All in all, from a quantitative perspective we observe that the impact of stock price index, GDP, as well as time dummies is higher in the U.S. than in Germany. This in turn might provide evidence for the fact that executive compensation in the U.S. is generally more sensitive to long-run performance due to higher share of stock-based components than in Germany.

The variable *lnSales* measures the short-run impact of company size on executive compensation. Contrary to Abowd and Bognanno (1995) we find evidence for the fact that quantitatively both countries have (at least in the short run) similar pay sensitivities. Depending on the specification the pay sensitivity ranges in the U.S. from 0.10% to 0.07% and in Germany from 0.10 to 0.05%. Calculating the long-run effects reveals that the size coefficient for the German case varies between 0.17 and 0.28 whereas the range for the U.S. case is slightly lower at 0.14 to 0.22.

However, considering that the average U.S. firm is on average more than 9 times bigger than the average German firm (increase in sales from EUR1.8 billion<sup>59</sup> to \$16.507 billion), illustrates the huge differences in company size between these two countries. Based on the estimated long-term size coefficient of 0.24 for the German data in the base model (table 2.3, column 2), an increase in sales by a factor of 9 would lead to an increase in average executive compensation by 69 percent<sup>60</sup>. Thus, in absolute values the current average German executive compensation of EUR432,524 would increase to a value of EUR730,966. If we were to assume that German firms were as large as U.S. firms our estimates reveal that the relation between average U.S. and German compensation would decrease from 10-fold to 6-fold.

Similar calculations regarding the impact of the performance indicator ROE reveals less explanatory power for international pay differences: The average value of ROE in the German subsample is 9.319 percentage points lower than the average value of ROE in the

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<sup>59</sup> In order to provide a better comparison in absolute effects we restricted the German sample to a comparable time period (1993 to 2010).

<sup>60</sup> For large changes in log transformed explanatory variables the approximate interpretation saying that a percentage change in the dependent variable corresponds to a  $\beta$  percent change in the dependent variable does not hold. In cases of a large change  $\delta$  the dependent variable would increase by  $\exp(\beta \log(1 + \delta)) = (1 + \delta)^\beta$ . In our example sales increase by a factor of 9, which results in an increase in executive compensation to  $9^\beta = 9^{0.24} = 1.69$ .

U.S. sample (from 7.28 percent to 16.6 percent). Calculating the impact of such an increase at the sample mean of import penetration based on German estimates in table 2.3, column 2 (long-term effects), reveals that executive compensation would only increase by 0.4 percent<sup>61</sup>. As discussed above, and contrary to the size effect, there is a systematic difference in the pay-performance sensitivities between the U.S. and Germany. As an alternative we therefore calculate the wage impact a decrease of the U.S. ROE to the German ROE level would have on the U.S. compensation level. Based on the estimates in table 2.4, column 2 it turns out that a decrease in the U.S. ROE of 9.319 percentage points would decrease the U.S. compensation level by 17%<sup>62</sup> from \$4,453,000 to \$3,697,000). Provided that U.S. firms have similar ROE to German firms, the relation between average U.S. and German compensation would decrease from 10-fold to 8.5-fold.

Hence, we conclude that systematic differences in company size between the U.S and Germany serve as one of the predominant explanations for the much discussed huge differences in total per capita compensation. However, although we observe systematic differences in company performance (represented by ROE), these do not fully explain international wage differences.

Finally, we model dynamic models by including the lagged dependent variable as explanatory variable in order to control for serial dependences. In both tables the lagged dependent variable is highly significant. Thus, our model supports our specification. Furthermore, the magnitude of the coefficient of the lagged dependent variable is higher in the German sample than in the U.S sample. This might be interpreted as a hint for the fact that in Germany executive compensation depends more strongly on (previous) fixed components and less on variable performance based components.

The Arellano-Bond autocorrelation test results for second-order serial correlation in tables 2.3 and 2.4 reveal the absence of second-order serial correlation at a significant level of at least 5%. Thus, the necessary condition for the validity of our estimation technique is fulfilled. Also, the Hansen test p value of over-identified restrictions reveals

<sup>61</sup>The German marginal impact of ROE on lnComp at the German subsample mean of import penetration is calculated by:  $\frac{\partial \ln \text{Comp}_{i,j,t}}{\partial \text{ROE}_{i,j,t}} = 0.0187 + 0.01915 * \ln(0.386) = 0.00047$ .

<sup>62</sup> The U.S. marginal impact of ROE on lnComp at the U.S. subsample mean of import penetration is calculated by:  $\frac{\partial \ln \text{Comp}_{i,j,t}}{\partial \text{ROE}_{i,j,t}} = 0.0318 + 0.0110 * \ln(0.3039) = 0.01868$ .

that the null hypothesis cannot be rejected and thus supports the validity of our instruments.

**Table 2.3: System GMM – German Manufacturing Industry 1985-2010**

	(1)	(2)	(3)	(4)	(5)	(6)
lnComp <sub>t-1</sub>	0.695*** (11.58)	0.657*** (11.35)	0.670*** (12.12)	0.656*** (11.59)	0.670*** (12.12)	0.652*** (12.18)
lnSales	0.0520** (2.52)	0.0816*** (3.67)	0.0782*** (3.75)	0.0995*** (4.45)	0.0782*** (3.75)	0.0995*** (4.52)
ROE	0.000334 (0.25)	0.00641** (2.07)	-0.00101 (-0.82)	0.00539** (2.26)	-0.00101 (-0.82)	0.00531** (2.20)
lnCDAXPI			0.191*** (4.89)	0.154*** (4.49)		
lnGDP					0.149*** (4.89)	0.125*** (5.04)
lnImportPen	0.0989** (2.50)	0.0523 (1.35)	0.0847** (2.32)	0.0360 (0.99)	0.0847** (2.32)	0.0444 (1.22)
lnImportPen *ROE		0.00657** (2.37)		0.00650*** (3.02)		0.00648*** (2.96)
dyear_08	-0.180*** (-3.31)	-0.191*** (-3.85)	-0.0665 (-1.15)	-0.0946* (-1.76)	-0.182*** (-3.70)	-0.193*** (-4.02)
dyear_09	-0.105 (-1.57)	-0.116* (-1.74)	-0.0457 (-0.70)	-0.0692 (-1.11)	-0.120* (-1.92)	-0.136** (-2.22)
N	2478	2478	2478	2478	2478	2478
ar2p	0.133	0.0846	0.111	0.0718	0.111	0.0686
hansenp	0.331	0.411	0.424	0.900	0.424	0.876

Dependent variable is  $\log CEOComp$ ,  $t$  statistics in parentheses,  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ , robust standard errors, two-step estimation, instruments restricted to second lags. Due to currency change in 2001 from DMark to Euro all monetary values have been transformed into Euro values by dividing with factor 1.95583. All monetary values are consumer price index deflated and reported in 1995 Euro. A full set of time dummies is used but only a selection of time dummy coefficients is presented.

**Table 2.4: System GMM – U.S. Manufacturing Industry 1993-2011**

	(1)	(2)	(3)	(4)	(5)	(6)
lnComp <sub>t-1</sub>	0.523*** (7.68)	0.528*** (8.48)	0.528*** (8.22)	0.542*** (8.59)	0.528*** (8.21)	0.542*** (8.59)
lnSales	0.103*** (2.77)	0.0831*** (2.69)	0.0699** (2.18)	0.0796*** (2.65)	0.0699** (2.19)	0.0796*** (2.65)
ROE	0.00802*** (3.80)	0.0150*** (3.36)	0.00625*** (3.07)	0.0148*** (3.62)	0.00626*** (3.14)	0.0148*** (3.62)
lnS&P500PI			0.483*** (7.42)	0.429*** (6.73)		
lnGDP					0.369*** (7.36)	0.327*** (6.73)
lnImportPen	0.184*** (3.29)	0.0795 (1.19)	0.156*** (3.13)	0.0275 (0.47)	0.160*** (3.21)	0.0275 (0.47)
lnImportPen* ROE		0.00508** (2.02)		0.00591*** (2.83)		0.00591*** (2.83)
dyear_08	-0.310*** (-3.91)	-0.275*** (-3.44)	-0.0477 (-0.59)	-0.0787 (-0.97)	-0.291*** (-3.93)	-0.296*** (-3.78)
dyear_09	-0.345*** (-4.81)	-0.311*** (-4.47)	-0.223*** (-3.28)	-0.208*** (-3.03)	-0.356*** (-5.17)	-0.328*** (-4.61)
N	2802	2802	2802	2802	2802	2802
ar2p	0.0687	0.0612	0.0550	0.0511	0.0556	0.0511
hansenp	0.359	0.707	0.464	0.972	0.458	0.972

Dependent variable is  $\log CEOComp$ ,  $t$  statistics in parentheses,  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ , robust standard errors, two-step estimation, instruments restricted to second lags. All monetary values are consumer price index deflated and reported in 2010 Dollar. A full set of time dummies is used but only a selection of time dummy coefficients is presented

## 2.6 Offshoring and International Outsourcing

One might argue that the measurement of import penetration and its exclusive interpretation as an indicator for the degree of foreign competition might ignore the fact that a certain share of import could well indicate efficiency, in particular in case of imported intermediate goods. The fact that imports could well include intermediates and thus represent a firm's efficient sourcing strategy, has recently gained in importance.

Literature calls this phenomenon “offshoring” or “international outsourcing”<sup>63</sup>. In order to show that our measurement of foreign competition represented by import penetration including all imported goods is adequate we use a German subsample that allows us to separate imported final goods from imported intermediates. This way, we are able to separate potential efficiency effects which might be included in the measurement for foreign competition that is commonly used.

In order to underline the relevance of imported intermediates in current developed economies Miroudot et al. (2009) summarize that 56% (73%) of trade in goods in OECD countries comprises intermediate goods (services). However, Dustmann et al. (2014) argue that considering the fact that, in 2007, 70 percent of overall inputs in Germany’s manufacturing sector are still domestically produced one should not assume that Germany in particular is an assembly location for foreign-produced inputs<sup>64</sup>.

Most of the existing literature regarding offshoring focuses on its impact on labor market outputs, particularly on labor market demand<sup>65</sup>. However, a firm’s motivation to increase offshoring could be to lower costs, acquire higher quality and eventually improve its own competitiveness. Thus, increasing the substitution of expensive domestic inputs by cheaper foreign inputs could be an appropriate measurement for efficiency and productivity within an industry. However, a much smaller section of literature is concerned with the productivity effects of offshoring. Wagner (2011) and Schwörer (2012) provide an overview on theoretical and empirical literature focusing on the productivity effects of offshoring. All in all, existing literature provides evidence for

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<sup>63</sup> The differentiation between offshoring and international outsourcing depends on the ownership and location of production. In the case of offshoring, a firm derives its intermediates from abroad irrespective of whether the provider is external or affiliated to the firm. In the case of international outsourcing, a firm assigns the production of the intermediate input to an independent supplier abroad. Thus, the term “offshoring” includes the term “international outsourcing” (Wagner, 2011, p. 218). As location is the crucial aspect of our offshore/ international outsourcing indicator we will use both terms as synonyms.

<sup>64</sup> The authors point out that 51% of inputs used in domestic manufacturing industry are domestic inputs from other domestic sectors which stayed relatively stable over the period from 1995 to 2007. However, there has been an increase in foreign inputs.

<sup>65</sup> A survey study of Crinó (2009) reviews this empirical literature. The author concludes among other things that low-skilled workers especially are negatively affected by material offshoring such that wage inequalities increase. Furthermore, there is a tendency (though not definite conclusion) for higher volatility of unemployment due to a more flexible labor demand. With regard to service offshoring, Crinó (2009) states that it has a small negative effect on total employment and a strong impact on the composition of the workforce due to an increase in the share of high-skilled white-collar employees. However, he also mentions that the overall labor effects are rather modest and mostly concentrated on special workforce groups.

small positive productivity effects. However, Schwörer (2012) points out that the effects are heterogeneous and depend very much on the country, the type of firms and the type of offshored inputs. Wagner (2011) in particular focuses on German studies and summarizes that offshoring indeed causes positive productivity effects in Germany. A recent study of Dustman et al. (2014) points out that Germany's manufacturing industry improved its competitiveness between 1995 and 2007 by: (1) using inputs from other domestic industries with lower real wages, (2) declining unit labor costs and increasing mean real wages in the manufacturing industry indicating higher productivity increases than wage increases and (3) increasing the amount of imported intermediates especially from the Eastern European countries in order to increase the competitiveness of its own final products.

As literature finds evidence for positive productivity effects due to outsourcing, we now aim to check whether the previously observed positive impact of import penetration on management compensation is driven by productivity effects due to outsourcing. In order to do so, appropriate data on imported intermediates is needed. For the German case we use annual German input-output tables from German national accounts data allowing a separation between imported inputs and final imports on a two-digit industry level. Unfortunately such a separation is not possible for the U.S. data due to a lack of adequate and publicly available data<sup>66</sup>. Therefore we restrict our analysis of the impact of international outsourcing on executive compensation and the pay incentives to a German subsample.

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<sup>66</sup> The value of imported intermediates in U.S. input-output accounts is not available due to data limitations such that the information has to be imputed from data of annual input-output tables. In particular, the imputed values are based on a so-called "import comparability" or "proportionality" assumption that the share of imported intermediates from all intermediates equals the ratio of imports to domestic supply. By using such a proportional assumption Feenstra and Hanson (1999) find that in the U.S. between 1979 and 1990 outsourcing could explain 15% of the increase in relative wages of non-production workers. However, the validity of such results is questionable and the National Research Council (2006) critiqued Feenstra and Hanson's (1999) assumption due to the significant limitation of current data collection and analysis. Winkler and Milberg (2012) use German data to test the employment effects of offshoring using the direct measures and the proxy measure calculated by using the proportionality assumption. It turns out that the impact depends to a large extent on whether they use the direct measure or the proxy. Thus, using the direct measure indicates a significant negative impact of service offshoring on employment whereas by using the proxy the impact turns out to be insignificant and sometimes even the opposite. Consequently, Winkler and Milberg (2012) recommend cautiousness when using proxy measurements for imported intermediates. Even Feenstra and Jensen (2012) discuss critiques on their proportionality assumption and evaluate alternative methodologies using firm-level trade data which are not publicly available.

As an appropriate measurement of outsourcing intensity we basically refer to Geishecker (2006) or Schwörer (2013) who define international outsourcing as the sum of a two-digit industry's purchases of imported goods from all manufacturing industries abroad as a share of the domestic industry's production value.<sup>67</sup>

$$OUTSOURCING_{jt} = \frac{\sum_{j^*=1}^{J^*} IMPINPUT_{j^*t}}{Y_{jt}} \quad (2.6)$$

In contrast, to focus solely on inputs from manufacturing industry abroad (e.g. Campa and Goldberg, 1997) we consider a “broader” definition by calculating the sum of all imported intermediates ( $IMPINPUT_{j^*t}$ ) from industry  $j^*$  abroad as a share in domestic production value  $Y_{jt}$  in the domestic industry  $j$ .<sup>68</sup> Besides calculating an indicator for the international outsourcing intensity on industry level, German input-output tables also deliver information on imported final goods which we use to calculate the import penetration defined as above<sup>69</sup>. Hence, the input-output table delivers two measurements which adequately differentiate between general import penetration as a measurement for foreign competition and outsourcing as a measurement for efficiency.

Due to the fact that input-output tables are currently only consistently available for the period from 1996 until 2007 the following analysis is based on a subsample of the

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<sup>67</sup>An alternative measurement for the outsourcing intensity would be to measure imported intermediates as a share in total non-energy inputs like Feenstra and Hanson (1999) or Amiti and Wei (2009). However, Schwörer (2013) and Geishecker (2007) argue that scaling by non-energy inputs is hard to interpret due to the fact that non-energy inputs might be also affected by changes from internal production to domestic outsourcing and thus do not represent a measure of the importance of international versus domestic outsourcing.

<sup>68</sup>Generally, literature on international outsourcing (e.g. Feenstra and Hanson (1999), Geishecker (2006), Winkler and Milberg (2012)) focuses on the share of manufactured imported intermediates as a share of production value when analyzing potential labor demand or inequality effects. As we are interested in the impact of outsourcing on managerial compensation as a general efficiency dimension we use a slightly different measurement by considering all imported intermediates as a share of production value (in particular imported intermediates from service sectors are additionally considered). Thus, we do not interpret outsourcing as a “make-or-buy” decision, rather “Does the industry prefer imported intermediates over domestically produced intermediates?” in general.

<sup>69</sup>In particular, the definition for import penetration for the subsample is:  $ImportPen_{j,t} = \frac{imported\ final\ goods_{j,t}}{final\ output\ value_{j,t} - exports_{j,t}}$ , whereas “final output value” already includes all the imports.

original German database used previously<sup>70</sup>. Table 2.5 represents summary statistics for this subsample. Thus, in the unbalanced subsample we observe 237 firms over the period from 1996 until 2007 such that total firm-year observation is 1117. In comparison to the full sample (table 2.1) the mean values of the variables only change marginally. Thus, the average per head executive compensation increased to EUR453,000, primarily due to the more recent time period of the subsample in contrast to the full sample. Similar developments hold for the other variables. Regarding the measurement of import penetration, we observe that the mean value at 0.39 is slightly higher than the full sample, which might well be caused by the more recent time period of the subsample. However, considering that the construction of import penetration in the subsample is based on a different data base the value is close to that of our subsample representing consistencies of our different data sources. Unsurprisingly, at 0.16 the sample mean for the outsourcing variable is smaller than the import penetration rate.

**Table 2.5: Summary Statistics – German Subsample 1996-2007**

	mean	sd
Comp	453.6056	464.8054
Sales	1913.981	6908.315
ROE	8.567502	18.95925
CDAXPI	306.4637	73.80555
GDP	1988.792	56.90253
ImportPen	.398065	.2194701
Outsourcing	.1637348	.0663212
<i>N</i>	1117	

Due to currency change in 2001 from DMark to Euro all monetary values have been transformed into Euro values by dividing with factor 1.95583. All monetary values are consumer price index deflated and reported in 1995 Euro.

<sup>70</sup> Due to new revisions, input-output tables from after 2007 are not easily comparable with input-output tables from former periods. The input-output tables used in this analysis are based on revision 2005.



Table 2.6 presents system GMM estimation results based on the German subsample. For clarity we only present the estimation results of our basic specification (equations 2.3 and 2.4) including import penetration based on input output tables (columns (1) and (2)) on the one side and outsourcing (columns (3) and (4)) on the other side<sup>71</sup>.

**Table 2.6: System GMM – Germany Manufacturing Industry – Subsample 1996-2007 - Outsourcing**

	(1)	(2)	(3)	(4)	(5)	(6)
lnComp <sub>t-1</sub>	0.733*** (10.83)	0.687*** (10.18)	0.720*** (10.94)	0.687*** (11.16)	0.749*** (12.72)	0.733*** (12.65)
lnSales	0.0899*** (3.46)	0.0998*** (3.72)	0.0692*** (3.15)	0.0836*** (3.84)	0.0759*** (3.49)	0.0817*** (3.56)
ROE	-0.00226 (-1.11)	0.00339 (1.59)	-0.00211 (-1.11)	0.00239 (0.44)	-0.000647 (-0.37)	0.00106 (0.19)
lnImportPen	0.200** (2.28)	0.116 (1.46)			0.300** (2.42)	0.318** (2.32)
lnImportPen* ROE		0.00566** (1.97)				
lnOutsourcing			0.0501 (0.58)	0.0356 (0.46)	0.238 (1.60)	0.227 (1.41)
lnOutsourcing* ROE				0.00239 (0.69)		0.000961 (0.27)
lnImportPen* lnOutsourcing					0.187** (2.34)	0.190** (2.10)
N	1117	1117	1117	1117	1117	1117
ar2p	0.257	0.252	0.261	0.269	0.262	0.262
hansenp	0.118	0.322	0.0959	0.368	0.658	0.658

Dependent variable is  $\log CEOComp$ ,  $t$  statistics in parentheses,  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ , robust standard errors, two-step estimation, instruments restricted to second until forth lags for model (1) to (4), instruments restricted to second to third lags for model (5) and (6). Due to currency change in 2001 from DMark to Euro all monetary values have been transformed into Euro values by dividing with factor 1.95583. All monetary values are consumer price index deflated and reported in 1995 Euro. A full set of time dummies is used but not presented.

<sup>71</sup> We also estimated the other specifications using GDP or CDAX price index as additional explanatory variable (table 2.3, columns (3)-(6)). The results are similar to table 2.3 and available upon request.

The impact of import penetration is similar to the previous ones in table 2.3 regarding sign and significance. Although based on a different data source, column (1) in table 2.6 still reveals that an increase in the import penetration rate has a significant positive impact on the total average per capita executive compensation<sup>72</sup>. Again, the second column of table 2.6 presents the basic model extended by an interaction term between ROE and import penetration in order to model the impact of import penetration on managerial incentives. Also, in this specification the results remain robust. Thus, we observe that the interaction term is significant whereas the coefficient of import penetration is insignificant, indicating that the increasing impact of import penetration is most likely driven by changes in managerial incentives. Also in line with earlier results, the marginal effect of ROE only turns out to be positive if import penetration exceeds a value of 0.54.

Conversely, the impact of outsourcing in column (4) of table 2.6 turns out to be insignificant. This indicates that an increase in international outsourcing and thus a more efficient sourcing strategy has no influence on the level of management compensation. Even extending the model by implementing the interaction between ROE and outsourcing (column (4)) does not change the result. An increase in international outsourcing does not per se influence the pay-performance sensitivity of executive compensation.

However, as mentioned earlier Raith (2003) and Schmidt (1997) state theoretically that the impact of competition leads to an increase of managerial pay if the value of a cost reduction is high. Considering outsourcing intensity as an indicator for the value of a cost reduction our setting allows us to check whether the impact of competition on managerial pay indeed depends on the value of a cost reduction. Thus, in columns (5) and (6) of table 2.6 we extend models (3) and (4) by adding import penetration and the interaction between import penetration and outsourcing as additional explanatory variables<sup>73</sup>. In line with Raith (2003) and Schmidt (1997) the coefficient of the interaction term between outsourcing and import penetration turns out to be significantly positive. Thus, the

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<sup>72</sup> However, at 20 percent the elasticity is higher than the equivalent elasticity in table 2.3 column (1) at 10%. One reason for this difference might be the more recent time period that is used in table 2.6 indicating that the impact of import penetration increased over the years.

<sup>73</sup> In order to avoid excessive additional interaction variables we consider in the following the impact on total pay as this consists of the fixed and variable component. If the variable component rises it is also reflected in the total pay.

stronger a company's effort to substitute expensive domestic inputs with cheaper foreign inputs the higher the positive impact of competition on managerial pay.

To sum up, disentangling the impact of imports on executive compensation into a competition measurement represented by import penetration based on final goods and into an efficiency measurement represented by outsourcing yields heterogeneous results. In particular, these results reveal that the impact of import penetration on executive compensation and managerial incentives is most likely driven by the competition effect rather than by a potential efficiency effect. Furthermore, based on theoretical assumptions it turns out that the positive impact of competition on managerial pay intensifies with the degree of outsourcing.

Thus, the results of the German subsample based on input-output tables provide evidence that the previously observed positive impacts of import penetration in the German sample as well as in the U.S sample (tables 2.3 and 2.4) are most likely driven by competition effects.

## **2.7 Conclusion**

With the liberalization of global financial markets, the foundation of the World Trade Organization and the introduction of free-trade agreements, the relevance of globalization has grown rapidly since the early 1990s. Consequently, increased imports have intensified the competitive pressure to which companies are exposed.

This study provides empirical evidence on the impact of foreign competition on managerial pay incentives using German and U.S. data. For both countries it turns out that an increase in foreign competition, represented by import penetration rates, leads to a rise in average per capita executive compensation. However, a more detailed focus on the impact of foreign competition on pay-performance sensitivity reveals international differences: In the U.S. an increase in foreign competition leads to a general increase in pay-performance sensitivity. However, such a general interpretation is not possible for Germany. Only if a certain degree of competition intensity is reached does pay-performance sensitivity turn out to be positive and increasing. In turn, in the event of low levels of competition intensity the model predicts negative pay-performance sensitivities. Considering that the general impact of foreign competition leads to an increase in total

compensation we argue that negative pay sensitivities in the case of low competition levels might indicate the greater weighting of fixed compensation components.

A potential reason for international differences in the impact of foreign competition on pay performance sensitivity might be the fact that in the U.S share ownership is typically more widely spread which makes the agency problem more severe. This might explain why our results indicate that competition as a governance instrument and thus its impact on managerial incentives applies earlier and more intensely in the U.S. than in Germany.

However, using import penetration rates as an indicator for the degree of foreign competition raises the question whether the estimated impact indeed represents the impact of competitive pressure or whether it rather represents efficiency effects. In detail, literature argues that imported intermediates indicate a firm's efficient sourcing strategy aiming to lower costs, acquire higher quality and improve competitiveness.

Thus, in a next step this study checks whether the estimated impact is driven or biased by potential efficiency affects. In order to do so, we use German input output table data that allow for a precise differentiation between imported final goods and imported inputs. Re-estimating the model reveals that previous results only reappear in the case of estimates based on final imported goods. Outsourcing, i.e. an increase in imported intermediates, turns out to have no significant impact on managerial compensation. Hence, this study provides empirical evidence that the positive impact of managerial pay incentives is driven by competitive pressure from abroad.

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### **3 The Impact of Disclosure Obligations on Executive Compensation - A Policy Evaluation Using Quantile Treatment Estimators<sup>74</sup>**

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<sup>74</sup> This chapter was written in collaboration with Kornelius Kraft and published as SFB Discussion Paper 57/2016. Furthermore this work was presented at 29<sup>th</sup> EALE in St. Gallen in September 2017.

### 3.1 Introduction

Most of the literature on executive compensation does not consider institutional factors like legislative interventions. Murphy (2013) criticizes this neglect and mentions disclosure requirements as one example of legislative action<sup>75</sup>. Disclosure requirements might well affect the total level of compensation as well as variable and fixed components. At least one might argue that this is what politicians have in mind when they introduce such requirements and it might be interesting to test whether its purpose is achieved. Although one of the aims is probably to limit management compensation, the effect is a priori unclear.

Thus, on economic grounds this paper exploits changes in German mandatory publication obligations as a natural experiment to causally identify the effect on the level of executive compensation. Before the reformation of German disclosure obligations stock listed companies were merely obliged to publish the total amount of compensation aggregated for the whole executive board<sup>76</sup>. With the implementation of the German Corporate Governance Code (GCGC) in 2002 companies received recommendations to voluntarily increase transparency by reporting executive compensation subdivided according to its components and on an individualized level. As only a few fraction of German companies followed this voluntary recommendation a new law, the Act on the Disclosure of Management Board Compensation<sup>77</sup> (VorstOG<sup>78</sup>), was implemented in 2006. The implementation of the law changed the voluntary disclosure obligations into mandatory disclosure obligations. On methodological grounds this paper uses the changes from voluntary to mandatory disclosure obligations as identification strategy. By modelling a differences-in-differences approach we compare firms which followed the voluntary recommendations with those which did not before and after the implementation of the VorstOG. Furthermore, due to the fact that we assume that the impact of policy change

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<sup>75</sup> Murphy (2013) chronologically describes reasons and reactions for several changes in US disclosure obligations over the last decades.

<sup>76</sup> Fernandes et al. (2013) give an overview of the introduction of compensation disclosure laws across different countries. Accordingly, the US implemented mandatory disclosure obligation in 1934 (extended in the following years). In the following years many other countries followed by introducing similar mandatory disclosure rules including: Canada in 1993, UK in 1995, Ireland and South Africa in 2000; Australia in 2004, Belgium, France, Germany, Italy, the Netherlands and Sweden, Norway and partly Switzerland in 2006.

<sup>77</sup> § 285 (9) HGB (German Commercial Code)

<sup>78</sup> Vorstandsvergütungs-Offenlegungsgesetz

may differ across the compensation distribution we extend the standard difference-in-differences approach to conditional and unconditional quantile regression.

Our main findings reveal a decrease in total compensation as a result of the implementation of the VorstOG. Interestingly, the leveling effects are merely significant in the upper part of the compensation distribution.

From a theoretical perspective disclosure obligations are described as monitoring and/or prevention tool. In particular politicians argue that an increase in disclosure obligations lowers shareholders' cost of monitoring the setting of executive compensation (monitoring tool). This, in turn, might increase the supervisory boards' need to justify their choice of compensation structures resulting in a decrease of inappropriate high compensation levels. Furthermore one might argue that an outrage constrained, caused by an increase of public pressure due to higher transparency, prevents managers from asking inappropriate high compensation packages in order to protect their own reputation (prevention tool) (e.g. Zeckhauser and Pound, 1990; Iacobucci, 1998; Gordon, 2005). Both mechanisms would theoretically postulate a leveling impact of stronger disclosure obligations on executive compensation. Additionally, literature provides evidence that due to sensationalism public preferably focuses on companies in the upper part of the compensation distribution (e.g. Core et al., 2008; Chen et al., 2008). As these companies experience higher media pressure, the impact of stronger disclosure obligations might intensify. Our results support this argument by showing that the leveling impact of VorstOG is only significant in the upper part of the compensation distribution and increases in absolute values along the compensation distribution.

However, our study provides no empirical evidence for an increase in compensation level caused by a potential ratcheting-up effect. Although studies on strategic peer benchmark provide evidence, that companies tend to set executive compensation slightly above the average in their industry (Bizjak et al., 2008, 2011) we find no evidence that an increase in transparency causes a ratcheting-up effect in the German context.

Obviously, from a theoretical point of view, there are divergent hypotheses suggesting either an increase or a decrease in executive compensation as a result of stricter publication obligations. However, there are only a few studies which empirically investigate the impact of changes in disclosure rules on executive compensation. Most of the studies focus rather on pay-sensitivity than on absolute level of compensation.

Thus, using New Zealand data, Andjelkovic et al. (2002) analyze executive compensation during the first year of mandatory pay disclosure rules and find no evidence of an increase in pay-performance sensitivity. Craighead et al. (2004) use Canadian policy changes in compensation disclosure in order to evaluate the impact on performance-based compensation. They find that mandatory disclosure obligations have a larger impact on the executive compensation in widely held firms than in closely held firms. This implies that pay-performance sensitivity increases more in less monitored (widely held) firms than in better monitored (closely held) firms. Clarkson et al. (2011) use Australian data and similarly they empirically detect an increase in pay-performance relation due to regulatory changes in disclosure requirements.

The remainder of this paper is organized as follows. Section 3.2 describes the German board system and provides an overview of German changes regarding mandatory disclosure obligations. Section 3.3 summarizes current literature and develops our main hypothesis. Information on the data and identification strategy is provided in section 3.4, followed by the presentation of our empirical results in section 3.5. We finish this paper with a conclusion in section 3.6.

## **3.2 The German Board Model and Disclosure Obligations**

Executive compensation is a highly discussed topic – both politically and in the media. The standard conflict between managers and shareholders, based among other things on the assumptions of managers, who maximize short-term interests, and shareholders, who follow long-term interests. This problem is usually analyzed by applying a principal-agent model. In such a context the shareholder (principal) engages a manager (agent) to act in his or her interest (Jensen and Meckling 1976). However, due to the well-known problem of asymmetric information, managers could use their discretionary power for opportunistic behavior to maximize their own utility to the disadvantage of the shareholders. One of the general aims in corporate governance is to minimize managerial opportunistic behavior by implementing several governance tools. The German two tier board system<sup>79</sup>, for example, implements a control institution – the supervisory board – with the explicit task of controlling executives to ensure that shareholders' interests are

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<sup>79</sup> In contrast to the American one tier system a dual board system differentiates between the management board and the supervisory board. The former has the task of managing the company, whereas the latter is supposed to supervise and advise the management board.



upheld. Amongst other issues, the supervisory board is responsible for setting the management compensation. Thus, management compensation could serve as an instrument to align shareholders' and managers' interests by setting adequate monetary incentives.

However, the composition of the supervisory board does not always reflect the interests of the shareholders. Only a minority of supervisory boards include one or more shareholders as members. The members are mostly executives from other companies or from banks. Friendly relationships between executives and supervisory board members or interlocked board memberships raise the question as to what extent shareholders' interests are adequately represented by supervisory board members. Therefore it is unclear whether the supervisory boards always control executives efficiently and set compensation in an optimal way. To the detriment of the shareholders, managers and supervisory board members might even share similar interests (that differ from those of the shareholders), resulting in inappropriately high compensation levels (Bitter, 2005).

In order to improve the corporate governance structure and thus the representation of shareholders' interests, German legislation implemented the German Corporate Governance Code (GCGC) in 2002<sup>80</sup>. This code is based on the concept of "soft laws" including proposals and recommendations aiming for a more transparent and comprehensible German corporate governance system. According to §161 of the German Stock Corporation Act, listed stock companies must annually confirm that they comply with the recommendations of the GCGC by publishing a declaration of compliance attached to their annual report. In case of deviation companies are additionally obliged to mention the reason for this.

With regard to executive compensation German legislation previously required only that companies report the overall compensation for the management board as a whole. In order to increase transparency the GCGC recommended the detailed disclosure of management compensation, thus, §4.2.4 of the code (GCGC 2005) states:

"Compensation of the members of the Management Board shall be reported in the Notes of the Consolidated Financial Statements subdivided according to fixed, performance-related and long-term incentive components. The figures shall be individualized."

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<sup>80</sup> From then on the code was reviewed annually.

Since the Code's adoption in 2002, empirical evidence shows that several companies did not comply with §4.2.4 of the GCGC <sup>81</sup> (Werder et al. 2005). The German parliament was quite unsatisfied with the companies' resistance regarding §4.2.4 of the GCGC. Thus, in 2005 they implemented the VorstOG, which became effective in 2006.

According to the VorstOG each stock listed company is now obliged to disclose individualized information on executive compensation in the notes of their financial statements differentiated into fixed and variable components, as well as components with long-term incentives. Henn et al. (2009) summarize that, due to the implementation of the VorstOG, German legislation was extended by (1) the mandatory disclosure of stock options and (2) the mandatory compensation disclosure by name.

With the implementation of the VorstOG several German lawyers and politicians postulated that the "new" mandatory disclosure of executive compensation could serve as an instrument to improve the representation of shareholders' interests in the compensation setting process. Furthermore, higher transparency, especially on an individualized level, could cause an outrage constraint towards managers not to request an inappropriately high remuneration. On top of this companies paying a relatively high level of executive compensation are likely to be in the focus of the media. Media attention in turn could exert public pressure on those companies which currently pay relatively high compensation packages. Next, based on the current literature we are going to stress the stated approaches and develop two hypotheses on the potential effects of the VorstOG on German executive compensation.

### **3.3 Literature and Hypothesis Development**

#### **3.3.1 Disclosure obligations as a Monitoring Tool for Shareholders**

It is often stated that greater compensation transparency should motivate the (supervisory) board members to serve the purpose for which the board was originally created, namely to set the executive compensation in the shareholders' interest. Thus, a main function of mandatory disclosure laws is to enhance a board's effort in designing efficient management contracts. The efficient design of executive compensation in turn will minimize agency costs (Vesper-Gräske, 2010; Lo, 2003; Alarie, 2003).

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<sup>81</sup> Werder et al. (2005) observe companies' compliance from 2002 until 2004.

By analyzing the effects of new disclosure rules in America<sup>82</sup> for instance, Murphy (1996) detects empirically that firms adopt compensation packages that reduce realized levels of compensation.

Andjelkovic et al. (2002) postulate that due to the announcement of new publication obligations in New Zealand directors should be motivated to fulfill more actively the task of designing an efficient monitoring of executive pay. Indeed, the authors find empirically that in response to new disclosure requirements firms, or their directors, introduce reforms such as the implementation of a remuneration committee or stock/option incentive pay scheme in order to enhance the efficiency of executive compensation.

Accordingly, Lo (2003) formulates a “governance improvement hypothesis” which argues that extensive compensation disclosures could improve compensation contracts by reducing frictions between shareholders and managers. Using American data the author indeed estimates that the expansion of compensation disclosure results in value-increasing governance improvements<sup>83</sup>.

Craighead (2004) et al. find that in the absence of disclosure obligations pay-sensitivity in widely held firms is lower than in closely held firms. After the implementation of mandated disclosure the performance-related part of executive compensation increases more in widely held firms than in closely held firms. Especially in cases of widely held companies (where monitoring is more difficult) shareholders face high cost in order to understand and influence the incentive structure of compensation packages. Thus, the implementation of disclosure obligations improved the representation of shareholders’ interests especially in cases where monitoring is more difficult.

These studies provide international evidence that stricter publication obligations lead to shareholders’ interests being more likely to be reflected in compensation packages –

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<sup>82</sup> In 1992 companies were required to report the value of options granted to the CEO during the year.

<sup>83</sup> Lo (2003) shows that companies lobbying for disclosure obligations experienced high stock returns. However, companies lobbying against disclosure regulations experienced an even higher improvement of firm performance relative to control firms.

partly because the supervisory boards are now more actively engaged in efficient contract design.<sup>84</sup>

According to German legislation the primary objective of the VorstOG is to assure the possibility of identifying whether German management compensation is reasonable. The degree of reasonableness – rather loosely defined – depends on the manager’s tasks as well as the company’s economic condition. The German parliament explicitly stated that publication obligations are particularly important for shareholders (Deutscher Bundestag 2005) and are assumed to improve investors’ protection.

As mentioned earlier, the German two tier board system is based on a supervisory board that autonomously determines executive compensation. The annual general meeting is the only point in time when supervisory board members might have to justify their compensation decision before the shareholders. Prior to the introduction of VorstOG, the only information available to shareholders was the aggregated sum of executive compensation with no indication of variable versus fixed components or the distribution of the total amount between the members of the management board.

With the implementation of the VorstOG several German lawyers expected improved opportunities to evaluate the adequacy of the design and level of the current system of executive compensation. This may be realized by improving shareholders’ monitoring possibilities, especially regarding the supervisory board members’ duty to set reasonable and efficient executive compensation (Baums 2005, Hoffmann-Becking 2005, Fleischer 2005). Thus, Baums (2005) regards mandatory disclosure rules as a monitoring tool.

Summarizing, one possible intention of the VorstOG is to put supervisory boards under pressure to adjust inadequate compensation packages in order to serve the interests of the shareholders<sup>85</sup>. However, aside of closer monitoring by shareholders the following

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<sup>84</sup> There are several studies analyzing the impact of firms’ negative media coverage (concerning CEO pay packages) and subsequent shareholder voting on say-on-pay resolutions. A recent study of Hooghiemstra et al. (2015) for example shows that negative media attention significantly affects subsequent shareholder discontent over say on pay. These results underline that shareholders’ willingness to criticize and thus influence management compensation depends largely on the degree of information they receive about the supervisory board’s decisions (either via media or directly via annual reports).

<sup>85</sup> Supervisory board members could fear shareholders’ tools such as the inducement of their dismissal, the refusal of their reappointment or in the worst case financial penalties (Vesper-Gräske, 2010).

concept of an “outrage constraint” might explain another leveling mechanism on executive compensation if such remuneration levels become more transparent.

### **3.3.2 Outrage Constraint Due to Higher Transparency**

In contrast to standard principal agent theory Bebchuk and Fried (2004) emphasize the role of managerial power as an explanation for inefficient contracts between agents and principals and the possibility of managers to influence their own pay arrangements<sup>86</sup>. However, so called “outrage constraints” are able to limit a managers’ rent maximization and the authors mention three reasons for the effects of outrage constraints:

Firstly, institutional investors may think due to outrageous compensation arrangements that executives are insensitive to shareholders’ interests. Thus, in the event of a hostile takeover or proxy fight, investors might be less motivated to support managers.

Secondly, regarding future market career prospects and current business dealings with outsiders, managers have an interest in avoiding reputational losses due to outrageous compensation arrangements.

Thirdly, social and psychological factors – such as criticism or ridicule from social or professional groups – discourage managers from adopting outrageous compensation arrangements.

Bebchuk and Fried (2004) summarize that “for executives to be adversely affected in a material way, outrage must spread among those outsiders whose views matter most to them: the institutional investor community, the business media, and social and professional groups” (Bebchuk and Fried, 2004, p. 66). Similarly, organizational behavior research states that due to self-serving motivation individuals tend to be unfair in reallocating resources. However, individuals change their self-serving behavior in cases where their allocation decisions were made public (Diekmann, 1997).

Dyck and Zingales (2002) empirically focus on the effect of media pressure on managers to behave according to social norms. They state that media attention affects managers’

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<sup>86</sup> The idea of managers influencing their own compensation can certainly be applied to the German corporate governance system. Although the two tier system implements supervisory boards as an autonomous institution responsible for management compensation, literature provides evidence of the supervisory boards’ inefficiency (i.e. Oehmichen et al., 2014; Kramarz and Thesmar, 2013; Andres et al., 2013). Particularly in cases where board members have friendly relationships (interlocking boards) it is likely that managers will indirectly receive managerial power to influence their own pay arrangements.

reputations not only in the eyes of shareholders and future employers but also in the eyes of family, friends and professional associates. Thus, the responsiveness of managers to environmental issues – which they examine empirically<sup>87</sup> – is partly due to concern about their public image. Kuhnen and Niessen (2012) on the other hand investigate the direct impact of public opinion on executive compensation in America and find empirical evidence that public opinion influences a firms' decision on the composition of executive compensation. Subsequent to negative press coverage of CEO compensation, firms adjust the level and structure of executive compensation<sup>88</sup> and this effect intensifies in firms having executives with stronger reputational concerns. Alissa (2015) examines empirically the compensation-based board response to shareholders' dissatisfaction<sup>89</sup>. He argues that, assuming shareholders' dissatisfaction damages the managers' reputations, managers might have an incentive to avoid further shareholder dissatisfaction by systematically reducing excess pay. However, a significant systematic pay-based reaction only occurs in cases of poor firm performance<sup>90</sup>.

Häring and Douglas (2012) provide evidence for the management compensation reducing effect of an outrage constraint by presenting a German example from the financial crisis. Although the economy was going through a financially difficult period, executives still received high compensation packages. For obvious reasons this caused outrage which made the CEO of Deutsche Bank, Josef Ackermann, “voluntarily” waive his bonus shortly before the bank announced a record loss in 2008. Similar behavior by U.S. American CEOs has been observed as well.

Detailed disclosure obligations regarding executive compensation lead to higher transparency and the general public receives the necessary information on compensation arrangements which could possibly induce outrage. Thus, Bebchuk and Fried (2004, 192)

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<sup>87</sup> The authors use international data.

<sup>88</sup> They observe a reduction in option pay and an increase in other compensation components such that overall compensation does not change.

<sup>89</sup> Measurement of dissatisfaction is possible due to the implementation of the Say on Pay regulation in the UK in 2002 that allows shareholders to vote against a firm's Directors' Remuneration Report.

<sup>90</sup> Thus, boards respond selectively to shareholders' dissatisfaction when there is poor performance. Alissa (2015) mentions two potential reasons for the lack of evidence in cases where performance is not bad: Firstly, the remuneration board might fear the loss of a valuable CEO in cases of wage reduction. Secondly, shareholders' dissatisfaction may influence certain elements of compensation which do not capture pay levels.

state that “the greater outsiders’ understanding of compensation arrangements, the tighter the outrage constraint”<sup>91</sup>.

Applied to the German context, several German lawyers hypothesized that disclosure of executive compensation by name might prevent executives from postulating inappropriately high compensation packages and therefore lead to a leveling effect of total compensation. (Baums 2005, Hoffmann-Becking 2005, Fleischer 2005). Hoffmann-Becking (2005) and Hirte (2003) point to the particular sensitivity in Germany to high compensation levels (probably of higher relevance than e.g. in the U.S.) which might even intensify the disciplining effect of an outrage constraint in the German context. According to Baums (2005) disclosure partly serves as a “prevention tool” that discourages executives from claiming inappropriately high compensation packages, such that the individual compensation disclosure by name might have a leveling effect on inappropriately high compensation levels.

So far we have described two mechanisms which both predict a leveling effect of stricter publication obligations on executive compensation. On the one hand, we claimed that disclosure obligations might serve as a monitoring tool for shareholders which might motivate supervisory board members to adopt executive compensation that reflects the shareholders’ interests. On the other hand, there might be an outrage constraint exerting pressure on executives which could discourage them from claiming inappropriately high compensation levels. Not least, it might well be that both mechanisms occur simultaneously. Thus we hypothesize:

***H1:** Higher transparency concerning executive compensation due to implementation of the VorstOG might intensify shareholders’ possibilities in monitoring the supervisory board’s compensation setting and/or an outrage constraint on managers. Therefore the implementation of the VorstOG should have a leveling (negative) impact on total (excessive) compensation.*

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<sup>91</sup> However, Bebchuk and Fried (2004) point out that disclosure only succeeds in constraining compensation effectively if the information is available to more than just a selected group.

### **3.3.3 Sensationalism –Public Tends to Focus on High Compensation Levels**

As mentioned above, recent literature discusses the impact of media on corporate governance.

Not only outsiders with particular interests and relations to companies, but also the media receive better information on executive compensation as a result of stricter disclosure obligations. Taking into account that shareholders' willingness to criticize and thus influence management compensation depends largely on the degree of information they receive, media on the one hand serves as an additional instrument for reporting governance issues. That in turn may intensify the former mentioned mechanism of disclosure obligations as a monitoring tool (Hooghiemstra et al., 2015). On the other hand, negative media coverage of executive compensation could damage the executives' reputation and thus set up an outrage constraint as discussed above.

Besides this, there is evidence that media tend to focus on companies paying a particularly high level of executive compensation. For instance, Core et al. (2008) showed empirically that negative press coverage on management compensation is related to the level of compensation, in particular the excessive part of compensation. Similarly, Chen et al. (2013) provide evidence that media coverage in China is much wider for firms with high executive compensation. One reason for this phenomenon could be the preference of the press for engaging in sensationalism. The higher the gap between average worker wages and executive compensation, the more spectacular the news<sup>92</sup>.

Accordingly, companies in the upper part of compensation distribution are more likely to receive public attention than companies with a relatively low compensation level. This hypothesis is probably particularly relevant for Germany, where high income levels are always considered suspicious by some people, irrespective of the performance and responsibility of CEOs. The implementation of the VorstOG is explicitly associated with higher transparency and could therefore cause an intensification of this phenomenon. Vesper-Gräske (2010) postulates an implicit intention of the VorstOG to limit high

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<sup>92</sup> Hooghiemstra et al. (2015) differentiate between media coverage in the financial and business press and media coverage in the general press. Thus, depending on the type of press, media could serve either as an information intermediary or as an instrument of entertainment. Core et al. (2008) support the sensationalism argument by showing that the press focuses negative attention on executives with particular large option exercises.



executive compensation by means of media publicity. Consequently, there might be higher public pressure, especially in the upper part of compensation distribution due to new publication obligations.

Thus we formulate the following hypothesis:

*H2: Companies in the upper part of the compensation distribution are more likely to be the focus of media attention and thus experience higher media pressure. Consequently, the effect of higher publication obligations on compensation levels should be stronger in the upper part of the compensation distribution.*

So far we would expect a negative impact of publication obligations on (inappropriately high) management compensation and thus a positive governance mechanism. However, the literature also critically discusses a possible increase in compensation level due to stricter publication obligations. Higher transparency and thus more detailed information about a rival company's compensation might justify a higher pay level. The so called "ratcheting-up" effect describes an inflationary growth of executive compensation because boards might tend to set executive remuneration at a level that is slightly above the average in their industry.

There is much debate as to whether this effect is efficient or not. On the one hand, benchmarking could lead to an inefficient increase in executive pay in cases where remuneration is orientated toward the compensation paid at other companies, but neglecting many of the specific circumstances confronting a particular firm (Alarie 2003). On the other hand, benchmarking could serve as an efficient mechanism to detect the reservation wage in order to get the best managers (Bizjak et al., 2008)<sup>93</sup>. However, Bizjak et al. (2011) report that firms (opportunistically) tend to target pay at higher percentiles than the median of the peer group or simply favor peer firms with higher compensation levels. Even after changes in disclosure regulation in the US in 2006<sup>94</sup>,

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<sup>93</sup> Indeed, the authors find out empirically that benchmarking and the use of peer groups is widespread in setting management compensation. In detail they show that executives receiving compensation packages below the median experience a larger increase in compensation than executives receiving compensation packages above the peer group median. Furthermore, the authors find evidence that the increase in compensation from below to above average is not systematically associated with poor corporate governance.

<sup>94</sup> Implementation of the 2006 Securities and Exchange Commission (SEC) rule

which required American companies to disclose their compensation to peer group members, Faulkender et al. (2013) find that strategic peer benchmarking did not disappear and was sometimes even intensified.

Besides the evidence for an inflationary effect of peer benchmarking on management compensation in general there is (to our best knowledge) no empirical evidence for a positive causal connection between mandatory compensation disclosure and executive compensation<sup>95</sup>. Although Perry and Zenner (2001) state that the real compensation levels increased dramatically in the period following compensation disclosure obligations in the US, the authors admit that the rise in stock option grants contributes to a large degree to these increases. Nevertheless, the conclusion of the authors is that executive compensation did not decline at all.

Finally, Baums (2005) doubts that information on rival companies' remuneration and thus the inflationary effect of peer benchmarking is a consequence of the implementation of publication obligations. He argues that experts of executive compensation consulting firms, which usually consult remuneration committees in the US, are well aware of competitors' remuneration systems, even without mandatory publication obligations. The same is true for Germany and the relevance of a ratcheting-up effect of executive compensation due to publication obligations might be limited for other reasons.

### **3.4 Data and Identification Strategy**

#### **3.4.1 Identification Strategy**

The aim of our analysis is to evaluate the impact of a natural experiment, in particular the implementation of the VorstOG, on the level of executive compensation. A standard approach in program evaluation is the difference-in-differences (DID) estimator. Basically, a DID approach compares the impact of a "treatment" (in our case the policy intervention) before and after the treatment by simultaneously considering a cross-sectional component. The cross-sectional component is provided by a basic differentiation between a so called treatment group and a control group. In our case the

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<sup>95</sup> In a recent working paper Balsam et al. (2015) analyze the effect of adopting International Financial Reporting Standards (IFRS) on executive compensation. They show that after IFRS adoption executive pay increases significantly. However, by focusing on the impact of general IFRS adoption and not on compensation disclosure obligations these results must be seen in another context and are not contradictory to our argumentation.

treatment group represents the group of companies which are affected by the policy change. That is the group of companies which did not voluntarily disclose the executive compensation before the implementation of the VorstOG. Consequently, the group of controls is defined by companies which disclosed executive compensation voluntarily even before it became mandatory by law. Now the basic idea is to estimate the change experienced by the treatment group adjusted by the change realized by the control group before and after the treatment.

Thus, in the following we will compare the level of executive remuneration before and after the implementation of the VorstOG, between companies which did not voluntarily disclose (treatment group) and companies which had already voluntarily disclosed (control group) remuneration before this became mandatory.

Fortunately we are able to differentiate between treatment and control group by using information from the declaration of compliance to the GCGC. Thus, the sample forming our treatment group consists of those firms which did not comply with §4.2.4 of the GCGC in 2005. As mentioned earlier, these are companies which refused to disclose executive compensation components on a differentiated and individualized level. The pre-reform cohorts consist of observations from before 2005 (including 2005)<sup>96</sup>. Since the VorstOG became effective in 2006 the post-reform cohort is represented by observations after 2005.

### 3.4.2 Econometric Model

The standard DID estimator calculates the average effect of the intervention on the treatment group<sup>97</sup> (Athey and Imbens, 2006). In order to do so it is necessary to calculate the counterfactual outcome of the treatment group. This is the outcome that the treatment group would have achieved if the treatment group had not been treated. Once the counterfactual outcome is calculated it has to be subtracted from the post treatment outcome of the treatment group in order to identify the treatment effect on the treated. Given the common trend and independence assumption is fulfilled the counterfactual situation can be easily calculated. Therefore we assume that  $E(y_{GT})$  represents the

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<sup>96</sup> Due to data restrictions we assume that companies which did not comply in 2005 with paragraph 4.2.4 GCGC also did not comply with the same paragraph in previous years.

<sup>97</sup> Given that the common trend assumption and independence assumption is fulfilled. Note that result depends on scaling of the outcome.

conditional expected outcome, whereas the index  $GT$  indicates whether the outcome is realized by the treatment group ( $G = 1$ ) or not ( $G = 0$ ) and simultaneously indicates the time period which is either the post treatment period ( $T = 1$ ) or not ( $T = 0$ ). The expected value of a counterfactual outcome is denoted by  $E(Y_{GT}^N)$ . Formally the counterfactual expected value of the treatment group's outcome  $E(Y_{GT}^N)$  is defined as follows:

$$E(Y_{11}^N) = E(Y_{10}) + E(Y_{01}) - E(Y_{00}) \quad (3.1)$$

The DID effect can then be computed by<sup>98</sup>:

$$\Delta DID = E(Y_{11}) - E(Y_{11}^N) \quad (3.2)$$

Aside of the general effect, in several cases it might be of interest to learn more about a particular treatment effect, especially when the effect of an intervention might differ across individuals or quantiles. With regard to the current research question it might well be the case that the implementation of the VorstOG has different effects on executive compensation depending on the quantiles of the distribution which are examined. Therefore, the Quantile-DID (QDID)<sup>99</sup> approach is used, which applies the standard DID approach to each quantile rather than to the mean (Athey and Imbens 2006).

In order to calculate treatment effects on different quantiles instead of at the mean we need to consider the conditional distribution function of our outcome variable,  $F_{GT}(y)$ . Again, the index  $GT$  differentiates between treatment and control group, respectively between post and pre-treatment. Within a QDID approach it is now necessary to fix a certain quantile  $\tau'$  for a specific outcome  $y'$  depending on the conditional distribution of the pre-treatment group ( $F_{10}(y')$ ) (see figure 3.1). Based on this quantile the counterfactual outcome distribution of the treatment group ( $F_{11}^N(y)$ ) will be computed. Similarly to the standard DID this is done by adding the difference between  $F_{01}(y)$  and

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<sup>98</sup> This difference is equivalent to  $(E(y_{11}) - E(y_{01})) - (E(y_{10}) - E(y_{00}))$  which perhaps more intuitively refers to the idea of a difference-in-differences estimator.

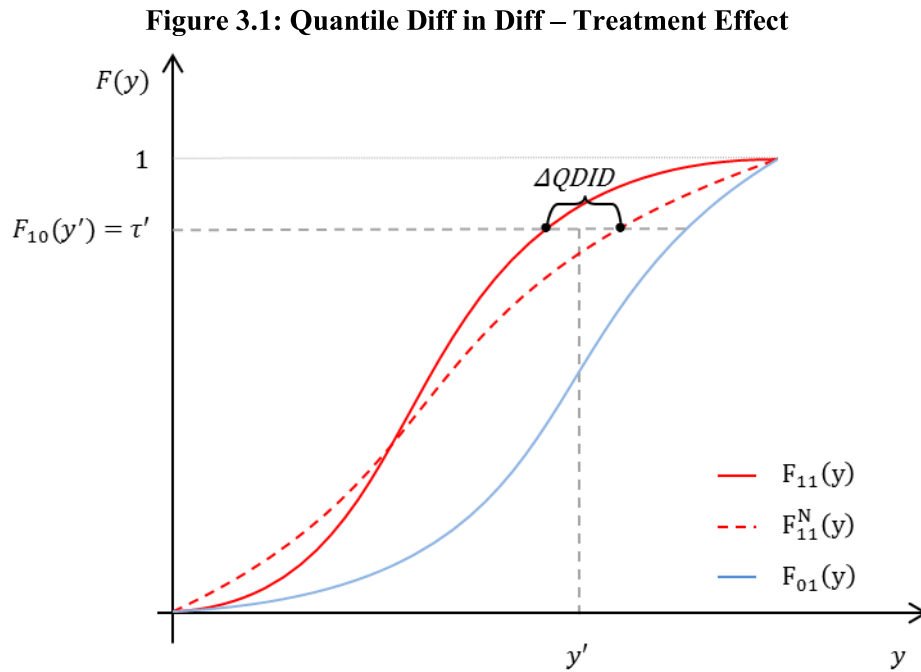
<sup>99</sup> Also called non-linear DID method

$F_{00}(y)$  to  $F_{10}(y)$  for a particular quantile  $\tau'$ . Formally this can be expressed by using inverse distribution functions (also known as quantile functions), such that:

$$F_{Y,11}^{-1N}(\tau') = F_{Y,10}^{-1}(\tau') + (F_{Y,01}^{-1}(\tau') - F_{Y,00}^{-1}(\tau')) \quad (3.3)$$

Figure 3.1 shows that the treatment effect  $\Delta QDID$  finally results in the difference between the actual and the counterfactual distribution of the treatment group on a certain quantile  $\tau'$

$$\Delta QDID = F_{Y,11}^{-1}(\tau') - F_{Y,11}^{-1N}(\tau') \quad (3.4)$$



**Notes:** Only post-treatment outcome distribution functions are shown;  $F_{11}(y)$  represents conditional distribution of  $y$  of the post-treatment group;  $F_{11}^N(y)$  represents counterfactual conditional distribution of  $y$  of the post-treatment group;  $F_{01}(y)$  represents conditional distribution of  $y$  of the post-control group.

The treatment effect at the  $\tau'$ -quantile is  $\Delta QDID = \theta_{\tau'}$  and can be easily estimated using standard quantile regression<sup>100</sup> by application of the following specification

$$F_Y^{-1}(\tau') = \alpha_{\tau'} + \beta_{\tau'}T + \eta_{\tau'}G + \theta_{\tau'}GT + \mathbf{X}'\gamma_{\tau'} \quad (3.5)$$

The explanatory variables  $T$  and  $G$  correspond to the index description definition explained above. The vector  $\mathbf{X}'$  represents a set of controls. Thus the QDID approach compares individuals across both groups and time periods according to their specific quantile (Athey and Imbens 2006)<sup>101</sup>.

Unfortunately, standard quantile regression, often referred to as conditional quantile regression, only provides the effect of changes in an explanatory variable on the conditional distribution of the dependent variable. Thus, the interpretation of the coefficients is only valid for the corresponding quantile of the distribution which is defined by the covariates (conditional distribution)<sup>102</sup>. In the context of this study this means that the estimated treatment effect, for example at the median, represents the treatment effect for companies that pay the median compensation which is defined by whatever covariates we include in the model (Porter, 2015). Thus the estimated treatment effect of disclosure obligations using conditional quantile regression represents the treatment effect within a group, where the “group” consists of companies who share the same values of the covariates.

However, empirical researchers are primarily interested in understanding the effect of a change in an explanatory variable on the unconditional distribution of the dependent variable. That is the treatment effect on a certain quantile of the overall compensation distribution. Especially in cases of evaluating policy interventions quantile effects for an unconditional population might be more interesting.

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<sup>100</sup> Koenker and Basset (1978); Chamberlain, G. (1994), Koenker, R. (2005)

<sup>101</sup> In contrast to standard DID the QDID framework makes independence of explanatory variables necessary (the underlying distribution of unobservable characteristics must be identical in all subpopulations). Restriction on data is that the transformation  $k^{QDID}(y) = y + \Delta QDID$  is monotone. Furthermore the identifying assumption depends on monotonic transformations of the outcome variable (Athey and Imbens 2002).

<sup>102</sup> In contrast to standard OLS regression an estimated coefficient  $\beta_{\tau}$  from a conditional quantile regression is generally different from the estimated coefficient measuring the effect of changing an  $X$ -variable on the  $\tau$ th quantile of the unconditional distribution of  $y$  (Firpo et al. 2009).

Thus, following Havnes and Mogstad (2015) we extend the idea of the QDID approach explained above to an unconditional quantile DID approach. Basically, this approach uses the concepts of influence functions (IF)<sup>103</sup> respectively recentered influence function (RIF) in the manner of Firpo et al. (2009) and adapts this technique to a DID framework. Firpo et al. (2009) developed the RIF regression model which in the case of quantile analysis can be interpreted as unconditional quantile regression. The main idea is to evaluate the impact of changes in the explanatory variable on the unconditional distribution of the dependent variable. To do so we first need to transform the dependent variable into the RIF such that we can run a regression of the RIF on the explanatory variables. The RIF is defined as the sum of the IF and the value of the dependent variable at the  $\tau$ th quantile ( $q_\tau$ ) such that:

$$RIF(Y; q_\tau, F_y) = q_\tau + IF(Y; q_\tau, F_y) \quad (3.6)$$

In a next step we will model the conditional expectation of the RIF as a linear function of the explanatory variables  $X$  such that we can run simple OLS in order to estimate the coefficient  $\beta$  in an unconditional quantile regression framework.

$$E(RIF(Y; q_\tau, F_y)|X) = X'\beta + \varepsilon \quad (3.7)$$

Firpo et al. (2009) showed that the average derivative of this unconditional quantile regression provides the marginal effect on the unconditional quantile of a small location shift in the distribution of covariates *ceteris paribus*. Thus, the interpretation of the estimated coefficients is similar to the interpretation of OLS estimates. Due to the transformation of the dependent variable into the RIF without considering any covariates the interpretation of the estimated coefficients is independent of covariates – or “unconditional”, so to speak.

As already mentioned, Havnes and Mogstad (2015) used the concept of RIF regression and extended it to the DID context. Similar to QDID, it is necessary to construct a

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<sup>103</sup> The influence function estimates the marginal effect of an observation on the value of a statistic. The influence function is frequently used in the literature on robust estimation as a measure of robustness to outliers.

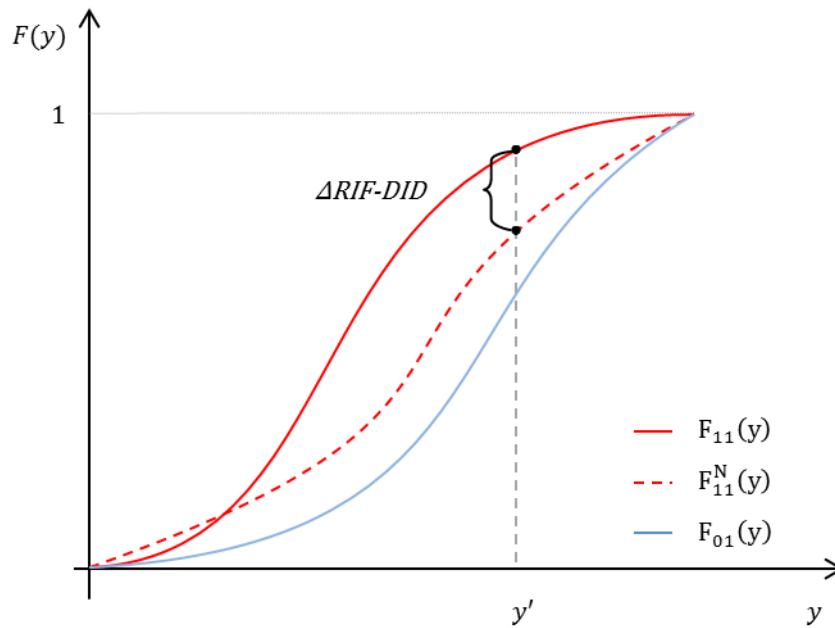
counterfactual distribution of the post-treatment output of the treated group. Thus, in order to identify  $F_{11}^N(y)$  in the RIF-DID context the model adds to the  $F_{10}(y)$  distribution the difference of the distributions of  $F_{01}(y)$  and  $F_{00}(y)$  such that:

$$F_{11}^N(y) = F_{10}(y) + (F_{01}(y) - F_{00}(y)) \quad (3.8)$$

Consequently the treatment effect  $\Delta RIF - DID$  results by subtracting  $F_{11}^N(y)$  from  $F_{11}(y)$  as can be seen in figure 3.2.

$$\Delta RIF - DID = F_{11}(y) - F_{11}^N(y) \quad (3.9)$$

**Figure 3.2: RIF- Diff in Diff – Treatment Effect**



**Notes:** Only post-treatment outcome distribution functions are shown;  $F_{11}(y)$  represents conditional distribution of  $y$  of the post-treatment group;  $F_{11}^N(y)$  represents counterfactual conditional distribution of  $y$  of the post-treatment group;  $F_{01}(y)$  represents conditional distribution of  $y$  of the post-control group.



The unconditional treatment effect  $\Delta RIF - DID = \delta_\tau$  can then be calculated by estimating the following specification via RIF regression.

$$E(RIF(Y; q_\tau, F_y)|X) = \alpha_\tau + \beta_\tau T + \eta_\tau G + \delta_\tau GT + \mathbf{X}'\gamma_\tau \quad (3.10)$$

Similar to the standard DID<sup>104</sup> approach, there are also underlying identifying assumptions for non-linear DID methods. In the QDID framework, for example, the common trend assumption in mean earnings in the absence of the treatment needs to be fulfilled. That means that given a certain quantile  $q'_\tau$  the change in the outcome variable for the treatment group (from before to after treatment period) would have been the same as for the control group if the treatment group had not been treated.

In contrast to this, the common trend assumption in the RIF-DID context is slightly less restrictive. There it is only necessary that the change in population shares (from before to after treatment period) *around a certain  $y'$*  would have been the same as for the control group if the treatment group had not been treated (Havnes and Mogstad, 2015).

### 3.4.3 Data

In order to evaluate the effect of the implementation of mandatory publication obligations in Germany on executive compensation we use a composed dataset of 84 German companies which are listed on the Prime Standard segment of the German Stock Exchange<sup>105</sup>. The dataset covers the periods from 2002 to 2011 (unbalanced) resulting in a total number of 762 observations<sup>106</sup>. Data on the average executive compensation per head is provided by Kienbaum Consultants International GmbH. Furthermore, we combine the Kienbaum dataset with the Dafne database compiled by Bureau van Dijk. This dataset contains information on firm financials and firm employment which will serve as control variables. Beside this we use self-collected data on the disclosure practices of the companies. For this purpose we evaluated the annual declaration of compliance for the financial year 2005. In detail we noted which companies complied

<sup>104</sup> In comparison to standard DID the non-linear DID approaches are invariant to monotonic transformation of the outcome.

<sup>105</sup> Most of the companies have been quoted either on the DAX or the MDAX.

<sup>106</sup> We only kept observations for which we have information before and after the treatment.

voluntarily and self-obliged with paragraph 4.2.4 of the German Corporate Governance Code in 2005 and which companies did not.

Table 3.1 presents descriptive statistics of our data separated into control and treatment group. Accordingly we observe 51 (484 firm-years) companies which refuse to apply the recommendation of paragraph 4.2.4 of the Corporate Governance Code and thus according to our identification strategy serve as the treatment group. Consequently, the 33 (278 firm-years) remaining companies that had already complied with paragraph 4.2.4 before the implementation of mandatory publication obligations became effective therefore form the control group.

Our dependent variable  $y$  is the logarithm of the average total compensation per head ( $\ln TotComp$ ). The average total executive compensation per head is €1.5m in the control group and greater than the corresponding amount of €1.05m for the treatment group. As the standard deviation for the average total compensation in the control group is also higher we know that the difference in total compensation between treatment and control group is rather driven by outliers than by systematic differences.

Both estimation techniques, QDID and RIFF-DID, use the same explanatory variables. Referring to equations (3.5) and (3.10) the variable  $T$  represents a dummy variable assuming unit value if the observation is from the year 2006 onwards (including the year 2006) and zero if the observation belongs to the pre-treatment period. The dummy variable  $G$  indicates whether an observation belongs to the treatment group (unit value) or to the control group. The (quantile) treatment effect will be represented by the coefficient  $\theta_\tau$  and  $\delta_\tau$  respectively.

As mentioned earlier,  $\mathbf{X}'$  represents a vector of controls. In particular, we control for size effects by using the log of employment ( $\ln Employ$ ). Table 3.1 shows that the average company size of the control group is 65.841 employees and therefore these firms are much larger than those from the control group, which employ on average 17.019 persons. Similar to the dependent variable, the standard deviation of the mean value for  $Employ$  is much higher in the control group than in the treatment group. Thus, we conclude that this difference in size is mostly driven by some extremely large companies in the control group (for example Volkswagen AG). This makes clear that in order to estimate a causal treatment effect it is important to control for possible size effects.

The impact of economic performance is considered by using return on equity (*ROE*) as an explanatory variable. The average return on equity for both groups varies between 7 and 8 percent. Furthermore, we control for an asymmetry in punishing managers for bad firm decisions and remunerating managers for good firm decisions by implementing a dummy variable that assumes unit value if the balance sheet total is positive and zero otherwise (*DProfit*). More than 80 percent of the overall observations include companies which have a positive balance sheet total. Additionally, we control for the asymmetric impact of performance on compensation by interacting *DProfit* with *ROE*. The average return on equity for companies having a positive balance sheet total (12.53%) is slightly higher in the treatment group than the corresponding value for the control group (10.38%). As we use an unbalanced panel for the periods between 2002 and 2011 we control for time effects by implementing time dummies. We also control for industry effects by using industry dummies<sup>107</sup>.

**Table 3.1: Descriptive Statistics for 2002 - 2011 for treatment and control groups**

	Variable	N	Mean	Se
Control Group (G = 0)	<i>TotComp</i>	278	1557	1413
	<i>ROE</i>	278	7.107	18.04
	<i>Employ</i>	278	65841	111485
	<i>DProfit</i>	278	0.838	0.369
	<i>intDProfitROE</i>	278	10.38	8.964
Treatment Group (G = 1)	<i>TotComp</i>	484	1048	1076
	<i>ROE</i>	484	8.097	22.59
	<i>Employ</i>	484	17019	47088
	<i>DProfit</i>	484	0.841	0.366
	<i>intDProfitROE</i>	484	12.53	11.67

TotComp represents total per head executive compensation in thousand Euros (84 companies from 2002 to 2011).

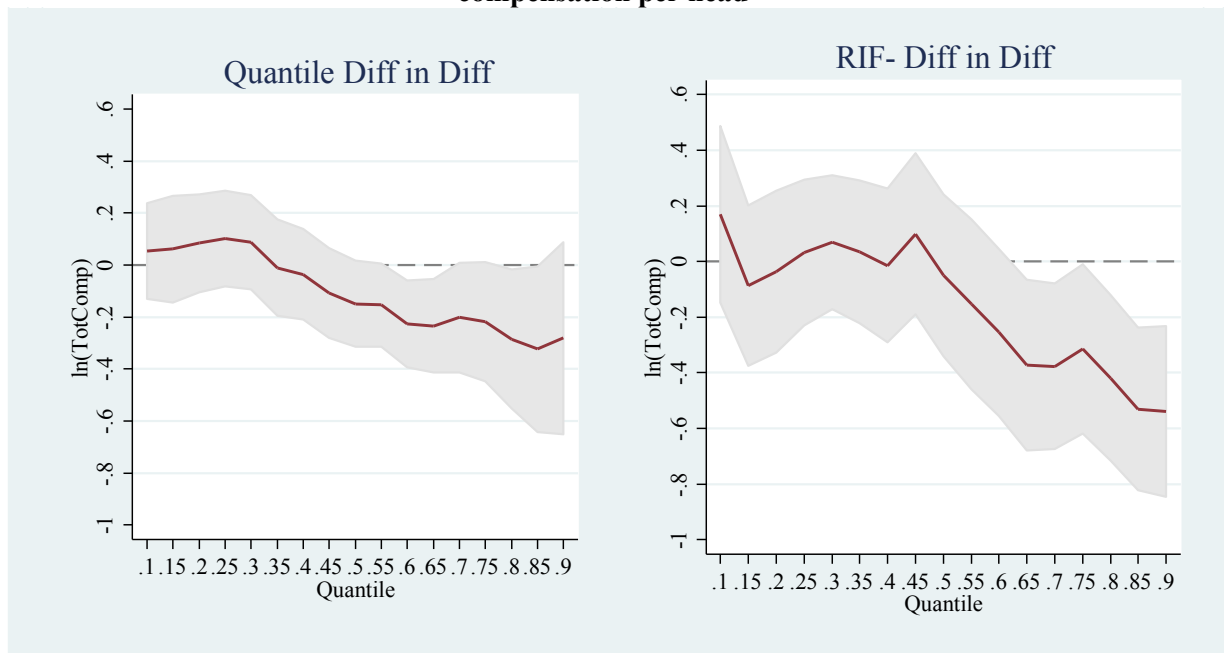
### 3.5 Results

As described in equations (3.5) and (3.10) we run the QDID and the RIF-DID estimator on identical specifications such that the set of independent variables and the number of observations is the same for both models.

<sup>107</sup> WZ2008 first stage (“Klassifikation der Wirtschaftszweige“ from Statistisches Bundesamt)

Figure 3.3 represents the estimated treatment effects for both models. The horizontal consists of quantiles ranging from the 10<sup>th</sup> to 90<sup>th</sup> quantile and the vertical represents the logarithm of the total compensation per head. Thus, the graph represents the percentage effect of the implementation of the VorstOG on the different quantiles of the compensation distribution.

**Figure 3.3: Quantile treatment effect of the VorstOG on the log level of executive compensation per head**



**Notes:** The plotted QTE corresponds to the estimator for  $\theta_{\tau}$  ( $\delta_{\tau}$ ) in equation (3.5) (equation (3.10)) in the QDID (RIFF-DID) case. As it is not recommended to push  $\tau$  into the tails too far we only present the QTE at quantiles 01-90. The grey shaded area represents a 90% confidence interval based on bootstrap with 200 replications.

As presented in figure 3.3 the similar shape of both curves (QDID and RIF-DID) indicates that our results are robust towards different estimation techniques whereas the point estimates of the RIFF-DID estimation are in absolute values higher than those of the QDID model. Both estimation techniques show a decreasing trend in the point estimates of the treatment effect along the quantiles. This serves as an indicator that the treatment effect differs across quantiles such that a quantile regression in general seems to be an adequate estimation technique to evaluate the effect of the implementation of VorstOG.

According to the QDID results, the implementation of the VorstOG caused a decrease of 23 percent in total compensation if the 65<sup>th</sup> quantile of the compensation distribution is

considered and a decrease of 32 percent if the 85<sup>th</sup> quantile is analyzed. When unconditional quantile estimation techniques are used it turns out that the effects are even more extreme. If this method is applied in the case of the 65<sup>th</sup> quantile the VorstOG causes a 37 percent decrease in total compensation and for the 85<sup>th</sup> quantile the estimated treatment effect is a decrease of 53 percent in comparison to the control group.

However, in both cases the estimated effects turn out to be significant only in the upper quantiles. Thus, between the 60<sup>th</sup> and 90<sup>th</sup> quantile the implementation of publication obligations in Germany has a significant negative effect on the total per head executive compensation.

In comparison to companies who already disclosed executive compensation on a detailed level voluntarily before the implementation of the VorstOG, companies who did not disclose information experienced a decrease in total compensation due to the mandatory changes in publication obligations. Thus, the fact that the estimated treatment effect in both models has a negative sign (at least at the part of the distribution where it turns out to be significant) supports H1. As we described earlier there might be two potential mechanisms which might (simultaneously) determine the revealed decrease in total executive compensation. The estimated results suggest that stricter publication obligation could possibly serve as an instrument to motivate supervisory board members to adopt total compensation schemes in accordance with shareholder' interests. The results also support the notion that, due to an outrage constraint, executives might be discouraged from claiming inappropriately high compensation packages, resulting in a decrease of total compensation.

There is no valid interpretation of the impact of the VorstOG on the lower part of the compensation distribution – perhaps due to the fact that there is no effect at all? Thus, the fact that the quantile treatment effects only turn out to be significant for the upper part of the compensation distribution supports the earlier discussed assumption that the policy change might especially be effective in the case of inappropriately high levels of compensation (H2).

Besides the fact that the treatment effect is only significantly estimated in the upper part of the distribution, the effect itself also increases in terms of absolute values. This might support our second hypothesis that media pressure, which mostly focuses on extremely

high executive compensation, succeeded in having a stronger impact on higher levels of compensation.

### **3.6 Conclusion**

This paper reports the results of an empirical study on the effects of the introduction of considerably more stringent disclosure requirements on the level of executive compensation. The innovative aspect is the comparison of companies which voluntarily followed a recommendation of the German Governance Code (before the disclosure became mandatory) and published detailed information on executive compensation with others which did not. Furthermore, we apply a quantile difference-in-differences model and extend the analysis to unconditional quantile regression. Interestingly, the companies which refused to publish data before it became mandatory, show a reduction in compensation levels for the upper quantiles. Hence, the mandatory requirements to publish detailed information affected remuneration in the way that was intended by the legislator.

Since before the implementation of the VorstOG only the total amount of executive compensation was published and not its components, we do not know to which extent the decrease in total per head compensation is due to changes in the compensation design. A decrease in total compensation could be caused by different mechanisms: Firstly, it could be caused by a simple decrease in the fixed part of executive compensation holding other variable compensation components constant. Secondly, a decrease in the total level of compensation could occur because both fixed and variable parts decreased. Or thirdly (but most unlikely), the reason for a total decrease is a decrease in the variable share of compensation.

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## **4 How do Labor Representatives Affect Incentive Orientation of Executive Compensation?<sup>108</sup>**

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<sup>108</sup> This chapter was written in collaboration with Kornelius Kraft and published as SFB Discussion Paper 22/2015. Furthermore this work was presented at Workshop on Co-determination and Employee Participation at IAAEU in Trier (2014) and at the 43th EARIE in Lisbon.

## 4.1 Introduction

In all developed countries labor markets are shaped by interventions through laws and institutions (Botero et al. 2004). State regulations encompass labor law, collective bargaining laws as well as institutions like unions, and social security provisions like employment protection or unemployment benefits. Once introduced, politically induced changes in corporate governance institutions affect rent creation positively or negatively and furthermore determine distribution of rents (Perotti and Thadden, 2006).

German codetermination is in a way an extreme politically mandated intervention into corporate governance structure in that 50% of the seats on the supervisory boards (which among other tasks appoint and control the executives) go to representatives of labor<sup>109</sup>. This offers the unique opportunity to examine how such a strong power of labor affects incentive orientation and therewith efficiency of the firms. We report the results of an empirical study on this question, which based on a unique sample of German listed firms and detailed information on compensation of top managers.

The background of our study is the argumentation that labor has an interest in deviation from long term profit maximizing behavior and redistributes rents in favor of the employees<sup>110</sup>. If this were true, labor might argue for an executive compensation package with large fixed components but not much incentive orientation by means of variable, profit related pay. On the basis of a largely profit independent remuneration, management might be less strongly induced to pursue cost minimization. The codetermined supervisory boards determine compensation of executives and also the composition in terms of fixed and variable parts. We investigate whether codetermined supervisory boards really reduce incentive orientation of executive compensation as e.g. Gorton and Schmid (2004) have stated.

Our study is not only relevant for Germany. On the one hand it is a test on what happens if labor has 50% of the votes in the determination process of executive compensation and

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<sup>109</sup> “An interesting political construction is the attempt to let labor directly influence corporate decision making. The most pronounced incarnation of this idea is compulsory labor codetermination as practiced in large German firms” (Perotti and Thadden 2006, 160).

<sup>110</sup> C.f. among others Jensen and Meckling (1979). A detailed review of the different views on codetermination (and other forms of worker decision rights) is given by Addison (2009). With respect to efficiency effect, it should be taken into account that codetermination might well affect employment decisions to a larger degree than remuneration (Kraft 2001).



this is probably a question of general interest. On the other hand Germany is the largest economy in which employees have the legal right to such participation, but it is not the only one. Denmark, Sweden, Austria, the Netherlands and Luxembourg have similar codetermination laws (but with lower percentage of total votes). Italy and the remaining West European countries (with the exception of the UK) implement work councils at the very least. French companies send non-voting employees to the board (Smith 1991). Addison (2009, 1) regards the German system of employee representation as a template for policy formation in the European Union.

The classical theoretical approach explaining performance-based management compensation is the principal agent model that discusses the divergence in interests of a firm's owner and manager. Shareholders are interested in maximizing long-run firm value while managers like to maximize their utility, which in turn is determined by compensation, large expense accounts, prestige and power. Many of the determinants of managers' utility are size-related and therefore incentives exist to overemphasize growth. Performance-based executive compensation contracts are used in such situations as instruments to balance the long-term interests between shareholders and managers.

The analysis may however be incomplete if the influence of workers as important stakeholders is neglected. As stated above regulation offers labor possibilities to influence decision making and the German system of codetermination is an exposed example for this.

Incentive-orientated contracts intend to motivate managers more towards profit maximization and this in turn could be a matter of cost minimization. In the context of codetermination one hypothesis is that employees want to avoid cost minimization strategies, which among other items include wage reductions (or low increases) and fast employment adjustments if this is necessary in times of crisis. Then codetermination could exert a negative impact on the incentive orientation of executive compensation.

In this study we discuss and test the opposite hypothesis namely that the frequently assumed difference in the objective function of shareholders and employees may not exist. On the contrary, employees could have an interest in setting incentives for the managers, such that the executives make decisions to guarantee the survival of a firm in the long term. For example, it is not in the interest of the employees that the top-management pursues overly risky expansion projects, implying a considerable overlap

between the interests of employees and shareholders. The codetermination rights of workers in particular are of relevance, as it is at least questionable whether control exerted by other forces really leads to optimal management compensation schemes<sup>111</sup>. Only a limited number of empirical studies exist that consider the effect of German codetermination on management compensation, especially on the performance orientation of executive compensation<sup>112</sup>. Gorton and Schmid (2004) use a sample of 250 listed companies in Germany that traded at the end of the year 1993 and are either quasi-parity codetermined or are subject to the weaker one-third codetermination. Due to limited publication obligations in Germany at this time the only available information on compensation is the ratio of total management board compensation to the number of members. To model pay-performance sensitivity the authors interact a performance indicator with a dummy variable indicating whether the company is equally represented. By means of the nearest-neighbor method, they found out that the link between executive compensation and firm performance at equal-representation companies is significantly negative. Thus the authors conclude that management board compensation provides incentives that are not conducive to pursuing shareholders' interests.

Edwards et al (2009) use a sample of 1,145 observations on 271 listed companies in Germany for the years 1989-1993. The authors investigate the effect of codetermination on pay for performance using a fixed-effect approach. Similar to Gorton and Schmid (2004) they use an interaction term to model pay-performance sensitivity. However, their results differ from Gorton and Schmid's (2004) as the coefficient of this interaction term is positive in several specifications, although never statistically significant due to problems of collinearity<sup>113</sup>.

In Germany there have been some recent changes in law concerning publication obligations of executive compensation. The so-called VorstOG<sup>114</sup> which became effective in 2006 for the first time requires the disclosure of detailed German data on different

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<sup>111</sup> Cf. for surveys Adams et al (2010), Murphy (2013) and for a quite critical view Bebchuk and Fried (2004).

<sup>112</sup> For a recent general study on executive compensation in Germany have a look at Fabbri and Marin (2016).

<sup>113</sup> Edwards et al (2009) use return on assets as performance indicator whereas Gorton and Schmid (2004) use the ratio of market to book value of equity. Edwards et al (2009) point out that accounting profitability was explicitly specified as performance indicators by the Aktiengesetz, such that their performance indicator is more suitable.

<sup>114</sup> Gesetz über die Offenlegung der Vorstandsvergütung

components of compensation. Henceforth, German listed corporations are obliged to publish the amount and composition of individual board members' compensation. The compensation is differentiated into fixed, short-term performance-based and long-run performance-based parts. This new opportunity of access to German data on executive compensation enables empirical research with a detailed look on the effect of codetermination on components of compensation in terms of fixed versus variable shares. Although from an international perspective employee representation by membership on supervisory boards is rather special, there are studies from other countries that are related to our research question. Outside Germany workers' interests are mostly represented by unions and it is of interest what effect unions have on management compensation.

Some studies have estimated the direct effect of union presence on the level of executive compensation. All studies detected a significant impact of unionization on executive compensation but with quite heterogeneous directions<sup>115</sup>. Nonetheless this literature underlines the importance of our research question, namely to what extent labor as a stake- but not shareholder is able to influence managerial compensation.

Below, section 4.2 presents the economic and institutional framework of the German board model and the impact of codetermination. Section 4.3 then provides an overview of the data and the econometric framework. Subsequently section 4.4 shows the empirical results followed by some robustness in section 4.5. Finally, section 4.6 concludes.

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<sup>115</sup> Gomez and Tzioumis (2013) present a good overview of existing literature: using U.S. data DiNardo et al (1997) find that greater levels of unionization were negatively and significantly associated with CEO cash pay. Banning and Chiles (2007) report that in the U.S. union presence, as well as the unionization rate at firm level, are negatively related to both the level of total CEO compensation and the proportion of CEO compensation that is contingent on firm performance. Based on Canadian data Singh and Agarwal (2002) show that union presence is associated with higher CEO cash pay, but not associated with other compensation components (e.g. stock options) and total compensation. Gomez and Tzioumis (2013) find evidence that union presence is associated with lower levels of total executive compensation in the U.S., especially lower stock option awards. The elasticity of cash pay to financial performance is similar across unionized and not unionized firms (US).

## 4.2 The German Board Model and the Impact of Codetermination

In the past the number of German stock companies was rather limited. Since 1997 the number of stock and joint- stock companies increased rapidly<sup>116</sup>. Thus, corporate governance related issues like the separation between ownership and control (Berle and Means 1932) gained in importance as shareholders do not manage their firm themselves anymore. Hence, this separation implies the risk of opportunistic behavior, i.e. the management's ability to manage the company to its own advantage at the shareholders' expense.

The standard framework describing this divergence of interests is the principle agent theory where the shareholder (principle) engages the manager (agent) to perform on his or her behalf (Jensen and Meckling 1976). In the textbook model the shareholders provide capital, bear the risk of investment and receive the profits as a compensation for risk bearing. The managers execute the operating business and are closely and effectively monitored by the shareholders.

Clearly, this model ignores information problems and hardly describes reality in modern stock companies. Managers have their own interests and are only imperfectly monitored. As a consequence managers might pursue their own utility maximization leading to (overly) risky projects, short-run profit maximization and expansion by mergers and acquisitions, which are not in the interest of shareowners. The more diversified capital ownership is, the more difficult effective execution of control is and the more relevant agency costs become.

These corporate governance problems have been known about for some time and instruments are applied to limit managers' activities that do not maximize the discounted present value of the firm. Such instruments include, for example, institutions that help to supervise top managers and incentive-compatible contracts. The working and effectiveness of such instruments is the topic of our contribution.

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<sup>116</sup> From 4,548 stock and joint-stock companies in 1997 to 14,184 stock and joint-stock companies in 2008 (Statista)

The internal corporate governance structure for German stock companies differs from the Anglo-Saxon one<sup>117</sup>. The American Board of Directors, for example, manages and supervises simultaneously whereas the German two-tier board system separates between a managing and a supervising institution, respectively between an executive and a supervisory board.

Besides operative decision-making the executive board has to call the Annual General Meeting and implements its resolutions. Furthermore it has to report to the supervisory board. The supervisory board advises and supervises the executive board. In principle the supervisory board is expected to act in the best interest of the company. Given that the members of the supervisory boards are elected by the shareholders (and their representatives) control of the executive board should be in compliance with the shareholders' interests. Thus, this institution has to ensure that the executive board's decisions are made in accordance with the shareholders' interests. Supervisory board members also decide on the adoption of the financial statements and approval of the consolidated financial statements. Another major decision area of the supervisory board is the selection, appointment, contract-renewal and dismissal of the executive board members. A subcommittee of the supervisory board, the *personnel committee*, decides on total compensation of top management and the composition of compensation in terms of fixed versus short- and long-run variable parts<sup>118</sup>. Hence the supervisory board on the one hand exerts control over managers and on the other hand is responsible for the implementation of an effective and incentive-compatible compensation scheme.

Given that shareholders and managers are interested in monetary values, incentive-based management compensation schemes could align shareholders' and managers' interests<sup>119</sup>.

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<sup>117</sup> See for a survey on the role of boards of directors in the U.S. Adams, Hermalin and Weisbach (2010).

<sup>118</sup> In the American corporate governance system the design and level of management compensation is delegated to compensation committees. Within these committees mostly outside members of the board of directors (directors who are neither current nor former employees) make decisions on executive compensation (Murphy, 1999).

<sup>119</sup> De Cesari and Ozkan (2015) is a recent empirical study on the effect of executive incentives on payout policy in Europe. The authors show that executive incentives in form of stock-based pay-performance sensitivity and stock ownership help to align the interest of the shareholders and executives by significantly increasing the level of total payout. By the use of German data Jirjahn and Kraft (2010) show that managerial incentive payments induce a more performance oriented wage structure for blue collar workers resulting in an increased wage inequality between skilled and unskilled workers. Leonard (1990) investigates U. S. data and finds out that long-term incentive remuneration plans for executives lead to a greater increase in firm performance.

Therefore, the management's compensation design should be divided into a fixed and a variable share. The variable share, e.g. bonus payment, profit sharing bonuses or stock options, should depend on key values indicating a profit- and value-increasing firm policy. Thus, by increasing the variable part of management's compensation the intention is to reduce or even to inhibit the incentives of pursuing opportunistic behavior.

#### Inefficiency of the supervisory board

The institutional differentiation into a management and a supervisory board in principle improves the task of controlling the top management. Obviously, the effectiveness of minimizing agency costs depends on the efficiency of the supervisory board. If the shareholders' interests are not represented adequately by supervisory board members, the risk of opportunistic behavior by management remains.

One major problem of this system is that supervisory boards are not dominated by the shareholders themselves, as one might assume in the first place. In fact, in the majority of supervisory boards not a single member is a capital owner<sup>120</sup>. Here we find the very specific and at the same time complicated situation where the principals appoint agents who control other agents. As the usual principal-agent problem is intensified, it would not be surprising if such a system did not work efficiently<sup>121</sup>. In this context Murphy (2013, p. 322) raises general concerns with respect to the role of outside directors in the U.S.: "However, these outside board members – who pay executives with shareholder money and not their own – are in no sense perfect agents for the shareholders who elected them." He points out that outside directors often hold only minor quantities of the shares and are reluctant to punish badly performing CEOs because they do not benefit much from these changes yet bear all of the non-monetary costs.

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<sup>120</sup> Lattemann (2010) refers to this phenomenon in the German governance system and Gralla and Kraft (2011) present some empirical evidence. Kahn et al. (2014) suggest distinguishing between share ownership by executive directors having responsibility for the day-to-day business and share ownership by non-executive directors (one-tier system). The executive's decisions might be more closely tied to firm performance if they hold shares. There is evidence that the share ownership of independent non-executive board members (which could be seen as a counterpart to the German supervisory board) is relatively small at 1.9% for an Australian dataset (Kahn et al., 2014) and between 1.92% and 3.09% for an American dataset (Mura, 2007).

<sup>121</sup> Canyon and He (2004) show that the presence of shareholders on the compensation committee of U.S. entrepreneurial firms lowers CEO compensation and increases CEO equity incentives. These results support the hypothesis that due to intensified agency problems the degree of incentive-orientated compensation schemes falls.

Furthermore, Lattemann (2010) mentions that former executive board members (after retirement) relatively often become members of supervisory boards of the same company. Oehmichen et al. (2014) proved this empirically by showing that in 25% of all observed firm-years the former executive is currently serving as a supervisory board member within the same company. In cases like this it is difficult to regard former CEOs as true outsiders and efficient supervisors. They are familiar with most of the current members of the management board and also with most other managers. Where top management compensation is to be determined, they might support the view of the executives. Furthermore in cases where problems arise due to their own wrong decisions in the past, they will hardly act as neutral supervisors. This could lead to a kind of intertemporal self-monitoring. It might violate the separation of supervision and management, at least for past decisions. Consequently Oehmichen et al. (2014) showed that these former executives have a significant negative impact on firm performance.

In Germany the legal number of supervisory board mandates is limited to a maximum of ten seats and some persons actually hold that many supervisory board seats. In such cases the supervisory board members simply cannot efficiently execute their control duties due to individual time constraints (Aurich, 2006). Existing literature discusses this argument as the “busyness hypothesis” saying that directors with multiple appointments are overcommitted (Ferris et al., 2003; Fich and Shivdasani, 2006)<sup>122</sup>.

Inefficiency could also occur due to the fact of interlocked board members, i.e. members of the supervisory boards are frequently executives from business partners, including banks<sup>123</sup>. There are usually loyal relations between the members of the management board and those members of the supervisory boards who are themselves top managers elsewhere. Networking is likely to take place, which might on the one hand have its benefits for members of the network, but on the other hand effective control of the

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<sup>122</sup> There is much debate as to what extent the “busyness hypothesis” is true. Some studies argue that a large number of board mandates is a sign of quality. For further discussion see Adams et al. (2010) or Andres et al. (2013).

<sup>123</sup> There is debate surrounding the efficiency effects of bank representation on German boards. See among others Gorton and Schmid (2000) and Edwards and Fischer (1994).

executives and efficient design of their contracts is questionable<sup>124</sup>. It is possible that reasonable decisions by the supervisory board which in principle would be valuable to the company, but affect the management negatively, would then be avoided to secure friendship and the personal network.

Bebchuk and Fried (2004) describe gains from the above-mentioned forces of collegiality, team spirit and respect for those leading the firm as spillover rents which come largely at the expense of shareholders (p 64). Thus, Adams et al. (2010) stress the importance of the independence of the board (discussing the U.S. experience) from the CEO to execute adequate control and collect information to decide on a possible contract renewal or replacement. As the authors emphasize, CEOs prefer less independent boards to be less closely monitored and to be able to maximize their own utility.<sup>125</sup>

Given these potential reasons for inefficiency, it is at least possible that the supervisory board members' motivation to implement efficient performance incentives is limited,

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<sup>124</sup> Kramarz and Thesmar (2013) show that networking determines board composition in France, that networked CEOs have higher incomes and that networks within the board reduce its efficiency. Battistin, Graziano and Parigi (2012) investigate the role of local connections on turnover and performance of Italian banks. Connections reduce turnover, attenuate the relation between performance and turnover, and worsen the performance of mutual, cooperative and local banks.

<sup>125</sup> Whereas in America there is a huge amount of literature on the monitor quality of dependent board members and its effects on firm performance, there is only little empirical literature for Germany. Recently, Anders et al. (2013) used a sample of 133 German firms and found out that firms with intensely connected supervisory boards have lower firm performance and a higher level of executive compensation. American empirical evidence mostly detects a negative impact of interlocking directorates on (indirect) firm performance. Hallock (1997) examined the effect of reciprocally interlocked boards on executive compensation in the US. He states that 8% of CEOs are reciprocally interlocked with another CEO and shows that CEOs of interlocked firms earn significantly more. Newman and Mozes (1999) examine the efficiency of the compensation committee when insiders are members of the compensation committee. Insiders are either employees of the current firm or employees of other firms that are well connected with the current firm. With insiders on the board, executive compensation is more favorable for the executive, but at the expense of shareholders. In particular they show that pay performance sensitivity is less weighted on inferior performance when insiders serve on the compensation committee. Chhaochharia and Grinstein (2009) show that CEO pay fell by 17% in firms which introduced more independent boards in comparison to firms which already had implemented such independent boards. Hwang and Kim (2009) find that while 87% of boards are conventionally independent only 62% are conventionally and socially independent (without social ties). They detect that firms in the latter group pay a lower level of compensation and exhibit stronger pay-performance sensitivity. Faleye (2011) proved empirically that CEOs are paid more and their compensation is less sensitive to firm performance when other CEOs serve on their boards.



which would be reflected in a relatively low share of incentive-based executive compensation.<sup>126</sup>

#### The impact of codetermination

Due to the rapid growth of stock companies the classical shareholder value approach has gained importance in recent decades. Basically, this approach stipulates maximization of the shareholders' equity. There are two interest groups: shareholders and managers. The principals are expected to efficiently determine management compensation in general and its components in particular.

Within this context the German codetermination law<sup>127</sup> introduces a third interest group, namely the employees. In companies with more than 2000 employees 50% of the seats of the supervisory board are legally filled by employee representatives<sup>128</sup>. This form of codetermination has been called "quasi-parity", as the head of the supervisory board has two votes in cases of disputes and the head is appointed by the shareholders. However, disputes are rather rare. In the case of firms with between 500 and 2000 employees the weaker one-third codetermination law applies, in which case 33% of the seats of the supervisory board go to the labor representatives<sup>129</sup>. Employees are legally involved in decision-making on the supervisory board such that in contrast to what the shareholder

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<sup>126</sup> Sun and Cahan (2009) compute a composite measure of compensation committee quality based on six different committee quality characteristics (1. CEO appointed directors, 2. senior directors, 3. CEO directors, 4. director shareholdings, 5. additional directorships and 6. committee size). By using a sample of 812 U.S. firms it turns out that CEO compensation is more positively associated with accounting performance when firms have high compensation committee quality.

<sup>127</sup> Codetermination encompasses three laws: In 1951 the Iron and Steel Codetermination Act enacted occupation of 50% of all seats in supervisory boards of iron and steel companies by representatives of labor. The Works Constitution Act of 1952 granted labor representatives one third of all seats of supervisory boards in all companies if a firm has 500 employees or more. In 1976 the Co-determination Act extended the 50% rule to all companies with 2000 employees or more. To secure decision-making capabilities in case of dispute the head of the supervisory board, appointed by the capital owners, has two votes. However, disputes are rare.

<sup>128</sup> Germany is the largest economy in which employees have the legal right to such participation. Denmark, Sweden, Austria, the Netherlands and Luxembourg have similar codetermination laws. Italy and the remaining West European countries (with the exception of the UK) implement work councils at the very least. French companies send non-voting employees to the board (Smith 1991)

<sup>129</sup> The employment limit is relevant to the company alone or, if it is a conglomerate or the company has subsidiaries, the total number of employees is decisive. The codetermination status of several companies deviates from the simple "individual firm employment rule" and it is unclear whether existing empirical studies have taken this into account. For quasi-parity codetermination reliable information is available from the Hans-Böckler Stiftung. Unfortunately, for one-third codetermination no such information is obtainable.

value approach proposes, the employee's interests should also be taken into account. The fact that employees get control rights raises the question to what extent their interests differ from or are in line with those of the shareholders' ones<sup>130</sup>. The literature discusses this question quite heterogeneously.

As proponents of the property rights theory, Jensen and Meckling (1976) doubt the efficiency of codetermination. They argue that if codetermination were beneficial then there would be no need for it to be mandatory. This argument supports the hypothesis that codetermination must be detrimental to shareholder value because employees' interests differ from those of the shareholders.

The literature on managerial compensation also considers labor representation as a possible cause for a weaker incentive orientation. For example, in their well-known study Jensen and Murphy (1990) find a rather weak correlation between performance and managerial remuneration. In their view this result might be caused by public and private politically orientated forces like unions, which limit the incentive orientation of contracts. The influence of such institutions may then partly be responsible for the inefficient design of executive pay.

Gorton and Schmid (2004) regard the German system of codetermination as one sort of labor participation in corporate decision making. Codetermination reduces shareholder wealth because the employee representatives might use their influence to "insure" the employees against negative shocks. This is realized by resistance against restructuring, layoffs, and wage reductions<sup>131</sup>. Gorton and Schmid (2004) then go one step further and argue that employee representatives are in favor of a low share of total compensation being performance-related. Then top management would be less orientated towards profit maximization and cost minimization.

In contrast to the property right theory, participation theory (e.g. Freeman and Lazear 1995) argues that involving employees in the decision-making process could imply a

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<sup>130</sup> McPherson (1951, p. 27) already stated more than 60 years ago: "In any case, the new structure of control [...] will provide an interesting test of the often debated degree of mutuality of interest of owners, managers, and employees.

<sup>131</sup> However, in Germany wage negotiations take place between trade unions and employers' associations. Wages differ between firms and there might also be some influence from works councils, but the impact of codetermination in the supervisory board on wages is probably rather limited. Slower employment adjustment might be an issue, however. Gorton and Schmid (2004) also recognize this point and test several alternative hypotheses supporting overemployment but not wage increases. See for wage bargaining in Germany Brenzel, Gartner and Schnabel (2014) and Hirsch and Schnabel (2014).

substantial information advantage and therefore have a positive impact on productivity. An important aspect of an employee's economic value is their years of experience, which is related to advanced skills and abilities of special value to the current company (Smith 1991). Thus employees invest in specific human capital which is only productive in the present employment relationship. On the one hand, labor representatives on the supervisory boards may execute the voice option in the sense of the Freeman and Medoff (1984) exit-voice theory and by this reduce quits. On the other hand, worker representatives may safeguard the increased investment in firm-specific human capital by adequate decisions on strategic decisions including managerial incentives. Witt (2002) points out that especially with respect to dismissals and bankruptcy the long-term interests of shareholders and employees may well be similar<sup>132</sup>.

In this connection Edwards et al. (2009) argue that employees may be good monitors of managerial performance because of their close knowledge of the firm's operations. Similarly Fauver and Fuerst (2006) point out that labor representatives on supervisory boards are highly informed monitors who reduce managerial agency costs as well as private benefits of blockholder control. They stress that unlike other members of the supervisory board the representatives of the workers have detailed information on the daily operations and processes taking place at the firm. They acquire knowledge on the feasibility of projects in practice and on the problems as well as advantages associated with new technologies.

We argued earlier that the German board system might suffer from inefficiency due to structural and agency problems. Consequently, the interests of the shareholders will probably not be represented adequately on the supervisory board. The representatives of the workers on the board may well be more independent in the sense of Adams, Hermalin and Weisbach (2010) and might therefore control CEOs more carefully than the representatives of the capital owners. Perhaps surprisingly, here the representation of the employees on the supervisory board may serve as a substitute for the underrepresented or unrepresented interests of the shareholders.

Eventually, shortly after the implementation of the first codetermination law McPherson (1951) already argues that employees and shareholders have similar interests as most

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<sup>132</sup> FitzRoy and Kraft (1993, 2005) discuss the possible effects of codetermination on employees' job security and observed productivity.

members of both groups have long-run relations to the firm in question. This may not hold for managers as allegedly at least some of them have a focus on short-run optimization<sup>133</sup>. If so, the employees' representatives will try to limit short-run optimization, the pursuit of overly risky projects and excessively costly expansion policies e.g. by merger or acquisition. As a consequence, codetermination may have a positive impact on executive compensation in terms of a stronger link between compensation and performance.

### **4.3 Empirical study**

The following empirical study analyses the impact of codetermination on management compensation. We want to examine empirically whether the assumed difference in the objective function of shareholders and employees really exists. In order to do so we will analyze the link between codetermination and management compensation.

Our general research strategy is the investigation of the ratio of variable to total compensation. In contrast to fixed compensation the variable share of compensation actually depends on short-term and long-term firm performance. Thus, the share of variable compensation indicates the incentive orientation of managerial remuneration.

#### **4.3.1 Data**

Our dataset is composed of five different sources. As mentioned earlier, detailed data on executive compensation has been available for some years. Kienbaum Consultants International GmbH collects data on different components of executive compensation and provided us with this information on large German corporations. Covering the years 2006 to 2011, this dataset contains, besides total average executive compensation per head, detailed information on fixed compensation and performance-based compensation. The variable part of the remuneration is differentiated into short-term and long-term incentive orientated payments. We combine the Kienbaum dataset with the database "dafne" provided by Bureau van Dijk, which contains companies' information on economic

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<sup>133</sup> McPherson 1951, p. 25: "It can be argued that the employees have as great interest as the stockholders in the general conduct of a corporation, since the livelihood, particular of the older long-service employees, is largely dependent upon the success of the enterprise. Also it can be said that there is approximately as much continuity in the relationship between the employees and the company as between the stockholders and the company."

variables, which in turn potentially explain the components of managers' compensation. This dataset contains among other items comprehensive information on companies' financial performance and employment. The information on quasi-parity codetermined companies was provided by the Hans Böckler Foundation. Furthermore we use OECD data on the labour costs per employee on industry level. Eventually, a unique unbalanced panel is assembled, consisting of 405 German stock-listed firms covering the periods 2006 to 2011 with 1713 observations overall.

Table 4.1 below lists definitions of the variables used and presents descriptive statistics for the whole sample. *RVariable* describes the ratio of variable to total executive compensation, whereas the variable part is defined as the sum of short-term variable and long-term variable parts. Thus, on average 38 percent of total per head compensation is variable<sup>134</sup>. The variable *LaborCostperEmploy* represents the average per head labour costs (compensation of employees) on industry level measured in Euro. According to participation theory investment into firm-specific human capital increases employees' interest in efficient management decisions and then an effect on incentive orientation of executive compensation is plausible. Specific human capital is usually reflected in wage levels

The number of executive board members is represented by *EBoardMembers*. We control for accounting profitability by using current and lagged information on returns on equity in percent (*ROE* and *LagROE*, respectively) as performance indicator<sup>135</sup>. The size of a company is represented by the number of employees. On average we observe companies with more than 13,000 employees. The dummy *DProfit* assumes unit value if the company generates an annual surplus and zero if the company generates an annual deficit. In our sample 77 percent of the companies obtain an annual surplus. The variable *intDProfitROE* represents an interaction between *DProfit* and *ROE*. Unsurprisingly the

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<sup>134</sup> The 38 percent of compensation which are variable on average consist of 32 percent short run and 6 percent long run components (the long run components include exercised stock-based compensation as well as fair values of stock-rights received at the grant date). Additionally, we test empirically on the relation between one performance indicator and total compensation. Moreover, it is investigated whether the (lagged value of) ratio of the variable part of compensation relative to total compensation really intensifies the relation between the performance measure and total compensation.

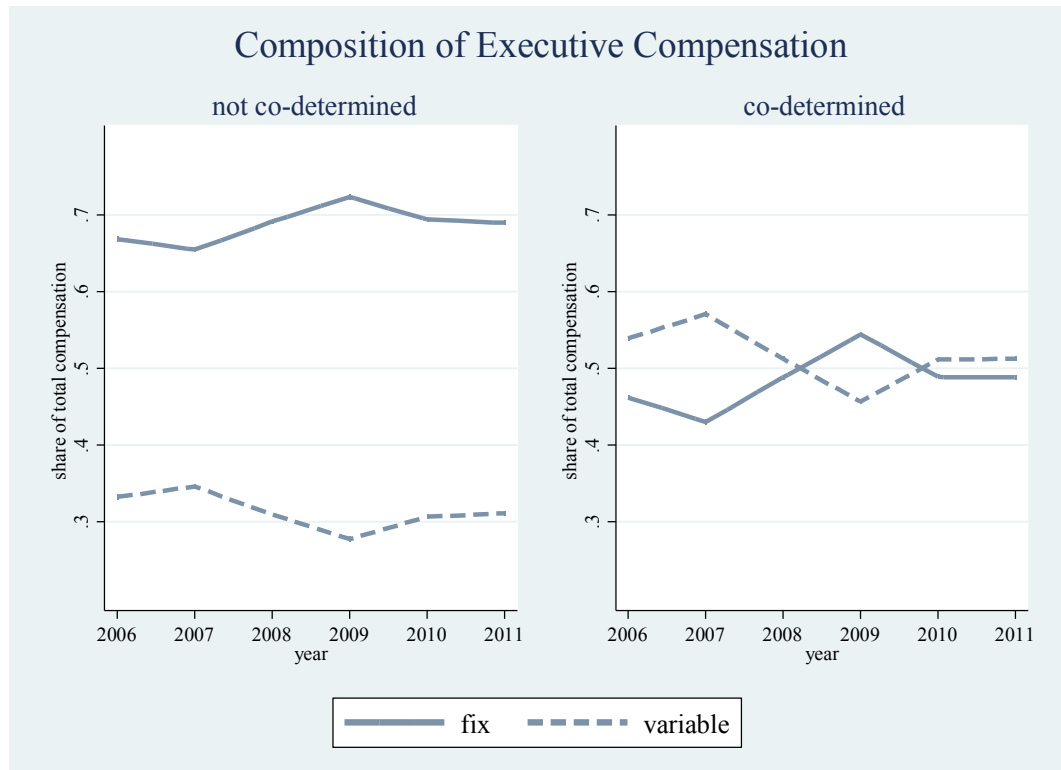
<sup>135</sup> Table 4.1 points to large negative values of *ROE* and *lagROE*. In order to test whether outliers affect our results, we deleted observations with extreme values below -100. Our results were qualitatively unchanged.

mean value of returns on equity of those companies with a positive balance sheet total is, at 9.65 percent, higher than the mean value of all companies in the current period (3.85 percent). *DCodet* serves as a dummy variable which takes the value one if it is an equal-representation company and zero otherwise. Around one quarter of our sample is represented by parity codetermined companies.

**Table 4.1: Descriptive Statistics for 2006-2011 (mean values and standard deviations)**

	Mean	Standard deviation	Min	Max
<i>RVariable</i>	0.382686	0.227071	0	0.9348
<i>LaborCostperEmploy</i>	40772.18	9330.883	18717.71	68007.97
<i>EBoardMembers</i>	3.080064	1.389584	1	9
<i>LagROE</i>	4.153216	30.07469	-579.93	131.04
<i>ROE</i>	3.848509	23.43952	-157.12	50.68
<i>Employ</i>	13250.66	48392.53	7	502763
<i>DProfit</i>	0.773099	0.418950	0	1
<i>intDProfitROE</i>	9.654398	9.75455	0	50.68
<i>DCodet</i>	0.243275	0.429185	0	1
Number of observations		1710		

Figure 4.1 shows the composition of executive compensation over the years for German companies without and with codetermination in terms of quasi-parity representation. Obviously, the compensation structure of companies with parity representation differs strongly from companies without parity representation. The mean value of the variable share of total compensation over the whole period is 31 percent for non-codetermined companies and 52 percent for codetermined companies. Thus, from a descriptive point of view, codetermined companies use a higher share of short-term as well as long-term performance-based compensation. These descriptive statistics give reason to hypothesize that codetermined companies determine executive compensation in a more incentive-based way than others. In the next step we check whether this presumption holds in a causal context by means of regression analysis.

**Figure 4.1: Composition of Executive Compensation**

### 4.3.2 Econometric Framework

If there is no unobserved heterogeneity, random effects estimators provide a consistent and efficient estimator. Obviously our research context has to deal with the problem of unobservable company-specific effects on executive compensation which might cause a specification bias. As a matter of principle, former studies used either a fixed effect or a random effects approach to get rid of the bias caused by unobserved company-specific effects.

In this study the Hausman Test rejects the hypothesis of no correlation between fixed effects and the regressors. The use of a random effects model makes therefore at most a first step but a fixed effects model seems to be more appropriate. Indeed a fixed effects model allows controlling for systematic unobservable effects by eliminating the

company-specific effect through use of deviations from means or first differences<sup>136</sup>. However, besides the advantage of eliminating unobserved effects, a severe disadvantage of the fixed effects estimator is the elimination of time-invariant variables. Given that we are interested in the effect of codetermination on compensation, which will be represented by a time-invariant dummy variable, the fixed effects method no longer serves as a suitable method.

Hausman and Taylor (1981) propose an estimator to deal with this problem using a special type of instrumental variable method. The major advantage of the Hausman-Taylor estimator is that it permits estimation of the impact of time-invariant variables in a panel data setting while solving potential endogeneity problems<sup>137</sup>. Hausman and Taylor (1981) consider the following panel model:

$$y_{it} = X_{1it}\beta_1 + X_{2it}\beta_2 + Z_{1i}\gamma_1 + Z_{2i}\gamma_2 + \alpha_i + \varepsilon_{it} \quad (4.1)$$

with  $\alpha_i$  representing the individual fixed effects and  $\varepsilon_{it}$  representing the error term. All regressors are assumed to be uncorrelated with  $\varepsilon_{it}$ . There are four groups of explanatory variables:

- $X_1$ : time-variant variables, which are not correlated with  $\alpha_i$
- $X_2$ : time-variant variables, which are correlated with  $\alpha_i$
- $Z_1$ : time-invariant variables, which are not correlated with  $\alpha_i$
- $Z_2$ : time-invariant variables, which are correlated with  $\alpha_i$

The main idea is to instrument the time-varying endogenous variables ( $X_2$ ) as well as time-invariant endogenous variables ( $Z_2$ ).  $X_2$  variables are instrumented by their deviations from group means. The instrumental variables for  $Z_1$  are the variables themselves. The critical time-invariant endogenous variables  $Z_2$  are finally instrumented

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<sup>136</sup> Examples for such firm-specific influences include difficulties in monitoring executives efficiently, which induce a stronger incentive orientation of executive compensation. In contrast, firms which are exposed to high exogenous risk reduce the variable component of remuneration (Kraft and Niederprüm, 1999). However, Peters and Wagner (2014) show that in the presence of high dismissal risk total compensation is higher.

<sup>137</sup> Endogeneity in the Hausman Taylor framework should not be confused with endogeneity in a simultaneous equation model. In the Hausman-Taylor model exogenous variables are independent of unobservable fixed effects and possible simultaneous determinations of variables are not an issue. Therefore selection of exogenous versus endogenous variables is based on independence of  $\alpha_i$  and has nothing to do with e.g. relations with codetermination. The validity of our selection is explicitly tested.



by means of the  $X_1$  variables, as these variables are independent of the individual fixed effects. So the Hausman-Taylor approach uses the time averages of those time-varying regressors that are uncorrelated with  $\alpha_i$  as instruments for the time-invariant regressors. Consequently this method requires that the number of time-variant exogenous variables is at least as large as the number of time-invariant endogenous variables. To test whether the set of instruments  $X_1$  is legitimate, and thus uncorrelated with  $\alpha_i$ , one can use a Hausman test based on the difference between Hausman-Taylor and the within estimator (Baltagi (2013, chapter 7.4) Verbeek (2012, chapter 10.2.6), Wooldridge (2010, chapter 11.3)).

#### 4.4 Results

Table 4.2 illustrates the results of a simple random effects estimation (1) and two Hausman-Taylor estimations ((2) and (3)). The dependent variable is the ratio of variable to total compensation.

Whereas in the random effects approach all explanatory variables are assumed to be uncorrelated with the firm-specific effect  $\alpha_i$ , the Hausman-Taylor approach differentiates between endogenous and exogenous variables. Therefore we grouped the variables *LaborCostperEmploy*, *EBoardMember*, time dummies and interactions between the returns on equity and industry dummies (WZ2008<sup>138</sup>-first stage) as  $X_1$  variables<sup>139</sup>. As  $X_2$  variables we set *ROE*, *LagROE*, the log of employment<sup>140</sup> (*lnEmploy*), *DProfit* and *intDProfitROE*. Time invariant industry dummies (WZ2008 two-digit)<sup>141</sup> are assumed to be exogenous ( $Z_1$ ).

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<sup>138</sup> „Klassifikation der Wirtschaftszweige“ of Statistisches Bundesamt with „first-stage“ referring to the most aggregated hierarchical classification of economic activities (sections). Economic activities are divided into 21 sections. The WZ2008- second stage is divided into 88 divisions.

<sup>139</sup> As it was mentioned earlier the Hausman-Taylor approach refers to the  $X_1$  variables as being independent of  $\alpha_i$ . Perhaps one might doubt the exogeneity of interactions between the returns on equity and industry dummies (especially because we assume the returns on equity themselves being endogenous). However, by using a Hausman test based on the difference between Hausman-Taylor and the within estimator we cannot reject the null hypothesis saying that the difference in the coefficients is not systematic. Therefore, the Hausman-Taylor estimation seems to be statistically adequate. Anyway, removing the interactions between returns on equity and industry dummies from the specification does not change the estimation results qualitatively.

<sup>140</sup> We use the log of *Employ* as a more flexible way to estimate the relation between firm size and the dependent variable.

<sup>141</sup> Time dummies and interaction between *ROE* and WZ2008 first-stage and WZ2008 two-digit are however omitted from table 4.2.

The exogeneity assumptions are not rejected using a Hausman test based on the difference between Hausman-Taylor and within estimator. Therefore, based on these test statistics for both Hausman-Taylor models the instruments chosen are legitimate.

The crucial difference between model (2) and model (3) is the assumption on the dummy variable *DCodet* in this Hausman-Taylor context. *DCodet* is assumed to be exogenous ( $Z_1$ ) in model (2) and endogenous ( $Z_2$ ) in model (3).

It turns out that in all three models and in contrast to previous studies the effect of parity employee representation has a positive effect on the variable share of executive compensation. If it is controlled for potential correlation between being codetermined and the individual firm-specific fixed effect using internal instruments, the impact increases and turns out to be significantly positive, even in the Hausman-Taylor context. Sometimes the fixed effects might have some relation to the time variant explanatory variables<sup>142</sup> and here the impact of codetermination on the variable share of executive compensation is affected by firm specific effects as well. Ignoring this correlation may lead to biased results.

Summarizing, codetermined companies apply a significantly higher share of variable compensation than companies which are not codetermined. The econometric results are in accordance with the earlier presumptions which were based on figure 4.1. In codetermined companies the variable share of executive compensation is on average 23 percentage points higher than in other companies.

Besides the positive impact of codetermination, the remaining controls provide further findings of major importance.

It turns out that average labour costs per employee on industry level have a significant positive impact on the incentive orientation of executive compensation. As outlined above employees with a high level of specific human capital might have an interest in safeguarding their investment by inducing adequate managerial decisions. Our results might well reflect the assumed positive correlation between specific human capital and wages and the connected incentives of employee (representatives) to pay executives incentive orientated. Thus the higher the employee wages, respectively the level of

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<sup>142</sup> Hausman test between within estimation and random effects rejects the null hypothesis. Thus there is a systematic difference in coefficients between within and random effects.

specific human capital, the higher the incentive orientation of executive compensation which might be even seen as a result of employee representation on the board level.

Furthermore, the significant positive coefficient of *lnEmploy* indicates that the larger the company, the higher the variable share of compensation. The impact of accounting performance indicators (*ROE*, *LagROE*) has to be considered in a more differentiated way. On average, once lagged returns on equity show no significant impact on the composition of management compensation. Therefore it seems that bad performance in the past does not influence future compensation design. However, an increase in current returns on equity by one percentage point increases the variable share of management compensation significantly by 0.3 percentage points. Thus the composition of management compensation significantly depends on accounting performance. By restricting the impact of returns on equity on companies with a positive balance sheet total (represented by *intDProfitROE*) the impact turns out to be significantly positive. Thus the degree of pay-performance sensitivity increases for companies with positive accounting performances in comparison to companies with negative accounting performances.

A similar interpretation holds regarding the coefficient of *DProfit*. In general companies in favorable economic conditions pay a 6.8 percentage point higher share of variable compensation than companies experiencing bad economic situations.

Obviously there seems to be a considerable asymmetry in punishing managers for bad firm decisions (resulting in a negative balance sheet total) and remunerating managers for good firm decisions (resulting in a positive balance sheet total).

**Table 4.2: Random Effects and Hausman-Taylor Estimation Results**

	Random Effects	Hausman-Taylor	
	(1) <i>RVariable</i>	(2) <i>RVariable</i>	(3) <i>RVariable</i>
		<b>TVexogenous (X<sub>1</sub>):</b>	
<i>LaborCostperEmploy</i>	2.69e-06* (1.75)	4.12e-06** (2.42)	3.65e-06* (1.91)
<i>EBoardMembers</i>	-0.0019 (-0.32)	-0.0059 (-0.84)	-0.0119 (-1.54)
		<b>TVendogenous (X<sub>2</sub>):</b>	
<i>LagROE</i>	0.0001 (0.59)	-0.0000 (-0.14)	-0.0000 (-0.05)
<i>ROE</i>	0.0036 (1.13)	0.0032*** (3.59)	0.0031*** (3.50)
<i>lnEmploy</i>	0.0494*** (8.12)	0.0562*** (4.06)	0.0384** (2.23)
<i>DProfit</i>	0.0590*** (4.33)	0.0689*** (4.64)	0.0685*** (4.62)
<i>intDProfitROE</i>	0.0040*** (5.62)	0.0032*** (3.93)	0.0031*** (3.88)
		<b>TIexogenous (Z<sub>1</sub>):</b>	
<i>DCodet</i>	0.0518** (2.05)	0.0393 (0.92)	
		<b>TIendogenous (Z<sub>2</sub>):</b>	
<i>DCodet</i>			0.2305** (2.20)
<i>_cons</i>	-0.1725 (-1.22)	-0.5821 (-1.40)	-0.7264 (-1.33)
$\chi^2$ (p-value) Hausman test on Hausman-Taylor vs. within estimation of all time-variant variables		13.06 (0.7878)	9.00 (0.9402)
N	1710	1710	

Notes: t statistics in parentheses; robust standard errors; \* p<0.1, \*\* p<0.05, \*\*\* p<0.01; TV refers to time varying; TI refers to time-invariant. Corresponding variables are deflated by cpi. Coefficients of interaction between industry dummies (WZ2008 first stage (sections)) and ROE are not reported (X<sub>1</sub>). Time dummies are not reported (X<sub>1</sub>). Coefficients of industry dummies (WZ2008 second stage (divisions)) are not reported (Z<sub>1</sub>). The reported chi value refers to a Hausman test without robust standard errors.

## 4.5 Robustness

Legislation explicitly links codetermination to firm size. Similarly, composition of compensation might be related to firm size. We control for firm size by including the log of the number of employees. However, there might be a more complicated non-linear relation at work, which is not taken into account by our size variable.

In order to test whether the estimated impact of codetermination on the pay-performance sensitivity is not simply driven by size effects we divide our sub-sample of codetermined firms into large and (relatively) small firms. Therefor we separate the sub-sample of codetermined firms at the median of the number of employees (15,030). Then we removed the larger codetermined firms (208 firm-years) from the whole sample and re-run our analysis with the restricted sub-sample of smaller codetermined companies. The results are shown in table 4.3.

Although the number of total observation decreased to 1502 our results stay robust in all models. Especially the absolute impact of codetermination only changes merely and stays as significant as in the full sample. Thus, controlling for firm size and re-running the regression with a model only including relatively small codetermined firms shows that the positive impact of codetermination on the pay-sensitivity of executive compensation is not influenced by size effects.

**Table 4.3: Random Effects and Hausman-Taylor Estimation Results - Robustness**

	Random Effects	Hausman-Taylor	
	(1) <i>RVariable</i>	(2) <i>RVariable</i>	(3) <i>RVariable</i>
		<b>TVexogenous (X<sub>1</sub>):</b>	
<i>LaborCostperEmploy</i>	2.73e-06* (1.70)	4.22e-06** (2.40)	3.89e-06* (1.74)
<i>EBoardMembers</i>	-0.0021 (-0.29)	-0.0071 (-0.81)	-0.0146 (-1.46)
		<b>TVendogenous (X<sub>2</sub>):</b>	
<i>LagROE</i>	0.0001 (0.43)	-0.0000 (-0.23)	-0.0000 (-0.14)
<i>ROE</i>	0.0035 (1.08)	0.0032*** (3.85)	0.0032*** (3.84)
<i>lnEmploy</i>	0.0519*** (7.61)	0.0597*** (3.60)	0.0470** (2.53)
<i>DProfit</i>	0.0566*** (3.88)	0.0667*** (4.14)	0.0662*** (4.11)
<i>intDProfitROE</i>	0.0042*** (5.50)	0.0033*** (3.76)	0.0033*** (3.70)
		<b>TIexogenous (Z<sub>1</sub>):</b>	
<i>DCodet</i>	0.0536** (2.11)	0.0467 (1.19)	
		<b>TIendogenous (Z<sub>2</sub>):</b>	
<i>DCodet</i>			0.3070** (2.20)
<i>_cons</i>	-0.1907 (-1.31)	-0.6183 (-1.49)	-0.9265 (-1.55)
$\chi^2$ (p-value) Hausman test on Hausman-Taylor vs. within estimation of all time-variant variables	-	13.75 (0.7455)	10.43 (0.8844)
N	1502	1502	

Notes: t statistics in parentheses; robust standard errors; \* p<0.1, \*\* p<0.05, \*\*\* p<0.01; TV refers to time varying; TI refers to time-invariant. Corresponding variables are deflated by cpi. Coefficients of interaction between industry dummies (WZ2008 first stage (sections)) and ROE are not reported (X<sub>1</sub>). Time dummies are not reported (X<sub>1</sub>). Coefficients of industry dummies (WZ2008 second stage (divisions)) are not reported (Z<sub>1</sub>). The reported chi value refers to a Hausman test without robust standard errors. The results refer to a restricted sample which only includes a subsample of small codetermined companies instead of all available codetermined companies.

Up to now, our basic assumption was that a high ratio of variable payments stands for an incentive orientated contract. However, it could be possible that the variable part has only a limited or no relation to a firms' profitability respectively a managements' performance and serves as a "hidden" or "camouflaged" increase of fixed remuneration<sup>143</sup>. Precautionary we would like to present some evidence that justifies our basic assumption. As before we use return on equity as our variable representing profitability, as identifying long-run performance is beyond the scope of this robustness test. Return on equity is still used as an explanatory variable. Furthermore we introduce an interaction variable between return on equity and the lagged value of the ratio of variable to total compensation (*intROELagRVariable*). These variables and some other controls are used to explain (the log of) total executive compensation (*lnTotComp*). The aim of this specification is to test whether a high share of variable payments really intensifies the relation between profitability and total compensation. We use a fixed effects (model 4 in table 4.4) and the Arellano-Bond GMM model<sup>144</sup> (model 5) to take account of firm specific effects and possible endogeneity which might be caused by the lagged ratio of variable to total compensation. The results are presented in table 4.4. In both models the crucial interaction variable attracts positive coefficients and therefore we find that variable parts of total compensation are indeed incentive-orientated. Interestingly with regard to model 5 the ROE variable now has a negative coefficient indicating that the relation between profitability and compensation is significantly weaker in companies without any or low levels of variable components.

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<sup>143</sup> This is sometimes said about stock options.

<sup>144</sup> Regarding the Arellano-Bond framework we can reject autocorrelation of second order. The Hansen test reveals that the used instruments are valid.

**Table 4.4: Fixed Effects and Arellano-Bond Estimation Results- Robustness**

	<b>Fixed Effects</b> (4) <i>lnTotComp</i>	<b>Arellano-Bond</b> (5) <i>lnTotComp</i>
<i>LaborCostperEmploy</i>	0.00002* (1.95)	0.0001*** (2.44)
<i>EBoardMembers</i>	-0.0729*** (-3.38)	-0.1273** (-2.27)
<i>ROE</i>	-0.0010 (-1.11)	-0.0052* (-1.81)
<i>LagRVariable</i>	-0.0381 (-0.47)	0.0410 (0.32)
<i>intROELagRVariable</i>	0.0057** (2.44)	0.0161** (2.30)
<i>lnEmploy</i>	0.3540*** (6.07)	-0.0104 (-0.05)
<i>DProfit</i>	0.0839** (2.41)	0.0957 (0.87)
<i>intDProfitROE</i>	0.0061*** (3.18)	0.0052 (0.96)
<i>_cons</i>	2.8108*** (4.15)	
z (p-value) Arellano-Bond test for AR(2) in first differences:	-	0.68 (0.498)
$\chi^2$ (p-value) Hansen test of overid. restrictions:	-	57.57 (0.856)
N	1268	910

Notes: t statistics in parentheses; robust standard errors; \* p<0.1, \*\* p<0.05, \*\*\* p<0.01; Corresponding variables are deflated by cpi. Time dummies are not reported.



## 4.6 Conclusion

A particularity of the German corporate governance system is that management and supervision are executed by two different institutions. In the two-tier board system the executive board manages the company whereas the supervisory board supervises the enforcement of the shareholders' interests. According to codetermination law 50% of the seats of the supervisory board must be filled by employee representatives. One explicit task of the supervisory board is to define the management's compensation. In order to avoid excessive risk taking and short-term optimization behavior by managers the supervisory board should ensure for an incentive-based executive compensation. This study aims at investigating the impact of labor as a stakeholder without capital shares on the incentive orientation of executive compensation by analyzing the effect of codetermination on the variable share of total compensation.

In many cases capital shares are highly diversified and it is by no means guaranteed that the interests of the capital owners will be efficiently executed by the supervisory boards. One indication for this presumption is the low representation of capital owners on the supervisory boards. However employees' interests are in many cases well represented by works councils and these are usually members of the supervisory boards of codetermined companies. Thus, unlike supervisory board members, who represent the capital owners, employee representatives probably use their control function more efficiently.

In contrast to previous literature we argue that employees may well to a large extent have similar interests to the shareholders. In order to avoid short-term profit maximization and undue risky decisions by top management, employees quite probably support performance-based compensation schemes.

The estimates of this study show that the variable share of executive compensation in codetermined companies is on average 26 percentage points higher than in non-codetermined companies. The stronger orientation towards incentive-based compensation in codetermined companies supports our hypothesis that, similarly to shareholders, employees pursue a policy that aims at securing the long-term survival of their firm. Perhaps surprisingly, the interests of capital and labor are not necessarily opposed. In a situation with rather weak representation of shareholder interests, worker representatives may even help to realize efficient management incentives.

Our assumption that a high variable part of executive compensation is generally good for firm performance might be regarded as being too optimistic. Sub optimally designed contracts might lead to short-term orientated decisions of executives and perhaps excessive risk taking. In future work we intend to study the connection between variable compensation and profitability of firms taking account of the simultaneously determined relations between these variables.

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**5 (In)Efficiency of Employment Agencies: A Study on Welfare Benefits Determination – Is there a Trade-off between Time Saving Case Management and Quality of Decisions?<sup>145</sup>**

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<sup>145</sup> This chapter was written in collaboration with Kornelius Kraft.

## 5.1 Introduction

Employment agencies have two tasks: to assist job placement and to provide basic income support for jobseekers. The goal of integrating employable persons into the labor market as quickly and efficiently as possible has been the subject of many studies<sup>146</sup>. Besides reintegration, in order to efficiently support unemployed people on their way back into labor, it is also the responsibility of the welfare state to provide appropriate financial support for jobseekers. The latter is largely neglected in empirical research, although this activity occupies the larger part of the agencies' personnel resources (in Germany). This paper reports the results of an empirical study on the efficiency of the welfare determination process both in terms of labor input per case and in terms of the quality of decisions.

In Germany, unemployed persons receive a fixed percentage (60-67% depending on individual circumstances) of their last income for a period of 12 to 24 months (depending on age) and this payment is called unemployment benefits I<sup>147</sup>. After this period, basic social security and social assistance (officially called unemployment benefits II and in common parlance named Hartz IV after the chairman of a commission that proposed this reform of welfare payments) replaces unemployment benefits<sup>148</sup>. Whereas in other countries<sup>149</sup> the determination process of welfare benefits and the job placement of unemployed people is usually organized by independent organizations, in Germany employment offices (called "job centers") are responsible for unemployment benefits II and employment services at the same time.

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<sup>146</sup> Examples of studies on efficiency of employment agencies with respect to placement of unemployed persons are e.g. for the US Cavin and Stafford (1985), for Switzerland Ramirez and Vassiliev (2007) Vassiliev et al. (2005), or for Sweden Andersson et al. (2014), Althin et al. (2010), Althin and Behrenz (2005, 2004).

<sup>147</sup> All regulations concerning social assistance for the unemployed and dependent relatives are prescribed by unemployment benefits I of the Social Security Code III (Sozialgesetzbuch III).

<sup>148</sup> All regulations concerning social assistance for the unemployed and dependent relatives are prescribed by unemployment II of the Social Security Code II (Sozialgesetzbuch II).

<sup>149</sup> In the U.S. the United States Employment Service (USES) is responsible for the provision of labor exchange and job placement assistance to job seekers and employers, whereas a joint state-federal program – or "unemployment insurance" – is responsible for the calculation and payments of cash benefits for the unemployed. Similarly, Switzerland separates responsibilities such that employment offices (Regionale Arbeitsvermittlungszentren (RAV)) are in charge of the job placement whereas an "unemployment fund" is responsible for the determination of unemployment benefits and how they are paid.

A large portion of personnel costs in employment agencies (55 % in 2013) is used for the determination of welfare payments (Bundesvereinigung der Deutschen Arbeitgeberverbände 2015, Federal Employment Agency 2015) and, since administrative costs amount to some EUR 5.264 billion (Bremer Institut für Arbeitsmarktforschung und Jugendberufshilfe 2017), this means that more than EUR 2 billion are spent on determining benefits for the unemployed and their families. In 2013 about EUR 33.68 billion were spent on assistance (Federal Employment Agency 2014), which amounts to 1.21% of GDP (expenditures for active labor market policy not included) and if the administrative costs are added, the sum is equivalent to 1.42% of GDP. In that year the total number of persons supported by financial aid through German employment offices amounts to 6,126,322<sup>150</sup>. Hence, the topic of our study has some economic relevance.

The efficiency of the public service is the subject of several empirical studies, and evidence of inefficiency in comparison to private suppliers of the same or similar services is a frequent result<sup>151</sup>. Reforms carried out during the Schröder administration, among other items, also aimed at improving the efficiency of employment agencies. Consequently, the German Ministry for Employment and Social Affairs (BMAS), the Federal Employment Agency, their local representatives, the federal ministries and municipalities, and the employment offices, set target agreements such as improving the efficiency of employment offices and compliance with legal norms (Matiaske et al., 2015, 146). However, in practice, very little is known about the efficiency of job agencies with respect to fulfilling this task, and this is of particular interest since agency employees complain of stressful work conditions<sup>152</sup>. Only 250 of the overall 96,300 employees (in

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<sup>150</sup> In Germany, the serviced recipients are referred to as “need communities (Bedarfsgemeinschaften). In 2013 3,323,823 need communities received social assistance. A need community (common household) encloses individual recipients as well as dependent family members or common law partners. The majority (2,419,804) of need communities consist of just one recipient.

<sup>151</sup> Boyne (2003) summarizes 65 empirical studies on determinants of public service performance. The author analyses five potential sources of service improvements: resources, regulation, markets, organization and management. The most consistent influences on performance in public service are resources and management.

<sup>152</sup> The so-called Bund-Länder Ausschuss (committee of the Federal Republic and Federal States), which is responsible for the governance and supervision of basic social security provision in Germany, initiated a research project aiming at evaluating the present situation at employment offices. Based on this evaluation, recommendations concerning the range of time necessary to determine welfare benefits per case should be developed and inefficient employment offices must take measures to improve their performance. This paper reports major parts of the scientific results of this study.

2015) of the Federal Employment Agency receive financial incentives in term of bonus payments if certain goals are reached (Kaltenborn et al. 2010, 34). Hence, in the absence of incentives for the overwhelming majority of employees, inefficiency would not be surprising.

In detail, our study seeks to identify the influence of economic variables on processing time for determining benefit level. We use a number of exogenous variables affecting time needed for servicing welfare recipients, such as the ratio of new registrations, the ratio of persons with increased requires, the ratio of long-term unemployed or the qualification of the employment office employees. By applying stochastic frontier analysis (SFA) we are then able to identify the determinants of the welfare determination process and the relative efficiency of employment offices simultaneously. In particular, efficiency is estimated as the deviation from an efficient frontier, taking account of the specific cost-driving factors with which an employment office is confronted.

The process of benefit determination is highly complicated, characterized by numerous legal requirements and subject to frequent revision (see below). As a result, many incorrect decisions are made. We therefore identify an employment office's quality by the amount of inappropriate decisions in the welfare determination process. In particular, we refer to the number of upheld appeals (due to incorrect application of the law) divided by the total number of cases dealt with by the employment office as our quality indicator. Finally, in order to analyze whether there is a trade-off between quality and efficiency we evaluate the impact of the estimated inefficiency term from SFA on the quality of decisions.

Previewing the results, unsurprisingly we find efficiency differences, but despite missing incentives (or disadvantages in cases of insufficient performance) they do not appear to be very large. The average employment office is 6.8-8.4% away from the cost minimum. Interestingly, the (in)efficiency term has no impact on the quality of decisions. Having said this, for some variables opposing signs exist with respect to time use and the ratio of upheld appeals. Hence, for one organizational variable (indicates whether the agency arranges specific appointments with the recipients) and the servicing of one specific group (newly registered unemployed) a trade-off between time input and the ratio of upheld appeals appears to exist. However, qualification of the employees has an effect both on the processing time needed for servicing and on the ratio of inappropriate

decisions. Thus, we conclude that better educated personnel would improve efficiency with respect to time use and quality of decisions.

The following section 5.2 provides an overview on related literature. Subsequently, section 5.3 discusses the research question and derives some hypotheses. Afterwards, in section 5.4 we provide information on our data. In section 5.5 respectively 5.6 we present estimation results on the time used for the determination of welfare support respectively on the quality assessment. Finally, section 5.7 ends with a short conclusion.

## 5.2 Literature Review

In general there is keen political interest in evaluating the quality and efficiency of public employment services. The existing literature usually evaluates efficiency by investigating the matching process of the unemployed with vacancies<sup>153</sup>.

One of the earliest studies evaluating technical efficiency at employment office level was conducted by Cavin and Stafford in 1985. The authors examine the efficiency of 51 American State Employment Security Agencies in providing three different output categories: quality (average placement wage) targeting (the amount of successfully placed young applicants) and quantity (the amount of successfully placed adults). The authors refer to the efficiency term as cost efficiency by using an approach based on frontier production and cost functions<sup>154</sup>. As a result Cavin and Stafford (1985) provide evidence for quite large efficiency differences between employment offices ranging from 38 percent higher costs than expected in New York to 27 percent lower costs than expected in Florida.

Later studies can be grouped according to the applied method that is used to quantify efficiency: Thus, the first strand of literature uses non-parametric and non-stochastic frontier methods like Data Envelope Analysis (DEA) which are typically used in operation research disciplines (linear programming). The second strand of literature refers to stochastic production frontier analysis which, contrary to the first method, also controls for stochastic components while estimating efficiency.

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<sup>153</sup> A recent study by Andersson et al. (2014) provides an overview of previous international studies on this topic. It turns out that the majority of existing literature refers either to Swedish or Swiss labor markets.

<sup>154</sup> The authors use the corrected OLS (COLS) estimation technique in order to calculate an employment office's deviation from the best performing office (best practice approach).

One of the first studies applying DEA is Sheldon (2003). The author investigates efficiency in Switzerland as a term of a regional placement office's "matching" efficiency (speed with which jobless people find employment and at the same time vacancies attract job seekers.) Using Swiss data from 1997-98 on 126 regional placement offices he reveals that placement offices on average reach only two thirds of their efficiency potential. A large part of inefficiency is due to the failure to exploit increasing returns-to-scale, meaning that the size of the placement offices should be bigger in order to handle the number of unemployed people and job vacancies efficiently. Furthermore, Sheldon (2003) points out that increased counselling of the unemployed is more effective in improving efficiency than any other labor market instruments. Vassiliev et al. (2006) also use DEA to analyze the Swiss labor market using data on 156 regional employment offices from 1998 to 1999. They focus on efficiency in terms of output maximization – in this case number of hires - from a given set of inputs. Similarly to Sheldon (2003), Vassiliev et al. (2006) show that, given the average amount of inputs used in Swiss employment offices, it would be possible to increase output by 15 percent. Further, it turns out that the office- and region-specific variables used are able to explain one third of the variation in an office's efficiency score, indicating that the external operating environment significantly influences efficiency.

Althin and Behrenz (2005, 2004)<sup>155</sup> provide two studies on the efficiency and productivity of Swedish employment offices. They use output variables like open market jobs and job placements. By applying non-stochastic production frontier analysis (DEA) they focus on an input-minimizing model<sup>156</sup>. As a result, an employment office's efficiency is measured as the mix and use of inputs in relation to the produced outputs (offices using less input in order to produce the same or more output are more efficient). Efficiency varies greatly between Swedish offices, and the mean efficiency measure has a value of just a little more than .7, implying that output could be produced by almost 30 percent lower input. Additionally, Althin and Behrenz (2004) used Tobit estimation to find an explanation for the variation in efficiency between the offices. It turns out that more unemployed and more vacancies have a significant positive effect on the efficiency scores whereas an office's municipality population has no impact on the efficiency score.

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<sup>155</sup> Althin and Behrenz (2005) use data on 253 Swedish employment offices for the 1992-1995 periods whereas Althin and Behrenz (2004) use data on 297 Swedish employment offices in 1993.

<sup>156</sup> The authors refer to Farrell (1957).



In the most recent study by Althin et al. (2010) the authors extend their model by considering intertemporal aspects of public employment services<sup>157</sup> while computing efficiency and simultaneously modelling and controlling for an office's expected work load<sup>158</sup>. Again the authors detect large differences in efficiency between the employment offices. Another application of DEA is Andersson et al. (2014), the most recent study on employment offices in Sweden<sup>159</sup>. They focus on an output-based approach, having the target to maximize the output<sup>160</sup> for a given stock of input, whereas the authors also consider intermediate outputs as future inputs (similar to Althin et al., 2010). This study considers yearly data on 185 employment offices during the period from 2004 until 2010. Although there is evidence for general inefficiencies (between 7 and 10 percent for the observation period<sup>161</sup>), it turns out that they are, in absolute terms, smaller than in previous studies using Swedish data.

The second strand of literature uses variants of stochastic or deterministic frontier analysis. Ramirez and Vassiliev (2007) is – from a technical perspective – the closest to our approach. In comparison to Vassiliev et al. (2006) the more recent version extends the model (and also recent general literature) by using a parametric stochastic approach, the so-called stochastic production frontier model. The authors model a classical production function and a production function based on the above-mentioned matching function<sup>162</sup> (results do not differ greatly). Using Swiss monthly panel data from November 2000 until December 2001 there is significant evidence for the existence of technical inefficiency. Due to the application of a stochastic analysis the author states that 19.1%<sup>163</sup> of the efficiency variation is due to random noise, underlining once again the importance of not

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<sup>157</sup> Intertemporal/intermediate outputs are reallocations over time and defined in three categories: the job seeker gets a job that does not fulfill his wishes, the job seeker is placed in training, the client is openly unemployed.

<sup>158</sup> The expected work load is estimated with the help of duration models. It represents the time required to transform an unemployment registration to a final output.

<sup>159</sup> Instead of the traditional distance function, the authors use a directional distance function approach.

<sup>160</sup> In this study the main output variable is represented by the number of individuals that got a job placement or the number of individuals that are transferred to outside education.

<sup>161</sup> Meaning that on average the employment offices could increase the number of job placements by 7 to 10 percent with the same level of input.

<sup>162</sup> In both cases production is measured by using a proxy for hires as single output variable. The difference between the classical production function and the matching production function is that the latter controls for open vacancies as an input into the production frontier.

<sup>163</sup> 22.3% for the model considering a matching function, respectively.

ignoring this aspect by using non-stochastic approaches. On average, employment offices generate 84% of their potential output, given the input factors. The authors detect (in contrast to formerly mentioned literature) negative returns to scale, implying that larger offices are not necessarily more productive than smaller ones<sup>164</sup>. Based on German data, Fahr and Sunde (2006) analyze the efficiency of the matching<sup>165</sup> process by using variations across 117 German labor market regions during the years from 1980 until 1997<sup>166</sup>. Evaluating efficiency by means of stochastic frontier analysis reveals that search effectivity depends on the age and skills of the unemployed person, i. e. the matching process is more efficient in regions with young labor market participants and in regions with higher proportions of highly and less educated<sup>167</sup>.

In principle, the studies discussed measure efficiency of the employment agencies on the one hand and the quality of the match between the job seeker and the job requirements on the other<sup>168</sup>. In regions where a strong industrial restructuring is underway, reemployment will be rather difficult irrespective of the efforts of the employees of the employment agencies. As expressed earlier, our interest lies in the efficiency of the process of determining welfare payments. We estimate the determinants of processing time for servicing the welfare recipients, taking account of specific cost-driving factors. Next we are able to investigate the quality of the process by investigating the relation between time input and the ratio of upheld appeals to decisions. Hence the main contribution of our study is firstly the direct estimation of the efficiency of the employment agencies and secondly a test of the quality of this process.

One advantage of our evaluation method is the possibility of getting information on managerial efficiency within employment offices, which is largely independent of

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<sup>164</sup> This is similar to our results. See below.

<sup>165</sup> As mentioned before, the efficiency of “matching” in this context also refers to the efficiency in matching unemployed persons with firms seeking to fill vacancies.

<sup>166</sup> Note that this study is based on regional data. For Germany no study is available to date using employment office level data.

<sup>167</sup> Using German data, several studies investigate the effects of public sector-sponsored training on the successful reintegration of jobless people into the German labor market (i.e. Lechner et al. 2011, Fitzenberger and Völter 2007).

<sup>168</sup> There is literature on regional labor market efficiency which does not consider an employment office’s specific characteristics. This efficiency is mostly referred to as matching efficiency analyzing the amount of hires in a certain region (output of production) explained by open vacancies (input) in a certain region. For an overview of literature on the regional matching efficiency see Fitzenberger and Furdas (2012).

regional labor market conditions<sup>169</sup>. As stated above, German employment offices are (in contrast to other countries) simultaneously responsible for the job placement and the determination process of welfare benefits, and an analysis of the efficiency of the determination process enables a direct test of managerial efficiency within German employment offices.

### 5.3 Research Questions and Hypotheses

In 2009 the Federal ministry for employment and social affairs made a recommendation on the relation of 130 cases (of welfare recipients) per employee of German employment offices responsible for servicing. The actual relation at that time was somewhat lower (1:115), and as the responsible ministries for employment and social affairs did not agree to this proposal, no effort was made to enforce the recommended service ratio. It is therefore not surprising that the employment offices realize quite different manning ratios.

As we will demonstrate in the next section, much of the variation in processing time per case for determination of basic income support for job-seekers is caused by exogenous factors. Hence, efficient allocation rules for personnel might actually take account of differing requirements for service intensity. Whether the resources of the employment offices are really fixed according to the number of cases and the specific requirements for intensity of consulting is an open question.

If resources are allocated efficiently according to the number of cases and their specific time requirements, the observed differences in efficiency between employment offices should be rather small. Furthermore, factors like location in a specific federal state should not exert an effect, as the states are not involved in funding employment offices.

One reason for differences in time required per case could be managerial inefficiency. An alternative explanation for possible considerable and unexplained differences in time required per case could be simply arbitrarily determined resource allocations (coincidence, historical reasons, political decisions) without a regular evaluation process. We include and test the effects of variables related to additional working time like the newly registered unemployed or recipients with increased requirements and several organizational measures like quality management or accounting measures, which

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<sup>169</sup> But for our study the unemployment rate at the regional level is also relevant.

explicitly aim at improving efficiency. The determination of welfare payments is highly complicated and under permanent revision. Between the introduction of the SGB II reform in 2005 and 2012, 62 laws were modified with, in part, drastic changes (Job Center NRW 2013). On average a file documenting the servicing of one household comprises 650 pages (Bundesvereinigung der Deutschen Arbeitgeberverbände 2015). Therefore, a certain share of incorrect decisions is not surprising.

The recipients have the possibility to oppose decisions if they suspect inaccurate decisions. In the first place, appeals are reviewed internally by a legal redress office. Inappropriate decisions are identified by the number of appeals approved by the redress offices. These are, in particular, appeals where decisions were based on misapplications of the law. Thus, our variable to identify (low) quality of decisions is the number of upheld appeals (due to incorrect application of the law) divided by the total number of cases dealt with by the employment office.

A priori, it is unclear how efficiency in the determination of benefit levels affects the quality of decisions. Clearly, one possibility is that time saving processing of the cases implies inadequate decisions<sup>170</sup>. However, alternatively, efficiency in one dimension of servicing the recipients (determination of payouts) might be positively correlated with efficiency in terms of accuracy of the decisions. For example, organizational measures might affect both dimensions of the process of determining welfare payments. Finally, of course, efficiency in benefit determination might be uncorrelated with the quality of the decisions. If this were true, a disproportionate amount of time for the determination process would have no benefit in any respect and, consequently, manpower of overstuffed employment offices could be shifted to other agencies or used for entirely different purposes.

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<sup>170</sup> Concerning the second task of employment offices, Hofmann et al. (2012) found that a better caseworker-to-client ratio in counselling and job placement activities in German employment offices leads to more job placements.

## 5.4 Data

The data for this study is on 299 employment offices operated by the Federal Employment Agency and the municipalities as *Joint Local Agencies* (“gemeinsame Einrichtungen”) and covers the year 2013. These agencies were formed in 2010 after a decision of the Federal Constitutional Court in Germany in 2007, which found that the former institution did not comply with the German constitution. After a change of the legal foundation in 2010, including a modification of the German constitution, new institutions were launched. The municipalities (counties and larger cities) were granted the possibility to choose between forming Joint Local Agencies or introducing Approved Local Providers (“kommunale Einrichtungen”) conducted by the municipalities only. 104 approved local agencies were created accordingly in addition to 304 joint local agencies (of which 299 participated in this study).<sup>171</sup>

The administrative costs of the employment offices operating as joint local agencies are shared. In particular, the municipalities cover 16% while the Federal Employment Agency bears 84% of the expenses. Expenditures for the recipients are also shared. The Federal Employment Agency bears the expenses of the so-called normal requirements (“Regelbedarf”), covering basic needs of living. Expenditures for rents and heating are taken over by the municipalities. This evaluation is based on the joint local agencies and not the approved local providers as the latter ones were not subject to the supervision and direction of the Bund-Länder-Ausschuss.

Information concerning the characteristics of employment agencies includes processing time used for servicing and the number of upheld appeals because of decisions due to misapplication of laws. On this basis our two dependent variables are formed. Exogenous variables are available on the characteristics of the employment offices, the welfare recipients and regional data. The variables are defined and discussed in detail below.

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<sup>171</sup> For a comparison of the performance between Approved Local Providers and Joint Local Providers with respect to transition probabilities of the unemployed into employment see Holzner and Munz (2013).

## 5.5 Stochastic Frontier Analysis on Time Used for Determination of Welfare Support

Since 2004 the employment offices have been responsible for the financial support of unemployed persons as well as of persons who live with them in a joint household if the unemployed person is covered by ALG II. These include spouses, partners and children who do not work and are not registered as unemployed themselves. Therefore, the number of persons serviced is quite high. In contrast to the ALG I, which is provided for the first 12 to 24 months of unemployment, the level of ALG II does not depend on previous income.

Within the employment offices, the tasks concerning determination of welfare benefits and employment services are separated. This study analyzes the determination of financial support only. In the first place, the average processing time needed by an agency to deal with all cases is estimated. Thus, an employee's total working time in hours can be divided according to the following six tasks:

- hours used for global tasks ( $h1$ )
- hours used for handling new applications ( $h2$ )
- hours used for permanent case management ( $h3$ )
- hours used for cross-case tasks ( $h4$ )
- hours used for education and social participation ( $h5$ )
- hours used for tasks outside the specific range ( $h6$ )

In order to derive precise information on the hours used for the determination of benefits per case ( $hBenefitDet$ ) we have to modify the employees' total working time. Tasks two to four focus explicitly on the determination of benefit levels and are hence entirely part of  $hBenefitDet$ . As tasks five and six are not directly connected to the benefit determination process, we do not consider them for the calculation of  $hBenefitDet$ . Task one represents global tasks which are generally included. However, due to the fact that tasks five and six are not included in the calculation, we reduce  $h1$  by a proportional amount that would refer to tasks five and six.

Finally, the average hours used for the determination ( $hBenefitDet$ ) in agency  $i$  is defined as follows:

$$hBenefitDet_i = \frac{h1_i - \left( \frac{h5_i + h6_i}{h2_i + h3_i + h4_i + h5_i + h6_i} * h1_i \right) + h2_i + h3_i + h4_i}{cases} \quad (5.7)$$

The denominator is the total number of cases. The literal denomination of the unit serviced is “Bedarfsgemeinschaft” (need community). However, for the sake of clarity, we use the word “case”. In our sample the average number of persons served per case is 1.88. The variable  $hBenefitDet_i$  is the dependent variable in the first part of this study. It is used after a logarithmic transformation.

The analysis of time input used to determine the level of welfare benefits can be regarded as an estimation of a cost function. One way to identify the relative efficiency of the employment offices at performing their tasks is by means of stochastic frontier analysis. Stochastic frontier analyses are parametric estimation models which investigate the relation between input and output. Typically, production or cost functions are estimated<sup>172</sup>. The procedure simultaneously estimates coefficients for the explanatory variables as well as deviations from an efficient frontier<sup>173</sup>. The model in the case of a cost function is:

$$\ln(hBenefitDet_i) = \beta_0 + \sum_{j=1}^k \beta_j \ln(x_{ji}) + v_i + u_i \quad (5.8)$$

The dependent variable  $\ln(hBenefitDet_i)$  is the logarithmic value of the time needed per case,  $\ln(x_{ji})$  are logarithmic values of the  $k$  explanatory variables<sup>174</sup>,  $\beta_0$  represents the constant term and  $\beta_j$  stands for the  $k$  coefficients of the exogenous variables. The

<sup>172</sup> As mentioned earlier, Ramirez and Vassiliev (2007) also use stochastic frontier analysis in order to evaluate the efficiency of employment offices. In contrast to us they estimate a production function instead of a cost function.

<sup>173</sup> A detailed presentation of the methods and models can be found in Kumbhakar and Knox Lovell (2000).

<sup>174</sup> Stochastic frontier analysis is based on the use of logarithmic variables. The variable ShareLowMedium has in one case a value of zero. To allow for logarithmization, instead of zero the lowest observed value is inserted, and this observation is additionally given a specific dummy variable.

stochastic term of the equation is denoted by  $v_i$  and the inefficiency term by  $u_i$ . In accordance with most applications of stochastic frontier analysis we assume in the case of  $v_i$  a symmetric normal distribution. However, as the inefficiency term  $u_i$  is non-negative (but also normally distributed), the total residual  $\varepsilon_i = v_i + u_i$  is asymmetric. Given that the dependent variable is specified in logarithmic values, the term  $\exp(u_i)$  stands for relative (in)efficiency. Larger values of  $\exp(u_i)$  represent lower efficiency.

A number of explanatory variables are used to explain *hBenefitDet*. The variables can be divided into measures characterizing the labor market, the unemployed persons receiving service and their families, the employment agencies and particular organizational measures applied to improve efficiency<sup>175</sup>. Table 5.1 presents an overview on all variables and the corresponding descriptive statistics.

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<sup>175</sup> Please note, for the explanation of *hBenefitDet* and the ratio of upheld oppositions we use the same set of variables (except the Federal States variables), although the relevance may differ. With this procedure we want to test whether a trade-off between time input and quality of decisions may be identified for specific variables (aside of the effect of the inefficiency term).



**Table 5.1: Variable Notation**

<b>Variable name</b>	<b>Notation</b>	<b>Mean</b>	<b>Std. Dev</b>
<b>Dependent Variables:</b>			
<i>hBenefitDet</i>	hours used for the determination of benefits per case	16.35	2.68
<i>Appeals</i>	number of appeals upheld after internal control because of a misapplication of the law, in relation to the total number of cases dealt with	.023	.013
<b>Labor market Characteristics:</b>			
<i>Unemployment</i>	number of unemployed persons, divided by total population below 65 in a given region	.077	.048
<i>Newly Registered</i>	ratio of newly registered recipients to total number of recipients in 2013	.52	.13
<b>Characteristics of the welfare recipients:</b>			
<i>Long-term Unemployed</i>	ratio of cases of long-term recipients (four years or more) to all cases	.57	.079
<i>Increased Requirements</i>	ratio of cases with increased requirements like pregnancy, disability, single parents, health problems to all cases	.33	.093
<i>Persons</i>	number of persons per case	1.83	.11
<i>Foreigners</i>	ratio of foreign recipients to total number of recipients	.17	.093
<i>Income</i>	ratio of recipients with income from other sources to total number of recipients	.64	.026
<i>Unqualified</i>	ratio of unqualified unemployed to all unemployed (both measured for our relevant SGB II group only)	.38	.096
<b>Characteristics of the employment agencies:</b>			
<i>Employees</i>	number of full-time equivalent employees	80.20	101.23
<i>Lower and Intermediate</i>	ratio of employees on the lower and intermediate level to total number of employees	.64	.19
<b>Organizational characteristics:</b>			
<i>One Caseworker</i>	dummy, takes unit value if cases are handled by just one person	.095	.29
<i>Scheduled</i>	dummy, takes unit value if agency arranges specific appointments	.47	.50
<i>Accounting</i>	dummy, takes unit value if staff is specifically responsible for management and operating accounting	.51	.50
<i>Organization</i>	dummy, takes unit value if staff is specifically responsible for organizational design	.29	.45
<i>Quality</i>	dummy, takes unit value if staff is specifically responsible for the existence of quality assurance	.40	.49

The characteristics of the local labor markets are first included by the number of unemployed persons, divided by the total population below 65 (variable is called *Unemployment*). The hypothesis is that a higher share of unemployed leads to routine in dealing with the cases and lower costs per case. Secondly, the number of newly registered benefits recipients in 2013 divided by total recipients of benefits enters the regression (*Newly Registered*). Usually cases that have to be serviced for the first time create additional work.

The characteristics of the serviced people unemployed are taken up by several variables. The structure of the benefits recipients is included by the number of long-term recipients (four years or more) divided by all recipients of benefits (*Long-term Unemployed*). On the one hand, such cases may require less time for servicing, as perhaps the individual circumstances do not change much over time. In contrast, it is sometimes said that servicing the long-term unemployed is particularly time intensive as these persons are frequently unhappy with their situation and have specific needs like debt counseling, addiction counseling or psychosocial care. The ratio of cases with increased requirements (pregnant women, disabled persons, single parents, persons who need specific diets due to health problems) to all cases will in all likelihood increase time costs (*Increased Requirements*). Similarly the variable persons per case (*Persons*) may lead to increased processing time, as every separate member of a need community is entitled to financial support. The unqualified unemployed perhaps need more time for assistance and therefore the ratio of these persons divided by the total number of unemployed (*Unqualified*) is also added<sup>176</sup>.

It is possible that servicing foreign unemployed persons would imply more time input, as language barriers and a lack of familiarity with German institutions lead to an increased time need. The ratio of foreign recipients to the total number of recipients is applied to take this possibility into account (*Foreigners*). A significant portion of the recipients have some income from other sources such as income from (part-time) work. This will in all likelihood imply an increased handling time and is included by the share of recipients with income to all recipients (*Income*).

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<sup>176</sup> Only the unemployed who are supported according to SGB II are taken into account, i.e. the group of unemployed considered by us.

Specific characteristics of the employment agencies are considered by two variables. The logarithmic value of the number of employees (*Employees*) tests for economics of scale. In addition, qualification differences might matter. Better qualified employees probably need less time to process cases (and simultaneously produce fewer inappropriate decisions). The employees are classified into four levels, which in turn are based on the basic education level: lower service, intermediate level, upper-intermediate level and upper level. The relative shares of employment of the four groups are shown in Table 5.2.

**Table 5.2: Ratios of Employees According to Education**

Level of education	ratio	sd
<i>Lower</i>	0.010	(0.025)
<i>Intermediate</i>	0.634	(0.192)
<i>Upper-intermediate</i>	0.355	(0.196)
<i>Upper</i>	0.001	(0.001)

Standard deviation in parentheses

As only very few employees of employment offices are assigned to the lowest and the highest levels of the hierarchy, only the employees belonging to the intermediate and the upper-intermediate levels are empirically relevant. The intermediate-level employees have a practical administrative training, while the upper-intermediate level employees have studied at a university of applied sciences (Fachhochschule) for at least three years. There are specialized universities of applied sciences for the public service and the Federal Employment Agency itself runs “universities of applied labor studies”. The (few) employees assigned to the upper level have studied for at least four years at a university<sup>177</sup> and have earned a masters degree or a state examination (Staatsexamen), which prepares them for working in the public sector at the upper level.

The structure of employees in employment agencies is included by the share of employees on the lower and intermediate level (*Lower and Intermediate*). The hypothesis is that better educated employees are able to fulfill their tasks more efficiently and if this were true the inclusion of the share of employees on the lower or intermediate-level would lead to positive coefficients in both the working time and the upheld appeal equations.

<sup>177</sup> Universities of applied sciences are practice-oriented, while universities offer the traditional academic education.

A set of variables takes up organizational characteristics. One variable is a dummy which has unit value if cases are handled by just one person (*One Caseworker*). Division of labor would lead to a specialization of employees and, given that the process is quite complicated, this might improve the speed of decisions and quality alike. However, in bureaucratic organizations with imperfect coordination and no incentives, a negative impact on productivity could also exist. Another organizational variable focuses on time scheduling. Some agencies arrange specific appointments for the unemployed (dummy variable *Scheduled*), while in other agencies the applicants simply have to wait until they are served.

Next, explicit initiatives to improve organizational efficiency are included. These are identified by dummy variables which assume unit value if staff are specifically responsible for efficiency-improving tasks. The efficiency measures considered are presence of management and operating accounting (*Accounting*), existence of organizational design (*Organization*) and existence of quality assurance (*Quality*).

All information was collected and provided by the Institute for Employment Research (Nuremberg).

**Table 5.3: Stochastic Frontier Analysis on Determinants of Processing Time (loghBenefitDet)**

	(1) lhBenefitDet	(2) lhBenefitDet
<i>Unemployment</i>	-0.137*** (0.030)	-0.084** (0.033)
<i>Newly Registered</i>	0.227** (0.102)	0.206** (0.100)
<i>Long-term Unemployed</i>	0.379** (0.156)	0.210 (0.154)
<i>Increased Requirements</i>	0.099*** (0.027)	0.100*** (0.031)
<i>Persons</i>	-0.283 (0.175)	-0.323* (0.188)
<i>Foreigners</i>	-0.005 (0.020)	-0.042* (0.022)
<i>Income</i>	0.250 (0.267)	0.326 (0.300)
<i>Unqualified</i>	0.019 (0.043)	0.012 (0.059)
<i>Employees</i>	0.015 (0.014)	0.043*** (0.014)
<i>Lower and Intermediate</i>	0.061*** (0.016)	0.063*** (0.016)
<i>One Caseworker</i>	0.014 (0.026)	0.019 (0.023)
<i>Scheduled</i>	0.029** (0.013)	0.024* (0.012)
<i>Accounting</i>	0.003 (0.015)	0.011 (0.015)
<i>Organization</i>	-0.011 (0.016)	-0.018 (0.015)
<i>Quality</i>	-0.006 (0.015)	-0.003 (0.014)
<i>B</i>		0.041 (0.037)
<i>HB</i>		0.186*** (0.063)
<i>Meck</i>		0.081 (0.050)
<i>SachA</i>		0.014 (0.054)
<i>TH</i>		0.154*** (0.040)
<i>SH</i>		0.046 (0.054)

**Table 5.3: Stochastic Frontier Analysis on Determinants of Processing Time (loghBenefitDet) (cont.)**

<i>Sachs</i>		0.006 (0.039)
<i>NI</i>		0.135*** (0.044)
<i>NRW</i>		0.115** (0.046)
<i>HE</i>		0.065 (0.054)
<i>RP</i>		0.150*** (0.048)
<i>SR</i>		0.153*** (0.049)
<i>BW</i>		0.197*** (0.053)
<i>BY</i>		0.201*** (0.051)
<i>_cons</i>	3.072*** (0.248)	2.827*** (0.233)
lnsig2v		
<i>_cons</i>	-4.672*** (0.246)	-5.022*** (0.213)
lnsig2u		
<i>_cons</i>	-4.966*** (0.908)	-4.583*** (0.493)
<i>N</i>	294	294

Notes: *t* statistics in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ , Heteroscedastic robust standard errors in parentheses. Dummy variable indicating *Lower and Intermediate*=0 not reported

Table 5.3 displays the stochastic frontier estimation results of two specifications. The results in column 1 are based on the reduced specification omitting federal states dummies. The argumentation in favor of including state dummies (column 2), although the states are not involved in funding employment offices, is the following: The financial situation of a federal state will be highly correlated with the average financial situation of the municipalities in that federal state. As mentioned above, municipalities cover 16% of the administrative costs and the financial background might therefore affect staffing ratios positively or negatively and without consideration of the geographical location this would be attributed to the employment offices as (in)efficiency. Related with this argument, employment agencies located in so-called city-states (Bremen, Bremerhaven, Hamburg and Berlin) as well as federal states dominated by large cities, such as North Rhine-

Westphalia, will on average have large employment agencies and (dis)economies of scale might be confused with federal state effects. The federal states are Berlin (B), Bremen (HB), Mecklenburg-West Pomerania (Meck), Saxony Anhalt (SachA), Thuringia (TH), Saxony (Sachs), Lower Saxony (NI), North Rhine-Westphalia (NRW), Hesse (HE), Rhineland-Palatinate (RP), Saarland (SR), Baden-Wurttemberg (BW) and Bavaria (BY). The employment offices of Hamburg and Brandenburg<sup>178</sup> are omitted and serve as the reference group. The State variables in model (2) are jointly highly significant ( $\chi^2 = 12.28$ ,  $p = 0.005$ ).

The unemployment ratio (*Unemployment*) on the regional level decreases time input per case<sup>179</sup>. Apparently a higher ratio of unemployed persons increases routine with servicing such cases. The ratio of long-term unemployed persons (*Long-term Unemployed*) has a positive coefficient in model one, implying that the long term unemployed need more attentive support. The variable is insignificant, however, if the federal states dummies are added. Unsurprisingly, people with particular requirements (*Increased Requirements*) need more time for servicing. Similarly, handling of persons asking for support for the first time (*Newly Registered*) takes additional time. Employees without higher education (*Lower and Intermediate*) need more time for handling the cases. Working on the basis of appointments (*Scheduled*) increases the time needed per case. Dealing with cases by just one caseworker (*One Caseworker*) has no impact. The measures to explicitly improve efficiency (*Accounting, Organization, and Quality*) unfortunately have no effect on processing time (but wait for the effect on quality). The ratios of recipients with income (*Income*) and of the unqualified unemployed (*Unqualified*) have no effects on time needed for servicing.

The size variable (*Employees*) has no impact on the dependent variable if the federal states variables are not included, but it becomes significant if these dummies are added. However, contrary to expectations, the scale variable points to diseconomies, meaning that the merging of employment agencies would not lead to less working time per case.

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<sup>178</sup> Hamburg has just one employment agency and cannot be given a separate dummy variable (Hendry and Santos 2006). Hamburg and Brandenburg have both the lowest costs and therefore serve as reference group.

<sup>179</sup> Stochastic frontier analysis does not compute  $R^2$  statistics. To give an impression of the relevance of the exogenous variables, the regressions have been repeated by OLS. The  $R^2$  is then .53 (specification of row 1) and .59 respectively (specification of row2).

These results are in line with Vassiliev and Ramirez (2007), who detected decreasing returns to scale of employment offices (in the context of placement of unemployed persons), suggesting that a larger employment office does not necessarily lead to higher productivity.

If the federal states variables are included the number of persons per case (*Persons*) and the ratio of foreign recipients (*Foreign*) become weakly significant. Surprisingly, these two variables reduce processing time per case.

The federal state dummies are jointly significant, although (as stated before) the states themselves do not contribute to funding the employment offices. Hence, this result points to historical reasons for the equipment with personnel. The significance of some of the federal state dummies may reflect historical or accidental effects, but if they are omitted the (in)efficiency of the employment agencies might be inappropriately measured. The alternative explanation for effects of location in specific federal states might be unobserved regional efficiency measures as it is the case in some matching studies (e.g. Vassiliev et al. 2006). In the case of determination of welfare payment region-specific efficiency effects are, however, less plausible than if job finding is considered. The term on (in)efficient time allocation is applied in the next step to explain quality.

One possible way to express the importance of the stochastic component versus the (in)efficiency is the relation  $\lambda = \frac{\sigma_u}{\sigma_v}$ . It is simply the ratio of the standard deviations of the two components. Interestingly, this value differs considerably between specification one and specification two. Without state dummies the variation of the random component dominates ( $\lambda = 0.81$ ) while, if state dummies are included, the variation of the (in)efficiency term is larger ( $\lambda=1.16$ ). Hence the part of the variance that is explained by the state dummies seems to be attributed to the stochastic part of the residual and not to (in)efficiency in case the state dummies are omitted. Thus, a consideration of the location of employment offices in the different states reduces uncertainty and is valuable information on the individual efficiency of the employment offices. Table 5.4 summarizes the estimates on (in)efficiency.



**Table 5.4: Summary Statistics of (In)Efficiency Measures**

	mean	sd	min	max
hBenefitDet	16.356	2.673	10.749	28.692
$u_1$ (without state dummies)	0.067	0.024	0.023	0.207
$e^{u_1}$ (without state dummies)	1.070	0.24	1.024	1.23
$u_2$ (with state dummies)	0.080	0.039	0.025	0.302
$e^{u_2}$ (with state dummies)	1.086	0.035	1.026	1.355

The minimum and maximum values point to a considerable range. This result is in line with previous literature which also detects considerable variation in efficiency between different employment offices (i. e. Cavin and Stafford, 1985; Althin and Behrenz, 2005, 2004). The efficiency measures express that, if the federal states dummies are omitted, the employment offices realize on average less deviation from the efficient frontier and are more efficient. Where federal state dummies are included, average deviation from the theoretical cost minimum is 8.6% and the difference to the employment office with lowest realized costs is about 6.0%. The analogous figures for the regression without federal state dummies are 7.0% and 4.6%. There is no obvious point of comparison for these figures, but if we take the empirical studies surveyed in the literature section, these deviations from the efficiency frontier seem to be of moderate magnitude. Computing monetary values, however, leads to values of 164 and 201 million Euros if the difference to the theoretical minimum is computed, and 108 and 141 million Euros if the difference to the observed minimum is the reference point<sup>180</sup>. These amounts are not negligible.

## 5.6 Quality Assessment

The main purpose of the estimation of the stochastic frontier analysis model is the generation of a variable concerning efficient time allocation, which takes into account the particular burden an employment office has to deal with. Next, the computed (in)efficiency term is used to explain the employment offices' service quality.

To investigate the accuracy of decisions we use data on the number of upheld appeals of welfare recipients against decisions. Appeals are first examined internally by a legal

<sup>180</sup> Taking 55% of the total administrative costs of 4,259 million Euros and multiplying with values between .046 to 0.086 leads to figures mentioned in the main text.

redress office. We use the number of appeals upheld following this internal control due to a misapplication of the law, in relation to the total number of cases dealt with.

The empirical model is basically a two-stage procedure where efficiency terms are estimated in the first place. These estimates are used in the second step. In two-stage approaches of this kind the conventional standard errors are not valid. Therefore, we use bootstrapping with cluster adjustment and 200 replications. Note, this bootstrapping procedure is based on the inclusion of both parts of the estimation procedure for every bootstrap sample.

The dependent variable is log-transformed (*logAppeals*). As in three cases zero upheld oppositions are observed, we follow the suggestion of Cameron and Trivedi (2009, 532) how to proceed in such a situation<sup>181</sup>. Because of the small number of censored observations we use OLS, but Tobit leads to almost identical results. All variables used in the estimation of time input efficiency are included here as well. In the case of several variables, the reason is the obvious relevance for both questions, for example that the more complicated cases (Increased Requirements, Persons, Income) not only lead to more processing time, but with some likelihood also imply a higher incidence of complaints<sup>182</sup>. Servicing by appointment (*Scheduled*) will probably lead to fewer problems while the effect of handling by one caseworker (*One Caseworker*) is unclear. It is quite likely that the qualification level of the employees (*Lower and Intermediate*) has an impact here as well because better qualified staff are expected to do a better job. As just mentioned, organizational variables may increase efficiency with respect to the number of upheld appeals, but the contrary is also possible, since organizational innovations might also increase stress and in turn also costs in terms of more upheld appeals.

It is possible that foreigners have problems with the whole process and do not complain about decisions. On the other hand, they might have the impression of being unfairly treated and therefore more often request a reexamination of decisions. Thus, no obvious hypothesis can be made with respect to the variable *Foreign* and this is also the case for the variables *Newly Registered*, *Employees*, *Unemployment* and *Long-Term Unemployed*.

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<sup>181</sup> The transformation requires that zero values of our dependent variable are adjusted to a value which is smaller or equal to the smallest uncensored value. In our case, this minimum is slightly lower than the smallest observed value.

<sup>182</sup> Exclusion of irrelevant variables does not affect the results.

Table 5.5 presents the results with column one referring to the specification using  $e^{u_1}$  and column two referring to the specification using  $e^{u_2}$  as explanatory variable. The ratio of employees with lower or medium-level education (*Lower and Intermediate*) increases the share of upheld appeals, indicating that better qualified employees have an advantage in analyzing the extensive and complicated legal basis for the decisions.

Working on a scheduled basis (*Scheduled*) reduces the share of upheld appeals. It would appear that this method of service takes more time, but is also more accurate. In a similar vein, the newly registered unemployed (*Newly Registered*) take more time to process on the one hand, but this allocation of resources leads to less inappropriate decisions on the other hand.

The need communities consisting of more persons increase the ratio of upheld appeals (*Persons*), presumably as these cases are more complicated and therefore lead to inappropriate decisions. Similarly, a higher share of foreign recipients (*Foreigners*) leads to a higher share of upheld appeals, and this suggests that these cases are dealt with insufficient care<sup>183</sup>.

Two of the variables aiming at improving organizational efficiency do not meet expectations. The use of accounting methods (*Accounting*) increases appeals without having an advantage with respect to time input<sup>184</sup>. The same conclusion is true with respect to the variable *Organization*. In contrast Quality assurance (*Quality*) works as expected by reducing upheld appeals. The federal states dummy variables have no effect and are omitted.

Adding the inefficiency term (either  $e^{u_1}$  nor  $e^{u_2}$ ) has no significant effect. In addition simpler (in)efficiency measures have been tried as alternatives to stochastic frontier analysis. Firstly, average processing time used for servicing (*hBenefitDet*) is included. Secondly, the difference between the observed value *hBenefitDet* and the expected value  $\widehat{hBenefitDet}$  is computed. The expected value is calculated on the basis of the specific parameter values of the explanatory variables and the coefficients. This method is called the deterministic frontier model. The implementation of these two variables does not lead

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<sup>183</sup> Interestingly the variables attract (in the specification with the federal states dummy variables) a negative impact on time input. Although here some evidence for a trade-off exists, we do not put too much evidence on this result as it is only found in one specification.

<sup>184</sup> In general, the efficiency of accounting systems and target agreements of employment agencies are quite controversially discussed (e.g. Kaltenborn et al. (2010, ch. 4.3. Matiaske et al. 2015).

to significant coefficients either. Hence, on the basis of upheld appeals concerning the decisions of the employment offices, there is no trade-off between processing time and quality of the service (based on the inclusion of several cost drivers in the first equation).

**Table 5.5: Determinants of Ratio of Upheld Appeals to Total Number of Cases**

	(1)	(2)
	logAppeals	logAppeals
<i>Unemployment</i>	-1.746 (1.373)	-1.776 (1.385)
<i>Newly Registered</i>	-1.155* (0.661)	-1.141* (0.665)
<i>Long-term Unemployment</i>	1.099 (1.278)	1.162 (1.263)
<i>Increased Requirements</i>	-0.185 (0.408)	-0.177 (0.408)
<i>Persons</i>	1.118** (0.552)	1.097** (0.554)
<i>Foreigners</i>	1.496** (0.618)	1.530** (0.615)
<i>Income</i>	-2.893 (1.949)	-2.809 (1.960)
<i>Unqualified</i>	-2.865*** (0.542)	-2.850*** (0.546)
<i>Employees</i>	-0.000 (0.0004)	-0.000 (0.0004)
<i>Lower and Intermediate</i>	0.752*** (0.201)	0.752*** (0.202)
<i>One Caseworker</i>	-0.200 (0.131)	-0.200 (0.131)
<i>Scheduled</i>	-0.191*** (0.068)	-0.194*** (0.068)
<i>Accounting</i>	0.158** (0.078)	0.159** (0.078)
<i>Organization</i>	0.133* (0.081)	0.133* (0.082)
<i>Quality</i>	-0.138* (0.077)	-0.139* (0.078)
$e^{u_1}$	1.402 (45930)	
$e^{u_2}$		0.347 (17882)
<i>_cons</i>	-5.013 (45891)	-3.959** (17890)
<i>N</i>	294	294

Notes: *t* statistics in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ , bootstrapped standard errors in parentheses

What stands out is that the ratio of employment offices employees with lower or medium-level education twice has a significant impact. This share has elasticity with respect to time needed for servicing of 0.061 to 0.063 and leads to more erroneous decisions due to

misapplication of the law by 112 %<sup>185</sup>. The employment offices or the Bund-Länder Ausschuss (committee of the Federal Republic and Federal States) should examine whether employment of (higher paid) upper-intermediate-level civil servants (substituting the intermediate-level civil servants) are worth the connected additional expenditures for them in comparison to the extra costs caused by the higher processing time and the increased probability of wrongful decisions in the case of the less well qualified personnel. Aside of the wrong decisions that are revised following an appeal, it might be presumed that not all inappropriate decisions are brought to the attention of the legal redress offices and the number of wrong decisions will then be higher than recorded in the data. Secondly, in all likelihood the recipients will not oppose too high benefit levels (at least not on purpose). We have no information on the share of benefits, which are inappropriately fixed at a too high level. Hence, the problems related with the employment of suboptimal trained personnel will probably be larger than what our data tells us.

## 5.7 Conclusion

The topic of this paper is the analysis of efficiency with respect to the time needed to determine welfare benefits and the impact of estimated (in)efficiency on the quality of this process. The empirical evidence is mixed. While the inefficiency term has no effect, for some particular variables opposing coefficients in the two equations are estimated. The opposing coefficients point to a trade-off in terms of processing time and quality of the decisions if employment offices work on the basis of scheduled appointments. Similarly, processing the newly registered unemployed leads to longer handling times and simultaneously to fewer upheld appeals<sup>186</sup>.

Unfortunately, this study does not find much evidence that approaches to improve organizational efficiency are working. With respect to processing time, no effect is found

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<sup>185</sup> Based on the computation of  $e^{\beta_{Lower\ and\ Intermediate}} = e^{0.75} - 1 = 1.117$

<sup>186</sup> With respect to the servicing of foreigners and need communities with several persons, similar evidence pointing to trade-offs is estimated.

and accounting and organizational design even increase the ratio of approved appeals<sup>187</sup>. In contrast, quality management reduces this ratio. The better qualification of employees improves efficiency in both dimensions and consequences of these results should be investigated.

The significant impact of some dummy variables indicating the location of the employment offices in specific federal states on processing time per case is not justified by institutional facts on financing the employment offices. This result suggests that historical reasons are at least partly responsible for the allocation of personal to employment offices. Based on this allocation some employment offices have more resources than others and manpower is not shifted to the offices with the highest demand. Although millions of people depend on the quick and correct determination of welfare benefits and billions are spent on this service, this is to our knowledge the first empirical study on the efficiency of the whole process. The results show the relevance of this research topic as there seems to be room for improvement in labor allocation.

One way to introduce target-oriented resource allocation is by yardstick competition. For example, in energy regulation the providers of network facilities are compared and evaluated during every regulatory period. Similarly to our analysis, the basis of the evaluation is Stochastic Frontier Analysis (and Data Envelopment Analysis). By applying such a benchmark system and an appropriate incentive mechanism, it would also be possible to increase efficiency over time for all employment offices.

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<sup>187</sup> A recent study of Matiaske et al (2015) empirically focuses on the working conditions in employment offices. The authors find out that due to “New Public Management” and the larger amount of emotional work employment office employees experience higher levels of stress than other professional groups. This could be one potential reason explaining inefficiencies in employment offices and a potential starting point in order to eliminate inefficiencies.

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## **6 Final Remarks**



In general good corporate governance aims at optimizing processes by which organizations are directed, controlled and held to account (ANAO 1999). The aim of this dissertation is to provide insights into the effectiveness of corporate governance in both the private and the public sectors. However, differences in the underlying objective function between the two sectors lead to differences in the underlying corporate governance goals. In detail, the objective in private corporations is profit maximization, whereas public sector represents non-profit organizations with the underlying goal to provide public services in an effective way. Furthermore, in the private sector stock companies are usually owned by individuals or legal entities and controlled by managers. Whereas, in the German government system, such a clear separation is not possible because of traditionally interlocked and interwoven councilors and administrative managers (Kuhlmann et al. 2008).

The classical principle agent relationship between owner and manager is therefore more present in the private sector and the alignment of interests between these two parties is the predominant goal. Contrary, corporate governance in the public sector predominantly aims to reach higher effectivities and efficiencies by the economization of public administration.

One finding of this dissertation is that the three considered corporate governance instruments in the private sector exert (to a certain degree) a significant (corporate governance improving) impact on management compensation. In contrast, the corporate governance instruments in public sector, in particular the effectiveness of new public management indicators, did not reveal the expected impact. They neither lead to an increase in job agency's output nor quality.

Clearly, chapter 4 reveals that due to German codetermination labor's influence leads to an increase in managerial pay incentives. However, regarding the impact of foreign competition and the implementation of stronger disclosure obligations, such a general answer is not possible. In particular, chapters 2 and 3 reveal that foreign competition in Germany only exerts positive pay performance sensitivities once a certain degree of competition is reached, respectively that the implementation of VorstOG only turns out to have a leveling effect in the upper quantiles of the compensation distribution. To what extent the "restricted" effectiveness of these two governance instruments represents a failure, is difficult to answer. Kaplan (1999) states that in competitive and growing

industries, like for example Germany, efficient governance system will result out of market mechanisms. Taking this into consideration, the results presented in chapter 2 and 3 may simply indicate market equilibria in corporate governance and thus be satisfactory outcomes.

However, by showing that

- (1) a high degree of foreign competition increases managerial pay incentives,
- (2) stronger disclosure obligations have a leveling effect in particular on inappropriate high remuneration levels,
- (3) labor's interest is similar to shareholder's and thus increases managerial pay incentives in cases of codetermination,

one might conclude that the considered private sector instruments succeed in improving corporate governance. The opposite holds regarding the results for the public sector. Instead of improving output and quality in job centers, some of the new public management indicators even decrease quality. Beside the fact that emotional stress for employees is lower in private corporations than in job agencies (e.g. Matiaske et al., 2015), another potential reason for the presented ineffectiveness of management tools might be the inappropriateness of such tools considering the complicated structures in public management. Furthermore, along with the economization of public administration and the delegation of resources and authorities to lower organizational levels, managerial issues, such as managerial motivation, also become relevant in public sector. Thus, the implementation of (financial) incentives and sanctions may be a crucial requirement for a successful target control in job centers (Kaltenborn et al., 2010). However, Kuhlman et al. (2008) point out that the relationship between politicians and administrative managers in Germany is by far the most neglected and avoided element of the new steering model.

In the U.S. for example, many U.S. public agencies adopted the idea of performance based management compensation as an instrument to enhance the level of organizational commitment in order to increase organizational effectiveness (Moon, 2000). Contrary to the U.S., in German job agencies in 2010, only 250 leading employees receive monetary pay incentives (Kaltenborn et al., 2010). Unfortunately, due to lack of data, chapter 5 could not consider the impact of monetary incentives on efficiency and quality in German employment offices. However, one might speculate that missing monetary incentives in

German job agencies might well serve as another potential explanation for the observed ineffectiveness of new public management reforms.

In this dissertation, monetary managerial incentives are assumed to be the central corporate governance instrument to solve the principal agent problem between managers and owners. Accordingly, high pay performance sensitivities aim at increasing firm performance. This, in turn, raises the question to what extent pay performance sensitivities and company performance are determined simultaneously. A first hint for such a simultaneity is provided in chapter 2. Beside the fact that U.S. pay performance sensitivity is higher than in Germany, it also turns out that U.S. firm performance (ROE) is at the average more than twice as high as in Germany. Thus, future research needs to consider potential endogeneity bias caused by simultaneity problems.

Finally, a crucial weakness of principal agent theory is its neglect regarding the fact that in reality, managers might well be able to manipulate earnings and stock prices. For example, by producing short term increases in share prices. Eventually, monetary incentives, in particular stock based incentives, might even encourage fraudulent behavior and thus provoke contrary effect as predicted by principal agent theory.

Thus, future research should focus on whether higher pay performance sensitivities indeed lead to high firm performance and whether the provision of non-monetary incentives might be an alternative for the alignment of interest between owner and manager.

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### **Eidesstattliche Versicherung**

Hiermit versichere ich, dass ich diese Dissertation selbständig verfasst habe. Bei der Erstellung der Arbeit habe ich mich ausschließlich der angegebenen Hilfsmittel bedient. Die Dissertation ist nicht bereits Gegenstand eines erfolgreich abgeschlossenen Promotions- oder sonstigen Prüfungsverfahrens gewesen.

Dortmund, 13.10.2017