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„Pay-Performance-Sensitivity – a theoretical approach
and its empirical evidence“

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Index of abbreviations

ATSOG	Australian Twin Study of Gambling
CE	Certainty Equivalent
CEO	Chief Executive Officer
CRSP	Center for Research in Security Prices
EBIT	Earnings before interest and taxes
e.g.	exempli gratia (for example)
GSEOP	German Socioeconomic Panel
HRS	Health and retirement study
IC	Incentive Constraint
i.e.	id est (this means)
ILO	International Labour Organization
ISCO	International Standard Classifications of Occupations
LEN	Linear-Exponential-Normal
NCEO	National Center for Employee Ownership
NASDAQ	National Association of Securities Dealers Automated Quotations
NYSE	New York Stock Exchange
OLS	Ordinary least squares
PSID	Panel Study of Income Dynamics
RC	Reservation Constraint
RET	Security Market Return
RoA	Return on Assets
RoE	Return on Equity
SAR	Stock appreciation right
SEC	Securities and Exchange Commission
SHIW	Survey of Household Income
S&P	Standard & Poor's
ULMS	Ukrainian Longitudinal Monitoring Survey
U.S.	United States (of America)
VP	Vice President

1 Introduction and relevance of the thesis

1.1 Basic problem

“Too often, executive compensation in the U.S. is ridiculously out of line with performance. That won’t change, moreover, because the deck is stacked against investors when it comes to the CEO’s pay. The upshot is that a mediocre or worse CEO – aided by his handpicked VP of human relations and a consultant from the ever-accommodating firm of Ratchet, Ratchet & Bingo¹ – all too often receives gobs of money from an ill-designed compensation arrangement.” (Warren Buffett, American business magnate and investor in his 2005 letter to Berkshire Hathaway² shareholders).

This quote by Warren Buffett summarizes the dilemma of executive compensation. A lot of different factors influence the level and structure of top management remuneration. The public perception is that the general level of compensation is too high and poor performing executives earn too much. Specifically in the course of the accounting and backdating scandals of the early 2000s that resulted in different reforms within the system of executive compensation regulations (e.g. the introduction of the Sarbanes-Oxley Act of 2002 and the Dodd-Frank Executive Compensation Reform Act of 2010) this controversially discussed topic emerged again (Murphy, 2012).

The mass media often poses the question if top executives earn too much. This does not entirely embrace the actual problem. The question should be if – as hinted by the quote of Buffett – executives are paid adequately, meaning if their respective wages are appropriate with regards to performance. One catchword that is often used within this context is “pay-for-performance”. The importance of

¹ “Ratchet, Ratchet & Bingo” is the name that Warren Buffet gave to compensation consulting firms (Morgenson, 2006).

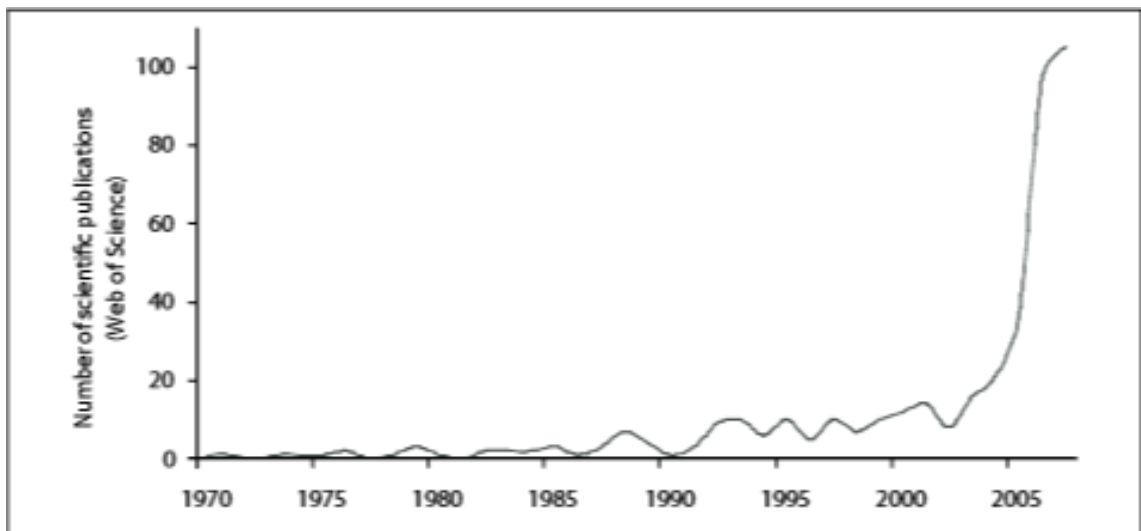
² Berkshire Hathaway is a holding company with Warren Buffett as Chief Executive Officer (CEO) (Wiebe, 2016).

1 Introduction and relevance of the thesis

this topic, for researchers, practitioners as well as the public, manifests when taking a look at the development of publications regarding pay-for-performance for the last decades.

Figure 1 illustrates that particularly since the aforementioned scandals at the turn of the millennium a lot of essays, studies and analyses were and are published every year.

Figure 1: Number of publications regarding pay-for-performance



(Rost / Osterloh, 2009, p. 122)

The entire topic pay-for-performance is multifarious and highly complex. A large number of different factors and stakeholders influence the relation between pay and performance. Some of these are already named within the quote of Warren Buffett (e.g. personal relations among the Chief Executive Officer (CEO) and other decision makers within the company (“[...] handpicked VP [...]”) or consulting firms that give advice on the level and structure of executive compensation contracts (“[...] a consultant from the ever-accommodating firm of Ratchet, Ratchet & Bingo [...]”).

1.2 Objectives and structure of the thesis

The existing and published literature on this issue is also many-faceted and diversified. This thesis pursues the goal of delivering a concise but still comprehensive and holistic overview on the most important theoretical insights and empirical findings concerning pay-for-performance.

Chapter 2 provides the necessary basics on the theory of pay-performance-sensitivity. It illustrates where the issue can be classified in a broader economically context (the principal-agent-conflict) and draws on that point to introduce a mathematic model that is often used when describing the theoretical basics of pay-performance-sensitivity. This model will be referred to when showing existing links or incongruities between theory and practice in the further elaborations.

First empirical studies are discussed in chapter 3. The development of the level and structure of executive compensation over the past decades is highlighted shortly. In chapter 4 selected studies that support and contradict the theory are presented chronologically. Furthermore, additional studies that cannot be perfectly allocated in “pro” and “contra”, and hence are “stuck in the middle”, are featured. In addition, empirical studies regarding the individual risk-aversion of an agent and its sorting and self-selection effects are examined. For each study, the rough structure and the key findings are highlighted.

Chapter 5 further deepens the evidence not supporting the theory. Different approaches that try to explain a missing link between pay and performance are expounded in this section.

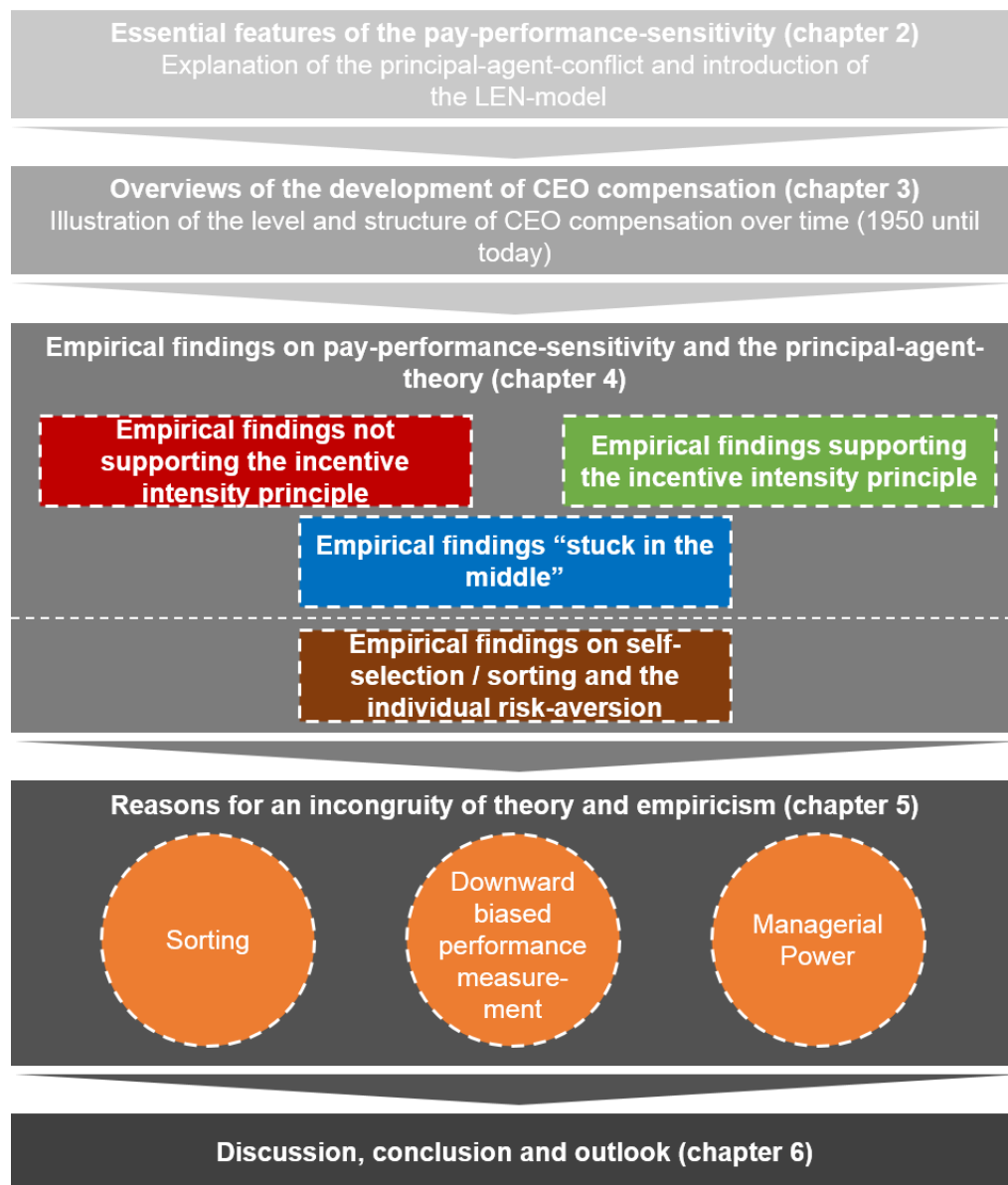
The thesis closes with a discussion followed by a conclusion and an outlook into possibly interesting topics and fields of research regarding the pay-performance-sensitivity in the future.

The work expands the surveys of Prendergast (1999, 2002) and discusses the research results on pay-for-performance.

1 Introduction and relevance of the thesis

Figure 2 depicts the structure of the thesis.

Figure 2: Structure of the present thesis



(Own illustration)

1.3 General definitions and proleptic annotations

The pay-performance-sensitivity represents the change in a CEOs wealth associated with a one-dollar change of a certain performance measure, e.g. the shareholder wealth (Jensen / Murphy, 1990a). Empirical measures concerning the relation between pay and performance are usually based on linear regression equations, typically in the form of

$$\Delta(\text{pay})_t = f + b \cdot \Delta(\text{performance})_t$$

where f represents a fixed payment and b stands for the bonus coefficient, both constant over the time t . When talking about pay-for-performance in the course of this thesis the pay-performance-sensitivity is meant if not explicitly explained otherwise. However, some studies measure the relation between pay and performance not as a sensitivity, but as an elasticity (pay-performance-elasticity). These two terminologies might describe a similar issue, but must not be used synonymously. The sensitivity describes which share of value creation an executive receives. Such a sharing rate is advantageously, since the question of pay-for-performance is being analyzed in the context of a principal-agent-framework in which problems (agency costs) arise, when the agent does not receive 100 percent of the value of an output. Hence, the sensitivity seems to be a good natural economic interpretation. An elasticity would not allow interpretations regarding the principal-agent-theory. Furthermore, an elasticity would require additional and mostly unavailable data of the non-firm-related CEO wealth. Hence, it is not appropriate when trying to deliver valid and cogent data (Murphy, 1998).

Most of the data and studies available concerning pay-for-performance concentrate on the U.S. and companies of the S&P 500. Only a few studies exist for Europe. This has to be kept in mind when looking at the drawn conclusions and results concerning the pay-performance-sensitivity within this thesis. The verbatim adaption of the results for the Europe is not necessarily possible. The opposite is the case when considering the empirical results of risk-aversion and self-selection / sorting. Most of the data available here refer to Europe. Hence, an adaption to other continental markets might not be correct.

2 Essential features of the pay-performance-sensitivity

2.1 The principal-agent-conflict

2.1.1 Early states of entrepreneurship

Until the end of the 19th and the beginning of the 20th century most companies in developed countries were small, specialized in producing only one product and had only a small number of employees. Some exceptions existed specifically in the railroads and steel industry. Companies in these industries were already quite large and complex. However, all companies were largely managed by one person. Either the founder directly, his³ descendant or another individual possessing a large amount of equity. This “proprietary management” structure comprised no conflicts of interest. The owner / founder of the business was simultaneously the manager. He therefore tried to achieve the best for the company as his economic reward usually resulted directly from his ownership. Therefore, the manager acted in a rationale and positive way aiming at gaining profits and steadily improving the value of the company. By doing so, he implicitly increased “his own wealth” due to the direct link between the company benefit and the personal reward (Murphy, 2012; Wells, 2011).

2.1.2 Changes in entrepreneurship

At the turn of the 19th to the 20th century the existing firm structure changed. An increasing demand for goods, resulting from a steady rise in global population (Birg, 2011), as well as the rapid technical progress, e.g. the invention and application of the assembly line by Ford (Goss, 2014), required and enabled the companies to upscale their production. This, and the fact that many companies

³ In the following the male speech-form is used without intending to prefer a gender. It simply serves the readability of the text.

merged together in order to form large corporations⁴, led to the rise of a new “type” of company. Additional managers with profound knowledge were needed to oversee the business, since business / manufacturing processes and the general organizational effort became too big and complex to be handled by one single person. These new managers were not compensated with equity stakes of the firm and their wealth was not concentrated within the company. Instead, they were largely paid with a fixed salary, like any other employee of the company.⁵ This was the starting point of modern executive management that superseded the hitherto used proprietary management style (Murphy, 2012; Wells, 2011).

2.1.3 The rise of principal-agent conflicts

This shift in management style came along with some severe issues concerning the incentives and interests of the owners and the (newly hired) managers. So far, owner and manager were the same person and the manager (the owner) would always act in a way that is good for the company. This normally resulted in a higher financial reward for him, too. In the course of the change in management style, the new managers received a fixed salary – mostly independent of firm performance – and acted on behalf of the owners. In more general terms, Jensen and Meckling – in their groundbreaking essay of 1976 (“Theory of the Firm”) – called this situation a “principal-agent-relationship” where the principal⁶ hires an agent⁷ that should deliver a performance on the principal’s behalf. For this, the principal commits a certain degree of decision making authority to the agent (Jensen / Meckling, 1976).

Nowadays most large companies that are traded publicly are not owned by one single owner but rather by thousands of shareholders. Consequently, the shareholders’ predominant “job” is to provide funds and to support the company with

⁴ For example, 2000 small manufacturing firms merged into 150 corporations in the U.S at the beginning of the 20th century (Murphy, 2012; Wells, 2011).

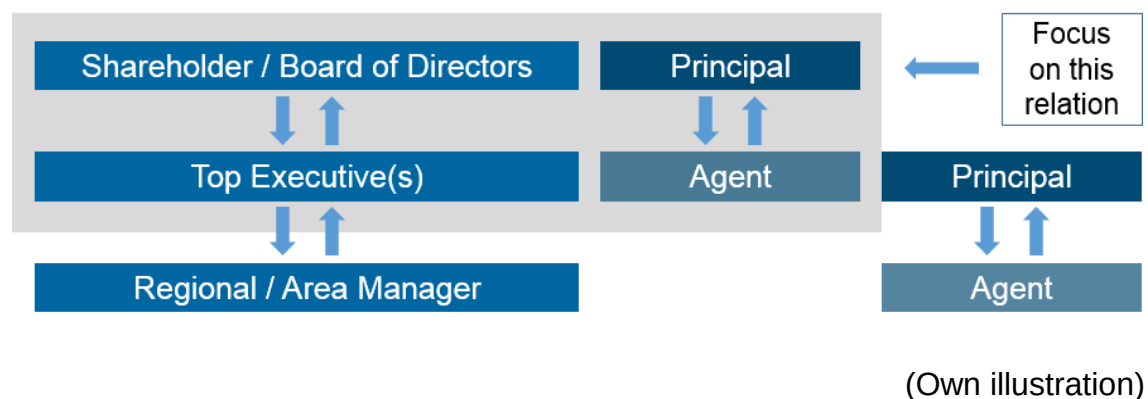
⁵ To be precise there were small differences between the American and the European compensation packages. American packages largely consisted of pure fixed payments whereas European packages already contained “variable” parts that were often linked to the firm performance (Wells, 2011).

⁶ In this special case the principal is the owner, but it can generally be one person or more.

⁷ In this special case the agent is the manager.

equity. The shareholders constitute the “principal” in present principal-agent-relationships, together with the board of directors (supervisory board), which is elected by the shareholders of publicly traded companies (Fox / Lorsch, 2012; Mroz, 2016). The shareholders, and as a consequence the board of directors, seek to maximize shareholder value. This shareholder value can be increased in different ways. Examples are a raise of the equity market value, dividends paid during or at the end of the year, or other payments to the shareholders, e.g. discounts on the par value of the stock (Fernandez, 2015).⁸ In order to realize this, a profitable organization is needed. The top executives, usually hired by the board of directors, embody the agents in the principal-agent-relationship. The executives on their own are principals in a certain way, e.g. when they announce regional or area managers. However, the focus in this thesis lies on the principal-agent-relationship between shareholders / board of directors and top executives. Figure 3 illustrates this circumstance.

Figure 3: The principal-agent-relationship



2.1.3.1 The first-best-solution

The agent, equipped with the decision making authority, is able to take most of the actions within a company. Consequently, he can influence his own welfare and the one of the principal (Spremann, 1987). In a world of perfect, symmetric information, this principal-agent-relationship would not cause serious problems. Assume a principal, preferring a high level of effort and low payment, would like an agent, preferring a low level of effort and high payment, to take a certain action

⁸ There are many other parameters that influence shareholder value. Analyzing those is beyond the scope of this thesis. At this point I refer to Rappaport (1986) and Rappaport (1999).

“ a ” from a set of actions “ A ”. The principal can monitor the action. This action constitutes a certain disutility for the agent. As a return for taking the action, the agent would like a compensation, generally in form of a payment. In a perfect world the principal would exactly know the “worth” of the agent’s disutility for taking the action. The principal would therefore offer a payment that satisfies the agent and makes him take the action preferred by the principal. In this “first-best-solution” an optimal contract can be found easily (Spremann, 1987).

2.1.3.2 The second-best-solution

When asymmetric information predominates the situation is more complicated. The principal cannot directly monitor the action the agent takes and cannot assess if the action taken is appropriate. This situation causes so called “agency costs” (Hall / Liebmann, 1997). As a result, principal and agent cannot negotiate “on eye level” about an optimal contract. The principal much more has to find a payment that induces the agent to take the preferred action. This is called the “second-best-solution” (Spremann, 1997).

The problem within the second-best-solution is that the principal can only observe the outcome resulting from the agent’s effort. He can hardly identify the real effort the agent has expended to realize the action. If almost no effort was necessary for the agent, a low payment would be the result in the first-best-solution. The other case might be that the agent had a lot of effort realizing the action, which would result in a high payment. As the principal does not have the information on the real effort in an imperfect world, the process of setting a right payment is made difficult (Arrow, 1984; Spremann, 1987).

The relationship between banks and their borrowers is an everyday life example for this Hidden Action problem. The bank (principal) borrows money to a customer (agent). The borrower normally presented his intended usage of the money to the bank. In turn, the bank checked internally if it is ok to lend the money, offered the conditions and set up a contract. Hence, the bank gave away resources (money) to the borrower in the confidence that it is used for the presented reason. The Hidden Action takes place after the borrower received the money. Without additional monitoring the bank is not able to verify if the borrower really used the

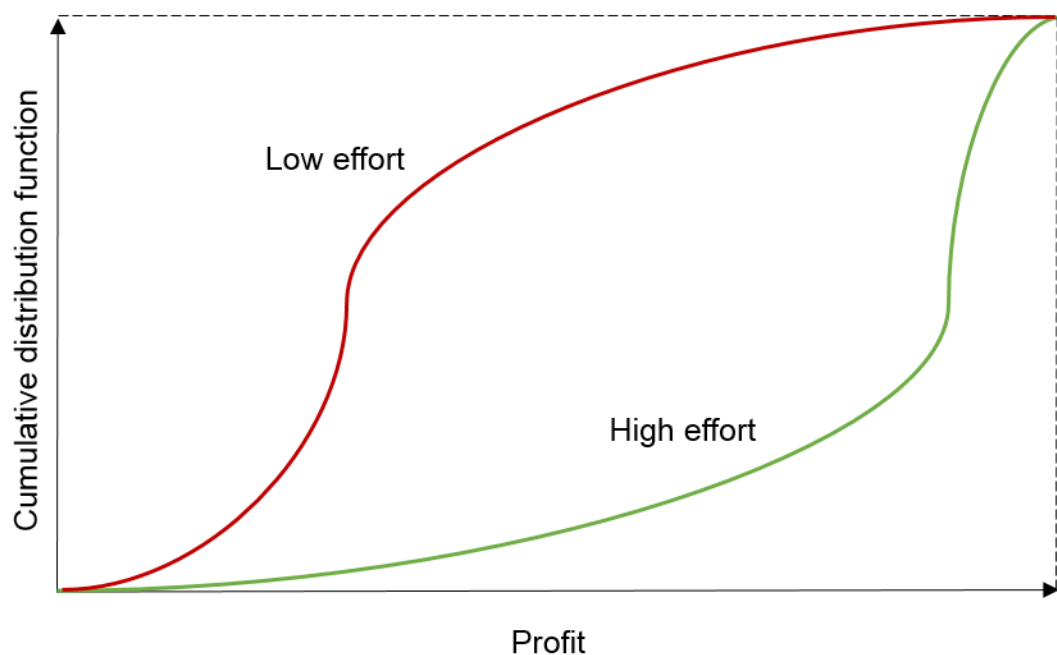
2 Essential features of the pay-performance-sensitivity

money for the intended purpose. He may even take the money for realizing much riskier projects (for which the bank actually would have demanded higher interests). The same problem occurs for the owners and managers of a company – the owner offers resources to the manager, but he cannot see how the manager applies these resources (Collard-Wexler, 2012; Arrow, 1984).

The Hidden Action / Hidden Effort problematic is enhanced by an exogenous risk. The outcome, recognizable for the principal, might be poor although the agent did his best. Even though the principal might be aware of the probability distribution of this exogenous risk, he might not be able to recognize if this exogenous risk was at fault for the poor performance / outcome. Simply put, the principal generally cannot decide between low effort and bad luck – and vice versa (Picot, 1991; Spremann, 1987).

The cumulative distribution function (CDF) of this problem could look like the following:

Figure 4: Cumulative distribution function



(Own illustration; based on Collard-Wexler, 2011)⁹

⁹ Please note: the source illustration was not taken one to one, as there is a mistake within the source figure. In the source figure, the ordinate is named "Density" which is not correct. The cumulative density function is the right caption of the y-axis.

Figure 4 illustrates that with higher effort by the agent, higher profits become more likely (the slope of the “high-effort-distribution-function” increases on the right side). On the other hand the “low-effort-distribution-function” implies that lower effort seems to translate to lower profits (the slope rises at the beginning and then stays more or less constant). External factors that the agent cannot influence might now lead to low profits despite the application of high effort. Even though the probability for this case is low, the principal might not recognize this issue and hence unjustifiably receives a bad impression of the agent.

According to the standard model the principal cannot observe the agent’s action. This does not necessarily mean that the action is not observable at all. For example, the principal can set up a monitoring system that validates the agent’s action, in order to constrain behavior that is not favorable for him. Of course such a monitoring is costly (Jensen / Meckling, 1976). One approach to implement such a monitoring is to use other agents to monitor the agent’s actions. The idea behind that is that monitoring for the principal might be costly whereas monitoring for other agents might be cheap. The rewards the police (principal) sets up for citizens (agents) who help identifying and solving a crime (committed by another agent) are an everyday life example of such a monitoring system. Instead of employing many new policemen (principals), which would be very costly and probably not affordable by the authorities, a reward is set up in order to induce the citizens (agents) to “keep their eyes open” and help finding the criminal. Working committees are an example of such a monitoring in corporate life (Varian, 1990).

The Hidden Characteristic is also a problem for the principal. On the market for talents, the principal has the possibility to hire agents who distinguish themselves with regard to their characteristics (Spremann, 1987). For example, one agent might be more risk-averse than another agent. According to theory, a more risk-averse agent is expected to be hired by a company which is active on a less volatile market. Agents – especially executives – may also differ concerning their managing and leadership style (e.g. democratic leader, autocratic leader, laissez faire leader). An autocratic leader is expected to be employed by a company that supports such a leadership form (Warrick, 1981). The problem for the principal (the company hiring the agent) is that he does not know about the agents’ characteristics ex-ante, at the time of contracting. It is therefore quite hard for him to

make an appropriate offer to the agent without knowing his specific characteristics and preferences (Cabarless / Charness, 2010; Picot, 1991; Spremann, 1987).

The implementation of sorting devices or screening tools is a possible solution for this problem. Such devices or tools disclose the characteristics of the agents at least to some extent. A payment scheme that leads to a “self-selection” through the agents can be an example for such a tool. If a company (principal) wants to attract an executive (agent) that is less risk-averse, it could offer a payment scheme with a high variable share (depending e.g. on the profit, EVA or some other performance measure) and only a small fraction of fixed salary. As a result, a more risk-averse agent would probably not want to join the company (if he has other offers that are more attractive to him). The company revealed the Hidden Characteristic (high risk-aversion) of the agent and could “sort him out” in the recruiting process (Spremann, 1987). The topic risk-aversion and self-selection / sorting will be handled in more detail within chapter 4 of this thesis.

Hidden Information is the third problem causing agency costs in a classic principal-agent-relationship. Similar to the Hidden Action problem, Hidden Information occurs ex-post, i.e. after the contracting took place. In contrast to the Hidden Action, where the action / effort of the agent cannot be observed by the principal, the Hidden Information describes a situation, in which the principal can watch the agent’s action. However, he cannot evaluate the quality of the action due to a lack of knowledge, expertise or experience (Picot, 1991).

The doctor and patient relationship is an everyday life situation of Hidden Information. The doctor (agent) chooses an action that results in the healing of the patient (principal) or not. The outcome and the action is perfectly recognizable for the patient (principal). He either gets healed or not (outcome) by the treatment (action). Assuming the patient is not a doctor himself, he cannot assess, why the doctor has chosen a specific form of treatment and whether the treatment was right or wrong. The doctor on the other hand knows exactly why he has chosen a certain treatment for the patient by combining his knowledge, experience and the patient’s symptoms. This combination is equal to a certain “information-advantage” that only the doctor has. For an unexperienced patient it is almost impossible to discern if the treatment was adequate or not (Arrow, 1984).

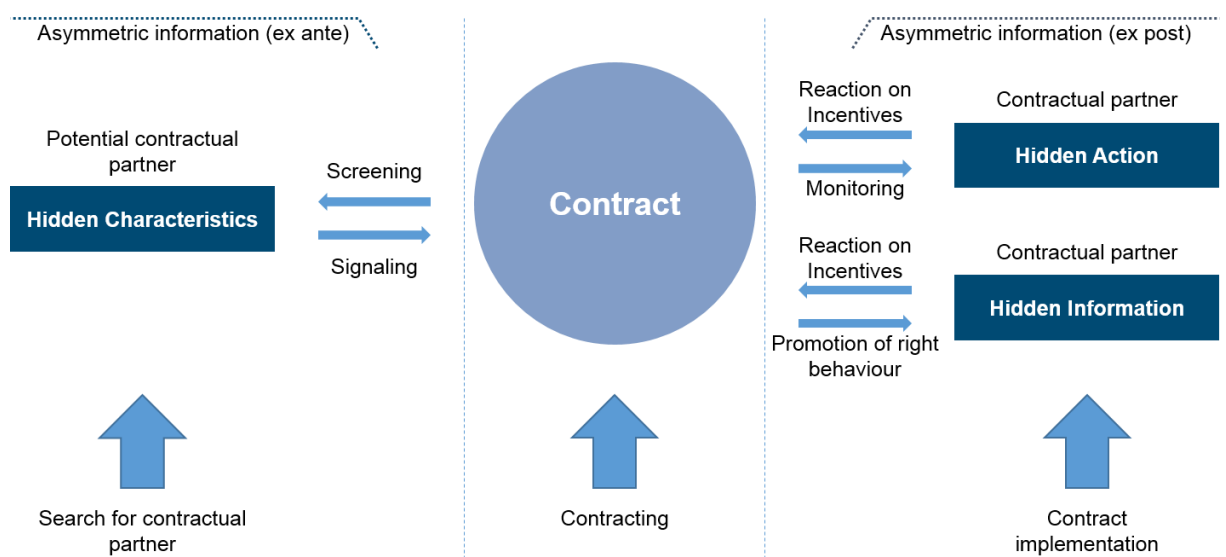
2 Essential features of the pay-performance-sensitivity

The Hidden Information problematic entails the danger of want of care by the agent. Through his expertise and knowledge advantage he could “claim” to have implemented an action that was right even if it was not, as the principal cannot prove it right or wrong. As the agent is generally averse of work it would make sense to lie about the implementation of an action as long as it does not affect his personal wealth. This Hidden Information problem can be reduced, e.g. by tying the compensation to the general company performance, or by compensating the agent with an additional risk premium. The general image of the agent additionally diminishes the risk of want of care. Imagine an executive who implemented wrong actions as he did not want to make the efforts for the right ones. As a result the company he led got into big trouble. After his tenure, his reputation might be harmed in such a way that no other company wants to hire him. Such an approach cannot be in the sense of any executive (Picot, 1991).

In practice, the mentioned problem types may overlap. In corporate life, the principal-agent-relationship is applicable specifically within the areas of company funding and the creation of incentive as well as information and communication systems (ibid.). As the principal-agent-theory is the basis for today's incentive schemes, its understanding is mandatory for the analysis of the pay-performance-sensitivity.

Figure 5 illustrates and summarizes the mentioned problematics.

Figure 5: Overview asymmetric information problematics



(Own illustration; based on Bhagwati, 2011)

2.2 The LEN-model

2.2.1 Derivation of the fundamentals and modeling of the previous insights

There are different models that describe the principal-agent-relationship in theory. An often used and cited model is the Linear-Exponential-Normal-model (further named LEN-model) that is also used in the further elaboration (Holmstrom / Milgrom, 1987; Spremann, 1987).

Before applying the model, the previous perceptions are shortly summarized in a mathematical and general manner, based on Spremann 1987. This shall enable a better and easier understanding of the LEN-model.

As mentioned in chapter 2.1, the principal's outcome is dependent on the agent's effort – a – which the principal cannot observe and an exogenous risk factor (sometimes also called “uncontrollable noise”) which stands for the existing information asymmetry or other events not controllable by the agent or principal. The risk factor is further denoted as ε . The principal's gross wealth, respectively the output, can be written as a function of a and ε and is further denoted as x .

$$(1) \quad x = f(a, \varepsilon)$$

The agent receives a payment ω which is contingent on the realized output, after accepting a certain payment scheme offered by the principal. Simultaneously, the agent has a disutility for taking the action, which is further denoted as $d(a)$. The “net wealth” of the agent can hence be viewed as:

$$(2) \quad Y(a, \omega) = \omega(f(a, \varepsilon)) - d(a)$$

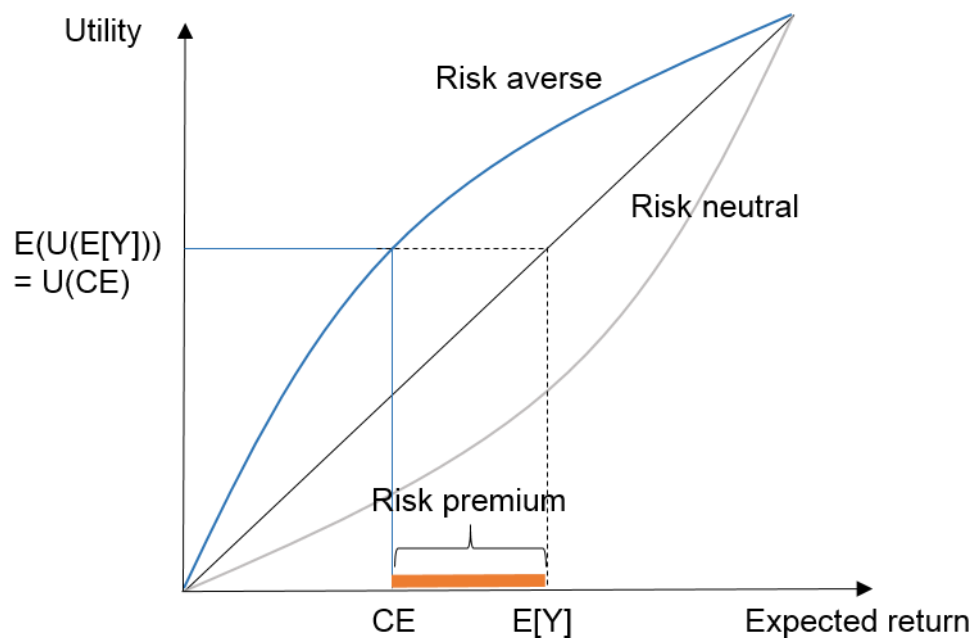
When deciding which action to implement, the return of the principal x as well as the wealth of the agent Y are unknown and risky. In order to express a “safe” wealth or cash equivalent that the agent rather accepts in advance than sharing the result following his actions and receiving the wealth of this case (expressed as $E[Y]$), the certainty equivalent (CE) is used (Pratt, 1964). In this thesis, the CE is denoted as:

$$(3) \quad U(a, \omega) = u^{-1}(E[u(Y)])$$

In this context, u represents the Neumann-Morgenstern utility function of the agent. The agent is assumed to be risk-averse, which means that the Neumann-Morgenstern utility function of the agent is concave. As a result, the agent's CE $U(a, \omega)$ is below the actual value of wealth that he could expect when taking the risk of receiving a payment depending on the outcome ($E[Y]$). The difference between $E[Y]$ and the CE is called the risk premium (Spremann, 1987).

Figure 6 illustrates this circumstance.

Figure 6: Certainty equivalent and risk premium



(Own illustration)

A safe lower payment (the CE) has the same utility (U) as an expected higher unsafe payment for a risk-averse agent (the risk premium is marked orange). The opposite would be the case for a risk-affine agent (hinted in grey). Due to this risk-aversion, the principal has to pay an additional risk premium within his payment scheme in order to “make” the agent take certain actions in a risky environment.

The agent will implement the action which yields the maximum wealth for him under the payment scheme offered by the principal. However, the agent will only participate in the contract if the wealth he receives at least equals a certain reservation value $\bar{U}$. This means he will only participate if the value (e.g. money) he

receives is worth more than participating in another contract (e.g. working for another company) or doing nothing (than the reservation value would be zero).

$$(4) \quad \max_a \{U(a, \omega) \mid a \in A\} \geq \bar{U}$$

This inequality is called the participation constraint (PC I).

As soon as the principal could “convince” the agent to take part in the contract and to implement the action, a result of the action is recognizable for the principal and the agent. Now, as the principal knows this result, the actual payment ω can be made.

The principal’s net wealth consists of his gross wealth x , subtracted by the payment made to the agent (ω). His welfare, depending on the agent’s effort a and expressed as a certainty equivalent can be viewed as

$$(5) \quad V(a, \omega) = v^{-1}(E[v(x - \omega)]).$$

The parameter v stands for the principal’s Neumann-Morgenstern utility function. An underlying assumption of this model is that the principal knows certain characteristics of the agent, meaning his utility function, his disutility $d(a)$, the pool of action from which the agent can choose and his reservation value $\bar{U}$.¹⁰

With this information the principal can anticipate how the agent will react on certain reward schemes $\omega \in W$ and which action the agent will implement depending on the reward scheme ($a = \hat{a}(\omega)$). As a result, the principal’s welfare maximization looks as the following:

$$(6) \quad \max\{V(\hat{a}(\omega), \omega) \mid \omega \in W\}$$

subject to the PC I which can be rewritten as $U(\hat{a}(\omega), \omega) \geq \bar{U}$.

To summarize, the principal selects from all payment schemes that guarantee the agent a value equal or higher than the reservation value exactly that payment scheme which maximizes his own wealth.

¹⁰ Please note: the fact that the principal knows about the characteristics of the agent does not mean that he can observe them. The information asymmetry still holds true. It is rather induced that by using a certain payment scheme, the principal predicts that the agent will act in a certain manner. The agent on the other hand will implement exactly that action predicted by the principal and induced by the payment scheme (Spremann, 1987).

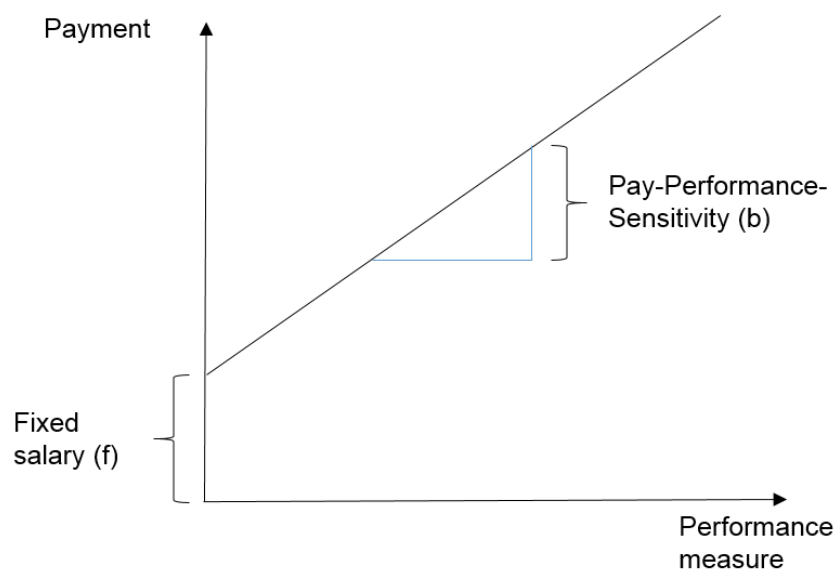
2.2.2 A simple one-period LEN-model

The previously described hidden-effort situation cannot be solved without the specification of some variables. The specifications taken give the LEN-model its name, since:

1. The output x is a linear function of risk ε . The agent's payment scheme is a function of the output. In this model it has the form $\omega = f + b * x$, where f is a fixed salary and b is a bonus-coefficient or share that depends on a certain performance measure (in this model the output x) (Holmstrom / Milgrom, 1987; Spremann, 1987). The letter b can be related to the pay-performance-sensitivity (Murphy, 1990). **(L)**

Figure 7 shows this graphically.

Figure 7: Pay-performance-sensitivity



(Own illustration)

2. The agent's utility function (u) is negative exponential and is written as

$$(7) \quad U(\omega, a) = -e^{(-\alpha(\omega - d(a)))}.$$

The parameter α stands for the risk-aversion of the agent (he is constantly risk-averse, that means $\alpha > 0$). Furthermore, it is assumed that the disutility of the agent is $d(a) = \frac{1}{2} a^2$ (Holmstrom / Milgrom, 1987; Spremann, 1987). **(E)**

3. The risk ε is normally distributed with an expected value of 0 ($\varepsilon \sim N(0, \sigma^2)$) (Spremann, 1987). **(N)**

As the risk is normally distributed and the output is a linear function of the risk, it is implied that both, the agent's and the principal's wealth are also normally distributed. Furthermore, as the utility function of the agent is negative and exponential and the agent is risk-averse, the certainty equivalents of the agent and the principal ((3) and (5)) can be rewritten. They are expressed as the expected value subtracted by half the variance times risk-aversion and the disutility of the agent (Bamberg / Spremann, 1981).

Hence, the rewritten CE of the agent looks as the following:

$$(8) \quad CE(\omega, a) = E[\omega] - \frac{1}{2}a^2 - \frac{\alpha}{2}Var[\omega]$$

The term $\frac{\alpha}{2}Var[\omega]$ stands for the risk premium that the individual agent demands, e.g. for taking a job. The risk-neutral principal aims at implementing a payment scheme which maximizes his expected utility. In the LEN-model, this can be written as:

$$(9) \quad \max_{\omega} \{E[x - \omega]\}$$

Thereby he has to consider the participation constraint (general form see (6)) that in this model assumes the form of:

$$(10) \quad E[\omega] - \frac{1}{2}a^2 - \frac{\alpha}{2}Var[\omega] \geq \bar{U} \quad (\text{PC II})$$

Furthermore, the principle has to take into account that the agent also aims at maximizing his utility. He therefore has to set the right incentives for the agent with the payment scheme. The maximization of the agent's utility function is called the incentive constraint (IC) (Holmstrom / Milgrom, 1987; Spremann, 1987). In this LEN-model the IC is written as:

$$(11) \quad \max_a \{E[\omega] - \frac{1}{2}a^2 - \frac{\alpha}{2}Var[\omega] \mid a \in A\} \quad (\text{IC})$$

Solving this problem set leads to the following optimal effort level (a) of the agent:

$$(12) \quad a = b$$

The optimal bonus coefficient is calculated as:

$$(13) \quad b = \frac{1}{1+\alpha\sigma^2} \text{ and hence } a = \frac{1}{1+\alpha\sigma^2}$$

Simultaneously, the principal's welfare sums up to:

$$(14) \quad V = \frac{1}{2} \left(\frac{1}{1+\alpha\sigma^2} \right) - \bar{U}$$

2.2.3 Interpretation of the LEN-model

The agent's bonus-coefficient and his effort (see equation (13)) depend both on the agent's personal risk-aversion parameter as well as on the exogenous risk (α and σ^2). An increase of one or both of these parameters results in a decrease of the agent's share as well as of his optimal effort. The decrease of b can be explained in such a way that the principal will decrease the bonus-coefficient and thereby the total payment of a more risk-averse agent, as such an agent will automatically ask for a higher risk-premium $\frac{\alpha}{2} Var[\omega]$. By reducing b the principal "offsets" the increase in the demanded risk premium. Changes in the volatility of the performance measure that is used (e.g. firm performance) have similar inverse effects (Spremann, 1987).

In this simple model, the theoretical approach in setting executive compensation seems to be clear. Furthermore, the model obviously states when and how to make use of bonus payments and how different factors influence the extent to which such bonus payments should be used. Hence, it seems clear how intensively pay should be tied to performance. However, the actual development of CEO compensation and empirical findings on that development give rise to doubt that theory can perfectly be put into practice.

3 Overviews of the development of CEO compensation

3.1 A constant start

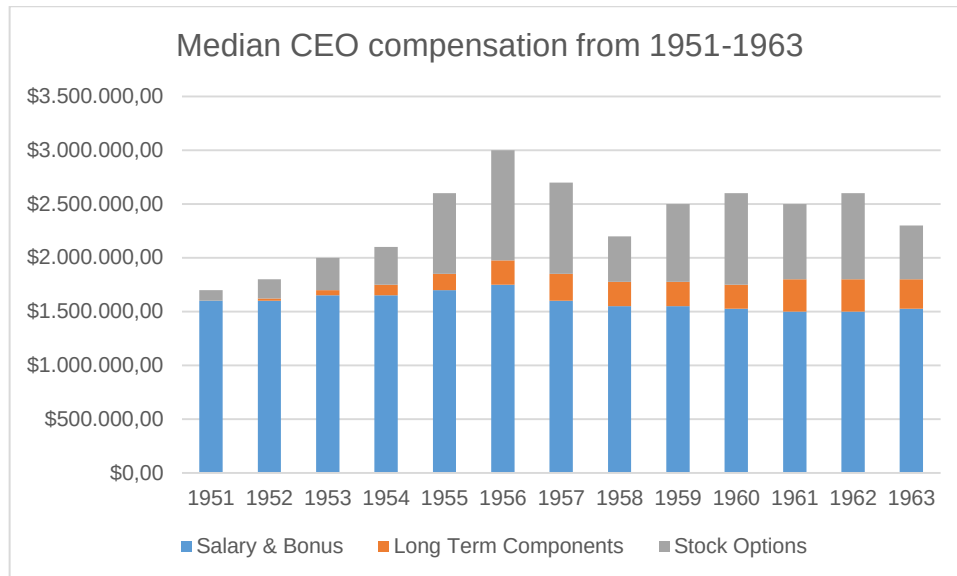
The actual payments made by the companies to the CEOs changed in their amount and composition. For this thesis, the 1950s constitute the starting point of modern executive compensation as the first “advanced” compensation packages with stock options or other long-term incentives occurred. Additionally, the first valid data on executive compensation was gathered by this time.

The short-term components of pay (salary and bonuses), which largely represented the entire compensation of CEOs before 1950, were expanded by some additional components in the 1950s. These advanced compensation packages now also contained incentives related to the multi-year performance of the company and the CEO. They were paid over several years either in cash or stock. However, the stock options did not play an important role at this time as at the beginning of the 1990s. Stock options are highlighted separately from other long-term components of pay in the figures of this paper, due to their important role within the development of executive compensation (Frydman / Jenter, 2010; Geiler / Renneboog, 2010).

Figure 8 reveals the CEO compensation levels from 1950 to 1963. The numbers are based on Lewellen (1968) and show the trends in before-tax CEO compensation in 50 large manufacturing companies. The median CEO compensation, adjusted to 2011 dollars, is depicted. What characteristically stands out is that the short-term components of pay largely stay constant. The recognized increase mainly results from a rise in long-term performance payments and the granting of stock options (Murphy, 2012).

3 Overviews of the development of CEO compensation

Figure 8: Median CEO compensation in 50 large manufacturing companies from 1951 – 1963



(Own illustration; based on Lewellen, 1968; Murphy, 2012, p. 50)

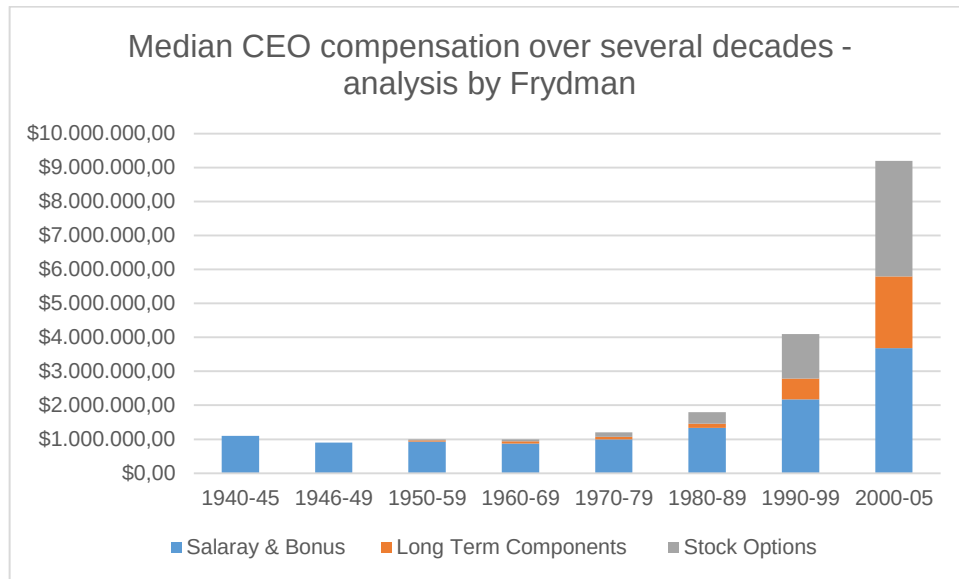
All in all, the beginning of executive compensation as we know it today started with a more or less constant level of compensation.

Figure 8 shows the CEO compensation of large manufacturing companies at that time. Additional data has to be taken into account in order to control if this development is representative and meaningful for the whole development at that time.

Frydman / Jenter (2010) focus on the largest 50 companies of the U.S. in general. They also conclude that in the early years, a constant level in executive compensation prevailed. Stock option plans considerably were applied as recently as in the early 1980s / 1990s. Moreover, the analysis by Frydman / Jenter (2010) detected a much lower compensation level compared to Lewellen (1968) and Murphy (2012) (Frydman / Jenter, 2010; Murphy, 2012).

Figure 9 highlights the analysis by Frydman and Jenter.

Figure 9: Median CEO compensation over several decades



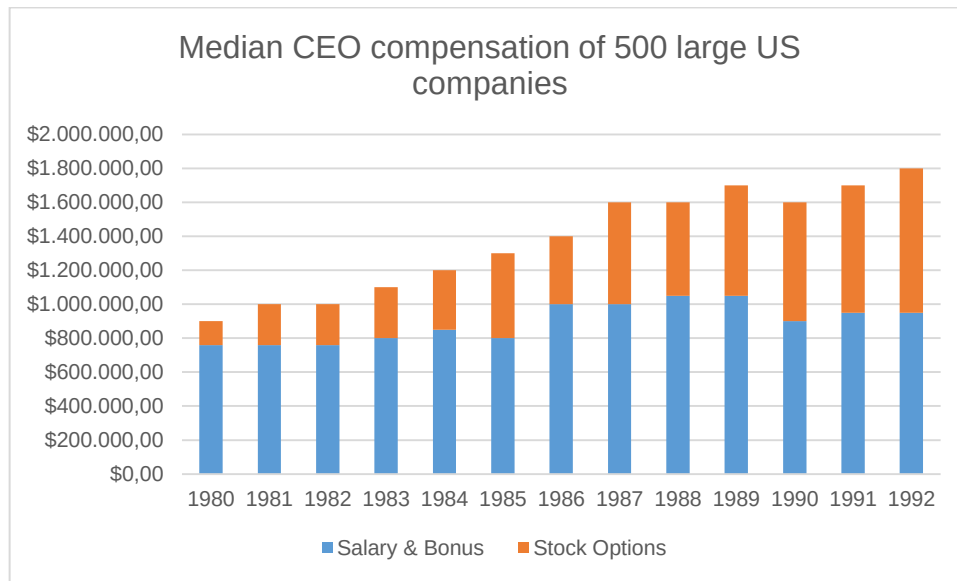
(Own illustration; based on Frydman / Jenter, 2010, p. 38)

3.2 The explosion of executive compensation

Executive compensation reported a rapid growth from the 1980s onwards. The short-term pay components only increased to a small extent. On the other hand, the long-term components – largely consisting of stock options – rose more intense. See Figure 9 and Figure 10 for illustrations. Figure 10 shows the median compensation for CEOs in approximately 500 large U.S. companies from 1980 to 1992. The figure is based on data of Hall / Liebmann (1998) and adjusted in the same way as the previous figures. Additionally, the stock option part is valued on grant-date with the Black and Scholes model.

3 Overviews of the development of CEO compensation

Figure 10: Median CEO compensation of 500 large U.S. companies from 1980 – 1992



(Own illustration; based on Hall / Liebmann (1998), p. 41 ff.; Murphy, 2012, p. 70)

Figure 10 depicts a steady growth in compensation, largely due to a rise in stock options. Frydman / Jenter (2010) find a similar median compensation level at that time for the 50 biggest companies (see Figure 9).

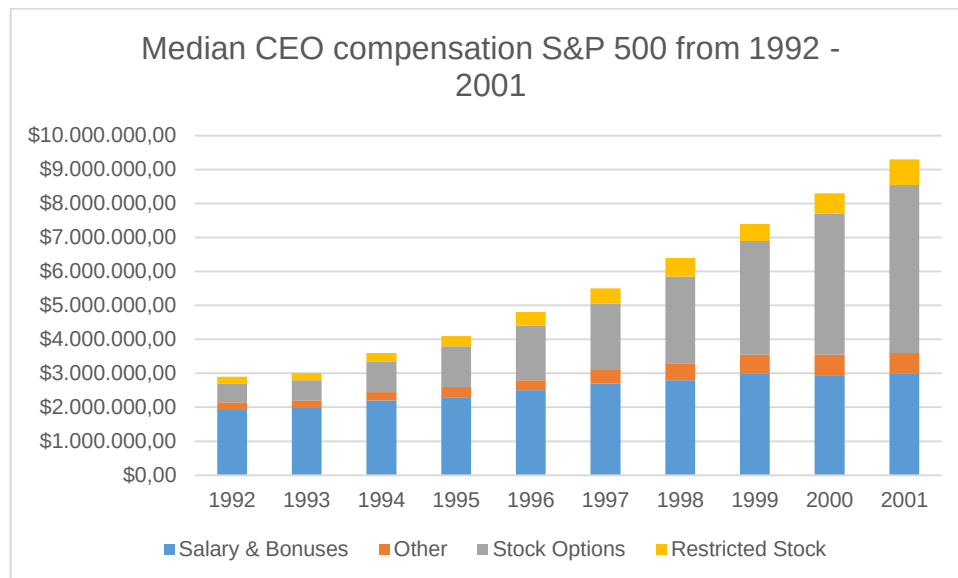
Some scientists ascribe the increased use of stock options as “shareholder awakening”. According to them, the increase in the amount of shareholders in the 1980s resulted in a claim for managers who are paid according to their contribution to the company in the long run (meaning their contribution to the value-creation). So far most payment scheme rewarded managers for reaching short-term accounting goals. As a result, the demand for a compensation dependent on stock options became louder. Such stock options were said to “guide” the managers into the right directions (Murphy, 2012).

The stock option trend continued during the 1990s, as visible in Figure 11 (adapted in the same way as Figure 10). The median CEO compensation of the S&P 500 companies from 1992 to 2001 are displayed. The increase was largely driven by the rise in pure stock options, whereas the appearance of restricted stock¹¹ made up only a small part of the growth (ibid.).

¹¹ Stock options enable employees to buy a quantity of shares after a certain vesting period at a specified price fixed at a grant date. Restricted stocks entitle employees to buy shares of the company as soon as predefined restrictions (e.g. a certain tenure or a performance goal) are met (Grünberger, 2014; National Center for Employee Ownership (NCEO), 2016a).

3 Overviews of the development of CEO compensation

Figure 11: Median CEO compensation S&P 500 from 1992 – 2001



(Own illustration; based on Murphy, 2012, p. 73)

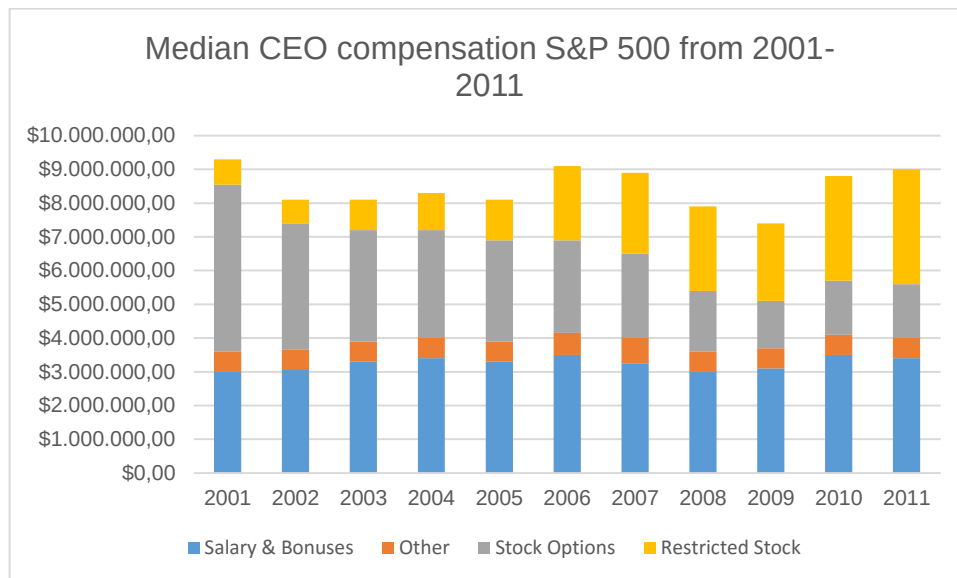
Until 2001 the remuneration of CEOs more than tripled – from \$2.9 million in 1992 to \$9.3 million in 2001. Pure stock options became the largest single component of the CEO rewards in 1996¹² and represented more than 50 percent of the entire remuneration by the year 2000 (Frydman / Jenter, 2010; Murphy, 2012).

The trend of stock-option based payment was – for the most part – not dependent on industry or firm-size. Companies of the Financial Services industry as well as Mining and Manufacturing companies recorded a rapid growth of option-based rewards during 1992 and 1996. The same development was also recognizable for other industries. There was also no considerable difference between the shares of option-based payment used for large, small- and mid-cap industrials (Murphy, 1998).

After its rapid growth in the 1990s, CEO compensation leveled off at a more or less constant niveau. Figure 12 reveals the median grant-date compensation for CEOs of S&P 500 companies from 2001 to 2011. Again, the numbers are adjusted to 2011 dollars. Stock options were valued on grant-date using either company fair-market values if obtainable, or otherwise the Black-Scholes model modified by ExecuComp (Murphy, 2012).

¹² As Salary & Bonuses are merged together in Figure 12 this may not become visible.

Figure 12: Median CEO compensation of the S&P 500 from 2001 – 2011



(Own illustration; based on Murphy, 2012, p. 97)

After reaching the climax in 2001, median CEO rewards dropped harshly the subsequent years. In 2006 and 2007, compensation almost reached its level of 2001 before decreasing again in 2008 and 2009 – probably due to the financial crisis. As the economy recovered from this shock, the CEO remuneration rose anew in 2010 and 2011 (Murphy, 2012).

3.3 The development of executive compensation and pay-performance-sensitivity during the financial crisis

The historical development of CEO compensation with its tremendous increase, specifically during the 1990s, always ignited fiercely led debates in the public (Vemala et al., 2014). Particularly during and after the financial crisis of the years 2007 – 2010 the media and public directed their attention to the CEO compensation even more intense. Executive compensation policies incentivized many executives of (specifically) financial institutions to take excessive risks. Hence, those policies were and are seen as one major driver that caused the financial crisis. This excessive risk-taking prevailed executives to make comprehensive and externally financed bets on the housing market. The bonuses the executives would have received if these bets proved to be successful were very large. As known today, these dangerous bets were the starting point of the financial crisis

that lead onto the worldwide economic crisis of the past years (Balachandran et al., 2010; Larcker et al., 2014).

During the financial and economic crisis many people lost their jobs as most of the companies were not performing well. The general public also expected the CEO compensation to decrease as at least some parts of an executive's remuneration are said to be dependent on firm performance (see chapter 2). Furthermore, due to the previously described large amount of stock options as part of the remuneration, compensation was expected to plummet as the stock market also recorded a tremendous downfall (Vemala et al., 2014).

However, the general public perception during the crisis was that CEOs still earn a huge amount and that there was no pay-for-performance (Bernstein, 2009; Schwartz, 2011; Die Welt, 2011).

This appraisal was strengthened by the study of Vemala et al. (2014). They analyze the 2004 to 2012 executive pay of the Fortune 500 companies that were listed in the rank in all of the sample-years. Among other influencing factors like board size, firm size or CEO duality¹³ they take a closer look at the influence of the financial crisis on executive compensation (Vemala et al., 2014).

Vemala et al. (2014) identify a statistically relevant proof that CEO compensation went up during the financial and economic crisis and shortly after it. This contradicts the theory, which implies a decreasing total compensation when company performance goes down. An interesting fact is that pure cash compensation was negatively affected by the financial crisis. Post-crisis, the cash compensation subsided by approximately 40 percent, whereas the long-term incentive and compensation packages (stock / stock options) recognized a sharp increase (ibid.).

This can be interpreted in such a way that companies reacted on the crisis and tried to link compensation even more to long-term instead of short-term performance. The question is, if this may enable a kind of "vicious circle" as specifically the long-term incentives used (mostly stock options) encouraged the CEOs to take excessive risks. This results from the fact that the value of an option in-

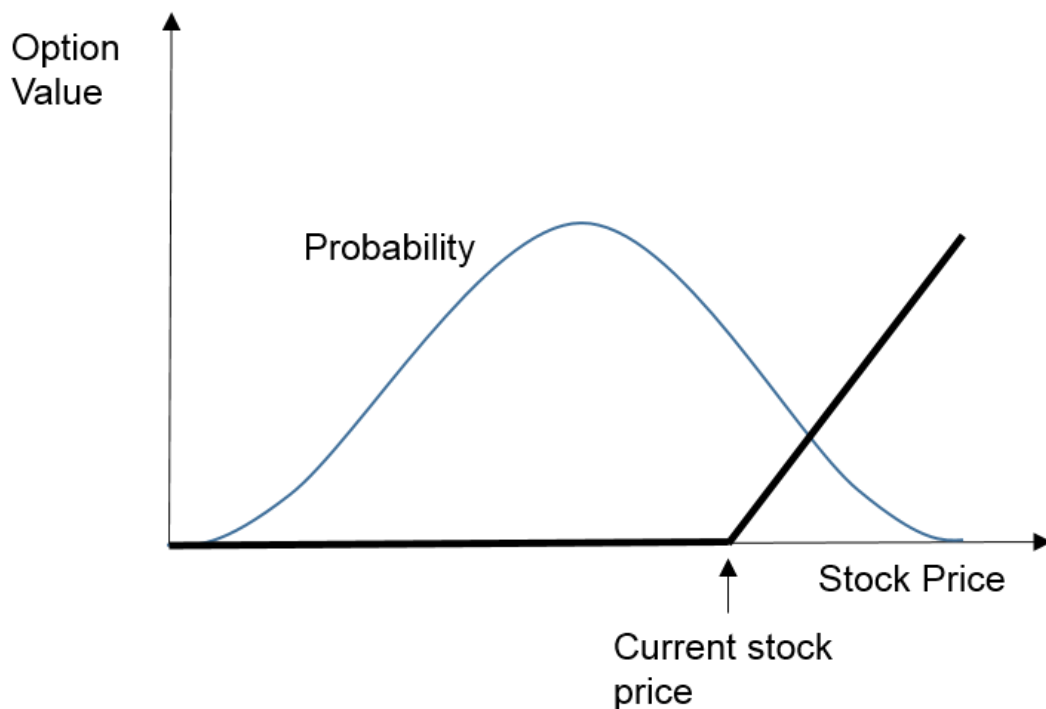
¹³ CEO duality means that the CEO of a company is simultaneously the Chairman of the board, which in a certain way determines the CEO compensation (Vemala et al., 2014).

3 Overviews of the development of CEO compensation

creases simultaneously to the stock price when the stock price is above the exercise price of the option (the option is “in the money”). The value of the option is not affected when the stock price is below the exercise price (the option is “out of the money”). Hence, an executive benefits indefinitely from a stock price that surpasses the exercise price but is protected against any loss when the stock price is below exercise price (Larcker et al., 2014).

Figure 13 illustrates this circumstance.

Figure 13: Incentives by stock options



(Own illustration)

This leads executives to tend to dare riskier projects. If a project fails and affects the stock price in a negative way, the worst thing that can happen is that the option has no value. A “negative” value, where the executive has to “pay for losses”, cannot occur. If the risky project is successful and the stock price is probably affected positively, the option increases in value and the executive benefits from it (ibid.).

Coming back to the study of Vemala et al. (2014) another striking result is that a significantly positive relation between pay and performance was recognizable for the entire sample period from 2004 to 2012. This surprises, since pay did not

seem to have been tied to performance during the financial and economic crisis (Vemala et al., 2014).

Besides the Vemala et al. (2014) study, there are only few other studies that cover the development of CEO compensation during and after the financial and economic crisis of 2007 to 2009. One of it is Gabaix et al. (2013) who regress the CEO compensation with different proxies for company size (firm value, earnings before interest and taxes (EBIT), sales and equity value). In a broader sense, all of these proxies can be seen as a certain measure of performance. They analyze the years 1992 to 2011 and use data of every year's top 1000 largest U.S. firms for which they can find relevant data for firm size in Compustat and data for CEO compensation in the ExecuComp data base (Gabaix et al., 2013).

The results of the study differ from those of the Vemala et al. (2014) study. CEO compensation reports a drop of 28 percent during 2007 to 2009, while firm value (one of the proxies for firm size / performance) decreases by 17 percent. From 2009 to 2011 remuneration records a growth of 22 percent and firm value increases by 19 percent. This implies that there is a significant relation between pay and performance (ibid.).

The example of the executive compensation development and the firm performance during the financial and economic crisis and the different results of the studies trying to analyze and address the pay-performance-sensitivity during that time show that the entire topic is highly complex. Results depend on different assumptions made, samples used, time periods considered or proxies applied. Hence, the following chapter gives a thorough overview over the existing studies on pay-performance-sensitivity, trying to shed light on the different results of the studies, from the early stages on until today. Besides studies that find a strong relation between pay and performance, also studies which cannot recognize a significant relation are analyzed. In addition, studies that only to a small extent find a relation (studies that are "stuck in the middle") are examined. Moreover, the special issue of risk-aversion and sorting / self-selection is highlighted.

4 Empirical findings on pay-performance-sensitivity and the principal-agent-theory

4.1 Empirical findings not supporting the incentive intensity principle

4.1.1 Early studies (until 1990)

Lawler (1971) offers a good review on the first empirical studies on pay and performance. The overview contains studies of Lawler (1964), Svetlik et al. (1964), Porter / Lawler (1966), Brenner / Lockwood (1965) and Haire et al. (1967). The studies analyze different approaches towards pay-for-performance, e.g. how a superior's evaluation influences the level of pay, or if year-to-year changes in pay might be explained through changes in the performance of the executives. All studies conclude that pay obviously is not tied to performance (Lawler, 1971).

Baker et al. (1988) analyze the pay-performance-sensitivity on a non-CEO level and find similar results confirming a pay without performance. In the course of their work they examine data of Medoff / Abraham (1980) who questioned two large manufacturing companies concerning the pay and performance of 7,629 managers (Baker et al., 1988). Even though this study falls out of the alignment, the results shall be highlighted shortly in order to demonstrate that a missing pay-for-performance is not necessarily an issue of top managers and CEOs.

The companies were asked to rate their managers according to their performance and to give information on compensation. Baker et al. (1988) analyze these figures and show that a good or an outstanding performance is rewarded only minimally. The salary differences between the managers performing worst and the ones performing best accounted for 7.8 percent in company A and 6.2 percent in company B. Table 1 offers a detailed overview.

4 Empirical findings on pay-performance-sensitivity and the principal-agent-theory

Table 1: Salary differences of managers according to their performance

	Salary premium	Percent of sample
Company A	%	%
Not acceptable	-	0,20
Acceptable	1,40	5,30
Good	5,30	74,30
Outstanding	7,80	20,20
Company B		
Unacceptable	0,00	0,00
Minimum acceptable	0,00	0,00
Satisfactory	0,00	1,20
Good	1,80	36,60
Superior	3,60	58,40
Excellent	6,20	3,80

(Baker et al., 1988, p. 595)

Jensen / Murphy (1990a) published one of the first large and thorough studies concerning pay-performance-sensitivity. They cover a sample period from 1974 to 1986, bringing a final sample size of 1,688 CEOs from 1,049 corporations. Data was acquired from the Executive Compensation Surveys conducted by Forbes for compensation data, the Compustat data base and the Center for Research in Security Prices (CRSP) for companies' fiscal year information and information on stock returns. The study analyzes the pay-performance-sensitivity for different components of executive pay, namely the salary and bonus, salary revision, the holding of stock options, performance-related dismissals and the holding of normal stock (Jensen / Murphy, 1990a).

Jensen / Murphy (1990a) quantify the pay-performance-sensitivity for each previously mentioned components of pay in terms of how a CEO's wealth changes in dollar for every \$1000 change in firm value. Here, salary and bonus show the smallest effects. A \$1000 change in shareholder wealth increases current and next year's CEO salary and bonus only by two cents. The entire cash compensation changes with about 30 cents for a \$1000 change. With a 15 cents increase for every \$1000 change in shareholder wealth effects are also minimal concerning stock options. The performance related dismissal part – expressed as “the CEO's dismissal related wealth consequences of each \$1000 shareholder loss

4 Empirical findings on pay-performance-sensitivity and the principal-agent-theory

for an average-size firm with -50 percent net-of-market returns for two consecutive years" (Jensen / Murphy, 1990a, p. 46) is 30 cents, resulting in total 75 cents for pay and dismissal (Jensen / Murphy, 1990a).

According to Jensen / Murphy (1990a) pure stock holdings contribute the most to pay-for-performance. The pay-performance-sensitivity of 0.25 incentivizes CEOs most intense. A \$1000 change in shareholder wealth results in a \$2.50 change in CEO wealth. Together with the previous parts, the total pay-performance-sensitivity sums up to a \$3.25 change in CEO wealth for every \$1000 change in shareholder wealth (ibid.).

Even though showing a positive and statistically significant relation between the pay of top executives and the performance of their respective companies, the study concludes that the incentive effects of compensation packages (as they existed in the 1990s) are too small to play an important role. What strengthens the issue of missing pay-for-performance according to Jensen / Murphy (1990a) is the trend of decreasing stock-ownership of the CEOs. Over the sample period the median percentage of a CEOs stock ownership of the company fell constantly (ibid.).

In the same year, Jensen / Murphy released another study that covers a slightly bigger sample (1,400 companies) and sample period (1974 – 1988). Results are quite similar to that of the first study. Salary and bonus change by 6.7 cents for every \$1000 change in firm value (two cents in the other study). The overall change sums up to \$2.59 for a \$1000 change in corporate value (\$3.25 in the first study) (Jensen / Murphy, 1990b).

Similar to their first study they criticize the decreasing fractional CEO inside stock ownership over time. Compared to 1938, inside stock ownership fell by a factor of ten in 1988. This decline in inside stock ownership decreased the incentives for CEOs to act in favor of the shareholders (Jensen / Murphy, 1990b).

With the Jensen / Murphy studies in mind, the increase of executive compensation during the 1990s and early 2000s that was largely promoted by a rise in stock options (see chapter 3.2) surprises in a certain way. Contrary as one would expect the focus in incentivizing the CEOs did not lay on the granting of pure stocks.

4.1.2 Recent studies (1990 until today)

Based on the data of Jensen / Murphy (1990b), Garen (1994) analyzes how the pay-performance-sensitivity measured by Jensen / Murphy fits into the framework of the principal-agent-theory. For testing the sensitivities, he uses a model slightly different from the one of Holmstrom / Milgrom (1987). The predictions of the model concerning pay-performance-sensitivity are used and tested against the practical data (Garen, 1994).

Prima facie, many findings seem to be in line with the principal-agent-theory. For example, factors that go along with greater volatility of firm income decrease the pay-performance-sensitivity (theoretically predicted in equation (13) of this thesis). Furthermore, Garen's model predicts the covariance of the firm and market returns to influence CEO compensation as well. Anyhow, a statistically significant proof of Garen's predictions is not found with the help of the practical data (ibid.).

Ittner et al. (1997) also investigate the predictions of the principal-agent-theory concerning the exogenous noise. The theoretical model introduced at the beginning of this thesis suggests that pay-performance-sensitivity increases, when the noise (variance) of the performance measure decreases. Hence, assuming that there are two performance measures used¹⁴, a financial and a non-financial one, the one that should be weighted more should be the one which has a lower noise (variance). Ittner et al. (1997) test this prediction by analyzing whether more weight is put on the non-financial performance measure when the exogenous noise in the financial performance measure increases¹⁵ (Ittner et al., 1997).

As proxies for the exogenous noise they use the variability in the respective median industry returns five years prior to the date of the proxy statements. In addition, they use firm-level correlations between stock market and accounting returns (Ittner et al., 1997). Their regression analyses indeed seem to support the

¹⁴ The simple model introduced in chapter 2.2.2 only covered one performance measure. However, in practice, there is often more than one performance measure used for evaluating the CEO. By using more than one performance measure, it is tried to reduce the agent's risk premium. Analyzing the optimal weight and constellation of performance measures is beyond the scope of this paper. Here, I refer to the respective literature, e.g. Dikolli et al. (2009).

¹⁵ Ittner et al. (1997) did not analyze one fix financial or one fix non-financial performance measures. This means non-financial performance measures can for instance be customer satisfaction, process improvement or similar (Ittner et al., 1997).

predictions made by the theoretical models. Higher variances of accounting and market returns seem to go hand in hand with a lower weight put on the financial performance measure. However, similar to the results of Garen before, the findings are not statistically significant (Ittner et al., 1997).

An analysis leading in the same direction as Garen (1994) and Ittner et al. (1997) is that of Core / Guay (2002). Their study focuses on the impact of risk on executive compensation. They base their study on the analysis of Aggarwal and Samwick (1999) who find a strong negative relation between the dollar return variance of a firm (which they use as the only proxy for risk within their model) and the incentives for CEOs (Aggarwal / Samwick, 1999; Core / Guay, 2002). The findings of Aggarwal / Samwick (1999) are basically in line with the principle-agent theory (see equation (13) of this thesis – a higher variance σ^2 automatically leads to a smaller value of b).

Core / Guay (2002) show within their analysis, that the proxy for risk used by Aggarwal / Samwick (1999) only re-documents an already known size-effect (decreasing pay-performance-sensitivity with rising firm-size). For their analysis they further regard market value and risk separately and decoupled from each other. In such a model, a change in the dollar return variance (risk) is not negatively but positively related with incentives (Core / Guay, 2002). This clearly contradicts the simple LEN-model of chapter 2.2.2.

Bebchuk et al. (2002) and Bebchuk / Fried (2004) also reveal findings on the issue of remuneration. Bebchuk is considered to be a great supporter of the “managerial power approach” in explaining executive compensation. As this issue will be discussed extensively in chapter 5, only some basic findings of his studies shall be highlighted shortly at this point.

One analysis on executive compensation compares the aggregate compensation of the top-five executives of companies listed in the ExecuComp and the Compustat data base with a market cap larger than \$50 million dollar with the aggregate net income of the respective companies. Considered are three-year-periods for the time span from 1993 to 2003 (Bebchuk / Fried, 2004, 2005). Table 2 depicts this.

Table 2: Compensation to net income ratio

Period	Compensation to net income ratio (in %)
1993-1995	5,0
1994-1996	4,9
1995-1997	5,2
1996-1998	5,5
1997-1999	6,0
1998-2000	6,5
1999-2001	8,6
2000-2002	12,8
2001-2003	9,8

(Bebchuk / Fried, 2005, p. 10)

During the entire period, the average ratio is 6.6 percent. A steady increase over time can be identified, peaking in a ratio of 12.8 percent in the period of 2000 to 2002 (Bebchuk / Fried, 2004, 2005). What contradicts an existing pay-for-performance is that the ratio is highest at the turn of the millennium, in a period in which companies recognized heavy losses (or at least much worse results compared to the previous years). The burst of the Dotcom bubble and the terrorist attacks of 9/11 engulfed the American – and by that the world's – economy into a crisis and recession. Especially American companies suffered, went bankrupt or registered losses (Geier, 2015). Advocates of an existing link between pay and performance now argue that the ratio grew automatically as the net income (and by that the denominator of the ratio) was very small during this period. However, it is obvious that the compensation packages did not decrease to such an extent as the net income did. If they did, there would not have been an almost tripling between the ratios of the period 1993 to 1995 compared to that of 2000 to 2002. This short table is only a small evidence that there is a “pay without performance” – as Bebchuk and Fried conclude in their book (Bebchuk / Fried, 2004, 2005).

So far, most studies presented are based on US-data. One study covering Europe was conducted by Schmidt / Schwalbach (2007). They analyze the pay-performance-sensitivity of the companies listed in the Euro Stoxx50¹⁶ index for

¹⁶ The Euro Stoxx50 index contains the 50 largest publicly traded companies of the euro zone (Finanzen.net, 2016).

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the year 2005. More precisely, they examine the sensitivity of the per capita compensation of the board members with two different performance measures (Schmidt / Schwalbach, 2007).

The compensation data is based on the companies' proxy statements. In the course of the analysis, compensation is divided into per capita cash compensation, including fixed salary, variable bonus and other cash compensation (e.g. dismissal wage) and total per capita compensation, including also equity-based compensation such as stock options, stock appreciation rights¹⁷ and restricted stocks. The performance measures are divided into a fundamental excess return (return on equity after tax subtracted by cost of equity) and a stock market excess return (appreciation of stock value plus paid dividends minus cost of equity) (ibid.). Schmidt / Schwalbach (2007) regress each component and performance measure. The results can be found in Table 3.

Table 3: Correlation per capita compensation within the Euro Stoxx50 and excess returns in 2005

Performance measures	Per capita cash compensation	Per capita total compensation
Fundamental excess return	-0,103	-0,097
Stock market excess return	-0,064	0,027

(Schmidt / Schwalbach, 2007, p. 16)

The correlations do not show a positive and significant relation between pay and performance. For three of the four regressions a slightly negative correlation is detected. Only the per capita total compensation and the stock market excess return seem to be positively correlated. All in all, Schmidt / Schwalbach (2007) agree with Bebchuk / Fried (2005) that there is a "pay without performance" (Schmidt / Schwalbach, 2007).

¹⁷ Stock appreciation rights (SARs) are quite similar to stock options. When exercising SARs, an employee receives the gain that results from the difference between the basic course, the course at which the employee "virtually" can buy shares and the current price of the stock on the exercising day. The difference between SARs and stock options is that no stocks are transferred but only the payment is made (National Center for Employee Ownership (NCEO), 2016b).

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Rost / Osterloh (2009) contribute another study not favoring the classic theory of pay-performance-sensitivity. They conduct a large meta-data-analysis by analyzing 75 empirical studies covering 123,797 companies. The studies document 259 statistical correlations between company performance and CEO remuneration (Rost / Osterloh, 2009).

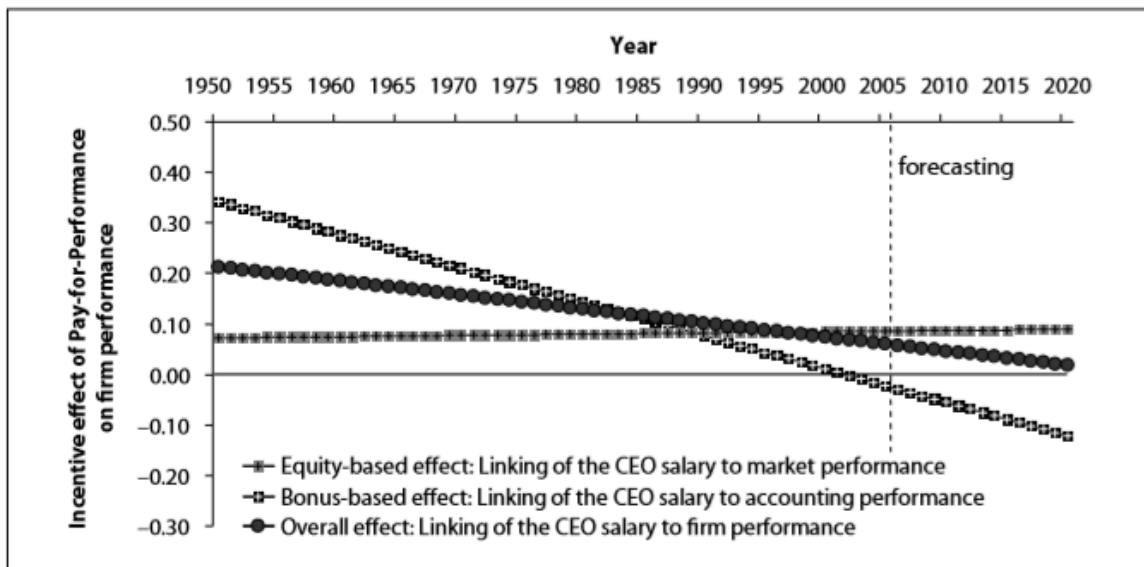
The work comprises of several different analyses on pay-performance-sensitivity. Concerning the type of incentive pay, they dissect between the effects of cash-based payments (e.g. bonus pay), equity-based payments (e.g. granting of stock or stock options) and both, cash- and equity-based payments on performance. Performance is measured in two dimensions. One dimension covers the “market-view” on firm performance. This performance is measured with the market-based value of the firm. The other dimension aims at accounting for an “internal” performance measure. Here, the accounting-based firm value is used as a performance measure (ibid.).

Their findings only report a weak and negligible amount of pay-performance-sensitivity for all of the payment forms and performance measures. Linking the CEO salary to accounting performance yields a pay-performance-sensitivity of 0.07. A link to market performance results only in a slightly higher relation of 0.08. To put it in the words of Jensen / Murphy, a \$1000 dollar change in the performance measure would result in a 70, respectively 80 cent increase in CEO wealth. Concerning the type of payment results are quite similar. A largely cash-based compensation package registers a pay-performance-sensitivity of 0.1. An equity-based package only even records a sensitivity of 0.04. This is surprising and contradicts the classic principal-agent-theory. Equity-based forms of payments are theoretically expected to ensure that CEOs strive to maximize returns or shareholder value. All in all, Rost / Osterloh (2009) quantify the overall pay-performance-sensitivity with 0.08. This depicts an insignificant value, even far below the one of Jensen / Murphy (1990a) who find a total sensitivity of 0.325 (Jensen / Murphy, 1990a; Rost / Osterloh, 2009).

Similar to other studies, Rost / Osterloh (2009) recognize a constantly decreasing total pay-performance-sensitivity over time. Their model predicts a further decline for the next years, as Figure 14 illustrates. The effect of bonus-based payments is even expected to be negative in the near future (Rost / Osterloh, 2009).

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Figure 14: Decreasing pay-performance-sensitivity over time



(Rost / Osterloh, 2009, p. 134)

Table 4 summarizes the most important facts of the presented studies.

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Table 4: Overview on studies not supporting the incentive intensity principle

Author(s)	Year	Performance measure used	Part of compensation package analyzed	Topic analyzed	Key-result
Baker et al.	1970	Individual performance evaluation by the company	Entire compensation package	Relation between individual performance and level of compensation	Only minimally higher wages for above-average performance
Jensen / Murphy	1990a	Shareholder wealth	Cash compensation / Stock options / Pure stock holding	Sensitivity of single compensation parts to changes in shareholder wealth	Only small sensitivities (largest sensitivity for pure stock holdings)
Jensen / Murphy	1990b	Shareholder wealth	Cash compensation / Stock options / Pure stock holding	Sensitivity of single compensation parts to changes in shareholder wealth	Only small sensitivities (largest sensitivity for pure stock holdings)
Garen	1994	Company income	Entire compensation package	Influence of factors increasing the volatility of the performance measure on the P-P-S	No statistically significant proof of Garen's theoretical model through the practical data
Ittner et al.	1997	Different financial or non-financial performance measures	-	Impact of exogenous noise on the weighting of performance measures	No statistically significant proof that less weight is put on the noisier performance measure
Core / Guay	2002	Company income	Variable part of compensation package	Impact of risk (dollar return variance of a firm) on executive compensation	Increase of the P-P-S with an increase of the risk (dollar return variance of a firm)
Bebchuk / Fried	2004 / 2005	Company net income	Entire compensation package	Development of compensation to net income ratio from 1993 to 2003	Steady increase of the ratio, peaking at a time in which companies recognized heavy losses
Schmidt / Schwalbach	2007	Fundamental excess return / Stock market excess return	Per capita cash compensation / per capita total compensation	Correlation of each performance measure with each per capita cash and total compensation	No significant positive correlation found. Even negative correlation examined for 3 of the 4 regressions conducted
Rost / Osterloh	2009	Market-based company value / Accounting-based company value	Cash based payments / Equity-based payments / Cash- and equity based payments	Sensitivity of single compensation parts to changes of the performance measures	Only very small sensitivities for all combinations. Even partly negative sensitivities predicted for the future

(Own illustration)

4.2 Empirical findings supporting the incentive intensity principle

4.2.1 Early studies (until 1990)

Lewellen / Huntsman (1970) analyze how variations in the performance measures book profits, equity market value and sales affect executive compensation. Their sample covers 50 companies of different sectors, drawn from the Fortune 500 and spanning the years 1942 to 1963 (Lewellen / Huntsman, 1970).

The work contains two regressions. The first one analyzes how changes in sales and profits affect executive compensation¹⁸. Here, a much stronger sensitivity is found regarding profits compared to sales. A similar regression is conducted with equity value and sales and again the sensitivity for sales is much lower compared to the other variable. Lewellen / Huntsman (1970) interpret these results as strong evidence that executives are paid for performances from which also shareholders benefit (ibid.).

Masson (1971) investigates which effects occur when executive compensation packages are tied more closely to stockholders' interests. He examines the top three to five executives of 39 companies in the electronics, aerospace and chemical business from 1947 to 1966 (Masson, 1971).

He finds a significant relation between an increasing stock value and positive financial rewards of executives. Furthermore, he finds that the financial interests of CEOs are more positively related to stock return than to sales changes or profit changes (ibid.). His detection that firms which tie financial rewards closer to stockholders' interests perform better in the stock market reports the strongest proof for a relation between pay and performance (ibid.). This result is in line with the agency-theory, according to which interests for the agent should be tied to firm performance in order to make the agent "act" in such a way that both, he and the principal (company / shareholder) benefit (see chapters 1 and 2 for more detail).

¹⁸ Compensation packages of this time largely consisted of a salary and bonus payment. Stock options or holdings were no significant part of payment schemes at that time (see chapter 3.1).

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Coughlan / Schmidt (1984) analyze 249 corporations from 1978 to 1980. Their study is based on surveys conducted by the Forbes magazine (information on compensation data) and stock price data from the CRSP. They reveal that in companies which are placed in a low percentile rank in stock return distribution (meaning in which the stock performance is bad), CEOs receive a negative percentage change in salary and bonus. Table 5 illustrates this circumstance. For example, when the company is placed in the first percentile of stock return distribution, salary and bonus of the CEO will decrease by 9.86 percent. When the company is placed in a high percentile rank in stock return distribution, the change in salary and bonus will be strongly positive. A company being placed in the top one percent in stock return distribution yields a salary and bonus increase of 10.17 percent for the executive (Coughlan / Schmidt, 1984).

Table 5: Dependence of salary + bonus from stock returns

Percentile rank	Percentage Change in Salary + Bonus
1%	-9.86
10	-3.96
20	-1.96
50	+1.20
80	+4.06
90	+5.54
99	+10.17

(Coughlan / Schmidt, 1984, p. 60)

Lambert / Larcker (1988) focus in their work specifically on how the two performance measures – Return on Equity (ROE, as a proxy for an accounting performance measure) and Security Market Return¹⁹ (RET, as a proxy for a market performance measure) – are implemented in compensation contracts. They conclude that companies put relatively more weight on market performance measures when the variance of the accounting performance measure is high compared to the variance of the market performance measure (Lambert / Larcker,

¹⁹ They defined the Security Market Return as the sum of a company's capital gains and dividends divided by the stock price (Lambert / Larcker, 1988).

1988). Remember from section 2.2.1 that the expected payment of the agent depends on his personal disutility, his reservation value and the demanded risk premium. The principal tries to minimize the payment he has to make to the agent. Hence, he also tries to minimize the risk premium that he has to pay the agent. The risk premium ($\frac{\alpha}{2} Var[p(\omega)]$) depends on the variance(s) of the payment and the risk-aversion of the agent. In order to minimize the risk premium it therefore makes sense to minimize the variance(s). Thus, the results of the study by Lambert / Larcker (1988) are in line with the principal-agent-theory.²⁰

4.2.2 Recent studies (1990 until today)

Mehran (1995) gathers data of 153 manufacturing firms with focus on a sample period from 1979-1980. He analyzes, among others, how equity based pay and firm performance relate. As a proxy for firm performance, Tobin's Q (ratio of the market value of the firm's securities to the replacement costs of the tangible assets) and the Return on Assets (ROA, ratio of net income to book value of total assets) are used (Mehran, 1995).

His regression of firm-performance on equity-based CEO remuneration reveals a statistically significant relation. Companies which tie compensation to the firm performance are inclined to perform better (in the sense of the principals (shareholders)) than companies which focus on other factors, e.g. a higher fixed salary. Mehran further concludes that the structure of the compensation is much more important than the level of compensation for inducing the right incentives for the executive (ibid.).

A first study that contradicts the thorough and detailed study of Jensen / Murphy (1990a) is that of Hall / Liebmann (1997). They analyze how a change in firm performance affects the compensation of a median CEO. Their sample is based

²⁰ To be precise, the relative weight of the performance measures used depend on different factors, e.g. the sensitivity of the measures to managerial actions or how strong the performance measures used are interrelated / correlated. Analyzing this is beyond the scope of this thesis and I refer to the respective literature, e.g. Lambert / Larcker (1988) or Dikolli et al (2009).

an existing study of Yermack (1995) and additional data from 10-K forms, proxy statements, CRSP and Compustat (Hall / Liebmann, 1997).

Similar to Mehran (1995) or Jensen / Murphy (1990a, 1990b), Hall / Liebmann (1997) find only a small pay-performance-sensitivity for bonus and salary. A \$1000 dollar increase in firm value leads only to a \$0.08 increase in wealth for the executive. A much higher sensitivity seems to exist for stock and stock options. The difference between Hall / Liebmann (1997) and Jensen / Murphy (1990) is, that Hall / Liebmann (1997) do not analyze the pure fractional ownership of the company ("how does a dollar change in firm value influence the dollar change in wealth of the CEO"), but investigate the real change in the dollar value of a CEOs equity stakes depending on the company's performance. Here, the study records an approximately \$2 million decrease in compensation for a CEO whose company is in the 10th percentile performance. A median stock performance leads to an increase of \$601.000 in rewards. A 90th percentile performance is even compensated with an approximately \$4.5 million increase in remuneration.²¹ These numbers are based on a one-year analysis. A five year analysis which is also conducted by Hall / Liebmann (1997) finds similar strong correlations between CEO (stock) compensation and firm performance (ibid.).

Frydman / Jenter (2010) take a similar line as Hall / Liebmann (1997) within their study. They also consider the Jensen / Murphy (1990a) approach. However, the sample period contemplated is larger compared to the other studies, covering the years from 1936 to 2005. The base data used is of Jensen / Murphy (1990b), extended – where necessary – by data from the S&P ExecuComp database (Frydman / Jenter, 2010).

A tremendous increase in fractional ownership is recognized concerning the Jensen / Murphy (1990a) approach, specifically since the 1990s. In 1992, a S&P 500 CEO benefited from a \$1000 increase in firm value by a \$3.70 increase in his personal wealth. In 2005, this share almost doubled to \$6.40, hinting at a stronger link between pay and performance (Frydman / Jenter, 2010). Replicating the Hall / Liebmann (1997) approach, the median dollar change in wealth for a one percent change in firm value (change in the value of equity stake) for top executives

²¹ These are changes solely due to changes in the holding of stock options and stock. Other forms of compensation are expected to stay constant (Hall / Liebmann, 1997).

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increases dramatically, being 12 times as big in the period between 2000 and 2005 compared to the period 1936 to 1940 (Frydman / Jenter, 201.). Table 6 illustrates a comparison of the Jensen / Murphy (1990a) and Hall / Liebmann (1997) approach on managerial incentives for top executives.

Table 6: Comparison of the Jensen / Murphy (1990a) and Hall / Liebmann (1997) approaches on managerial incentives

	Jensen / Murphy approach	Hall / Liebmann approach
Period	Change in wealth by a \$1000 increase in firm value	Change in wealth by a one percent increase in firm value
1936-1940	1,350	18.670,00
1941-1949	0,399	6.814,00
1950-1959	0,452	13.975,00
1960-1969	0,675	38.978,00
1970-1979	0,470	21.743,00
1980-1989	0,551	34.679,00
1990-1999	0,946	120.342,00
2000-2005	1,080	227.881,00

(Frydman / Jenter, 2010, p. 42)

Also the closer consideration of Frydman / Jenter (2010) of the S&P 500 CEOs regarding the Hall / Liebmann (1997) approach illustrates an increase of the equity stakes from \$144.000 in 1992 to \$683.000 in 2005 (Frydman / Jenter, 2010).

Grund / Sliwka (2010) examine the impact of an agent's risk-aversion on executive compensation. There have been almost no studies conducted yet concerning this topic, since the degree of risk-aversion is hard to quantify or to measure. The studies that already exist largely focus on the risk-aversion of a very specific group. For example, Gaynor / Gertler (1995) investigate the risk-aversion of physicians of a medical group or Ferrall / Shearer (1999) examine the risk-aversion by analyzing data from a British Columbia copper mine. Hence, the studies may not be representative (Grund / Sliwka, 2010).

Grund / Sliwka (2010) make use of the German Socioeconomic Panel (GSEOP) of 2004, which covers 7500 full and part-time working employees. The participants were questioned, if their job performance is regularly evaluated by a superior and – if yes – whether this evaluation affects their compensation in any form

(e.g. bonus, salary or promotions). Furthermore, the participants were asked to estimate their individual attitude towards risk on a scale from 0 (“unwilling to take risks”) to 10 (“fully prepared to take risks”). This risk-query was conducted concerning a general risk attitude and regarding further areas, e.g. the risk attitude when deciding on occupational career choices (Grund / Sliwka, 2010).

The results concur with the theoretical aspects concerning the Hidden Characteristic problematic mentioned in chapter 2.1.3.2. According to the study, more risk-averse employees tend to apply for and take jobs in which compensation is less dependent on performance measures (ibid.). Remember that a possible solution of the Hidden Characteristic problematic is a kind of “self-selection” by the agents by offering payment schemes that in the first place address applicants with the preferred degree of risk-aversion.

An extensive summary and analysis of the studies that already exist concerning this issue is provided in chapter 4.4 of this thesis.

Table 7 summarizes the most important facts of the presented studies.

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Table 7: Overview on studies supporting the incentive intensity principle

Author(s)	Year	Performance measure used	Part of compensation package analyzed	Topic analyzed	Key-result
Lewellen / Huntsman	1970	Book profits / equity market value / sales	Entire compensation package	Effects of variations of performance measures on executive compensation	Higher sensitivity of profits and equity market value compared to sales. Indication for shareholder oriented compensation of executives
Masson	1971	Stock value	Entire compensation package	Effects of tying executive compensation more closely to stockholder's interests	Significant relation between increasing stock value and positive financial rewards. Companies with intense tie of compensation and stockholders' interest outperform other companies
Coughlan / Schmidt	1984	Stock return	Salary and bonus	Change of salary and bonus with regard to percentile rank in stock return distribution	Negative changes in salary and bonus for low percentile ranks and positive changes for high percentile ranks
Lambert / Larcker	1988	Return on Equity / Security Market Return	Entire compensation package	Impact of volatile Return on Equity on the weighting of performance measures	More weight on the Security Market Return with increasing volatility of Return on Equity
Mehran	1995	Tobin's Q / Return on Assets	Equity based payments	Importance of tying compensation to firm-performance	Companies that tie compensation to firm-performance outperform other companies (with regard to KPI's interesting for shareholders)
Hall / Liebmann	1997	Firm value / stock performance	Equity based payments (stock and stock options)	Change of dollar value of a CEOs equity stake depending on the performance measure	The better the percentile rank concerning stock performance the higher the compensation. Absolute dollar values are very high
Frydman / Jenter	2010	Shareholder wealth / firm value	Entire compensation package	Replication of Jensen / Murphy and Hall / Liebmann approaches with a larger dataset and bigger sample period	Tremendous increase in fractional ownership since the 1990s. Increase of the P-P-S especially within the past years
Grund / Sliwka	2010	Different performance measures	Entire compensation package	Impact of personal risk-aversion on job search (self-selection / sorting)	More risk-averse employees apply for and take jobs in which compensation is less dependent on performance measures

(Own illustration)

4.3 Empirical findings “stuck in the middle”

There are many further studies that cannot reveal clear empirical support of the principal-agent-theory predictions in practice. These studies are “stuck in the middle” and covered in this sub-chapter.

Murphy (1985) examines data of 461 CEOs of 72 manufacturing companies that were part of the Fortune 500 from 1964 – 1981. He analyzes how salary and bonus as well as total compensation react on the shareholders’ realized rate of return. As Murphy (1985) assumes a per se strong pay-performance-sensitivity between the different forms of stock compensation and firm performance, he omits this relation. Table 6 illustrates how salary and bonus respectively total compensation (excluding inside stock holdings) react to different rates of shareholders’ realized returns from -30 percent up to +30 percent (Murphy, 1985).

Table 8: Reaction of salary and bonus / total compensation on changes in shareholder return

Realized rate of return shareholders	Salary + Bonus in \$	Total pay in \$	Salary + Bonus percentage change	Total pay percentage change
X < -30%	497.000,00	659.900,00	-1,2%	6,8%
-30% < X < -10%	507.800,00	667.600,00	0,2%	7,4%
-10% < X < 0%	560.600,00	743.000,00	4,1%	7,2%
0% < X < +10%	559.600,00	799.400,00	4,8%	16,9%
+10% < X < +30%	543.700,00	656.000,00	5,1%	5,8%
+30% < X	474.200,00	641.200,00	8,7%	22,0%

(Murphy, 1985, p. 17)

Murphy detects a monotonic increase of salary and bonus compensation. A realized rate of return of -30 percent or more leads to a decrease of salary and bonus of 1.2 percent. A return exceeding 30 percent leads to an increase of 8.7 percent. This is symptomatic for a pay-for-performance relation. However, a negative rate of realized shareholder return that lies between -30 and 0 percent still implies a positive effect on salary and bonus. This clearly is not in line with theory. Moreover, the percentage change in total pay levels also contradicts the theory. The change is positive for every return and does not show a monotonic development (Murphy, 1985).

Antle / Smith (1986) analyze pay-for-performance in the context of a relative performance evaluation. They focus on accounting ROA and Return on Common Stock as performance measures. Their intention is to explain changes in executive compensation dependent on systematic and unsystematic changes in returns / changes in stock value. Systematic changes are declared as changes that can be explained through industry-wide fluctuations. Unsystematic changes are attributable solely to the performance of the company. The data set used is based on that of Masson (1971) (see chapter 4.2), extended to the year 1977 (Antle / Smith, 1986).

The findings of the study are assorted. In a relative context, the strongest sensitivity of pay and performance is found for the accounting performance measure ROA. The evidence for the sensitivity of the market performance measure RET is weak and not consistent with relative performance evaluation. Antle / Smith (1986) explain this by the possibility of an executive to hedge the systematic risks of the industry with market transactions (ibid.).

Abowd (1989) investigates whether strengthening the sensitivity of the current remuneration to current performance has a positive effect on the company performance the following years. He clusters his analysis into two sections: effects of changes in the pay-performance-sensitivity for accounting based performance measures (e.g. after tax ROA or after tax ROE) and for economic / market performance measures (Gross Cash Flow divided by replacement costs of total assets (economic measure), and return per share of common stock (market measure)). The study only finds weak evidence that future performance is positively related to a more intense performance based compensation (for accounting based performance measures). A stronger influence is found for economic and market performance measures. The greatest effects are recognized when market performance measures are implemented as basis for compensation (Abowd, 1989).

However, Abowd (1989) concludes that none of the results are precise enough to be statistically relevant and hence an uncritical adoption is not recommended (Abowd, 1989).

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Leonard (1990) records similar results in his study. He bases his study on private surveys, questioning a few hundred major U.S. companies during the years 1981 to 1985. He cannot find a significant relation between changes in accounting measures and executive pay. However, he finds a significant relation between pay and ROE for long-term incentive plans bound to shareholders' interests. Yet, his detection of a "U-shaped" pay-performance relation contradicts agency theory. Indeed, executives in better performing companies tend to earn more. Nevertheless, executives of firms recognizing heavy losses seem to receive higher compensation than top managers in companies that still do a little better (Leonard, 1990).

Murphy (1998) investigates different aspects of the pay-performance-sensitivity. Concerning the differences of implicit and explicit relation between pay and shareholder wealth (performance), no entirely new findings are revealed. According to Murphy (1998), the explicit relation (meaning the impact of using stock-price performance measures, e.g. through the holding of stock, stock options or restricted stock) is much greater than the implicit relation (the impact of using accounting-based performance measures like accounting return). Anyhow, though denoting the general pay-performance-sensitivity still as low, the work recognizes a strong increase from 1992 to 1996 (Murphy, 1998).

Murphy's (1998) findings concerning the pay-performance-sensitivity within certain industries and for companies of different sizes tell against the classic principal-agent-theory, respectively cannot perfectly be explained through it. He reveals an extremely low sensitivity for the Utility sector compared to the Mining and Financial Service sector. The pay-performance-sensitivity of other industries is even stronger compared to the mentioned sectors. Completely different sensitivities are also found for companies of different sizes. Within an analysis of the S&P 500 industrials, Murphy (1998) illustrates that the pay-performance-sensitivity dramatically decreases with a rising company size²². According to the study, the median CEO of a small-cap industrial within the S&P 500 gained a \$28.23 increase in wealth in 1996 from a \$1000 dollar increase in firm value. The median CEO of an industrial registering above median sales could only increase his wealth by \$4.34 for every \$1000 dollar increase in firm value (Murphy, 1998). All

²² Murphy used the companies' sales figures as proxies for firm size (Murphy, 1998).

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in all, the various results of Murphy (1998) give rise to doubts whether the issue of pay-performance-sensitivity is practicably applied as stated in the principal-agent-theory.

Core et al. (2005) revise Bebchuk / Fried (2004). Remember from chapter 4.1 that Bebchuk / Fried (2004) espouse a “no pay-for-performance” view. Core et al. (2005) criticize that Bebchuk / Fried (2004) focus only on the annual compensation, including the annual grants of options, when examining the pay-performance-sensitivity. According to Core et al. (2005), the incentives triggered by a CEOs entire equity portfolio²³ should be considered. The “myopic” approach of Bebchuk / Fried (2004) does not correctly mirror the actual incentives triggered by stock and stock options. When looking at the entire equity portfolio, the work finds a very strong relation between pay and performance (Core et al., 2005).

However, Core et al. (2005) recognize only a small pay-performance-sensitivity for payments except for stocks, stock options or similar rewards. Furthermore, the authors do not want to deny the existence of other factors than the “invisible hand” of the principal-agent-theory shaping the structure and composition of executive compensation packages. Especially the influence of “managerial power”, emphasized by Bebchuk / Fried (2004), may play an important role, even if not that important as stated by Bebchuk / Fried (2004) (ibid.). In fact, Core et al. (2005) believe that executives use their power to “improve” their respective contracts to a certain extent. They assume that under the existence of managerial power, the optimal contracting approach helps to implement contracts that are still shareholder orientated (ibid.).

A lot of research investigated the effects of short-term components of pay, e.g. salary or bonuses, on the pay-performance-sensitivity. Most of the studies only report a weak relation between pay and performance incentivized by those components. Usually, studies investigate the effects of the aggregate of different short-term components. However, Shaw / Zhang (2010) divide the short-term components into individual parts and specifically analyze the pay-performance-sensitivity of a CEOs cash compensation, challenging the idea of “ex post settling

²³ The portfolio can for example contain accumulated unexercised stock options or other unsold firm stocks (Core et al., 2005).

up” in executive compensation, introduced by Leone et al. (2006)²⁴ (Leone et al., 2006; Shaw / Zhang, 2010).

Contrary to Leone et al. (2006), Shaw / Zhang (2010) cannot confirm an “ex post settling up” in CEO cash compensation, which would be a hint for pay-for-performance. The relation between cash compensation and stock returns is not determined by firm performance. For negative (accounting) earnings they even recognize a decreasing relation between performance and cash compensation, similar to the results of Leonard (1990) (ibid.). Shaw / Zhang (2010) actually go a step further and examine these relations for companies with a strong corporate governance²⁵ that are expected to implement a pay-for-performance and hence an ex post settling up of cash payment as well. They find similar ratios as for the entire sample. This indicates that no systematic pay-for-performance seems to exist for cash compensation (ibid.). When looking at the entire cash compensation (including bonus payments), sensitivities increase only marginally, leading Shaw / Zhang (2010) to doubt the existence of a consistent pay-for-performance for short-term components of pay (Shaw / Zhang, 2010).

Sommer et al. (2013) contribute one of the few studies analyzing the pay-performance-sensitivity in Europe, and specifically in Germany. Concretely, they analyze the influence of different performance measures (total shareholder return defined as stock return including received dividends as well as ROE) on short-term variable pay and on fixed components when contracts are renegotiated. With the sample period of 2008 they focus on one year of the financial and economic crisis. They examine data gathered from the proxy statements of companies listed in the DAX and MDAX and compensation data from a data set of “Kienbaum Management Consultants” (Sommer et al., 2013).

They find a negative but not significant relation between short-term variable pay and total shareholder return. Furthermore, a positive pay-for-performance rela-

²⁴ According to Leone et al. (2006) poor firm performance (classified as a negative market-adjusted stock return) is “punished” harder in terms of cash compensation compared to a good performance (classified as a positive market-adjusted stock return) (Leone et al., 2006).

²⁵ Companies with strong corporate governance are defined as having a low G-Index (an index reflecting how heavily restricted shareholder rights are within a corporation), a higher number of shares outstanding held by institutional investors and an above average amount of independent directors within the board (Gompers et al., 2003; Shaw / Zhang, 2010).

tion between short-term variable components and the ROE is detected. Specifically the latter relation is in line with various previous studies. Concerning renegotiated fixed salaries, a positive relation between performance and pay is recognized. Here, contrary to the variable components, the relation between total shareholder return and pay is the important and significant one. Sommer et al. (2013) conclude that changes in shareholder wealth affect the fixed salary of CEOs with an increase for good and a decrease for poor performance (Sommer et al., 2013).

However, the results are quite different from the findings of Shaw / Zhang (2010) that take a similar approach. Sommer et al. (2013) attribute differences to a possibly more efficient application of corporate governance mechanisms in Germany. Furthermore, they assume that a generally higher public attention concerning the compensation of top executives exists in Germany (ibid.). Anyhow, possible differences in pay-performance-sensitivities of distinct geographic regions are an interesting field for future research.

Table 9 summarizes the most important facts of the presented studies.

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Table 9: Overview on studies "stuck in the middle"

Author(s)	Year	Performance measure used	Part of compensation package analyzed	Topic analyzed	Key-result
Murphy	1985	Shareholders' realized rate of return	Salary and bonus / entire compensation package (excluding stock options)	Percentage change of salary and bonus / entire compensation for different shareholder rates of return	Almost monotonic increase of compensation the better the rate of return is - but also increase of compensation for negative rates of return
Antle / Smith	1986	Return on Assets / Return on Common Stock	Entire compensation package	Pay-for-performance in the context of a relative performance evaluation	Strong sensitivity concerning Return on Assets and compensation - surprisingly weak sensitivity for compensation and Return on Common Stock
Abowd	1989	Accounting based performance measures / economic and market performance measures	Entire compensation package	Impact of strengthening the sensitivity of current remuneration to current performance on future company performance	Weak evidence for positive impact of tying compensation on accounting based measures - stronger but still weak influence regarding economic and market
Leonard	1990	Accounting based performance measures / economic and market performance measures	Entire compensation package / long-term compensation packages	Impact of performance measures on compensation parts	Significant relation between pay and Return on Equity for long-term incentive plans - "U-shaped" results, executives in poorly performing companies earn more than executives of companies doing
Murphy	1998	Explicit performance measures / implicit performance measures	Entire compensation package	P-P-S for companies of different industries and sizes	Partly huge differences regarding the P-P-S depending on industry and firm size
Core et al.	2005	Company net income	Entire compensation package	Revision of Bebchuk / Fried (2004) - focus not only on the annual compensation of a CEO but on his entire equity portfolio	Strong P-P-S for entire equity portfolio but small P-P-S for payments except for stocks, stock options or similar
Shaw / Zhang	2010	Stock returns / accounting income	Cash compensation	Analyses of the theory of "ex post settling up" of cash compensation	Relation between cash compensation and stock returns are independent of performance - lessening relation between accounting earnings and cash compensation. Similar result for companies with strong corporate
Sommer et al.	2013	Total shareholder return / Return on Equity	Fixed components of pay / short term variable pay	Impact of changes in performance measures with regard to the different components of pay when contracts are being renegotiated	Negative but insignificant relation between total shareholder return and short term variable pay, positive relation between short term variable pay and Return on Equity. Positive significant relation between fixed pay and total shareholder return

(Own illustration)

4.4 Self-selection / sorting and the individual risk-aversion

One important driver of the incentive intensity principle / the pay-performance-sensitivity is the individual risk-aversion of an agent ($b = \frac{1}{1+\alpha\sigma^2}$). The bonus coefficient partly depends on the risk-aversion of the agent (α). The higher the risk-aversion, the smaller the bonus-coefficient. It is therefore, from a monetary point of view, more favorable for an individual with a low degree of risk-aversion to work within a sector, industry or specific job that “rewards” such a low degree of risk-aversion. An agent with a low degree of risk-aversion would earn the same as an individual with a high degree of risk-aversion when being offered a compensation contract without a variable share and only a fixed salary paid. When being offered a contract with a variable share, the individual with a lower degree of risk-aversion – according to the LEN-model – would be offered a higher share of variable pay (the bonus coefficient b), compared to the individual with a high degree of risk-aversion. Hence, the individual with a low degree of risk-aversion could benefit from a higher variable pay compared to the individual with a high degree of risk-aversion.

Thus, the individual risk-aversion could be used as a “sorting-device” or a “self-selection-tool” for different sectors or kind of jobs. Therefore, the relation between an agent’s risk-aversion and sorting / self-selection shall be dissected in this subchapter. Several studies concerning risk-aversion and the occupational choice in a broader sense are analyzed in the first place. Concretely, it is determined how the degree of risk-aversion influences an employee’s choice to take a job in the private or in the public sector and how risk-aversion affects an agent’s decision to become self-employed. In a second step, the relation between risk-aversion and accepting a concrete job is analyzed.

4.4.1 Individual risk-aversion and employment in the private and public sector

Generally, the public sector is seen as more stable and “safe” compared to the private one. Different studies, e.g. Bloch / Smith (1979), show that the danger of becoming unemployed is much lower in the public than in the private sector. Hence, theory implies that, *ceteris paribus*, more risk-averse employees tend to favor an engagement in the public instead of the private sector. The possibility to sort for employees / agents into the public and private sector is put into practice by companies with the diffusion of pay-for-performance and incentive schemes. Public sector companies in most industrialized countries do not use pay-for-performance and incentive schemes as much as companies of the private sector (Burgess / Metcalfe, 1999; Bryson et al., 2011). By that, more risk-averse individuals should be sorted / self-selected into the public sector and less risk-averse individuals into the private one.

Bellante / Link (1981) were one of the first to analyze this theoretical statements. They use an index based on the participants’ answers on questions concerning the condition and insurance of their automobiles, the use of seat belts, their magnitude of medical treatments and their drinking and smoking habits as a proxy for risk.²⁶ They find that the higher the degree of risk-aversion of an individual, the higher is the probability that he is employed in the public than the private sector (Bellante / Link, 1981).

Guiso / Paiella (2005) analyze the influence of peoples’ risk-aversion on their general behavior and decisions, comprising e.g. portfolio or moving decisions, job changes and the occupational choice. The risk-aversion is measured with a specific part of the 1995 Survey of Household Income and Wealth (SHIW). Participants were asked how much they would pay for a hypothetical negotiable asset. The more a participant would pay for the asset, the more he is seen as a “risk loving” participant (Guiso / Paiella, 2005).

²⁶ This declaration of a risk index has to be treated with caution as it may reflect only the ability rather than the tendency to avoid risks (e.g. maybe some workers are simply not able to afford a proper medical treatment but they actually would like to have such a medical coverage). However, Bellante / Link (1981) refer to a previous study that has already applied this index and performed properly (Bellante / Link, 1981).

Guise / Paiella (2005) find that risk-averse individuals are more likely to work in the public sector. However, it has to be mentioned that this relation is only significant on a 34 percent level. Taking a closer look on the risk-averse individuals only, the probability of deciding for a safe employment is increasing with the degree of risk-aversion and is also statistically relevant (Guiso / Paiella, 2005).

Brunello (2002) uses the same dataset as Guiso / Paiella (2005), but comes to the conclusion that risk-aversion and public sector employment do not significantly correlate with each other. This may result from the fact that he uses risk-aversion in a slightly different context. He analyzes the relation between risk-aversion and public and private sector employment in order to show that risk-aversion is an instrument to estimate the returns of education. This slightly different approach may have led to a different interpretation of the index / parameters (Pollmann, 2011).

Pfeifer (2011), using the GSEOP of 2004, employs a similar measure for risk-aversion as Grund / Sliwka (2010). The questions concerning general risk-taking and career-specific risk-taking were of particular interest for Pfeifer (2011). He analyzes these two risk categories and the type of occupation (participant employed in the public or private sector). People with a higher risk-aversion tend to be employed within the public sector. What Pfeifer additionally reveals is that specifically the career risk-taking and not the general risk-taking attitude is responsible for driving a participant into the “direction” of public or private sector (Pfeifer, 2011).

Pfeifer did not fully trust in the procedure and outcomes of the GSEOP data for different reasons.²⁷ He therefore conducted an additional survey with students from his university (Duisburg-Essen) in order to rule for different sources of bias. Concretely, he created a hypothetical but still realistic scenario in which students had to decide between a public and private sector employment after finishing their studies. A risk-aversion index could also be derived from the questions. The results support the previous findings and the theory. The risk-taking behavior is

²⁷ In detail, he assumed that a public sector employment per se would increase the risk-aversion of an employee and not vice versa. Furthermore, he insinuated that participants maybe did not have to choose between private and public sector employment as labor market conditions might have not allowed such an “open” choice. Third, he argued that choosing public sector employment may be influenced by additional factors than occupational security (Pfeifer, 2011).

large for participants who would like to work in the private rather than the public sector (Pfeifer, 2011).

4.4.2 Individual risk-aversion and the probability of being self-employed

The general perception is that being self-employed is rather risky compared to being employed. A self-employed protagonist has to bear several risks, e.g. the general risk of entrepreneurship or financial risks (e.g. unsafe wages). This perception is in line with the theory that views self-employment as a risky investment (Kihlstrom / Laffont, 1979).

Hence, in the context of pay-performance-sensitivity and self-selection / sorting through the individual risk-aversion, the probability that individuals with a lower risk-aversion are self-employed should be higher than for individuals with a higher degree of risk-aversion.

Barsky et al. (1997) examine this prediction based on data from the Health and Retirement Study (HRS). The participants are clustered in four different risk preference categories based on a short questionnaire concerning the decisions the participants would take when being offered several hypothetical situations in occupational life.²⁸ The results of the risk-index are compared to the employment status of the participants (self-employed or not). No significant correlation between risk-aversion and employment status is found (Barsky et al., 1997).

Cramer et al. (2002) come to a different conclusion. They base their analysis on the latest version (1993) of the Dutch “Brabant survey”, which focuses on detailed information on entrepreneurial experiences (among others, if the participants are / were self-employed or not) and risk attitudes (the participants were asked how much they would pay for a ticket of a hypothetical lottery). Different to Barsky et al. (1997), they find a significant relationship between a low level of risk-aversion and the occupational status “self-employed” (Cramer et al., 2002).

²⁸ For a detailed overview of the questions I refer to Barsky et al. (1997) page 3.

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Cramer et al. (2002) on their own state that the risk-aversion measures of the study were expected to stay constant over time. This not necessarily has to be true. Moreover, it is a retrospective observation. The participants were interviewed concerning their risk-aversion (in 1993) after their occupational choice has been made. This means that the occupational choice on its own may have influenced the answers given in the 1993 survey (Cramer et al, 2002).

Hartog et al. (2002) find similar results as Cramer et al. (2002). They use the same data-set and two further data-sets. These include the questioning of 1,599 accountants and approximately 17,000 readers of a newspaper concerning their attitude towards risk and their entrepreneurial experience (measured as within the “Brabant survey”). The gathered and analyzed data shows a significant empirical support of the theory. A lower risk-aversion increases the probability that a participant of the survey(s) is self-employed. For the specific employee-group of accountants such a statistical significance cannot be found. Hartog et al. (2002) do not see this result as a proof for the non-existence of a link between the degree of risk-aversion and the type of occupation chosen. They argue that many “self-employed” accountants within the survey were actually partner within a company. This goes along with a much lower risk than being truly self-employed (Hartog et al., 2002).

Ekelund et al. (2005) measure the attitude towards risk-aversion with an aspect of a normal temperament dimension – harm avoidance. They argue that this facet of an individual’s temperament manifests well before adulthood and remains stable over the entire life. Hence, they claim, harm avoidance reflects a good, constant and unswayable factor of risk-aversion. They find that this measure of risk-aversion has a significant statistically and quantitatively negative effect on the probability of an individual being self-employed. According to them, the public perception and the theory is empirically proven (Ekelund et al., 2005).

Caliendo et al. (2006) base their analysis on data from the GSEOP. Similar to the previous results, Caliendo et al. (2006) find a significant relation between high inclination towards risk and the probability that an individual starts an own business. However, this relation only seems to hold for individuals that have had a “normal” employment before. No such link was found for individuals that were unemployed or inactive (Caliendo et al., 2006).

Dohmen et al. (2011a) use the GSEOP and a field experiment as basis for their analysis. In the course of the experiment, participants had to answer a questionnaire similar to the one of the GSOEP and participate in a lottery experiment in order to better validate the risk proxy within their study. They divide the risk parameter into a general risk parameter and a career risk parameter, which measures the tendency of a participant to take risks when taking occupational decisions. Specifically the career risk parameter shows a significant relation with the occupational choice. The likelihood of being self-employed increases by 43 percent when the standard deviation of the career risk parameter increases by one (Dohmen et al., 2011a).

4.4.3 Individual risk-aversion and particular occupations

There are – unfortunately only a few – studies that examine the impact of risk-aversion on specific occupations.

Saks / Shore (2005) determine which effect the wealth (in the sense of monetary wealth) of parents of university students has on their major and occupational choices. Concretely, they analyze this relation for eight different occupations: teachers, healthcare workers, computer workers, engineers, math / science workers, sales people, managers and entertainers. The research framework used by Saks / Shore (2005) assumes that the wealthier the parents of the students are, the more risk the students are willing to take when choosing a job. Saks / Shore (2005) measure the risk of an employment with the income variance of the respective occupation. The study reveals that specifically business related occupations are subject to much higher income variances. Saks / Shore (2005) further report that children of parents with higher degree of wealth tend to prefer business related jobs. Hence, they see their hypothesis and the theory of risk-aversion and occupational choice confirmed (Saks / Shore, 2005).

Fourage et al. (2014) also analyze the behavior of young graduates regarding risk-aversion and occupational choice. As a proxy of risk, a questionnaire similar to that of the GSOEP was conducted among the 40,000 participant of the study (graduates from high-school, college and university). The proxy of occupational risk comprises of the earnings risk (variance of the wages), the employment risk

and the earnings growth of the respective occupations the young graduates have chosen (Fourage et al., 2014).

A systematic positive and significant relation between the occupational risk of the jobs the young graduates choose and their respective willingness to take risks is revealed. Fourage et al. (2014) further take a closer look on the “patience” of the graduates. They analyze how fast the graduates accept a job offer and if this job matches to their risk and economic preferences. They find that “patient” individuals, meaning graduates that need a longer time to get their first job, are more likely to choose a job that leads to a steep earning profile. Graduates whose individual preferences do not align with the riskiness of their initial occupation, meaning individuals who are “impatient” and take one of or even the first job offer they receive, are more likely to change to another occupation that better fit to their individual preferences (ibid.).

These findings, and especially the second one, provide strong evidence for the existence of sorting and self-selection. The findings illustrate that a kind of self-selection exists although this self-selection may not be perfect. However, even if the self-selection does not function perfectly, there is still a kind of a “downstream-sorting” that takes place (some / many “impatient” individuals changed their initial occupation to a job that better fits their personal preferences).

Skriabikova et al. (2012) find similar results for the Ukraine. They examine the relation between risk-aversion and occupational choice within the context of the transition from the Soviet Union to the Ukraine. They hypothesize that there was no correlation between risk attitudes and occupational choice before the transition, since there were actually no “risky occupations”. They measure the risk of an occupation with the unexplained earnings variance of an occupation. This variance was quite low, respectively did not differ among occupations in the Soviet Union, due to the political and (labor) market situation. Hence, although having a certain degree of risk-aversion, Skriabikova et al. (2012) assume that no real sorting and self-selection took place. They further postulate that the “opening” of the (labor) market was the starting point of sorting and self-selection in the Ukraine (Skriabikova et al., 2012).

As main data source they make use of the Ukrainian Longitudinal Monitoring Survey (ULMS) that is structured similar to the GSOEP. The findings confirm their hypotheses. The earnings variance before the transition did not differ significantly between occupations. After the transition, a general rise in variances is recognized with some occupations increasing more sharply. For example, the variance increased for corporate managers²⁹ by approximately 200 percent, whereas the one of teaching associate professionals only increased by approximately 7 percent. After the transition, a significant positive relation is revealed for the risk attitude and the occupational choice. Individuals with a low risk-aversion are more likely to be employed within “risky occupations”, for instance as administrative or commercial manager or science and engineering associate professionals. On the other hand, people with a high degree of risk-aversion tend to be employed in occupations with a low earnings variance, such as general or office clerks, machine operators or health professionals. Besides this self-selection, Skriabikova et al. (2012) also determine a kind of a “downstream-sorting”. Many people changed their occupations after the transition from the Soviet Union to the Ukraine. They examine that most of the people who had changed their job, chose a new occupation that better matched their respective risk attitude (Skriabikova et al., 2012).

Bonin et al. (2007) analyze – based again on data of the GSOEP – the correlation between cross-sectional earnings risk and individual risk attitudes. The individual risk attitude is measured with the aforementioned scheme that was used within the GSOEP. Bonin et al. (2007) use the variance in monthly income of the participant that is not elucidated by recognizable differences in individual’s stock of human capital³⁰ as a proxy for earnings risk (Bonin et al., 2007).

They find that participants which are willing to take more risks are more likely to work in an occupation with a high income variance, e.g. in a managerial position (Bonin et al. 2007).

²⁹ Skriabikova et al. (2012) do not talk about concrete occupations. They refer to the numbers of the International Standard Classifications of Occupations (ISCO). An overview can for instance be found on the webpage of the International Labour Organization (ILO) (ILO, 2016). I adapted the occupations listed there to the numbers that were named within the study of Skriabikova et al. (2012).

³⁰ For a detailed explanation of the measurement of earnings risk I refer to Bonin et al. (2007) page 929.

Even though the analysis by Bonin et al. (2007) rules for some weaknesses of other studies, there are still some flaws that have to be kept in mind. Focusing solely on one aspect as a proxy for risk-aversion (income variance of the respective jobs) might not perfectly illustrate the riskiness of a certain occupation. It would be better to take into account further “dimensions” that reflect the riskiness of an occupation. Examples can be the risk of becoming unemployed or even the risk of fatal accidents (this could be interesting for certain types of jobs).

Isphording (2010) replicates the analyses by Bonin et al. (2007). He finds a positive significant relationship between the risk-attitude and the earnings risk only for participants with recent job changes. A significant relationship for the entire sample cannot be detected (Isphording, 2010).

One of the few studies examining data gathered outside Europe concerning this issue is that of Le et al. (2014). They make use of the Australian Twin Study of Gambling (ATSOG). They examine that the higher the willingness to take risks, the higher the probability of being employed as a professional / business professional, specialist manager or managing supervisor and the lower the probability of being employed within health or educational occupations (Le et al., 2014).

This is in line with theory. It can be assumed, that the contract of a business professional or managing supervisor is much more dependent on bonus and incentive payments compared to a contract within the health or educational sector.

Tables 10 and 11 summarize the empirical studies mentioned in chapter 6.

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Table 10: Overview on studies concerning risk-aversion and self-selection / sorting (I/II)

Author(s)	Year	Relation analyzed	Proxy for individual risk-aversion	Key-result
Bellante / Link	1981	Impact of individual risk-aversion on the probability of private and public sector employment	Index based on the participants' answers on questions concerning condition and insurance of their automobiles, use of seatbelts, magnitude of medical treatment and drinking / smoking habits	The higher the degree of risk-aversion the higher is the probability that an individual is employed in the public sector
Guiso / Paiella	2005	Impact of individual risk-aversion on the probability of private and public sector employment	Price participants of the SHIW would pay for a hypothetical negotiable asset with risky parameters	Risk-averse participants are more likely to work in the public sector (only significant on 34 % level)
Brunello	2002	Impact of individual risk-aversion on the probability of private and public sector employment	Price participants of the SHIW would pay for a hypothetical negotiable asset with risky parameters (same data-set used as within Guiso / Paiella)	No significant correlation between risk-aversion and public / private sector employment (data-set was used in slightly different context compared to Guiso / Paiella)
Pfeifer	2011	Impact of individual risk-aversion on the probability of private and public sector employment	Risk-questions of the 2004 GSEOP (several questions concerning risk-aversion within different areas with focus on questions concerning general risk-taking and career-specific risk-taking) - additionally supported by own survey	Higher risk-aversion tends to lead to public sector employment - especially career risk-taking attitude is responsible for this trend
Barsky et al.	1997	Impact of individual risk-aversion on the probability of being self-employed or not	Short questionnaire regarding decisions participants would take when offered several hypothetical situations in occupational life	No significant relation between risk-aversion and the probability of being self-employed or not
Cramer et al.	2002	Impact of individual risk-aversion on the probability of being self-employed or not	Price participants would pay for a hypothetical lottery (within the "Brabant survey")	Risk-loving participants (spending more for the lottery) are more likely to be self-employed rather than employed
Hartog et al.	2002	Impact of individual risk-aversion on the probability of being self-employed or not	Price participants would pay for a hypothetical lottery (same data-set used as within Cramer et al.) + two additional data-sets (questioning of accountants and newspaper readers in the same way)	Risk-averse participants are more likely to be employed rather than self-employed (holds true for the newspaper readers and participants of the Brabant-survey) - no statistically relevant relation found for the accountants
Ekelund et al.	2005	Impact of individual risk-aversion on the probability of being self-employed or not	Tendency to harm avoidance (survey of Northern-Finns born in 1966)	Statistically significant quantitatively negative effect of risk-aversion on the probability of being self-employed
Caliendo et al.	2006	Impact of individual risk-aversion on the probability of being self-employed or not	Risk-questions of the 2004 GSEOP (several questions concerning risk-aversion within different areas with focus on questions concerning general risk-taking and career-specific risk-taking)	Significant relation between high inclination towards risk and probability of becoming self-employed (holds true for participants that had a "normal" job before - no relation found for individuals that were unemployed or inactive)

(Own illustration)

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Table 11: Overview on studies concerning risk-aversion and self-selection / sorting (II/II)

Author(s)	Year	Relation analyzed	Proxy for individual risk-	Key-result
Dohmen et al.	2011a	Impact of individual risk-aversion on the probability of being self-employed or not	Risk-questions of the 2004 GSEOP (several questions concerning risk-aversion within different areas with focus on questions concerning general risk-taking and career-specific risk-taking) + field experiment similar to the questions of the GSEOP	Especially career-specific risk-taking has large influence on the probability of being self-employed or not - likelihood of being self-employed increases by 43 % when standard deviation of the career-risk parameter increases by one
Saks / Shore	2005	Impact of individual risk-aversion on choosing specific jobs	Wealth of the parents of university students - the wealthier the parents, the less risk-averse the students are assumed to be	Risk-loving students are more likely to start careers within riskier jobs, e.g. business related jobs (riskiness of jobs measured with the income variance)
Fourage et al.	2014	Impact of individual risk-aversion on choosing specific jobs	Questionnaire among 40,000 participants similar to the GSEOP	Risk-loving graduates are more likely to start careers within riskier jobs (riskiness of jobs measured with the income variance, employment risk and earnings growth) - clear evidence for sorting found (graduates that chose a job that did not match individual risk-preferences were more likely to change the job again)
Skriabikova et al.	2012	Impact of individual risk-aversion on choosing specific jobs	ULMS questionnaire with similar questions regarding risk as within the GSEOP	Risky jobs, e.g. corporate managers, commercial managers or engineering associate professionals (jobs with high unexplained earning variance) are more likely to be taken by individuals with low risk-aversion and vice versa (no risky jobs are e.g. office clerks, health professionals or machine operators)
Bonin et al.	2007	Impact of individual risk-aversion on choosing specific jobs	Risk-questions of the 2004 GSEOP (several questions concerning risk-aversion within different areas with focus on questions concerning general risk-taking and career-specific risk-taking)	Individuals that are willing to take more risk are working in occupations with higher income variance (riskier occupations), e.g. in managerial positions
Le et al.	2014	Impact of individual risk-aversion on choosing specific jobs	Participants of the ATSOG were asked two questions on their attitude towards risk when spending their money	The higher the individual willingness to take risk, the higher the probability that individuals work as business professional, specialist manager or managing supervisor and the lower the probability that an individual works within health or educational occupations

(Own illustration)

5 Reasons for an incongruity of theoretical predictions and empirical results regarding pay-performance-sensitivity

5.1 A model on sorting and its effects on the pay-performance-sensitivity

The previous chapter, and specifically sub-chapter 4.1, revealed that the optimal / efficient contracting approach derived in chapter 2.2 is obviously not able to perfectly explain the development and trends in executive compensation. Specifically the measured intensity of pay-performance-sensitivity is often lower than predicted by theory. One explanation of this circumstance offered by Ray (2012) approaches the sorting effects of executive compensation contracts on pay-performance-sensitivity. Besides providing incentives for incumbent managers, executive compensation also serves as a “sorting device” with regard to the pool of potential executives. Ray (2012) maintains that this sorting effect lowers the pay-performance-sensitivity.

He considers a risk-neutral manager of type θ . The type is known to the manager, but not to the company. There is a single manager, but different types of managers within the pool of executives. The density $\hat{f}$ and the cumulative distribution function F , over support $\Theta = [0, \infty)$ with mean μ_θ and variance σ_θ^2 express the company's uncertainty on θ . The company's output with a type θ manager is

$$(15) \quad x = \gamma\theta a + \varepsilon$$

where ε is symmetrically distributed with 0 and variance σ^2 . The variable γ stands for the company's and the manager's complementarity.³¹ The parameter a represents the effort the manager exerts at the costs of $D(a) = 0.5da^2$.³² The type θ of the manager and his effort a are complements. The manager has an outside option $\bar{U} (> 0)$. The company's fixed costs for employing the manager of type θ

³¹ For reasons of simplicity, γ will be set to 1 in the further elaboration.

³² For reasons of simplicity, d will be set to 1 in the further elaboration.

are $k - m\theta$ ($k, m > 0$). The term reflects the non-negative fixed cost ($k - m\theta$) $\equiv \max\{0, k - m\theta\}$ for the hiring and training of the worker. The variable costs $m\theta$ imply that a “better” manager (higher θ) can be employed at reduced costs. The variable k represents the relation of firm-specific and general human capital. Companies acting in a complex environment may need to defray higher costs for the training of newly hired managers. The variable m stands for the return of a better manager. The higher the parameter, the higher the cost savings of a better manager (Ray, 2012).

The company pays the manager according to the linear contract $\omega = f + b * x$ ($f, b > 0$), where f represents the fixed salary and b the bonus parameter. The expected output for each manager is $E[x|\theta] = \theta a$. The expected wage is hence $E[\omega|\theta] = f + b\theta a$.

First best

The manager has to decide whether or not to join the company and – if he joins – which effort level to choose. The firm’s expected total surplus (TS) with the θ type manager is

$$(16) \quad E[TS|\theta] = \theta a - D(a) - (k - m\theta) - \bar{U}.$$

It consists of the expected output, the manager’s cost of effort and the fixed costs of hiring and onboarding. The first best effort level $a^{FB} = \theta$ maximizes the total surplus. Thus, for more productive types it is advantageous to exert more effort. Furthermore, a manager with high cost of effort should exert less effort, since high effort would decrease the manager’s utility and total surplus. When applying $a = \theta$ the total surplus is

$$(17) \quad E[TS|\theta] = \frac{\theta^2}{2} - (k - m\theta) - \bar{U}.$$

An increase of θ leads to an increase of the total surplus. Total surplus decreases with an increase of k . This holds true only iff

$$(18) \quad \theta > \sqrt{(m^2 + 2(k + \bar{U}))} - m \equiv \theta^{FB}.$$

θ^{FB} represents the minimal managerial type a company would employ to be efficient. This cutoff rises with k . Thus, it is efficient for a company to hire more

types and having them work more, the lower the cost of supplying the effort(s) are (Ray, 2012).

The manager's problem

The manager of type θ maximizes his expected wage, subtracted by his cost of effort

$$(19) \quad \max_a E[\omega|\theta] - D(a) .$$

The manager's incentive constraint yields $a^* = b\theta$. Higher bonuses induce more effort, as well as an increase of θ . Furthermore, the manager only joins the company, if his reservation utility will be exceeded, meaning $E[\omega|\theta^*] - D(a^*) \geq \bar{U}$. The marginal manager θ^* who satisfies $E[\omega|\theta^*] - D(a^*) = \bar{U}$ looks as follows:

$$(20) \quad \theta^* = \frac{\sqrt{2(\bar{U}-f)}}{b}$$

The marginal manager θ^* decreases in f and b . This means higher wages attract more types to the firm.

Implementation of the first best solution

Within the first best solution, the company's expected profits are $E[\pi|\theta] = E[x|\theta] - E[\omega|\theta] - (k - m\theta)$. Applying the IC, the expected profit is

$$(21) \quad E[\pi|\theta] = \frac{\theta^2 b(1-b)}{1-f-(k-m\theta)} .$$

The company profit increases in θ and decreases in f and k . The effect of the bonus cannot be explained that simple. A small bonus increases profits, whereas a large bonus lowers profits due to the simultaneous sorting and incentive effects (Ray, 2012). When considering a^{FB} and the manager's equilibrium effort a^* , it manifests that the company would have to implement $b = 1$ to implement the first best solution. This would lead to a negative firm profit. Hence, although having two instruments (salary and bonus) to solve the problems of the manager's participation and exerted effort level, an efficient solution cannot be implemented (Ray, 2012).

Implementation of the second best solution

Within the second best solution, the company tries to maximize its expected profits. Hence, it sets f and b to maximize

$$(22) \quad \Pi(f, b) = \int_{\theta^*(f, b)}^1 E[\pi|\theta] \hat{f}(\theta) \theta.$$

$\theta^*(f, b)$ illustrates that the marginal type of manager depends on the parameters the company sets by the compensation contract. The compensation contract on the one hand sorts the managers' types through θ^* and provides incentives through the expected wage $E[w|\theta]$. When solving this problem the parameter b appears to affect the manager's incentives to work and the decision whether to join or not. Ray (2012) offers a solution to this problem that gives insights into the dual sorting and incentive effects. In his model the fixed salary f is

$$(23) \quad f = \left[\theta^*(1 - b) - \frac{1 - F(\theta^*)}{\hat{f}(\theta^*)} b \right] b \theta^* - (k - m \theta^*).$$

The bonus parameter b is

$$(24) \quad b = \left(2 - \frac{\theta^{*2}}{E[\theta^2|\theta > \theta^*]} \right)^{-1}.$$

The sorting effect appears directly within the compensation contract, which now depends on the distribution of manager types. Different to the first best solution, where $b^* = 1$, representing a “sell-the-firm” contract, in which the agent would receive all the firm's output and the principal would take back the rents via a (unrealistic) negative salary f , the contract now illustrates a realistic scenario. The sorting effects lead to $b < 1 = b^*$ for all $\theta > \theta^*$ for which $E[\theta^2|\theta > \theta^*] > \theta^{*2}$ (Ray, 2012).

The pay-performance-sensitivity is dampened by the presence of sorting. Although a positive bonus-share is necessary to attract high quality executives, a high bonus-share will transfer too much rent to the manager. Companies have to trade off the downward pressure of sorting against the upward pressure of incentives on the bonus-coefficient (ibid.).

5.2 Downward biased pay-for-performance measurement

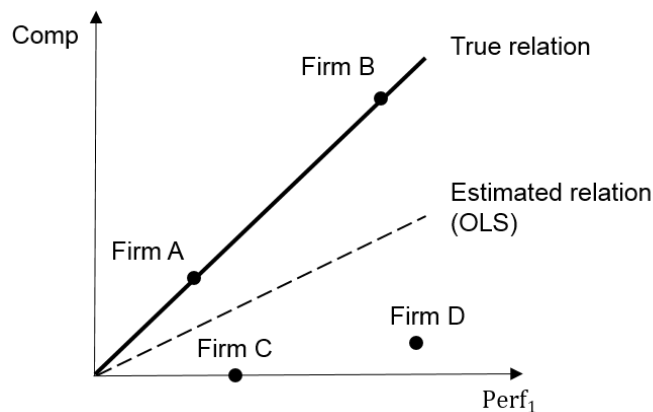
Hermalin (2013) explains empirical studies not supporting a strong link between pay and performance with the adaption of different performance metrics (e.g. profit, RoA, stock return, etc.) when measuring the pay-to-performance within the studies. The performance measures used in a compensation contract may differ among companies and industries (Hermalin, 2013).

A possible regression used in the studies could look as the following:

$$(25) \quad Comp_n = f + \beta_1 * Perf_{1n} + \dots + \beta_j * Perf_{jn} + \varepsilon_n$$

with $Comp_n$ being the compensation of the n th executive and $Perf_{jn}$ being the j th performance metric for the n th executive's company. The variable f depicts the fixed salary and the β s represent the shares of the performance measures. Hermalin (2013) insinuates that a lot of studies assume all analyzed companies to use the same performance measures. This does not necessarily have to be the case. For instance, companies A and B may tend to use $Perf_1$ whereas companies C and D make use of $Perf_2$. This could manipulate the image when examining the pay-performance-sensitivity. Figure 15 illustrates this circumstance.

Figure 15: Downward biased pay-to-performance



(Own illustration; based on Hermalin, 2013, p. 23)

The actual pay-performance-sensitivity for companies A and B, which base their compensation (largely) on $Perf_1$ is the “true relation”. Studies that use a “uniform” regression such as shown in equation (25) will tend to result in a lower pay-performance-sensitivity (“estimated relation”) (Hermalin, 2013).

5 Reasons for an incongruity of theoretical predictions and empirical results regarding pay-performance-sensitivity

Hermalin (2013) further elaborates a model with only one performance measure, which also shows the underestimating effects of pay-performance-sensitivity.

The model assumes a normally distributed performance measure r with mean $a\tau$ and variance σ^2 , in which $a \in \mathbb{R}_+$ is the CEO's action and τ stands for a firm's type (high-type firm performing well or low-type firm not performing well). The CEO's utility function is denoted as $-e^{\frac{1}{2a^2}-\omega}$ where ω is the CEO's income deriving from the contract $\omega = f + \beta_1 r$. The CEO's expected equilibrium utility is hence

$$(26) \quad f + \frac{1}{2} \beta_1^2 (\tau^2 - \sigma^2).$$

The model further assumes that the CEO will be hold to his reservation utility $\bar{U}$. As a result, the expected equilibrium compensation and the company's expected profit are

$$(27) \quad \bar{U} + \frac{1}{2} \beta_1^2 (\tau^2 + \sigma^2) \text{ respectively } \beta_1 \tau^2 - \frac{1}{2} \beta_1^2 (\tau^2 + \sigma^2) - \bar{U}.$$

β_1 will be set to maximize the expected profits and hence takes the form of $\beta_1 = \tau^2(\tau^2 + \sigma^2)^{-1}$. This shows on the one hand that higher-type companies apply stronger governance than lower-type companies. On the other hand it illustrates that every company uses different contracts – depending on its individual type. Hence, the assumption of equation (25) is invalid (Hermalin, 2013).

The underestimation of the pay-performance-sensitivity becomes even more obvious by a simple simulation of the specified model. The reservation utility $\bar{U}$ is set to 0 and the variance σ^2 is set to 1. A hypothetical sample of 10,001 firms is constructed where $\tau_1 = 1$ and $\tau_n = \tau_{n-1} + 1/10,000$, with $1 < n \leq 10,001$. For each firm a random performance measure r is generated as a normal variable with the mean $a_n \tau_n$, or, substituting, mean $\tau_n^4(\tau_n^2 + \sigma^2)^{-1}$. Running this simulation with OLS several times leads to estimations of β_1 that lie between 0.575 and 0.58. This can be compared to the “estimated relation” in Figure 15. The true relation ranges from 0.5 to 0.8 and 82 percent of the values are larger than 0.58 (the highest value of the OLS). This illustrates how the pay-performance-sensitivity of the sample is dramatically understated when using the general OLS approach that many empirical studies apply (Hermalin, 2013).

5.3 The managerial power explanation

5.3.1 The basic idea

There are different authors, especially Bebchuk together with Fried and Walker, but also Murphy and Yermack as early contributor, who take a different approach than the optimal contracting one towards explaining the design of top management remuneration contracts. They argue that CEO contracts are not capable of guiding the CEO into a direction from which also shareholders benefit. They indicate that executives' contracts are influenced by an important factor – the power of the executives. This perception also names the approach: the managerial power approach or managerial power perspective (Bebchuk / Fried, 2002; Murphy, 2012).

The managerial power approach basically derives from the same “starting point” as the optimal contracting approach – the principal-agent-theory. Within the optimal contracting approach, executive compensation is seen as the “remedy” for the principal-agent-problematic. By designing individually suited contracts, the CEOs' goals are aligned with the shareholders' interests. Executive compensation in the managerial power approach is not seen as the sole solution of the principal-agent-problematic, but also as a part of the problem itself (Bebchuk / Fried 2004).

Concretely, the approach suggests that executives use their power within their respective companies to extract even more rents. This results in payments that are higher compared to the payments they would receive from the “arm's length contracting” of the optimal contracting approach. Furthermore, the managerial power approach does not see the board (of directors) as being “perfect representatives” of the shareholders during the negotiations of executives' remuneration arrangements. The reasons why the board is not able to take on the role as representatives can be various. For example, literature names missing information or a lack of time. However, this constellation yields contracts that are not in line with shareholders' interests (Bebchuk / Fried, 2003; Bebchuk / Fried, 2004).

The power within the managerial power approach targets on the power an executive might have over the board of directors or at least some members of the board. Thus, a correlation between the (managerial) power and rent extraction or the total amount of compensation is maintained to exist. Generally speaking, the higher an executives' influence (or the weaker the board of directors), the higher are the possible rents an executive would be able to extract (Bebchuk et al., 2002; Bebchuk / Fried, 2004).

A CEO can gain power over the board of directors in different ways. One possibility is to gain power via the shares a CEO owns of his company. A rising number of shares leads to a greater influence of the CEO when electing the members of the board of directors. He therefore can – at least to a certain degree – “pick” members that are “meant well” by him (this is in fact one point that Warren Buffett mentioned within his quote at the beginning of this thesis). The power of the CEO will therefore increase with the number of shares he owns and decrease with the number of shares owned by outside share- and blockholders (ibid.). However, this issue might not be that important due to the small percentage of shares a CEO of a publicly traded company holds today.

Nevertheless, it is interesting to see that the optimal contracting and the managerial power approaches differ concerning the issue of (inside) CEO stock ownership. Whereas most advocates of the optimal contracting approach support a higher percentage of inside CEO stock ownership in order to tie pay more intense to performance, such stock ownership is seen as critical within the managerial power approach. The fact that both approaches are in disagreement with such a very crucial part of compensation shows the entire difficulty that emerges when talking about pay-for-performance.

Besides the direct influence a CEO can have via his percentage of shares and his possibility to affect the election of the board of directors, his power might also depend on the organization and composition of the board. A CEO can have significant influence over the inside directors. The higher the amount of independent board members, the smaller the CEOs power and by that his possibility to influence decisions made by the board (e.g. decisions on his compensation package). Moreover, the number of directors (inside or independent) on which the CEO has

a direct personal influence is also important. For example, such a personal influence can occur when a director is a close and longstanding friend of the CEO or if the director owes his nomination into the board to the CEO (Bebchuk / Fried, 2004).

5.3.2 A theoretical approach towards managerial power and pay-performance-sensitivity

Choe et al. (2008) set up a theoretical bargaining model to examine the relation between managerial power and (firm) performance. As starting point they assume a similar agency model as introduced in chapter 2.2. There is a risk-averse manager with preferences according to the constant absolute risk-aversion (CARA) utility function $u(\omega, a) = -e^{(-\alpha(\omega - d(a)))}$ with α as coefficient of constant risk-aversion, ω as the monetary payoff and $d(a) = \frac{1}{2}a^2$ as the monetary costs when exerting effort a . The manager has a reservation utility of $\bar{U}$. The owner is assumed to be risk-neutral with the reservation utility of $\bar{V}$. The company's stock price – gross of the manager's remuneration – is denoted as $x = \bar{x}(a) + \varepsilon$ with the normally distributed error term ε with mean 0 and variance $\sigma(e)$. Linearity assumptions are also the same as in the model of chapter 2.2. (Choe et al., 2008).

Choe et al. (2008) assume a generalized Nash bargaining game or a noncooperative Rubinstein bargaining game³³ in which either the owner has the entire bargaining power (resulting in a contract that maximizes the owner's expected utility subject to the manager's PC and IC) or the manager has the entire bargaining power (resulting in a contract that maximizes the manager's expected utility subject to the owner's PC and the manager's IC). The Nash bargaining solution will hence be the weighted average of the two outcomes, approximated by the subgame perfect equilibrium of a Rubinstein bargaining game. Hence, as the manager's (owner's) bargaining power rises, the solution will converge to the one preferred by the manager (owner) (Choe et al., 2008).

³³ For a more detailed overview of the Nash and the Rubinstein bargaining game I refer to Nash (1950) and Rubinstein (1982).

5 Reasons for an incongruity of theoretical predictions and empirical results regarding pay-performance-sensitivity

The optimal contract share with the owner having full bargaining power is $b = \frac{1}{1+\alpha\sigma}$.

Assuming the manager has full bargaining power with a contract of the form $\omega(x) = bx + f$ ³⁴ with b as the incentive component and f as fixed salary he maximizes his utility under the owner's PC $V(b, f, a) \geq \bar{V}$, his own IC a maximizes $U(b, f, \cdot)$ and his limited liability (LL) constraint $f \geq 0$.³⁵ Hence, the effort function is the same as in the case with the owner having the bargaining power. Furthermore, the manager's effort choice is independent of the base salary f . Thus, the manager's optimal contracting problem is

$$(28) \quad \text{Maximize}_{b,f} U(b, f, a(b)) \text{ subject to } V(b, f, a(b)) = \bar{V}.$$

This yields

$$(29) \quad [\bar{x}(a(b)) - 0.5\alpha b^2 \sigma'(a(b)) - a(b)]a'(b) - \alpha b \sigma(a(b)) = 0.$$

Denoted by β_p , the solution of the manager's problem is $(\beta_p, \vartheta_p, a_p)$ ³⁶ where $a_p = a(\beta_p)$ and $\vartheta_p = (1 - \beta_p)\bar{x}(a_p) - \bar{V}$.

Since (29) is the same in case the owner has full bargaining power, $\beta_a = \beta_p$, from which follows $a_a = a_p$. Hence, as long as the manager receives a positive base salary (which should be the case in reality), his optimal share of the company is independent of the distribution of bargaining power. Following that, the manager will exert the same level of effort in both cases. Shifting the power from the owner to the manager leads to a rent extraction of the manager through a higher fixed salary. This means the pay-performance-sensitivity might not be directly affected by the bargaining power, but the pay ratio changes (Choe et al., 2008).

For an examination of the effect of managerial power on firm performance, Choe et al. (2008) set up a bargaining game in which $\mu \in [0,1]$ is a proxy for bargaining power. The Nash bargaining problem is written as

³⁴ Please note: the model uses Greek letters when talking about the owner's optimal contract and Latin letters when talking about the manager's optimal contract.

³⁵ Choe et al. (2008) also illustrate cases with a negative fixed salary. This is not in the scope of this paper.

³⁶ Since the Greek alphabet does not know the letter "f", ϑ is used as "counterpart" for the Latin letter.

$$(30) \quad \text{Maximize}_{\beta, \vartheta} [U(\beta, \vartheta, a(\beta)) - \bar{U}]^{\mu} [V(\beta, \vartheta, a(\beta)) - \bar{V}]^{1-\mu}$$

subject to $U(\beta, \vartheta, a(\beta)) \geq \bar{U}, V(\beta, \vartheta, a(\beta)) \geq \bar{V}$.

The general solution of this equation is $(\beta_{\mu}, \vartheta_{\mu}) \equiv \mu(\beta_p, \vartheta_p) + (1 - \mu)(\beta_a, \vartheta_a)$. If $\mu = 1$, the solution is (β_p, ϑ_p) and if $\mu = 0$, the solution is (β_a, ϑ_a) . The manager's effort level is hence $a_{\mu} = a(\beta_{\mu})$. Gross firm performance is the expected stock price $\bar{x}(a_{\mu})$ and net firm performance is the owner's expected return $V(\mu) \equiv (1 - \beta_{\mu})\bar{x}(a_{\mu}) - \vartheta_{\mu}$. It is straightforward that net firm performance will decrease with an increase of managerial power, whereas gross firm performance is not affected (Choe et al., 2008).

The pay-performance-sensitivity in both cases is the same ($\beta_p = \beta_a$). Anyhow, for empirical studies which measure pay-for-performance with the entire salary as dependent variable within the regression, a lower relation between pay and performance can be explained with the help of the model.

5.3.3 Limits and forms of managerial power

There are some constraints that restrict the extent to which additional pay can be gained through managerial power. An important factor is how outsiders perceive the level of executive compensation. If they think the level is too high or the payment is unjustified, a negative reaction by the public – the so called outrage – can be expected. This outrage imposes outrage costs on the directors setting the level and form of payment and the executives' themselves (Bebchuk / Fried, 2004).

If a board approves an extraordinarily high compensation package for a CEO – maybe due to reasons of managerial power – which is also perceived as too high within the public, this could lead to a reputational loss for the directors. This reputational loss would bring along the forfeiture of the benefits of sitting in a board of a publicly traded company (e.g. prestige or connections to prestigious persons). The same holds true for managers. If they extract rents too excessively and high outrage costs are generated, their future career plans might be harmed. If it is conveyed that a CEO cares more about his personal wealth than about the

wealth of his company and specifically the shareholders' wealth, he might not be employed by other companies after his current tenure (Bebchuk / Fried, 2004).

The managerial power approach enables CEOs to extract additional rents and explains why directors might approve extraordinarily high compensation packages. However, the fear of public criticism and the consequences such criticism might have restricts the level of rent extraction. At some point it might even discourage managers to extract rents or board members to accept reward systems enabling the extraction of rents (ibid.).

The main issue of outrage costs is the extent to which the compensation packages are perceived as too high by the public. Thus, managers and directors are incentivized to create compensation packages in such a way that outsiders do not recognize the rewards as being unjustified. They try to hide, obscure or "camouflage" these compensation packages. The "camouflaged" contract / compensation packages are supposed to appear as a result of arms' length contracting, respectively the optimal contracting approach, to the outside. One form of hidden pay can be rewards that do not have to be disclosed in the companies' proxy statements. The probability that outsiders get to know about this remuneration (e.g. retirement pay, deferred-compensation arrangements or other forms of benefits provided to the CEO like company loans or perks) is low. Hence, the danger of outrage is also reduced. Many researchers interpret the rise of such payments or benefits in the past as evidence for the existence of camouflaging and therefore managerial power.

5.3.4 Compensation consultants and the ratcheting up of salaries

The use of compensation consultants is another form of camouflaging excessive compensation contracts, respectively justifying the level and form of compensation contracts to the public. Such consultants are actually used to contribute to an improvement in the design of compensation packages within the optimal contracting approach. On the one hand, compensation consultants are expected to bring in additional expertise in designing compensation packages. On the other hand, their primary work is conducting compensation surveys across different compa-

nies and industries. The companies hiring the consultants hope to receive additional insights in the pay-setting process of other companies (Bebchuk et al., 2002).

However, there are various reasons that such consultants are largely used for camouflaging or justifying too high levels of executive compensation. In a certain way, they also contribute to a steady and unjustified increase in executive compensation and a decoupling of pay from performance. As the consultants are usually hired by the company's HR department, which in turn is subordinated to the CEO, the CEO implicitly has an influence in choosing the compensation consultant. As a result, the consultant – even if only subliminally – will rather recommend a compensation scheme from which the CEO benefits. Otherwise, there might be the jeopardy of not being hired the next years. Again, the CEO can make use of his power to increase his compensation. Furthermore, compensation consultants mostly are on the payroll of consultancies which have additional assignments within the company. This constellation further influences their incentives (Crystal, 1991; Bebchuk / Fried, 2003).

The steering of compensation surveys in a direction that produces results favorable for the CEO or the gathering of data that vindicates a higher compensation are typical practices of compensation consultants. For example, a consultant will likely support the pay-for-performance approach when the company is doing well. When the performance is above (industry) average, they will argue that an above average payment is mandatory. On the other hand, when the company's performance is below average, a consultant will tend to implement a "peer group approach", arguing that compensation should be higher in order to incentivize the CEOs even more and to better reflect the industry levels (Gillan, 2001).

Bizjack et al. (2000) deliver empirical evidence on the issues of compensation consultants. Their analysis of 100 large companies within the S&P 500 index making use of compensation consultants reveals that 96 companies orient themselves by peer groups. In addition, most companies using the peer group approach set remuneration at the fiftieth percentile of the peer group or even higher. This results in a kind of "vicious circle". The compensation packages will automatically increase over time – independent from the actual performance of the CEO. If – hypothetically – the companies continue adapting the remuneration

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packages in the same manner every year, the “hurdle-rate” of the fiftieth percentile will automatically increase from year to year, resulting in a “ratcheting up” of salaries. Again, no pay-for-performance is applied. On the contrary, Bizjack et al. (2002) even find evidence that pay increases from CEOs of poorly performing companies are higher compared to others. In their updated report from 2007, they still find the previously mentioned circumstances (Bebchuk et al., 2002; Bizjack et al., 2002; Bizjack et al., 2007).

6 Discussion, conclusion and outlook

6.1 Discussion

Further attempts to explain an incongruity of theory and empiricism concerning the pay-performance-sensitivity exist. Three of them shall be highlighted shortly in this section.

Political and legal regulations

During the development of executive compensation there have been different attempts by the government (in the United States) to “guide” the reward system of top managers into the “right” direction. The attempts were miscellaneous, ranging from changes within the tax policies to changes of accounting rules, disclosure requirements, direct legislation or other norms and regulations, e.g. concerning the independence of the board of directors. The Sarbanes-Oxley Act of 2002 required the board of directors of companies listed on the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotations (NASDAQ) to have a majority of outside directors (Murphy, 2012).

However, the vast majority of these attempts failed or defeated its purpose. Most of the regulations were ineffective or in some cases even counterproductive. This partly led to a rise of agency problems and compensation levels and induced further unintended effects (ibid.).

Many rules and regulations deployed in the 1990s contributed to an extraordinary increase in the stock option part of executive compensation. One example of a failed governmental regulation concerning performance-based payment is the “Clinton \$1 million deductibility Cap” from 1993. The decree of this section proscribed companies to deduct remuneration to CEOs (and the four highest executive officers according to the proxy statement) from taxes, if the payment exceeds the amount of \$1 million. An exception was created for performance-based pay. Clearly, the intention of the government was to strengthen the link between pay and performance concerning the remuneration of top executives of publicly

traded firms. The attained effect was quite different. Instead of a rise in performance-based pay³⁷ and a decrease in cash-based pay, executives were able to hold their level of cash-based pay constant and simultaneously generate additional rewards through the performance-based pay. Here, some researchers recognize again the power and influence some executives seem to have over the directors. According to theory, an increase in one part of the compensation package would have led to a decrease in another part of the reward scheme (if the performance is assumed to be constant). Further factors contributing to this trend were the implementation of a minimum holding period and option disclosure rules by the SEC, as well as rules concerning the accounting for options or special NYSE listing requirements³⁸ (Bebchuk / Fried, 2004; Murphy, 2012).

There are different explanations why regulations and norms implemented by the government might not be successful. First, each regulation focuses only on one part or aspect of executive compensation. In doing so, incentives for (costly) circumvention of the regulations are set. Second, most regulations are developed and implemented after a specific scandal that usually pertained only to a specific sector or part of a sector. However, the regulations implemented hold true for all companies and by that for many companies that were actually not affected by the scandal. Thus, compensation packages of companies are externally effected although they may have “functioned” well before. For example, the Dodd-Frank Act on executive compensation³⁹ was introduced for all public and private financial institutions, although it was developed as a reaction on the excessive risk-taking by a small number of security brokers and dealers of large publicly traded companies. Finally, one problem lies in the mere fact that regulations are set by politicians. This group of people is mostly incentivized and driven by political agendas and rarely by the goal of increasing or creating shareholder value. The different goals of the politics may influence incentive contracts and hence the predictions of the principal-agent-theory (Murphy, 2012). Political regulations, e.g. a pay cap,

³⁷ Section 162(m) clearly defines which payments are “performance-based” and which conditions have to be met to be classified as “performance-based”. For an overview, I refer to Murphy (2012) page 57 and the following.

³⁸ Giving examples for each of the factors is beyond the scope of this paper. At this point I refer to Murphy (2012) page 73 and the following.

³⁹ For a detailed explanation of the Dodd-Frank Act see e.g. Murphy (2012) page 111 and the following.

are not considered within classic theoretical models. However, the empirical studies are of course influenced by these regulations as they rely on the real data available. Thus, political and legal regulations may contribute partly to the incongruity of theoretical predictions and empirical evidence.

Norms and conventions

Norms and conventions concerning the design of executive compensation packages prevailing in an industry or sector might also prevent the implementation of optimal and efficient contracting.

Most individuals tend to adhere to existing conventions and norms in their lives. As studies show, this also seems to be true concerning the roles of norms in the context of corporate governance (Eisenberg, 1999; Eisenberg, 2001).

The issue of the importance of conventions and norms probably can be transferred from the general topic of corporate governance to the specific topic of executive compensation. Probably, inefficient payment schemes exist and endure as firms – and specifically the board of directors – tend to apply compensation practices of other firms unquestioningly, regardless of whether the payment scheme is “good” (in the sense of a payment scheme that is oriented at the creation of shareholder value) or not (Bebchuk / Fried, 2004).

This attitude can be explained rationally. Adapting an existing payment scheme of another company – probably of the same industry or within the same sector – “protects” the board of directors in a certain way. If they follow these norms and conventions, they do not have to explain or justify themselves, especially when the “output” is not as positive as expected. Remember the “outrage” passage from the managerial power chapter and that directors (and CEOs) try to minimize this outrage. If directors now take another path towards the design of executive compensation packages and this path “fails”⁴⁰, the outrage perceived by the public would be far greater compared to the outrage that would occur if the directors would have followed previously adapted compensation packages and failed thereupon. Hence, the desire to “stick to the Status Quo” is much bigger. This

⁴⁰ A failure in this case could be a compensation package that generously compensates the executives but sets no real incentives concerning the shareholder value orientation.

might lead to an adaption of inefficient contracts or slows down the improvement process of current compensation packages (Bebchuk / Fried, 2004).

The perceived cost approach and the windfall of options

Another approach trying to explain why the massive application of stock (option) payment during the 1990s occurred and why this not necessarily resulted in a stronger tie of pay to performance is the perceived costs approach.

This view argues that options are granted by the board of directors to the CEOs on the basis of the “perceived costs” they induce, rather than on the economic costs. The economic costs for a company of granting an option to an employee are equal to the costs an outsider would have to pay for the option. When granting a “normal” option to the employee, the company does not have to bear accounting charges and does not have an outlay of cash. In addition, when the employee exercises the option, the company grants a new share to him and can deduct the spread between stock and exercise price from taxes. Hence, the perceived costs of an option are far beneath the economic costs of an option (Hall / Murphy, 2003).

At first glance, granting options may be viewed as a better tie of pay to performance. The CEO will receive an additional payment when the stock price performance is good. Hence, an incentive to act in the sense of the shareholders is created. However, a good stock price performance does not necessarily have to result from a good performance of the CEO. The stock performance may only be positive, because the general economic climate is good, or for other reasons, e.g. falling interest rates. Thus, normal options depend to a certain degree on “windfalls” and do not perfectly reflect the actual performance of the CEO. Therefore, a link between pay and performance is not directly reached through an increase in the granting of “normal” stock options (Bebchuk / Fried, 2004).

It would be better to grant options to CEOs that filter out those windfalls. Different methods that exclude these windfalls exist. One example is indexing the exercise price of the option. Such indexed options eliminate the effects of market or sector movements on the company’s stock price. Another possibility is vesting the options or at least some part of them dependent on how the share price performance of the company outperforms the share price performance of competitors.

This constitutes a classic relative performance evaluation (Bebchuk / Fried, 2004).

Here, the perceived costs come into play again. As reduced-windfalls options (e.g. indexed options) do not have a fixed exercise price, they fall out of the “charge-free” zone – at least in the U.S. FASB rules allow companies which grant options with a fixed exercise price and a determined expiration date to do this charge-free. Hence, reduced-windfall options are not subject to this favorable accounting treatment. Companies have to mark these options and accrue an earnings charge in the amount of the spread between the stock price and the indexed exercise price. Hence, the perceived costs of the reduced-windfall options are higher compared to the perceived costs of the “normal” options previously mentioned. As a result, the board of directors favors the granting of the normal options, although this is unfavorable in two ways. First, executives may receive huge bonuses although their actual performance was quite bad. Second, incentives for executives to act in a way positive for the shareholders and the company are softened. If reduced-windfall options were used, shareholders would benefit in different ways. The decoupling of the options from sector and market performances can save shareholders’ money, as the company is able to create the same incentives as with normal options at lower costs. This results from the fact that executives earn less as the influence of the market and sector changes are filtered out. Moreover, the company can grant more reduced-windfall options to the executives at the same money and hence create larger incentives. The company would not pay less money in this case, but – compared to normal options – the executives would need to take decisions that increase shareholder value. Examples for such an incentivized behavior are the reduction of slack or downsizing empires (Bebchuk / Fried, 2004; Hall / Murphy, 2003).

The mistakes and misperceptions of the board of directors concerning the perceived costs is seen as a reason for a partly only weak link between pay and performance. However, there are also advocates of the managerial power approach who interpret the use of normal options instead of reduced-windfall options as a further proof of managers exerting power on the board of directors (ibid.).

Further discussion

Despite the fact that the work tried to create a thorough theoretical and practical overview on the topic of pay-for-performance and pay-performance-sensitivity by considering a large amount of material from different sources, some aspects have to be critically assessed.

The classification of the empirical findings into the categories introduced in the thesis might not be perfectly distinct. The classification took place after a broad overview of the existing literature was gained. Not every study that was categorized e.g. into the category “Empirical findings supporting the incentive intensity principle” clearly concluded that there is a 100 percent accordance between theory and practice. The classification was much more made after comparing the results and conclusions of every study considered within the thesis (and some studies not considered). This stems from the fact that the researchers on their own classify their studies to a certain extent, dependent on personal interpretations or the context in which the results are set. For instance, a \$6.25 increase in personal wealth for a CEO for every \$1000 increase in firm value seems to be a clear evidence for pay and performance for some researchers, whereas others would interpret such a value as a weak link.

Concerning the empirical results of risk-aversion and self-selection / sorting, different factors might negatively influence the meaningfulness of the results. For example, the risk-aversion of the participants is in some cases measured with the help of only one question. This might not perfectly illustrate the real risk-aversion of the employees. Furthermore, some studies only take into account one birth cohort, a special geographic region or only one “kind” of participants. By that, it is hard to prove or disapprove a relation between risk-aversion and occupational choice.

6.2 Conclusion

The present thesis arose from the goal of creating a concise but still comprehensive and holistic overview on both, the theoretical and empirical aspects of pay-for-performance respectively pay-performance-sensitivity.

The theoretical basics of the pay-performance-sensitivity are explained initially. At that, I present the development and characteristics of the principal-agent-theory in a first step. As the principal-agent-theory forms the theoretical framework for contractual agreements and hence implicitly for the pay-performance-sensitivity, the basics of the theory are needed to enable the further understanding of the thesis. In a second step I introduced a LEN-model similar to Holmstrom / Milgrom (1987) and Spremann (1987) in order to explain the theoretical basics of the pay-performance-sensitivity itself.

After the theoretical groundworks are laid, I give first empirical insights by highlighting the development of the level and structure of executive compensation over time. The increasingly complicated structure of executive compensation, together with the scandals at the turn of the millennium, lead to the rise of the question, if CEOs are paid with regard to their actual performance, respectively if there is a link between pay and performance.

I assess this issue by providing a thorough and comprehensive overview on the most important existing empirical results. The fact that there are almost as many empirical studies that support or deny the view of an existence of pay-for-performance, as well as the many studies that are not able to opt clearly for one of that perceptions, illustrates the complexity of this topic. However, the fact that there are more authors that “changed” their opinion from a “no-pay-for-performance-attitude” to a “pay-for-performance-attitude” (e.g. Murphy) might be interpreted as evidence that the link between pay and performance increases. The chapter is complemented with empirical evidence on a special issue of the pay-for-performance: the effects of sorting / self-selection through the individual risk-aversion. Most of the studies show that risk-averse employees are apt to be working in sectors, branches and occupations in which compensation does not depend on the (personal) performance to a large extent.

Chapter 5 illustrates that a partly missing link between pay and performance in practice can stem from different factors. I display that the presence of sorting, a downward biased performance measurement within some empirical studies and the existence of managerial power can be identified as important drivers of an

incongruity between theoretical predictions and some empirical studies. However, the discussion shows that there are many further influencing factors which impact executive compensation and hence the pay-performance-sensitivity.

6.3 Outlook

A better and closer collaboration between researchers of different geographic regions is recommended for future research. So far, almost every study focuses only on one geographic region and / or a small and limited sample. This holds true for the general studies on the topic pay-for-performance as a whole as well as for the special issue of risk-aversion and self-selection / sorting. Interestingly, much more studies on the latter issue were found for Europe, whereas American studies are dominating the pool of studies on pay-performance-sensitivity. It would be interesting to see, which results “global” studies on the topics of pay-for-performance and risk-aversion and self-selection / sorting would offer. Such an international comparison might reveal geographic differences due to distinct cultural and historical backgrounds. For instance it would be interesting to find out, if a lower pay-performance-sensitivity exists in countries in which an “envy culture” is not that distinct as in other countries. Maybe the pay-performance-sensitivity in such countries is lower, as executives are able to earn more money at the same performance as “normal” employees do not envy them and do not begrudge the achievements of an executive. Concerning the issue of risk-aversion, such a global analysis could for instance reveal different sorting and self-selection mechanisms. For example, one could expect individuals from countries in which the “degree of uncertainty” is rather high (e.g. due to economic crisis or war) to be more risk-averse than individuals that grow up in a “safe” environment. According to theory such individuals would prefer safer occupations. Hence, the share of people working in such safe occupations should be higher in “uncertain” countries compared to “safe” countries. These are only two examples of possible fields of research that would be worthwhile to be examined within a “global” approach on the issue.

The more importance the issue pay-for-performance will gain in the future, the more important will be a thorough, global and comprehensive approach towards the topic, from a theoretical and practical point of view.

The present thesis can be seen as a “starting point” for an attempt to consolidate and compress the already existing quantity of essays and studies on this topic.

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Abstract

Deutsch

Die vorliegende Arbeit stellt eine Abschlussarbeit im Masterstudiengang „Betriebswirtschaft“ der Universität Wien dar. Die Ausarbeitung diskutiert das Thema „Pay-Performance-Sensitivity – a theoretical approach and its empirical evidence“.

Der Leser erhält zu Beginn Einsicht in die relevantesten Faktoren der Principal-Agent-Theory und der Pay-Performance-Sensitivität. Hierbei werden grundlegende theoretische Aspekte erläutert und ein LEN-Modell erstellt, welches als Bezugspunkt für weitere in der Arbeit erläuterte Modelle dient. Nach dem Aufzeigen der Entwicklung der Vorstandsvergütung über die letzten Jahrzehnte erfolgt eine ausführliche Literatürübersicht über empirische Studien zum Thema Pay-Performance-Sensitivität. Hierbei werden sowohl empirische Werke, die einen Zusammenhang zwischen Entlohnung und Performance erkennen, als auch Werke, die einen solchen Zusammenhang verneinen, sowie Werke, die keinen klaren Standpunkt beziehen wollen / können, aufgezeigt und die wichtigsten Erkenntnisse erläutert. Ergänzt wird das Kapitel um eine Übersicht empirischer Befunde bezüglich einer Sonderthematik der Pay-Performance-Sensitivität und des Anreizintensitätsprinzips – der Risiko-Aversion von Agenten und etwaigen Selbstselektions- oder Sortierungseffekten.

Im darauffolgenden Kapitel werden anhand diverser Modelle Gründe für die Nichtübereinstimmung von theoretischen Vorhersagen des LEN-Modells und empirischen Befunden bezüglich der Pay-Performance-Sensitivität erläutert. Die Arbeit schließt mit einer Diskussion, in welcher weitere theoretische, jedoch nicht Modell-gestützte, Erklärungsversuche für eine Nichtübereinstimmung von theoretischen Vorhersagen und empirischen Befunden diskutiert werden. Des Weiteren erfolgt ein Fazit und es wird ein Ausblick auf zukünftig interessante Themen- und Forschungsgebiete im Bereich der Pay-Performance-Sensitivität gegeben.

English

The present thesis depicts a final assignment in the master degree course “Business Administration” at the University of Vienna. The thesis discusses the topic “Pay-Performance-Sensitivity – a theoretical approach and its empirical evidence”.

At the beginning the reader receives insights into the most relevant factors of the Principal-Agent-Theory and the Pay-Performance-Sensitivity. In the course of that basic theoretical aspects are explained and a LEN-model is set up that serves as reference point for further models illustrated in the thesis. After showing the development of executive compensation over the past decades, an extensive literature overview of empirical studies on the issue of Pay-Performance-Sensitivity is given. Empirical studies recognizing a relation between pay and performance, as well as studies not recognizing such a relation and studies that do not want to / are not able to clearly take up a position are illustrated and the key-highlights are outlined. The chapter is complemented by an overview of empirical studies regarding a special issue of the Pay-Performance-Sensitivity and the incentive intensity principle – the risk-aversion of agents and possible self-selection and sorting effects.

In the following chapter different reasons for an incongruity of theoretical predictions of the LEN-model and empirical results regarding the Pay-Performance-Sensitivity are explained with the help of several models. The work closes with a discussion in which further theoretical but not model-based approaches for an explanation of the incongruity of theoretical predictions and empirical results are examined. In addition, a conclusion and an outlook on interesting topics and fields of research in the future concerning the Pay-Performance-Sensitivity are given.