

**Value-based Management in Practice: Effects of Implementation
Forms, Compensation Schemes and Investor Relations on
Financial Performance**

DISSERTATION



zur Erlangung des akademischen Grades eines
Doktors der Wirtschaftswissenschaften an der Universität Passau

vorgelegt von

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Dezember 2014

Tag der Disputation: 14.09.2016

Acknowledgements

At the beginning of this thesis, those people that made this thesis possible shall receive my thanks. At first, I would like to thank my doctoral adviser, Prof. Robert Obermaier. He has been a constant source of intellectual stimulation in the past three years and has regularly given me new impulses to improve my work. The atmosphere at his chair provided me with enough space for self-fulfillment, in order to follow through with my research ideas. His numerous appeals for me to be more patient have helped me not to lose focus for the essential. At this point, I also want to thank Prof. Oliver Entrop for taking over the second supervision.

Special thanks also goes to my colleagues Florian Kaiser, Christian Maier and Dr. Josef Schosser, who picked me up in times of doubt through constant amusement, but also challenged me in plenty of discussions. I will miss our mutual gym time but I will always have a happy memory. I also want to thank our assistant, Ulrike Haberl, who always had a smile for everyone down pat and therefore significantly contributed to the good atmosphere.

Further I would like to thank my colleagues of the BMW Group Investor Relations team who have supported me throughout the three years, by giving me enough space for my research. It must have been hard for them to endure the volume increases on Thursdays and Fridays. Not to mention the printing costs. Especially, I want to thank Torsten Schüssler, whose leap of faith made the whole project possible in the first place and whose practical expertise had a large impact in particular on the fourth article of this thesis. Special thanks go to Christa Krieger, who I owe most of my professional career so far. For without her, I would have never started the internship that eventually has lead to this project. She has supported me unconditionally in each and every situation. I am sure, she still does.

It would be a remiss not to thank my parents at this point. The sacrifices they made were significant and allowed me to take the chosen path in the first place. I will always be grateful for this. At last, I would like to thank my wonderful wife, Joanna, whose love and support was a major factor for this project to be successful. She endured the numerous weekends alone and also the endless nights when I came to bed late.

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Preface

The necessity for concepts such as value-based management arises from the question on the overall corporate objective function. One answer to this question can be found in the seminal work of *Rappaport* of 1986: A company's overall objective is the long-term increase of shareholder value. The shareholder value is the residual portion of company value that belongs to the owners of a company after the claims of other capital suppliers have been settled. If all companies in a competitive environment maximize shareholder value, also social welfare is maximized (*Loderer et al.* 2010). This relationship, and therefore the validity of the objective, is however based on the rather strong assumptions. One key assumption is that all parties related to the company that are not shareholders, the so called stakeholders, are protected by complete contracts and their interests are fully covered by these contracts.¹ In contrast, shareholders do not possess such a contract and therefore they need to gain control over the company and its residual earnings (*Tirole* 2001). Accordingly, a company's overall objective is to increase these residual earnings for shareholders. Critics of the shareholder value principle insist in particular on the fact that complete contracts do not exist in reality and further, that companies are responsible for their externalities. Both arguments shake on the foundation of the shareholder value as corporate objective. Critics of the shareholder value principle therefore propose a different objective function: stakeholder value maximization. According to this approach, a company, or its managers, should try to maximize the sum of all stakeholders' surpluses (*Tirole* 2001). This of course implies trade-offs between the different interests of stakeholders, which can easily be illustrated when looking at e.g. the price setting process of a product. Whereas customers want low prices and high quality this, all else equal, leads to lower salaries of employees (*Loderer et al.* 2010). The missing delivery of solutions for these trade-offs through the stakeholder value concept conversely is the major critique by proponents of the shareholder value concept.

But neither of the two concepts can persist without the respective other and the contradictoriness between both concepts might be based on a misunderstanding of the shareholder value concept. It is hard to imagine that a company can create long-term shareholder value without motivated and qualified employees. Eventually also proponents of the stakeholder value concept need to ask themselves, how to distinguish well and badly performing companies, when a single-valued objective function is missing. In order to align both concepts, *Jensen* (2002) suggests an enlightened value maximization concept or

¹ Remaining assumptions: complete markets, individuals act as price takers, perfect information, no transaction costs and local non-satiation of preferences

enlightened stakeholder theory. The enlightened value maximization concept, as well as an enlightened stakeholder theory, accept the long-term increase of shareholder value as corporate objective, by satisfying stakeholders' needs. Implicitly, *Jensen* (2002) assumes a cause and effect relationship, where pursuing stakeholder interests is the reason for shareholder value to increase. This relationship between stakeholders and shareholders is also what *Rappaport* (1986) had in mind by stating: "This view recognizes that to continue to serve all stakeholders, companies must be competitive if they are to survive. This view further recognizes that a company's long-term destiny depends on financial relationship with each stakeholder that has an interest in the company" (*Rappaport* 1986, p. 7).

Each objective generally needs accordingly designed management control systems to pursue the objective on a daily basis. At this point the concept of value-based management comes to mind. The concept of value-based management is closely associated with the enlightened value maximization principle. Under this concept, company value shall be created in the long-term by identifying company specific financial and non-financial value drivers (*Stewart* 1991, *Young / O'Byrne* 2001). Value drivers hereby are especially concerned non-financial value drivers such as created innovations or employee satisfaction. These value-drivers are assumed to be leading indicators of value-based metrics that are assumed to have an influence in the future (*Young / O'Byrne* 2001). In order to control the company, the concept of value-based management suggests using value-based metrics. These value-based metrics are almost exclusively based on the residual income and therefore have one in common: They can be used to determine the company value in accordance with discounted cash flows, whereas the sum of discounted future residual incomes with the cost of capital equals the company value (*Preinreich* 1937, *Lücke* 1955). Due to these unique characteristics of value-based metrics an application in management control systems can provide incentives to increase company value (*Zimmerman* 1997).

Advocated by leading consulting firms, the concept of value-based management has enjoyed popularity and found its way into corporate practice in the mid 1990s. But the large breakthrough of value-based management held off, especially in the German landscape. Empirical investigations regularly document that value-based metrics are commonly applied only in large companies and even in these companies value-based metrics are applied inconsistently (e.g. *Aders et al.* 2003, *Lueg* 2010). Inconsistently means that value-based metrics are not applied in all management control systems. However, a consistent use of value-based metrics is what the concept of value-based management is based on (*Stewart* 1991, *Young / O'Byrne* 2001).

Generally, management control systems can be separated in accordance with the classical framework of *Demski / Feltham* (1976) as either decision facilitating systems, when the information is provided ex ante before the decision, or as decision influencing systems, when the information is provided ex post in an evaluation process. These two functions are not exclusive but highly interdependent: One piece of information can be used for decision facilitating and decision influencing purposes at the same time (*Obermaier / Müller* 2008). This differentiation corresponds with the results of a seminal study of *Simon et al.* (1954) that reveals that accounting information are used for three interrelated purposes: scorecard keeping, attention directing and problem solving. Scorecard keeping means the target setting process and measuring the status quo. After measuring relevant indicators, the company receives information about differences between the targets set and the current state. The company can now allocate focus towards the reasons for these issues in the attention directing step. Eventually, solutions should be found for these issues. The framework of *Simon et al.* (1954) acts on the assumption that the three process steps of scorecard keeping, attention directing and problem solving are consistent. It would be inefficient for example to draw attention to a certain performance metric and then to measure something different. However, this is what happens according to the empirical investigations on the spreading of value-based management in German corporations (e.g. *Aders et al.* 2003, *Lueg* 2010). These studies document that value-based metrics are regularly applied in management control systems in German companies, but without tying compensation to them. To date it is largely unknown whether these dominating partial implementations of value-based management in corporate practice actually lead to decisions in accordance with the concept and eventually to an increase in company performance. Such results would be of major practical importance. However, existing literature falls short of investigating performance effects of partial implementations of value-based management. Further, it remains an open question what drives partial implementations of value-based management in corporate practice.

Therefore, these issues are topic of the first three articles in this cumulative thesis. In the first article (*“Zur Entwicklung des Status-quo der Vorstandsvergütung in deutschen Unternehmen: Regulierung, Struktur und Wertorientierung“*) the status quo of value-based management in German board compensation systems is investigated. The database of the first article is extended and analyzed in the second article (*“The Role of different Forms of Value-based Management Implementations and their Effects on Value Drivers and Firm Performance”*) where the especially the performance implications of partial implementations of value-based management are investigated. The third article (*“Value-based Management:*

An Instrument For Underperformer?") addresses the question on why partial implementations of value-based management come up in German companies.

Another aspect of value-based management, apart from management control systems, is the external communication of value relevant information. Companies invest high amounts of money in undertaking activities to disclose value relevant information to capital market participants (*Bushee / Miller 2012*). These activities are regularly consolidated under the terms “Voluntary Disclosure”, “Value-Reporting” or “Investor Relations”. Such reporting facilitates the transformation of company internal value generation into market valuation (*Ruhwedel / Schultze 2002*). Quality differences in such disclosure activities are topic in the fourth article, in particular focusing on investor relations activities (“*Capital Market Effects of High Quality Investor Relations Activities - The European Evidence*”).

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Zur Entwicklung des Status-quo der Vorstandsvergütung in deutschen Unternehmen: Regulierung, Struktur und Wertorientierung

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Zusammenfassung:

Ziel der vorliegenden Arbeit ist es, die Auswirkungen der zahlreichen regulatorischen Vorgaben auf die Gestaltung der Vergütungssysteme zu analysieren und dabei ihre Ausrichtung auf eine am Unternehmenswert orientierte Steuerung zu diskutieren. Die Ergebnisse zeigen, dass regulatorische Eingriffe insbesondere durch das VorstOG, das VorstAG und den DCGK auf die Ausgestaltung der Vorstandsvergütung wirken. Jedoch zeigt die eingehende Analyse der empirischen Entwicklung des Status-quo der Vorstandsvergütung in deutschen Unternehmen auch, daß von einer Vorstandsvergütung im Sinne der Anteilseigner allenfalls nur mit Einschränkungen gesprochen werden kann, was unter Rückgriff auf den *managerial power approach* erklärbar ist.

Stichwörter: Vorstandsvergütung; Regulierung; Struktur; Wertorientierung.

JEL: M12, M48, M52.

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1. Problemstellung

Das Thema Vorstandsvergütung ist in der täglichen Berichterstattung en vogue und wird von Gesellschaft und Gesetzgeber gleichermaßen kritisch beäugt. Auch in der Wissenschaft ist sie Gegenstand zahlreicher empirischer Untersuchungen, in deren Vordergrund die regelmäßige Dokumentation von Höhe und Struktur aktuell gewährter Vorstandsgehälter, die Analyse ausgewählter Vergütungskomponenten wie z.B. den sog. Long Term Incentives (LTI) oder eine Analyse möglicher Anreiz- und Performancewirkungen stehen.

Mitunter kommt der Einfluß regulatorischer Vorgaben (*Gesetz zur Offenlegung der Vorstandsvergütung*, *Gesetz zur Angemessenheit der Vorstandsvergütung*, *Deutscher Corporate Governance Kodex*) zu kurz, denen die Vorstandsvergütung in besonderem Maße unterworfen ist. Diesen Regelungen ist gemein, daß sie eine tendenziell „transparentere“, „nachhaltigere“ und „angemessenere“ Vorstandsvergütung anstreben, wobei allerdings offen bleibt, inwiefern diese Ziele in den jeweils realisierten Vergütungssystemen erreicht werden und wie sie überdies zu erreichen sind. Damit wird die Gemengelage des Problemkomplexes Vorstandsvergütung offenbar: Sie ist im Spannungsfeld öffentlichen Interesses diversen regulatorischen Eingriffen unterworfen und soll gleichzeitig konkrete Anreizwirkungen entfalten und Fehlanreize vermeiden.

Ziel der vorliegenden Arbeit ist es, zunächst die Auswirkungen der zahlreichen regulatorischen Vorgaben auf die Gestaltung der Vergütungssysteme zu analysieren, um anschließend insbesondere ihre Ausrichtung auf eine am Unternehmenswert orientierte Steuerung zu diskutieren. Folgende grundsätzlichen Forschungsfragen stehen daher im Vordergrund:

- (1) Welche Einflüsse zeigen die diversen regulatorischen Eingriffe auf Ausgestaltung und Struktur von Vorstandsvergütungssystemen deutscher Unternehmen im Zeitablauf?
- (2) Wie sind die in der Praxis realisierten Vergütungssysteme aus Anreizsicht im Kontext einer sog. wertorientierten Unternehmensführung zu beurteilen?

Diskutiert werden Anreiz- und Vergütungssysteme in der betriebswirtschaftlichen Literatur seit geraumer Zeit.¹ Dabei werden, um die Interessen der Vorstände den maßgeblichen Interessen der Anteilseigner anzugleichen, vom Schrifttum vor allem sog. wertorientierte Vergütungssysteme vorgeschlagen.² Inwieweit die in der Praxis

¹ Vgl. Murphy (1998), Jensen et al. (2004)

² Vgl. Stewart (1991), Zimmerman (1997), Rogerson (1997), Reichelstein (1997), Young / O’Byrne (2001)

implementierten Vergütungssysteme zu einer Interessenharmonisierung zwischen Vorständen und Anteilseignern führen, ist ebenfalls Gegenstand der Analyse.

Die Arbeit ist wie folgt aufgebaut. Nach einem Überblick über die relevante Literatur in Kapitel 2 werden in Kapitel 3 die relevanten Rahmenbedingungen erläutert, ehe die detaillierten Forschungsfragen abgeleitet werden. Die Ergebnisse der Analyse werden in Kapitel 4 dargestellt und diskutiert. Die Studie schließt mit einem Fazit in Kapitel 5.

2. Literaturüberblick

Regelmäßig erscheinen kommerzielle, zumeist nicht öffentlich zugängliche Studien, die die Gestaltung der Vorstandsvergütung in deutschen Unternehmen dokumentieren. Wissenschaftliche Beiträge, die die Ausgestaltung der Vorstandsvergütungssysteme in deutschen Unternehmen umfassend untersuchen und sie im Kontext der betriebswirtschaftlichen Literatur diskutieren, sind rar. Aufgrund der zumeist kurzen Untersuchungszeiträume können überdies die Auswirkungen der zahlreichen regulatorischen Eingriffe in die Gestaltung der Vorstandsvergütung nicht abschließend untersucht werden. Empirische Untersuchungen der Vorstandsvergütungssysteme deutscher Unternehmen geben zumeist entweder nur einen Überblick über die Gestaltung der Vorstandsvergütungssysteme, oder greifen lediglich einzelne Aspekte der Vorstandsvergütung heraus.

Rapp / Wolff (2011) zeigen, daß die durchschnittliche Vorstandsvergütung im Jahr 2010 das Vorkrisenniveau des Jahres 2007 bereits um 5% überstieg. Dabei war im Durchschnitt aller untersuchten Prime Standard-Unternehmen 9% (7% 2009) der Vergütung aktienkursbasiert, 36% (30% 2009) variable Barvergütung und 55% (63% 2009) Fixvergütung. Auch die Zahl der Unternehmen, die ein Malus-System oder Ausschüttungssperren verwendeten, nahm im Jahr 2010 gegenüber 2009 zu. Insgesamt hat sich insbesondere die Komplexität der Vergütungssysteme erhöht, da beispielsweise im Jahr 2010 55% der DAX-Unternehmen mindestens drei Kennzahlen zur Bonusbemessung herangezogen haben, im Gegensatz zu 13% im Jahr 2009. Abschließend halten *Rapp / Wolff* (2011) fest, daß ein Trend hin zu langfristig orientierten Vergütungssystemen zu beobachten sei.

Friedl / Pfeiffer (2014) geben ähnlich wie *Rapp / Wolff* (2011) einen Überblick über die Ausgestaltung der Vorstandsvergütung und betrachten dabei die Vorstandsvergütung der DAX- und MDAX-Unternehmen. Sie zeigen, daß ein DAX-Vorstand im Jahr 2012 im Mittel 3.243 Tsd. € verdiente, ein MDAX-Vorstand 1.555 Tsd. €. Im Verhältnis zu einem durchschnittlichen Mitarbeiter verdienten Vorstände damit das 53-fache. Die variable

Vorstandsvergütung war im Jahr 2012 die dominierende Vergütungskomponente in den DAX-Unternehmen, mit einem Anteil von 46,6% an der Gesamtvergütung, wobei 24,5% einjährig und die restlichen 22,1% mittelfristig bemessen waren. Im Vergleich zu 2009, als nur 3,6% der variablen Vergütungskomponenten mittelfristig bemessen waren, ist dies ein bemerkenswerter Anstieg. Sie zeigen weiter, daß 28,3% auf die Fixvergütung fielen und 25,1% auf die aktienbasierten Vergütungskomponenten. *Friedl / Pfeiffer (2014)* weisen außerdem darauf hin, daß die untersuchten Unternehmen neben finanziellen Kennzahlen zunehmend nicht-finanzielle Kennzahlen zur Bonusbemessung heranziehen. Ähnlich wie die Studie von *Rapp / Wolff (2011)* fokussieren auch *Friedl / Pfeiffer (2014)* hauptsächlich auf die Struktur der Vorstandsvergütung, ohne jedoch genauer auf die konkrete Ausgestaltung der Komponenten einzugehen. Fragen nach der Ausgestaltung von Obergrenzen oder nach der Wahl der Bemessungsgrundlagen der einzelnen Vergütungskomponenten bleiben unbeleuchtet.

Koch / Raible / Stadtmann (2011) untersuchen die aktienbasierte Langfristvergütung, die 2006 bis 2009 von den DAX und MDAX-Unternehmen gewährt wurde. Im Rahmen der Untersuchung wird zwischen dem Zeitwert bei Gewährung und dem tatsächlich ausgezahlten Betrag aus aktienbasierten Komponenten, differenziert. Sie stellen fest, daß nur ein Bruchteil der zugewiesenen aktienbasierten Vergütungskomponenten am Ende der Laufzeit ausgebezahlt wurde. So bestand die Gesamtvergütung im Untersuchungszeitraum zwischen 16 und 20% aus Zeitwerten aktienbasierter Vergütungskomponenten bei Gewährung, aber nur zu 5 bis 9% aus Auszahlungen aktienbasierter Vergütungskomponenten. Obwohl *Koch / Raible / Stadtmann (2011)* auf eine detaillierte Diskussion verzichten, zeigen deren Ergebnisse, daß ein Großteil der ursprünglich gewährten aktienbasierten Komponenten nicht ausbezahlt wurde, da die vereinbarten Ziele nicht erreicht wurden. Es bleibt jedoch offen, auf Basis welcher Kennzahlen diese Ziele vereinbart wurden.

Judith / Sommer (2012) untersuchen anhand von 57 Unternehmen des DAX und MDAX aktienbasierte Vergütungskomponenten und analysieren detailliert die Ausgestaltung dieser Vergütungskomponenten. Im Fokus ihrer Analyse steht die Frage, ob die gewährten aktienbasierten Vergütungskomponenten Anreize zur Steigerung des Shareholder Value schaffen. Sie thematisieren das Fehlen von Eigeninvestment der Vorstände in die Aktien des Unternehmens sowie die kurze Dauer von Zugriffssperren. Zudem würden aktienbasierte Komponenten regelmäßig an die absolute Kursentwicklung gebunden, welche sich zur Performancemessung jedoch nur eingeschränkt eignet. Daher wird eine relative Bemessung im Vergleich zu Indizes oder anderen Vergleichsgruppen vorgeschlagen.

Götz / Friese (2012) untersuchen die Veränderung der Vergütungssysteme im Jahr 2011 gegenüber 2010 anhand der DAX und MDAX-Unternehmen und analysieren, ob die untersuchten Unternehmen die Vorstandsvergütungssysteme an die Anforderungen des VorstAG angepasst haben. Sie stellen fest, daß 65 der 80 untersuchten Unternehmen bereits im Jahr 2010 die Regelungen des VorstAG vollumfänglich umgesetzt haben. Von den restlichen 15 Unternehmen passen 8 Unternehmen das Vergütungssystem im Sinne des VorstAG im Jahr 2011 an. Ähnlich wie Rapp / Wolff (2011) kommen auch Götz / Friese (2012) zum Ergebnis, daß die Komplexität der Vorstandsvergütungssysteme, aufgrund der Vielzahl an verwendeten Kennzahlen zur Bonusbemessung, zugenommen hat.

3. Theoretische und regulatorische Grundlagen

3.1 Theoretische Grundlagen

Fallen Eigentum und Verfügungsgewalt in Unternehmen auseinander, entsteht zwischen Anteilseignern und Managern eines Unternehmens eine sog. Prinzipal-Agenten-Beziehung.³ Diese Beziehung ist grundsätzlich gekennzeichnet durch Informationsasymmetrien zu Lasten des Prinzipals, wobei im Rahmen der sog. Agency-Theorie zwischen Informationsasymmetrien vor bzw. nach Vertragsabschluss unterschieden wird, die im Kontext der Vorstandsvergütung besonders relevant sind.

Bereits vor Vertragsabschluß besteht das *hidden characteristics* Problem, denn der Prinzipal kennt die Eigenschaften des anzustellenden Agenten nicht vollumfänglich. So ist es dem Prinzipal nur eingeschränkt möglich, den für das Unternehmen geeignetsten Manager zu finden. Nach Vertragsabschluß wird zwischen *hidden action* bzw. *hidden information* und *hidden intention* unterschieden. Der Prinzipal kann nach Anstellung des Agenten nur das vom Agenten realisierte Ergebnis beobachten, nicht aber die Handlungen des Agenten selbst (*hidden action*). Desweiteren weiß der Prinzipal nicht, inwieweit der Agent für das Ergebnis verantwortlich ist, falls der Agent diese Information für sich behält (*hidden information*). So ist es beispielsweise möglich, daß der Agent aufgrund günstiger Umstände ein gutes Ergebnis erreicht (windfall profits). Der Agent wird dabei stets seine eigenen Interessen und nicht zwingend die Interessen des Prinzipals verfolgen (*hidden intention*). Während die Anteilseigner annahmegemäß eine langfristige Steigerung des Unternehmenswerts verfolgen, strebt der Manager – ebenfalls annahmegemäß – nicht zwingend danach, sondern z.B. nach hohem Einkommen, Macht oder Prestige. Aufgrund dieser per se nicht optimalen Beziehung

³ Vgl. Berle / Means (1932)

zwischen Prinzipal und Agent entstehen sog. *agency costs*.⁴ Zu deren Reduktion können Anteilseigner beispielsweise Vergütungssysteme implementieren, um die Interessen der Manager an ihre Interessen anzugleichen.

Ein „ideales“ Vergütungssystem erreicht dabei vier Ziele, die gleichzeitig als Bewertungskriterien für praktische Vergütungssysteme in der Analyse dienen sollen: Die für das Unternehmen besten Manager sollen (1) zu möglichst niedrigen Kosten (2) angezogen, (3) gehalten und (4) dazu motiviert werden, die Ziele der Anteilseigner zu verfolgen.⁵ Damit Manager angezogen bzw. gehalten werden, muss das Unternehmen eine Vergütung anbieten, die die Opportunitätskosten des Managers übersteigen. Die Opportunitätskosten entsprechen hierbei dem sog. Reservationsnutzen des Agenten, den dieser auch ohne allfälligen Vertrag erzielen kann. Damit der Agent einen Vergütungsvertrag akzeptiert, muss die erwartete Auszahlung aus dem Vergütungsvertrag also einen Nutzen mindestens in Höhe des Reservationsnutzens des Agenten stiften.

3.1.1 Optimal Contracting Theory

Wenn Manager (annahmegemäß) nicht zwingend im Sinne der Eigentümer agieren, sollen sie z.B. durch variable Vergütungskomponenten dazu angeregt werden, in Übereinstimmung mit den Zielen der Anteilseigner zu handeln. Im Sinne der *optimal contracting theory* ist dazu eine lineare Vergütungsfunktion zu wählen, die Handlungen des Managers nur dann zusätzlich entlohnt, wenn der Unternehmenswert steigt und im Gegenzug sanktioniert, sollte der Unternehmenswert fallen.⁶ Dieser Zusammenhang wird im Allgemeinen als *pay-for-performance-relation* bezeichnet.⁷ Das Problem dabei ist, daß der Beitrag einer Handlung des Managers zum Unternehmenswert unmittelbar kaum messbar ist.⁸ Somit muss eine Kennzahl gefunden werden, die einerseits das Resultat der Handlungen des Managers abbilden kann und andererseits mit dem Unternehmenswert kausal verbunden ist, um überhaupt erst Anreize im Einklang mit den Interessen der Anteilseigner schaffen zu können.⁹ In diesem Kontext zeigen z.B. die Modelle von *Rogerson (1997)* und *Reichelstein (1997)*, daß wertorientierte Kennzahlen diese beiden Kriterien unter ganz bestimmten Bedingungen erfüllen können. Bei kürzerem Zeithorizont, stärkerer Ungeduld oder höherer Risikoaversion des Managers kann wiederum nicht ohne weiteres von Zielkongruenz ausgegangen werden. Zur Linderung dieses

⁴ Vgl. Jensen / Meckling (1976)

⁵ Jensen et al. (2004) S. 19

⁶ Jensen et al. (2004), S. 75

⁷ Vgl. Jensen / Warner (1988), Jensen / Murphy (1990a)

⁸ Jensen et al. (2004), S. 78

⁹ Zimmerman (1997), S. 105

Problems können langfristige Vergütungskomponenten gewährt werden, um explizit langfristig orientierte Entscheidungen des Managers adäquat zu vergüten.

3.1.2 Managerial Power Approach

Variable und insbesondere langfristige Vergütungskomponenten können mitunter zwar im Sinne der Anteilseigner sein, sind für Manager jedoch, dem sog. *managerial power approach* folgend, aufgrund des Auszahlungsrisikos nur wenig motivierend.¹⁰ Manager präferieren demnach keine langfristigen variablen Vergütungskomponenten, sondern ein möglichst hohes Fixgehalt mit möglichst wenigen variablen Vergütungskomponenten. Die Vorstandsvergütung ist dabei nicht das Ergebnis des Optimierungskalküls eines Prinzipals (gemäß *optimal contracting theory*), sondern das Ergebnis der Macht und der damit verbundenen Einflußmöglichkeiten eines Managers. Offenbar steht der *managerial power approach* der *optimal contracting theory* konträr gegenüber, so daß die Struktur der Vorstandsvergütung aus dem Blickwinkel von zwei teilweise konkurrierenden Theorien diskutiert werden kann: Abweichungen von Vergütungssystemen von linearen *pay-for-performance-relationen* könnten beispielsweise im Lichte des *managerial power approach* diskutiert werden.

3.2 Gesetzliche und freiwillige Rahmenbedingungen

Neben theoretischen Überlegungen spielen vor allem regulatorische Vorgaben eine zentrale Rolle bei der Gestaltung von Vergütungskomponenten, die im Folgenden näher beleuchtet werden sollen.

3.2.1 Gesetz zur die Offenlegung der Vorstandsvergütung (VorstOG)

Das *Gesetz zur Offenlegung der Vorstandsvergütung* von 2005 verpflichtet, mit erstmaliger Auswirkung auf das Geschäftsjahr 2006, börsennotierte Aktiengesellschaften zur individuellen Offenlegung der Vorstandsbezüge in gesonderten Vergütungsberichten. Einzeln anzugeben sind dabei erfolgsunabhängige und erfolgsabhängige Bestandteile der Vorstandsvergütung, sowie Komponenten mit langfristiger Anreizwirkung. Desweiteren wird der Begriff der Gesamtvergütung definiert, der auch dieser Untersuchung zu Grunde liegt. Die Gesamtbezüge enthalten Gehälter, Gewinnbeteiligungen, Bezugsrechte und sonstige aktienbasierte Vergütungen, die mit ihrer Anzahl und dem Zeitwert bei Gewährung (*fair value at grant*) angegeben werden müssen sowie Aufwandsentschädigungen, Versicherungsentgelte, Provisionen und Nebenleistungen jeder Art. Besonders relevant ist

¹⁰ Vgl. Bebchuk / Fried / Walker (2002), Bebchuk / Fried (2003)

dabei die Regelung des Ausweises aktienbasierter Vergütungskomponenten, da hier auch eine andere Vorgehensweise denkbar wäre. So wäre beispielweise auch ein Ausweis der tatsächlichen Auszahlung aus aktienbasierten Vergütungskomponenten als Teil der Gesamtvergütung denkbar, da der Zeitwert einem rechnerischen Wert des aktienbasierten Vergütungspakets zum Zeitpunkt der Gewährung entspricht. *Koch / Raible / Stadtmann* (2011) zeigen, daß eine alternative Vorgehensweise nicht zu unterschätzende Einflüsse auf die Höhe der ausgewiesenen Gesamtvergütung hätte, da die tatsächliche Auszahlung stets niedriger war, als der Wert der gewährten aktienbasierten Komponenten.

3.2.2 Gesetz zur Angemessenheit der Vorstandsvergütung (VorstAG)

Im Jahr 2009 trat das *Gesetz zur Angemessenheit der Vorstandsvergütung* in Kraft. Die Intention des Gesetzes ist die Festlegung von Kriterien, die erfüllt sein müssen, damit von einer angemessenen Vergütung gesprochen werden kann. Der Fokus liegt dabei auf der Schaffung langfristiger Anreize und der Nachhaltigkeit der Handlungen von Vorständen. Wörtlich regelt das VorstAG:

„Die Vergütungsstruktur ist bei börsennotierten Gesellschaften auf eine nachhaltige Unternehmensentwicklung auszurichten. Variable Vergütungsbestandteile sollen daher eine mehrjährige Bemessungsgrundlage haben; für außerordentliche Entwicklungen soll der Aufsichtsrat eine Begrenzungsmöglichkeit vereinbaren.“ (§ 87 Abs. 1 AktG)

Ausgeschlossen ist dadurch nicht, daß kurz- und langfristige Vergütungskomponenten in Verbindung miteinander gewährt werden, solange sie auf eine nachhaltige Unternehmensentwicklung ausgerichtet sind und mehrjährig bemessen sind. So können beispielsweise auch mehrjährige Bemessungsgrundlagen (z.B. dreijähriger Durchschnitt des EBIT) jährlich vergütet werden. Entscheidend für eine nachhaltige Ausrichtung ist somit nicht etwa der Zeitpunkt der Auszahlung sondern die Wahl der richtigen Bemessungsgrundlage, über die jedoch keine konkreten Aussagen zu finden sind.

Als „angemessen“ bzw. „üblich“ gilt eine Vergütung die im vertikalen und horizontalen Vergleichsumfeld liegt. Als vertikal wird dabei das Verhältnis zum Lohngefüge innerhalb des Unternehmens bezeichnet und als horizontal das Verhältnis zur Branche, Unternehmensgröße und Landesüblichkeit. Weiter sollen performanceabhängige Vergütungskomponenten langfristige Anreize setzen und nicht zu stichtagsbezogenen Verschiebungen (bspw. von Aufträgen) verleiten.

Weiter schreibt das Gesetz nun eine Sperrfrist für Aktienoptionen von mindestens vier Jahren vor. Zuvor waren zwei Jahre Mindestanforderung. *Koch / Stadtmann* (2010) kritisieren

hierbei, daß nicht nur die kurzfristige Zugriffssperre von aktienbasierten Vergütungskomponenten zu Anreizproblemen führen kann, sondern fehlende Performancehürden als problematischer einzustufen sind. Der Zeitpunkt der Messung ist analog den kennzahlenbasierten Komponenten nicht das entscheidende Kriterium für die richtige Anreizsetzung im Sinne der Anteilseigner.

3.2.3 Deutscher Corporate Governance Kodex (DCGK)

Die Ausgestaltung der Vorstandsvergütung ist neben diesen gesetzlichen Vorgaben seit 2002 auch schon Gegenstand des *Deutschen Corporate Governance Kodex* (DCGK), ein von einer Regierungskommission der Bundesrepublik Deutschland erarbeitetes Regelwerk, das Empfehlungen und Anregungen im Sinne von Grundsätzen guter Leitung und Kontrolle (Corporate Governance) für börsennotierte Unternehmen enthält.

Der DCGK empfiehlt eine Trennung zwischen fixer und variabler Vergütung, wobei die variablen Vergütungskomponenten „jährlich wiederkehrende, an den geschäftlichen Erfolg gebundene Komponenten und auch Komponenten mit langfristiger Anreizwirkung enthalten“ (Deutscher Corporate Governance Kodex vom 26. Februar 2002, S. 6). Im Jahr 2003 wurde dieser Teil des Kodex um die Empfehlung zur Implementierung eines Caps erweitert, um außerordentlichen Entwicklungen der Vergütung entgegenzuwirken. Seit dem Jahr 2006 empfiehlt der Kodex, analog dem VorstOG, eine Offenlegung und Erläuterung des Vorstandsvergütungssystems in einem Vergütungsbericht. Aktienbasierte Vergütungskomponenten sollen nun mit dem Zeitwert bei Gewährung angegeben werden.

Die letzte für den Untersuchungszeitraum relevante Änderung des DCGK wurde im Juni 2009 veröffentlicht. Hauptsächlich wurden dabei die Vorgaben der variablen Vergütung geändert. Der Kodex schreibt nun nicht mehr die Trennung von jährlich wiederkehrenden und langfristig orientierten Komponenten vor, sondern nennt als Beispiel zur Ausgestaltung der variablen Komponenten stattdessen aktien- oder kennzahlenbasierte Komponenten. Die klassische, jährlich wiederkehrende Bonuszahlung wird somit nicht mehr vom Kodex direkt empfohlen, bleibt aber als eine Form der kennzahlenbasierten Vergütung möglich. Zusätzlich soll die gesamte Vergütung auf eine nachhaltige Unternehmensentwicklung ausgerichtet werden, positive und negative Entwicklungen abbilden können, eine mehrjährige Bemessungsgrundlage haben und nicht zu hohen Risiken verleiten.

Analog der Interpretation des VorstAG ist somit nicht etwa der Zeitpunkt der Auszahlung von Vergütungskomponenten ausschlaggebend für die Nachhaltigkeit der Vorstandsvergütung, sondern die Wahl der richtigen Bemessungsgrundlage. Kurz- und

langfristige Komponenten können durch die Wahl geeigneter Bemessungsgrundlagen auf eine nachhaltige Unternehmensentwicklung ausgerichtet werden.

3.3 Forschungsfragen

Auf Basis der dargestellten theoretischen und regulatorischen Rahmenbedingungen sollen nun die expliziten Forschungsfragen der Studie abgeleitet werden.

Durch das VorstOG werden die Unternehmen zur Offenlegung ihrer Vergütungskomponenten verpflichtet und die Komponenten der Gesamtvergütung einheitlich definiert. Zuvor war insbesondere im Rahmen der aktienbasierten Vergütung unklar, ob der Zeitwert bei Gewährung oder die Auszahlung nach der Zugriffssperre Teil der Gesamtvergütung ist. Deshalb soll zunächst die Höhe der Vorstandsvergütung nach Definition des VorstOG untersucht werden. Es ergibt sich Forschungsfrage 1:

Wie hoch ist die durchschnittliche Vorstandsvergütung je Vorstandsmitglied?

Mit dem Inkrafttreten des VorstAG im Jahr 2009 und den Änderungen des DCGK im selben Jahr, werden die Unternehmen verpflichtet, mehrjährig bemessene variable Vergütungskomponenten zu implementieren. Mehrjährig bemessene Vergütungskomponenten sollen Ergebnisverschiebungen zwischen den Perioden verhindern und langfristig orientierte Entscheidungen des Managers anregen. Da Anteilseigner an einer langfristigen Steigerung des Unternehmenswerts interessiert sind, ist im Sinne der Anteilseigner daher ein möglichst hoher Anteil langfristiger Vergütungskomponenten anzustreben. Dagegen stehen die Interessen des Managers, der nach dem *managerial power approach* langfristige Vergütungskomponenten aufgrund der damit verbundenen Auszahlungsunsicherheit ablehnt. Angesichts der konkurrierenden Interessen von Anteilseignern und Managern bei der Ausgestaltung der Vorstandsvergütung, soll die Struktur der Vorstandsvergütung sowie die Anteile der Vergütungskomponenten an der Gesamtvergütung untersucht werden. Es folgt daraus Forschungsfrage 2:

Welchen Anteil haben die Vergütungskomponenten an der Gesamtvergütung?

Das VorstAG sowie der DCGK regeln eine nachhaltige Gestaltung der Vorstandsvergütung, weshalb geeignete Bemessungsgrundlagen gewählt werden müssen. Aus Sicht der Anteilseigner sind Bemessungsgrundlagen zu wählen, die eine nachhaltige Steigerung des Unternehmenswerts „incentivieren“. Wertorientierte Kennzahlen werden in der Diskussion über die Gestaltung von Vergütungssystemen oft als überlegen gegenüber traditionellen Kennzahlen dargestellt, da sie formal mit dem Unternehmenswert verknüpft

werden und Anreize zur Unternehmenswertsteigerung schaffen können.¹¹ Gerade letzteres bewog *Aders / Hebertinger* (2003) zur Formulierung zweier Thesen: Einerseits erwarten sie eine erhöhte Relevanz dieser Kennzahlen zur Bonusbemessung, die mit einem Rückgang traditioneller Größen einhergehe. Andererseits werde die Bedeutung aktienbasierter Vergütungskomponenten zurückgehen, da sie von den wertorientierten Komponenten verdrängt würden. *Aders / Hebertinger* (2003) begründen ihre Thesen damit, daß wertorientierte Kennzahlen besser als traditionelle Kennzahlen dazu geeignet seien, die Interessen der Vorstände an die Interessen der Anteilseigner anzugleichen. Da bis dato die eingesetzten Bemessungsgrundlagen im Rahmen von Vergütungskomponenten nur wenig empirisch dokumentiert sind, kann Forschungsfrage 3 formuliert werden:

An welche Bemessungsgrundlagen werden kurz- und langfristige Vergütungskomponenten gebunden?

Die Wahl einer geeigneten Bemessungsgrundlage ist nur ein Parameter in der Gestaltung der Vergütungskomponenten. Aufgrund der unterschiedlichen Zeithorizonte von Anteilseignern und Vorständen führt selbst eine incentivierte wertorientierte Kennzahl nicht immer zu Entscheidungen im Sinne der Eigner.¹² Eine Annäherung der Zeithorizonte durch langfristige Vergütungskomponenten lindert dieses Kongruenzproblem. Das VorstAG und der DCGK schreiben in diesem Zusammenhang aber nicht vor, mit welchem Zeithorizont diese Vergütungskomponenten zu versehen sind, oder ob diese überhaupt zukunftsgerichtet sein müssen, sondern regeln nur eine nachhaltige Gestaltung und mehrjährige Bemessung der Vergütungskomponenten. Deshalb soll untersucht werden, mit welchen zeitlichen Horizonten die untersuchten Unternehmen ihre langfristigen Vergütungskomponenten versehen. Daraus folgt Forschungsfrage 4:

Welchen zeitlichen Horizont haben langfristige kennzahlenbasierte Vergütungskomponenten?

Die Implementierung von Vergütungsobergrenzen (Caps) sowie Malus-Systemen sind weitere Komponenten, die diskutiert werden. Caps sollen Gehaltsexzesse verhindern und werden somit als Instrument gegen gesellschaftlich nicht akzeptierte Vergütungshöhen gesehen. Sind diese Caps jedoch zu niedrig gesetzt, kann dies zu Anreizproblemen führen. Die Rolle von Obergrenzen ist deshalb in der betriebswirtschaftlichen Literatur umstritten.¹³ Im Sinn der Anteilseigner sind Obergrenzen wenn dann nur zur Begrenzung der gesamten

¹¹ Vgl. Young / O'Byrne (2001), Preinreich (1937), Lücke (1955), Zimmermann (1997)

¹² Vgl. Rogerson (1997), Reichelstein (1997)

¹³ Vgl. Young / O'Byrne (2001), Jensen et al. (2004)

Vergütungskosten denkbar, dürfen aber zu keinen Anreizproblemen führen, wodurch die gewünschte lineare *pay-for-performance-relation* unterbrochen werden würde. Aus Sicht der Manager ist nach dem *managerial power approach* davon auszugehen, daß Obergrenzen grundsätzlich abgelehnt werden. Da die Höhe und Art der implementierten Obergrenzen weitgehend undokumentiert sind, wird Forschungsfrage 5 formuliert:

Wie sind Obergrenzen der kurz- und langfristigen Vergütungskomponenten ausgestaltet?

Kontrovers diskutiert werden auch Malus-Systeme. Ab dem Jahr 2009 schreibt der DCGK eine Vergütungsstruktur vor, die sowohl positive als auch negative Entwicklungen abbilden kann. Ohne Malus-System trägt der Manager einen potenziellen Verlust des Unternehmens nur bis zum Ausfall seines Bonus. Ein Malus-System, das den Manager zu einer Rückzahlung verpflichtet kann, lässt den Manager auch an einem Verlust des Unternehmens partizipieren, wodurch eine Angleichung mit den Eigentümerinteressen erreicht werden kann. Ein Malus-System stellt somit aus Sicht der Anteilseigner eine Erweiterung der *pay-for-performance-relation* dar, da der Manager nun auch an einer negativen Unternehmensperformance über den Ausfall seines Bonus hinaus beteiligt wird. Malus-Systeme sind jedoch kritisch zu betrachten, da eine Implementierung von Malus-Systemen unter Umständen das Entscheidungsverhalten des Managers insofern negativ beeinflussen kann, daß risikoreichere Projekte ausgeschlagen werden. Zur Analyse des Implementierungsstandes von Malus-Systemen wird deshalb Forschungsfrage 6 formuliert:

Wie hoch ist der Anteil an Unternehmen, die ein Malus-System in die Vorstandsvergütung integrieren?

Eine weitere Möglichkeit zur langfristigen Incentivierung bilden aktienbasierte Komponenten, wodurch Vorstände Anreize erhalten sollen, wie Unternehmenseigentümer zu handeln. Insbesondere stehen aber Aktienoptionen in der Kritik, da sie den Anreiz schaffen können, den Aktienkurs kurzfristig zu beeinflussen und Manager nur an positiven Kursentwicklungen teilhaben. Einer solchen kurzfristigen Orientierung will das VorstAG entgegenwirken und schreibt deshalb eine mindestens 4-jährige Zugriffssperre für Aktienoptionen vor. Zwar werden durch längere Zugriffssperren entsprechende Anreize gesetzt, es bleibt jedoch für den Vorstand weiterhin attraktiv den Aktienkurs kurz vor Ablauf der Zugriffssperre zu beeinflussen. Ein Anreiz, der durch die Gewährung von Aktien zumindest abgeschwächt wird. Es soll deshalb untersucht werden, welcher Art der aktienbasierten Komponenten in der Praxis von den Unternehmen gewährt werden und wie diese ausgestaltet sind. Forschungsfrage 7 lautet:

Wie sind aktienbasierte Vergütungskomponenten ausgestaltet?

Das VorstOG definiert als Teil der Gesamtvergütung den Zeitwert bei Gewährung aktienbasierter Komponenten. Die tatsächliche Auszahlung aus diesen Komponenten kann jedoch vom Zeitwert bei Gewährung abweichen. Eine Momentaufnahme zum Zeitpunkt der Gewährung ist daher bei der Bestimmung der tatsächlichen Vergütung des Vorstands aus diesen Komponenten nur wenig aussagekräftig. Unternehmen publizieren deshalb häufig auch die Auszahlungsbeträge an Vorstände. Es soll daher untersucht werden, in welchem Verhältnis die tatsächliche Auszahlung zum Zeitwert bei Gewährung steht. Es ergibt sich schließlich Forschungsfrage 8:

Werden aktienbasierte Vergütungskomponenten vollumfänglich ausbezahlt?

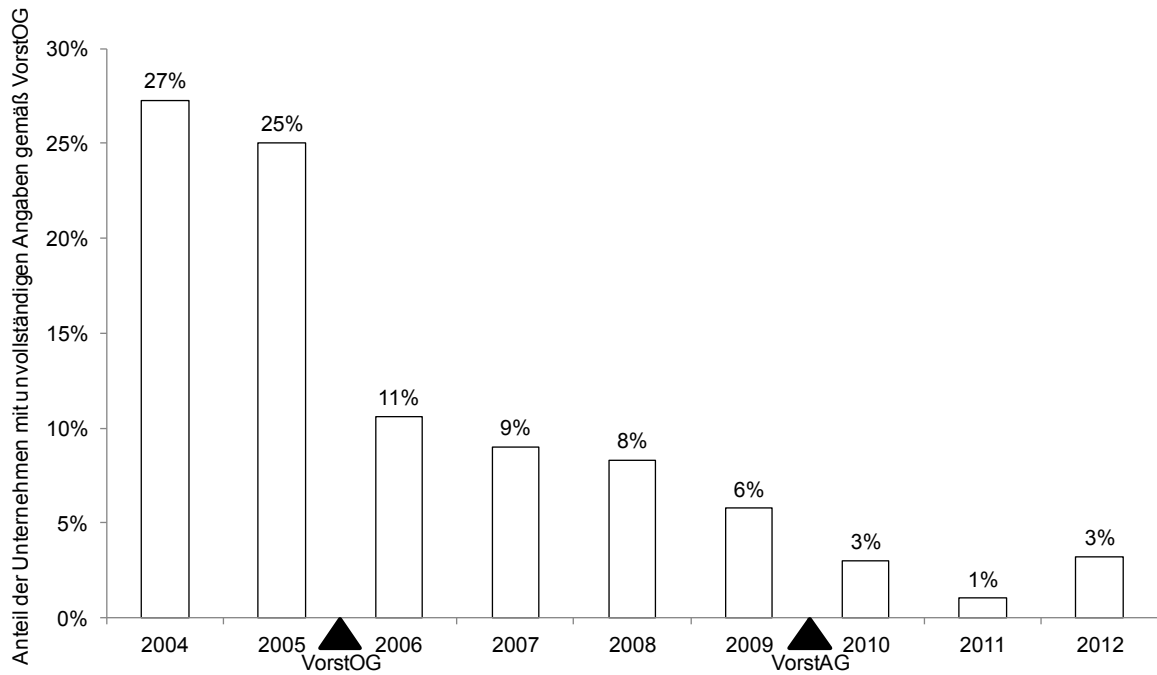
4. Daten und Ergebnisse

4.1 Sample und Datenerhebung

Der Untersuchung liegen durchschnittlich 107 Unternehmen pro Jahr zu Grunde. Alle Industrieunternehmen der Auswahlindizes DAX, MDAX, TecDAX und SDAX werden im Jahr 2004 erfasst und die Daten bis 2012 erhoben. Als Quelle dienen die Vergütungsberichte sowie die jeweiligen Angaben im Anhang der Geschäftsberichte. Der Informationsgehalt der Daten in den Jahren 2004 und 2005 ist mangels Veröffentlichungspflicht der Vergütungskomponenten noch eingeschränkt. Dies ändert sich durch das Inkrafttreten des VorstOG im Jahr 2005, wie *Abbildung 1* entnommen werden kann.

Nur für einen kleinen Teil der untersuchten Unternehmen fehlen ab dem Jahr 2006 einzelne Erhebungen. Der Anstieg an Unternehmen mit unvollständigen Angaben im Jahr 2012 lässt sich auf eine Lücke in der Offenlegungspflicht zurückführen. Diese Lücke hat erst durch die Regelungen kennzahlenbasierter Langfristkomponenten durch das VorstAG ab dem Jahr 2010 an Relevanz gewonnen. Im Rahmen von zukunftsgerichteten mehrjährigen Bonuskomponenten werden Rückstellungen für zukünftige Auszahlungen an den Vorstand gebildet. Es ist jedoch unklar, ob diese Rückstellungen bereits zur Gesamtvergütung zu zählen sind. Vereinzelt verzichten Unternehmen im Jahr 2012 daher auf den Ausweis dieser Rückstellungsbeträge als Teil der Gesamtvergütung, obwohl dies 2011 noch der Fall war. Auf den ersten Blick scheint die Gesamtvergütung der Vorstände zurückzugehen. Als Reaktion schlägt der DCGK in der gültigen Fassung von 2013 eine einheitliche Darstellung von Vergütungskomponenten vor, die auch Rückstellungsbeträge umfasst. Es bleibt abzuwarten, wie die Unternehmen die Empfehlungen des DCGK umsetzen.

- Abbildung 1: Anteil der Unternehmen mit unvollständigen Angaben zu den Komponenten der Vorstandsvergütung nach Definition des VorstOG -



Als kurzfristige kennzahlenbasierte Vergütung (*Short-term Incentive*; STI) werden im Weiteren alle Vergütungskomponenten bezeichnet, die einjährig bemessen sind. Die Definition der langfristig orientierten Vergütungskomponenten (*Long-term Incentive*; LTI) ist nicht mehr, wie in zahlreichen älteren Studien üblich, auf die aktienbasierte Langfristvergütung beschränkt. Das VorstAG sowie der DCGK ab 2009, fordern eine langfristige Bemessung kennzahlenbasierter Komponenten, die somit die zweite Art der Langfristvergütung, neben den aktienbasierten Vergütungskomponenten, darstellen. Die Grenze zwischen aktienbasierten und kennzahlenbasierten Vergütungskomponenten ist in der praktischen Ausgestaltung jedoch meist fließend. Oft werden beispielsweise aktienkursbasierte Komponenten an buchhalterische Kennzahlen gebunden, oder zurückgestellte Beträge in virtuelle Aktien umgerechnet. Eine Trennungsmöglichkeit bietet hier IFRS 2: Vergütungskomponenten, die mittels eines Zeitwerts bei Gewährung angegeben werden, werden im Folgenden als aktienbasierte Langfristvergütung (LTI-A) bezeichnet; anderenfalls wird von einer kennzahlenbasierten Langfristvergütung ausgegangen (LTI-K).

4.2 Ergebnisse

4.2.1 Gesamtbetrachtung

Durchschnittliche Höhe der Vorstandsvergütung je Vorstandsmitglied

- Abbildung 2: Durchschnittliche Vergütung je Vorstandsmitglied (in TEUR) -

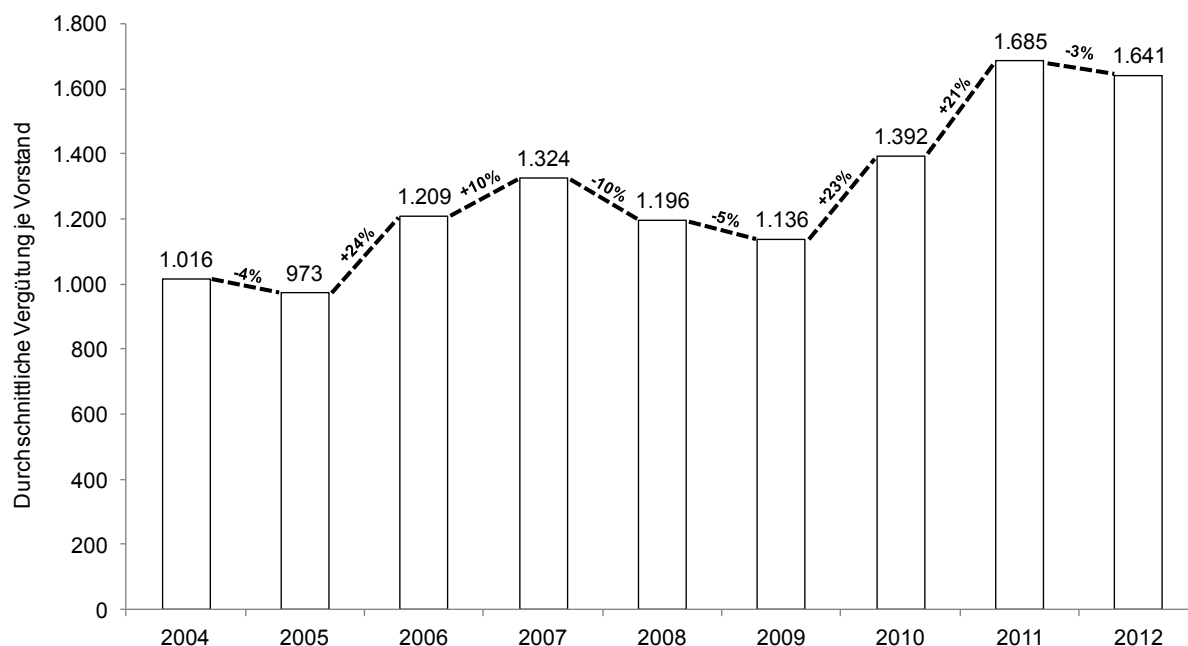


Abbildung 2 zeigt einen Anstieg der Vorstandsvergütung ausgehend vom Jahr 2004. Während 2004 die durchschnittliche Vorstandsvergütung bei 1,02 Mio. EUR lag, betrug diese 2012 bereits 1,64 Mio. EUR. Durchschnittlich stieg die Vorstandsvergütung jährlich um ca. 6,2%.

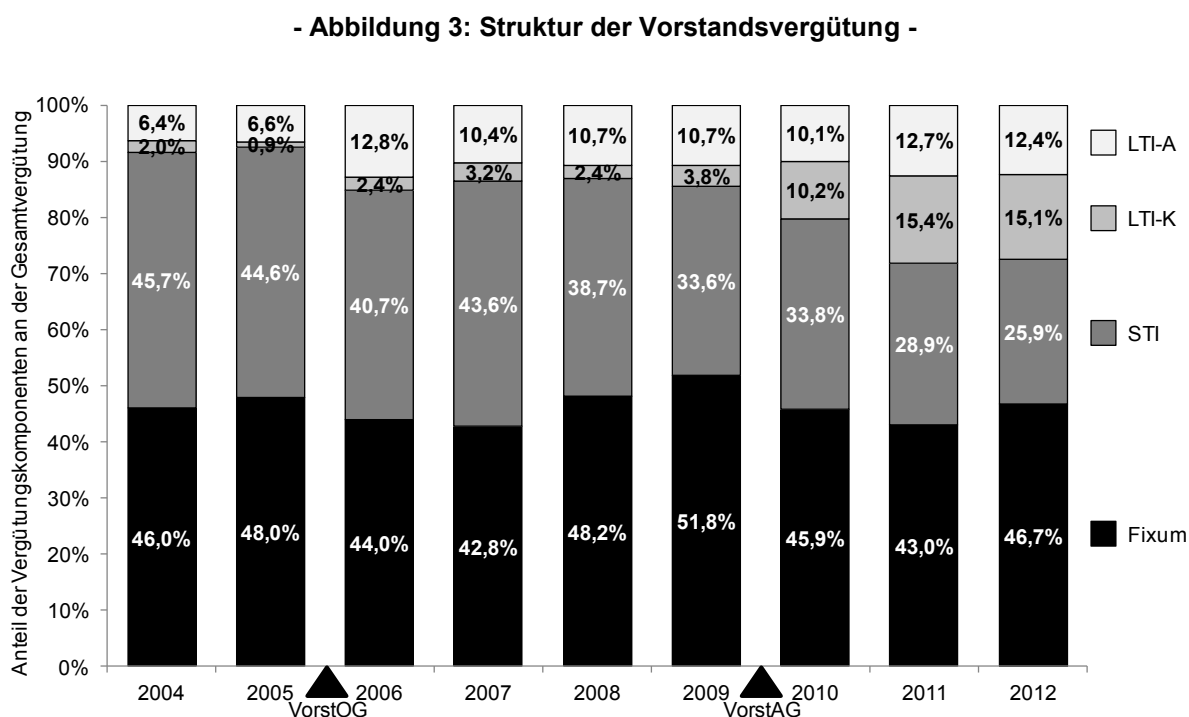
-Tabelle 1: Höhe der durchschnittlichen Vorstandsvergütung nach Indizes (in TEUR) -

Index	2004	2005	2006	2007	2008	2009	2010	2011	2012	Durchschnitt
DAX	2.225	2.189	2.465	2.614	2.305	2.018	2.475	2.919	3.123	2.481
MDAX	860	913	1.425	1.364	1.148	1.132	1.392	1.533	1.561	1.259
TecDAX	542	474	693	1.195	802	921	991	1.464	878	884
SDAX	506	585	733	859	889	657	820	944	928	769
Durchschnitt	1.016	973	1.209	1.324	1.196	1.136	1.392	1.685	1.641	

Differenziert nach Indexzugehörigkeit zeigt sich, daß die Vorstandsgehälter im MDAX, TecDAX und SDAX gegenüber 2011 stagnieren bzw. zurückzugehen, während die Gehälter in den DAX-Unternehmen weiter ansteigen (Tabelle 1). Der Anstieg in den DAX-Unternehmen fällt im Jahr 2012 jedoch geringer aus als in den Nachkrisenjahren 2010 und 2011.

Struktur der Vorstandsvergütung

Die Zusammensetzung der Vorstandsvergütung verändert sich nur leicht bis zum Jahr 2008 (Abbildung 3).



Legende: STI: einjährig bemessene variable Vergütung, LTI-K: langfristige kennzahlenbasierte Vergütung, LTI-A: langfristige aktienbasierte Vergütung.

Das Fixum ist über den gesamten Untersuchungszeitraum die dominante Vergütungskomponente, während der Anteil der STI stetig zurückgeht. Der relative Anstieg der aktienbasierten Vergütungskomponenten, (LTI-A), im Jahr 2006 ist auf die Publikationspflicht dieser Komponenten zurückzuführen, die 2005 durch das VorstOG erstmals geregelt ist. Für Unternehmen, die vor 2006 aktienbasierte Komponenten nicht mit dem Zeitwert bei Gewährung angegeben haben, konnte folglich kein Wert der aktienbasierten Komponenten erhoben werden, wodurch deren Anteil in 2004 und 2005 tendenziell unterschätzt wird. Insgesamt schwankt der Anteil der aktienbasierten Vergütungskomponenten ab 2006 nur wenig.

Im Jahr 2009 passen die Unternehmen ihre Vergütungssysteme vermehrt an die Anforderung des VorstAG an. Das Inkrafttreten des VorstAG führt zu einem steigenden Anteil der langfristigen kennzahlenbasierten Komponenten (LTI-K) an der Gesamtvergütung, wohingegen der STI zurückgedrängt wird. Bis zum Jahr 2009 spielen die LTI-K hingegen nur eine Nebenrolle in der Gestaltung der Vorstandsvergütung. Die Analyse zeigt, daß LTI-K in den großen DAX-Unternehmen zumeist in Form von Bonusbanken umgesetzt werden, kleinere Unternehmen greifen vermehrt auf mehrjährige Bemessungsgrundlagen auf Basis

historischer Performance zurück. Mehrjährige Bemessungsgrundlagen sind zwar im Sinne des VorstAG nachhaltige Vergütungskomponenten, sind jedoch nicht zukunftsgerichtet, da die durchschnittliche Entwicklung der Bemessungsgrundlage der vergangenen Perioden gemessen wird. Aus Sicht der Anteilseigner ist jedoch eine langfristige und gleichzeitig zukunftsgerichtete Vergütungskomponente vorzuziehen, da nur so die gewünschte Interessenshomogenität erreicht werden kann.

Die Analyse zeigt, daß ein Großteil der Vorstandsvergütung entweder fix oder kurzfristig bemessen ist. Die Struktur der Vorstandsvergütung lässt sich daher eher durch den *managerial power approach* erklären und widerspricht teilweise den Aussagen der *optimal contracting theory*. Nach dem *managerial power approach* nutzen Vorstände ihren Einfluss, um den Anteil des Fixums an der Gesamtvergütung zu erhöhen und ziehen kurzfristig bemessene Vergütungskomponenten langfristigen vor. Hohe Fixgehälter dienen aber auch dazu, Vorstände in wirtschaftlich schlechten Zeiten im Unternehmen zu halten und sind so zumindest teilweise vereinbar mit den Zielen von Anteilseignern nach der *optimal contracting theory*. Seit dem Inkrafttreten des VorstAG im Jahr 2009 ist jedoch ein Trend hin zu längerfristigen Vergütungskomponenten auszumachen, da der Anteil der LTI-K seit 2009 stetig zunimmt. Es bleibt jedoch an dieser Stelle der Analyse noch offen, wie diese Komponenten aus Anreizgesichtspunkten abschließend zu bewerten sind.¹⁴

Vergleicht man die Struktur der Vorstandsvergütung zwischen den einzelnen Indizes, zeigen sich zwei größere Unterschiede. Exemplarisch soll das Jahr 2012 herausgegriffen werden (*Tabelle 2*).

- Tabelle 2: Struktur der Vorstandsvergütung nach Indizes im Jahr 2012 -

	DAX		MDAX		TecDAX		SDAX	
	relativ	absolut	relativ	absolut	relativ	absolut	relativ	absolut
Fixum	29,8%	932	38,3%	598	58,3%	512	62,6%	581
STI	26,7%	833	28,4%	444	24,9%	219	25,2%	234
LTI-K	19,0%	594	22,3%	347	5,5%	48	9,8%	91
LTI-A	24,5%	764	11,0%	171	11,2%	98	2,3%	21
Summe		3.123		1.561		878		928

Legende: absolut in TEUR. (Werte der Komponenten gerundet)

Zum einen ist der Anteil des Fixums größer, je kleiner die Unternehmen sind. Während die DAX-Unternehmen nur etwa ein Drittel der Gesamtvergütung erfolgsunabhängig gewähren, sind etwa zwei Drittel der Vergütung in den SDAX-Unternehmen fix. Zum

¹⁴ Eine detaillierte Analyse der STI erfolgt in Abschnitt 4.2.2 und der LTI-K in Abschnitt 4.2.3

anderen fällt der Anteil der langfristigen Vergütung, je kleiner die Unternehmen werden. So beträgt der Anteil langfristiger Vergütungskomponenten im DAX etwa 44%, im SDAX lediglich etwa 12%. Ähnliche Ergebnisse zeigen sich für den gesamten Untersuchungszeitraum.

Die Höhe der gewährten Fixgehälter unterscheidet sich zwischen den Indizes weniger, als die Höhe der gewährten variablen Komponenten. So erhält ein DAX-Vorstand im Durchschnitt mit 932 TEUR Fixgehalt „nur“ das 1,6 fache Fixum eines SDAX-Vorstands. Die Fixgehälter der MDAX, SDAX und TecDAX-Vorstände unterscheiden sich hingegen nur geringfügig. Dies lässt sich anhand des *managerial power approach* erklären, da ungeachtet der Unternehmensgröße der Manager seine Macht nutzen wird, um ein möglichst hohes Fixgehalt zu erreichen.

4.2.2 Ausgestaltung des STI

Bemessungsgrundlagen

Tabelle 3 zeigt die Entwicklung der Kennzahlen, die zur Bemessung der STI am häufigsten herangezogen werden. Im ersten Jahr der Untersuchung machen mehr als die Hälfte der untersuchten Unternehmen keine Angaben zu den Bemessungsgrundlagen der STI. Durch das Inkrafttreten des VorstOG im Jahr 2005 nimmt dieser Anteil stetig ab und die Qualität der Daten steigt.

Seit dem Inkrafttreten des VorstAG im Jahr 2009 vergüten die untersuchten Unternehmen vermehrt nicht-finanzielle Kennzahlen, die zur Messung der CSR-Performance des Unternehmens herangezogen werden können. So setzen im Jahr 2012 14% der untersuchten Unternehmen nicht-finanzielle Kennzahlen als Bemessungsgrundlage der STI ein, im Jahr 2008 beträgt der Anteil dagegen nur 2,8%. Die Unternehmen kommen so der Forderung des VorstAG nach, das eine nachhaltige Gestaltung der Vorstandsvergütung regelt. Nicht-finanzielle Kennzahlen können als Treiber für die zukünftige Performance eines Unternehmens gesehen werden. Die häufigere Incentivierung von nicht-finanziellen Kennzahlen kann deshalb auch als eine Tendenz, hin zum Einbezug der Ursachenebene für zukünftige Unternehmensperformance gesehen werden. Diese Entwicklung ist aus Sicht einer nachhaltigen Unternehmensführung grundsätzlich positiv zu bewerten.

Die Anzahl an Unternehmen, die eine wertorientierte Kennzahl kurzfristig vergüten, steigt bis zum Jahr 2008, fällt aber ab dem Jahr 2009. Insgesamt spielen wertorientierte Kennzahlen nur eine untergeordnete Rolle, denn es dominieren traditionelle Kennzahlen. Die Dominanz

- Tabelle 3: Bemessungsgrundlagen der STI -

	2004		2005		2006		2007		2008		2009		2010		2011		2012	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
RG	8	6,6%	7	6,0%	10	8,8%	10	9,0%	12	11,1%	7	6,7%	4	4,0%	4	4,2%	5	5,4%
CVA	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	1	1,1%
CSR	1	0,8%	0	0,0%	0	0,0%	2	1,8%	3	2,8%	5	4,8%	11	11,0%	14	14,7%	13	14,0%
Umsatz	4	3,3%	7	6,0%	11	9,7%	16	14,4%	19	17,6%	16	15,4%	17	17,0%	18	18,9%	20	21,5%
EBIT	13	10,7%	14	12,1%	20	17,7%	22	19,8%	23	21,3%	26	25,0%	25	25,0%	24	25,3%	23	24,7%
EBT	7	5,8%	11	9,5%	14	12,4%	17	15,3%	15	13,9%	15	14,4%	11	11,0%	11	11,6%	9	9,7%
JÜ	11	9,1%	17	14,7%	25	22,1%	25	22,5%	24	22,2%	27	26,0%	24	24,0%	22	23,2%	21	22,6%
EPS	2	1,7%	3	2,6%	1	0,9%	1	0,9%	2	1,9%	1	1,0%	1	1,0%	4	4,2%	2	2,2%
DPS	8	6,6%	9	7,8%	6	5,3%	7	6,3%	7	6,5%	4	3,8%	3	3,0%	3	3,2%	0	0,0%
Cash-flow	6	5,0%	5	4,3%	10	8,8%	11	9,9%	10	9,3%	13	12,5%	13	13,0%	15	15,8%	15	16,1%
Kapitalrendite	9	7,4%	14	12,1%	12	10,6%	15	13,5%	14	13,0%	15	14,4%	14	14,0%	14	14,7%	12	12,9%
k.A.	64	52,9%	45	38,8%	30	26,5%	23	20,7%	20	18,5%	16	15,4%	10	10,0%	4	4,2%	6	6,5%

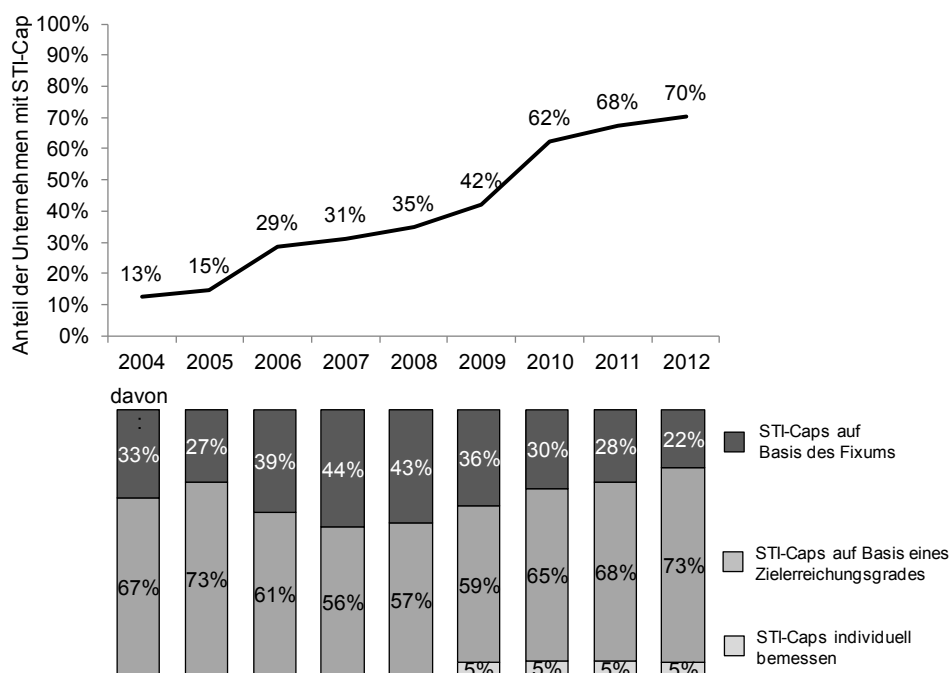
Legende: RG = Residualgewinn, CVA = Cash Value Added, CSR = nicht-finanzielle Kennzahlen aus den Bereich Corporate Social Responsibility, JÜ = Jahresüberschuss, EPS = Ergebnis je Aktie, DPS = Dividende pro Aktie, Kapitalrendite = Verhältnis aus Ergebnisgröße und Kapitaleinsatz (z.B. ROCE), k.A. = keine Angaben.

traditioneller Kennzahlen zur Bemessung der STI lässt sich dabei weder durch die *optimal contracting theory* noch durch den *managerial power approach* abschließend erklären, da beide Theorien nur eingeschränkt Aussagen zur Wahl der optimalen Kennzahl zur Bonusbemessung machen. Im Sinn der Anteilseigner ist jedoch eine Kennzahl zu wählen, die Interessenshomogenität ermöglicht, sodaß der Manager nur profitable Investitionsprojekte durchführt. Aus Anreizgesichtspunkten ist die Dominanz traditioneller Kennzahlen deshalb als problematisch anzusehen, da Fehlanreize gesetzt werden können. Relative Kennzahlen, wie beispielsweise Kapitalrenditen, führen unter Umständen zu einem Unterinvestitions-, absolute Gewinnmaße dagegen zu einem Überinvestitionsproblem. Die Verwendung solcher Kennzahlen als Bemessungsgrundlagen beinhaltet offensichtliche Anreizprobleme.

Obergrenzen

Der Anteil der Unternehmen, die den STI nach oben begrenzen, steigt über den gesamten Untersuchungszeitraum an (*Abbildung 4*).

- Abbildung 4: Entwicklung und Struktur der STI-Caps -



Im Jahr 2006 führt die allgemeine Offenlegungspflicht von Vergütungskomponenten durch das VorstOG zu einem Anstieg. Desweiteren regeln DCGK und VorstAG eine Implementierung einer Obergrenze zur Vermeidung von außerordentlichen Entwicklungen der Vorstandsvergütung, weshalb der Anteil an Unternehmen, die eine Obergrenze implementiert haben, weiterhin ansteigt.

Obergrenzen werden in der praktischen Ausgestaltung anhand des Fixums, eines vorher definierten Zielerreichungsgrades oder individuell festgelegt, wobei Obergrenzen auf Basis eines Zielerreichungsgrades über den gesamten Untersuchungszeitraum hinweg dominant sind. Individuell bemessene Obergrenzen spielen nur eine untergeordnete Rolle. Obergrenzen auf Basis des Fixums oder eines Zielerreichungsgrades gehen dabei stets mit der Festlegung einer absoluten Obergrenze einher. Eine absolute Obergrenze ist aus Anreizgesichtspunkten problematisch, da das Erreichen der Obergrenze zu einem Motivationsverlust des Vorstands führen kann, da ein Überschreiten der Obergrenze zu keinem weiteren Anstieg seiner Vergütung führt. Nach dem *managerial power approach* wird der Vorstand Obergrenzen somit ablehnen und eine Implementierung vermeiden wollen. Dementgegen steht jedoch der steigende Verbreitungsgrad von Obergrenzen in den STI. Dagegen lässt sich im Sinne der *optimal contracting theory* der hohe Anteil an Obergrenzen in den STI nur insofern erklären, da Obergrenzen zu einer Begrenzung der gesamten Vergütungskosten führen, die letztendlich von den Eigentümern getragen werden müssen. Obergrenzen haben abseits der theoretischen Überlegungen aber auch eine soziale Funktion, da sie als Mittel gegen gesellschaftlich nicht akzeptierte Vergütungshöhen gesehen werden.

Relevant für eine abschließende Beurteilung der Anreizwirkung von Obergrenzen ist eine Analyse, wie oft Obergrenzen tatsächlich erreicht werden. Es kann jedoch mangels Daten nicht geklärt werden, wie oft die eingesetzten Obergrenzen tatsächlich greifen, weshalb die Frage nach der Anreizwirkung in der vorliegenden Studie nicht abschließend beantwortet werden kann.

Obergrenzen auf Basis eines Zielerreichungsgrades orientieren sich an der jeweiligen Bemessungsgrundlage. Eine bestimmte Höhe der Bemessungsgrundlage wird dabei als hundertprozentige Zielerreichung festgelegt. Wird die Bemessungsgrundlage weiter gesteigert, so erhält der Vorstand nur solange eine höhere Vergütung bis die Obergrenze greift. Die Analyse zeigt, daß in der Unternehmenspraxis Obergrenzen zumeist bei 150% Zielerreichung festgelegt werden. Im Jahr 2012 greifen 41% der untersuchten Unternehmen mit einer Obergrenze auf Basis eines Zielerreichungsgrades auf diese maximale Höhe zurück. Weitere 47% der Unternehmen vergüten eine Zielerreichung von mehr als 150%, nur 12% weniger. Der höchste beobachtete Cap liegt bei 275% Zielerreichung.

Obergrenzen werden in der Unternehmenspraxis auch im Verhältnis zur Fixvergütung implementiert. Innerhalb dieser Gruppe dominieren Obergrenzen mit einer Höhe von 1,5x

Fixum im Jahr 2012. Etwa 42% der Unternehmen mit einer Obergrenze auf Basis des Fixums gewähren maximal einen Jahresbonus in Höhe von 1,5 x Fixum.

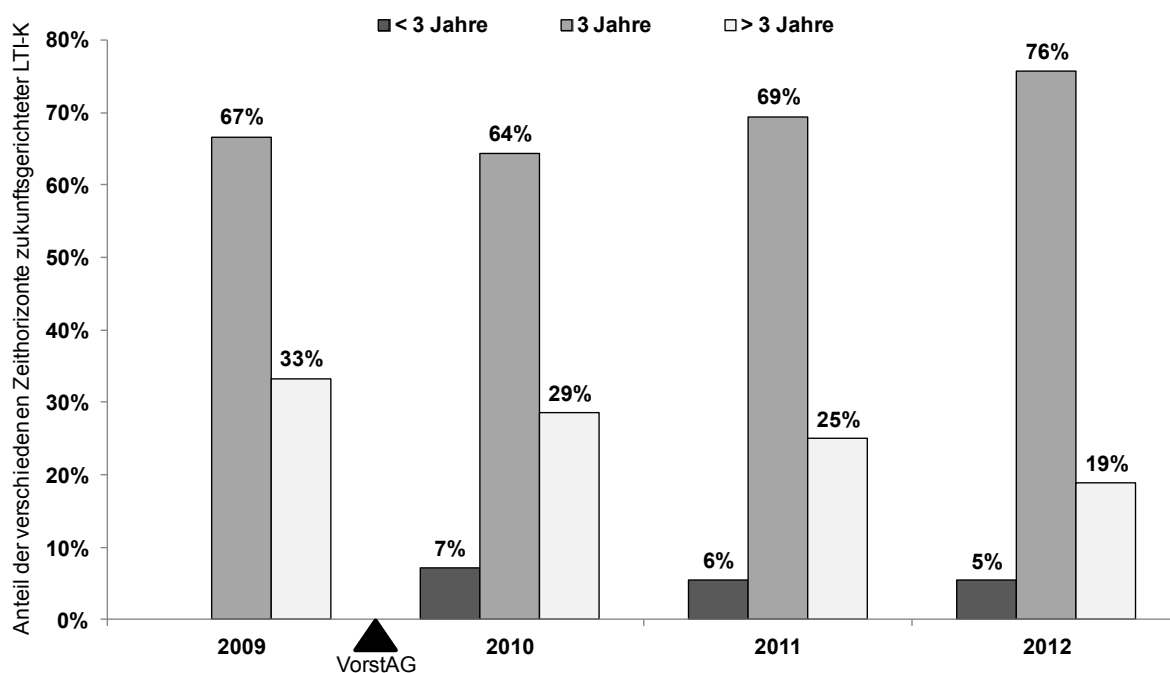
4.2.3 Ausgestaltung des LTI-K

Das VorstAG regelt die Einführung nachhaltiger Vergütungskomponenten und insbesondere die Implementierung mehrjähriger Bemessungsgrundlagen. Im Jahr 2012 gewähren bereits 62% der untersuchten Unternehmen einen LTI-K gegenüber lediglich 13% im Jahr 2009. Im Folgenden wird deshalb die Auswertung zur Veranschaulichung der Auswirkungen des VorstAG auf die Jahre 2009 bis 2012 beschränkt.

Zeitlicher Horizont zukunftsgerichteter LTI-K-Komponenten

Zukunftsgerichtete Komponenten sind zumeist mit einem 3-jährigen Zeithorizont versehen (*Abbildung 5*).

- Abbildung 5: Zeitlicher Horizont zukunftsgerichteter LTI-K -



Seit dem Inkrafttreten des VorstAG im Jahr 2009 steigt der Anteil 3-jähriger Komponenten auf 76% an, wohingegen längerfristige Zeithorizonte immer seltener eingesetzt werden. Von einer Angleichung der Zeithorizonte von Managern und Anteilseignern kann jedoch nicht gesprochen werden, lediglich der Anreiz Gewinne in andere Perioden zu verschieben wird geschmälert. Empirische Analysen zeigen, daß Vorstände im Durchschnitt

vier bis fünf Jahre im Unternehmen verweilen.¹⁵ In dieser Zeit wird der Vorstand (annahmegemäß) versuchen, seine Vergütung zu maximieren. Ob ein- oder dreijährige Vergütungskomponenten in diesem Zeitraum gewährt werden, spielt dabei nur eine untergeordnete Rolle, da der Manager bereits einen Zeithorizont äquivalent zu seiner Vertragslaufzeit hat. Diese, aus unternehmerischer Sicht eher kurzfristigen Zeithorizonte von Managern, können dazu führen, daß der Manager nicht immer das aus Eigentümersicht optimale Investitionsportfolio durchführt. Aus Sicht der *optimal contracting theory* lässt sich diese eher kurzfristige Gestaltung der LTI-K somit nur eingeschränkt begründen, wohingegen dies eher der Präferenz von Managern für kurzfristige Vergütungskomponenten nach dem *managerial power approach* entspricht.

Bemessungsgrundlagen

Während bei der Bemessung der STI wertorientierte Kennzahlen nur eine untergeordnete Rolle spielen, sind sie die dominanten Kennzahlen bei der Bemessung der LTI-K und werden von 22,4% der untersuchten Unternehmen im Jahr 2012 eingesetzt (*Tabelle 4*).

- Tabelle 4: Bemessungsgrundlagen der LTI-K -

	2009		2010		2011		2012	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
RG	2	15,4%	8	19,0%	11	19,3%	12	20,7%
CVA	0	0,0%	0	0,0%	1	1,8%	1	1,7%
CSR	0	0,0%	4	9,5%	5	8,8%	5	8,6%
Umsatz	5	38,5%	8	19,0%	9	15,8%	10	17,2%
EBIT	4	30,8%	11	26,2%	12	21,1%	11	19,0%
EBT	2	15,4%	4	9,5%	7	12,3%	8	13,8%
JÜ	3	23,1%	7	16,7%	10	17,5%	9	15,5%
EPS	0	0,0%	3	7,1%	3	5,3%	2	3,4%
DPS	1	7,7%	2	4,8%	3	5,3%	5	8,6%
Cash-flow	1	7,7%	2	4,8%	2	3,5%	3	5,2%
Kapitalrendite	2	15,4%	6	14,3%	9	15,8%	12	20,7%
k.A.	0	0,0%	2	4,8%	2	3,5%	1	1,7%

Legende: RG = Residualgewinn, CVA = Cash Value Added, CSR = nicht-finanzielle Kennzahlen aus den Bereich Corporate Social Responsibility, JÜ = Jahresüberschuss, EPS = Ergebnis je Aktie, DPS = Dividende pro Aktie, Kapitalrendite = Verhältnis aus Ergebnisgröße und Kapitaleinsatz (z.B. ROCE), k.A. = keine Angaben.

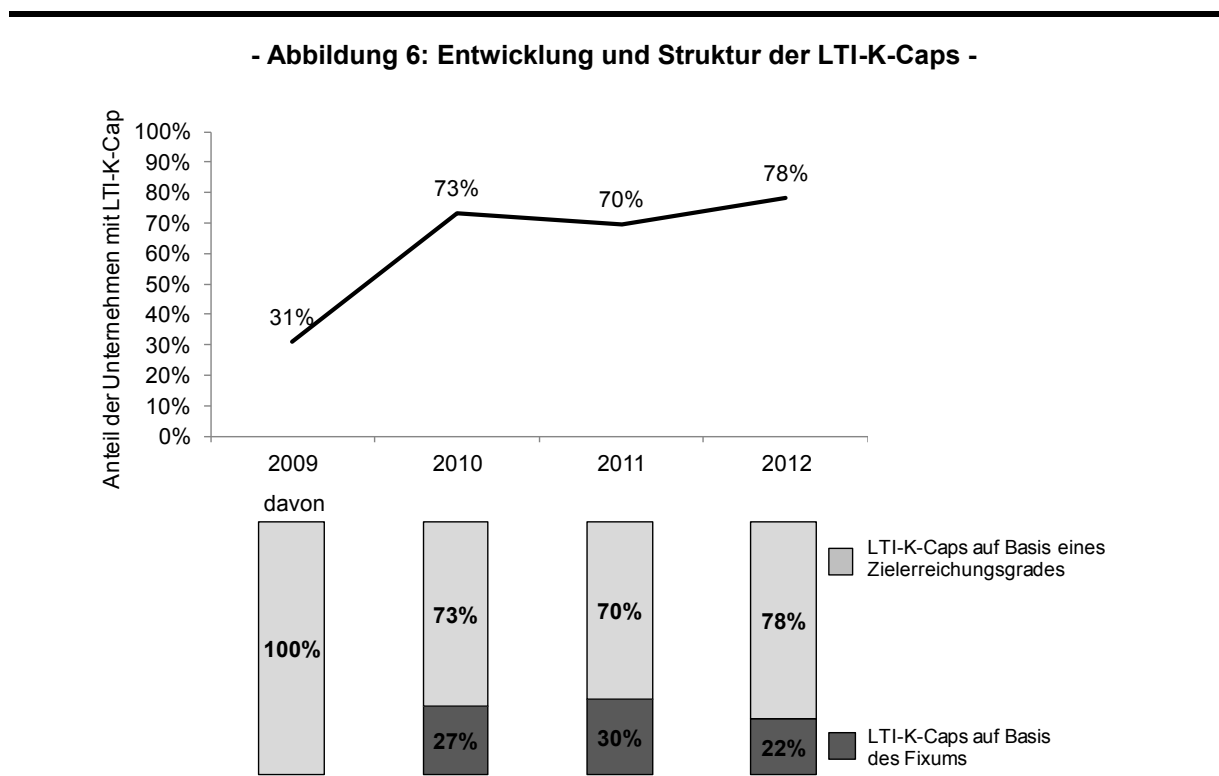
Gegenüber den Bemessungsgrundlagen der STI ist dies durchaus positiv herauszustellen. Insgesamt betrachtet dominieren aber weiterhin traditionelle Kennzahlen, die jedoch nun nicht nur einjährig sondern mehrjährig incentiviert werden. Gegenüber den STI stellen die LTI-K

¹⁵ Vgl. Studie von Booz & Company (2013)

somit aus Anreizgesichtspunkten nur eine geringfügige Verbesserung dar, denn weiterhin kann die Incentivierung von traditionellen Kennzahlen zu Über- bzw. Unterinvestitionsproblemen führen. Aus Sicht der Anteilseigner, die an einer langfristigen Steigerung des Unternehmenswerts interessiert sind, ist dies weiterhin als problematisch anzusehen.

Obergrenzen

Ein Großteil der Unternehmen, die LTI-K gewähren, begrenzt diese nach oben (*Abbildung 6*).



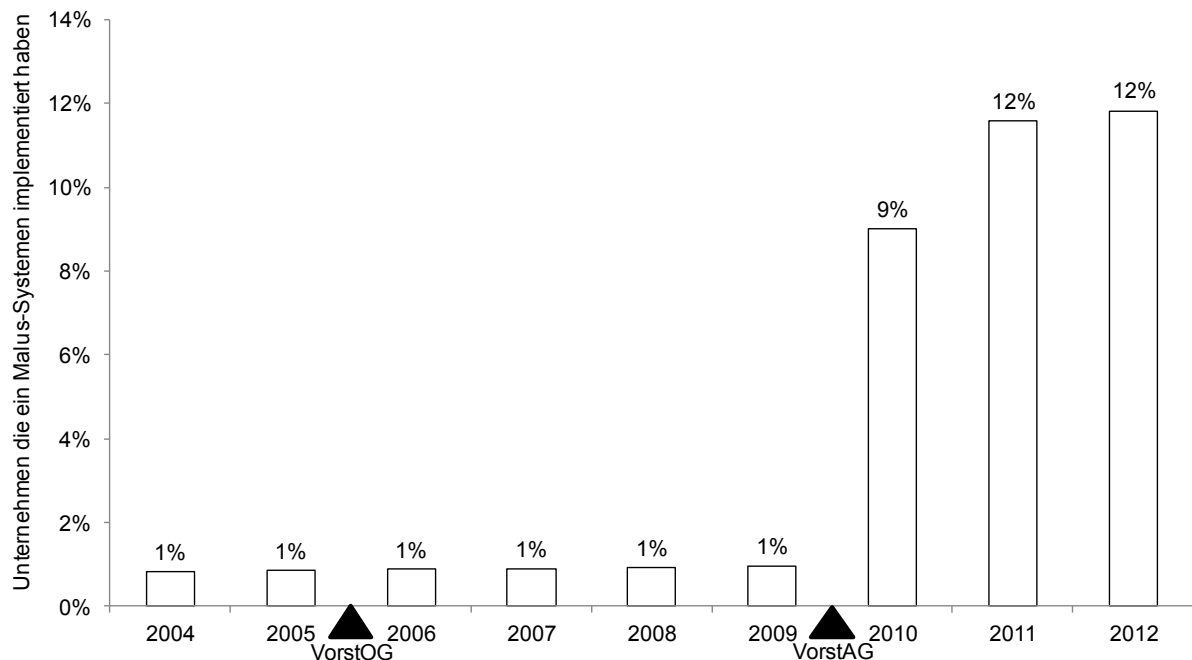
Es findet also eine ähnliche Vorgehensweise wie bei den Obergrenzen der STI statt. Analog gilt, daß auch in langfristigen Vergütungskomponenten Obergrenzen zu Anreizproblemen führen können und deshalb aus Sicht der Anteilseigner und Manager zunächst kritisch zu betrachten sind. Sollten Ziele schon frühzeitig erreicht werden, greifen Obergrenzen früher und können zu Anreizproblemen über mehrere Perioden führen. In der praktischen Ausgestaltung dominieren wiederum Obergrenzen auf Basis eines Zielerreichungsgrades, die vermehrt in Höhe von 150% Zielerreichung festgelegt werden. 36% der untersuchten Unternehmen setzten die Obergrenze bei 150% Zielerreichung. Weitere 48% der Caps auf Basis eines Zielerreichungsgrades werden höher als 150% gesetzt, die restlichen 16% sind niedriger als 150%. Die höchste Obergrenze liegt bei 275% Zielerreichung.

Obergrenzen auf Basis eines Fixums liegen etwas niedriger als die Obergrenzen des STI. Es dominiert die Grenze „1 x Fixum“ als maximale Höhe des LTI-K, sollte ein solcher Cap implementiert sein.

4.2.4 Malus-Systeme

In der Fassung von 2009 empfiehlt der DCGK eine Vergütungsstruktur, die positive als auch negative Performanceentwicklungen berücksichtigt. Der Anteil der untersuchten Unternehmen, die ein Malus System implementieren, steigt im Jahr 2010 auf 9% an und beträgt im Jahr 2012 12% (Abbildung 7).

- Abbildung 7: Malus-Systeme in der variablen kennzahlenbasierten Vergütung -

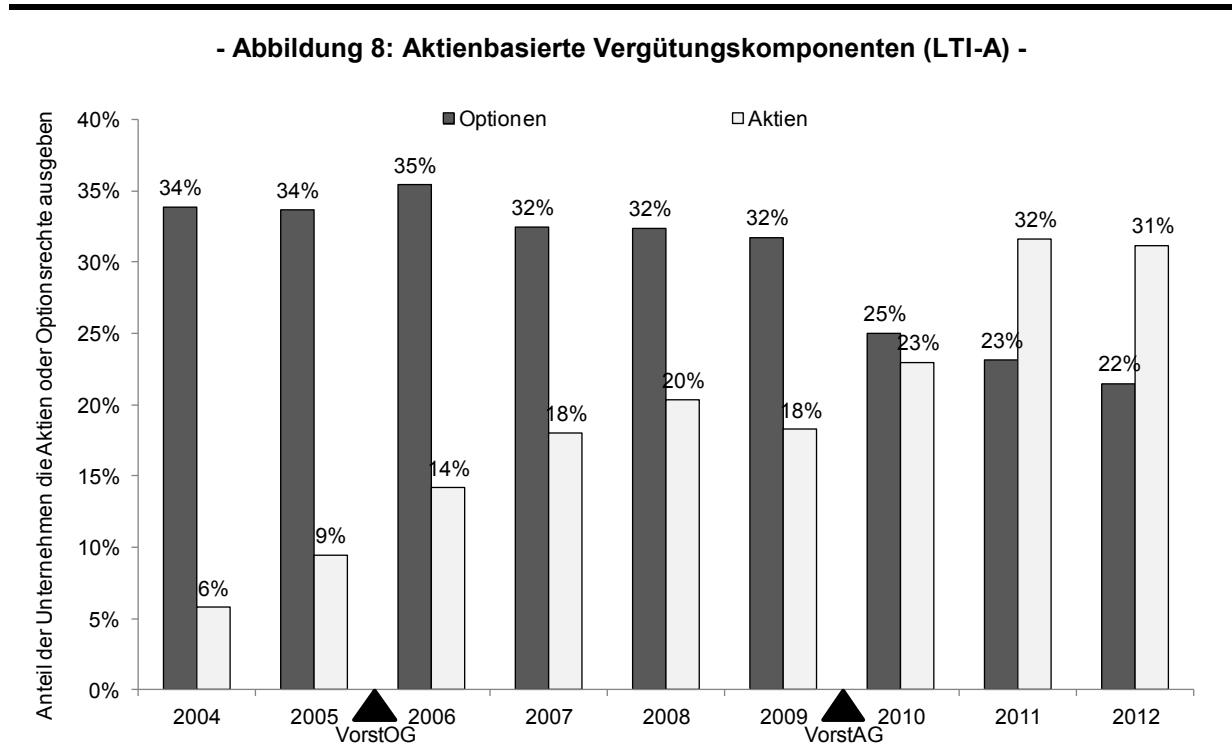


Die Unternehmensgröße spielt bei der Implementierung eine wichtige Rolle. So verfügt fast jedes vierte Vergütungssystem im DAX über ein Malus-System, in den untersuchten SDAX-Unternehmen ist dagegen keine Implementierung auszumachen. Über Struktur und Höhe des Rückzahlungsanspruchs wird von den Unternehmen nicht detailliert berichtet, weshalb hier eine genauere Betrachtung unterbleibt. Grundsätzlich sind Malus-Systeme jedoch einer kritischen Beurteilung zu unterziehen. Im Sinne einer linearen *pay-for-performance-relation* dienen Malus-Systeme dazu, den Vorstand an einer schlechten Performance teilhaben zu lassen, die ansonsten nur von den Eigentümern getragen wird und ist deshalb aus Sicht der Anteilseigner zu begrüßen. Sie sind jedoch nur schwer mit der mit dem Ziel vereinbar, die besten Manager im Unternehmen zu halten. Auch im Kontext des

managerial power approach ist davon auszugehen, daß Vorstände Malus-Systeme ablehnen, wodurch sich der weiterhin niedrige Anteil von Malus-Systemen erklären ließe.

4.2.5 Ausgestaltung des LTI-A

Etwa die Hälfte der untersuchten Unternehmen gewährt aktienbasierte Vergütungskomponenten (*Abbildung 8*).



Während in den früheren Jahren der Untersuchung noch häufiger Optionen als Aktien gewährt wurden, übersteigt 2011 der Anteil an Unternehmen, die Aktien gewähren erstmals den Anteil an Unternehmen, die Optionen gewähren. Anteilseigner tragen positive und negative Kursentwicklungen, während Optionsinhaber nur an positiven Kursentwicklungen partizipieren. Aus Sicht der Anteilseigner und im Sinne der *optimal contracting theory* ist deshalb eine Gewährung von Aktien einer Gewährung von Optionen vorzuziehen.

Bemessungsgrundlagen

Die Ergebnisse zeigen, daß die Auszahlung aktienbasierter Vergütungskomponenten am häufigsten an Ziele auf Basis der absoluten Aktienkursentwicklung gebunden wird (*Tabelle 5*). Ein Vergleich der Kursperformance mit Wettbewerbern oder einem Auswahlindex ist bei einer absoluten Bemessung nicht möglich, weshalb selbst eine relativ schlechte Kursperformance im Vergleich zu Wettbewerbern zu einer variablen Vergütung führen kann. Halten Anteilseigner ein diversifiziertes Anlageportfolio ist eine relative Performancemessung vorzuziehen, da eine solche Performancemessung bereinigt von

- Tabelle 5: Bemessungsgrundlagen der LTI-A -

	2004		2005		2006		2007		2008		2009		2010		2011		2012	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
abs. AKE	30	52,6%	37	66,1%	45	75,0%	46	80,7%	43	78,2%	40	76,9%	35	74,5%	34	69,4%	32	69,6%
rel. AKE	22	38,6%	24	42,9%	28	46,7%	26	45,6%	23	41,8%	23	44,2%	19	40,4%	21	42,9%	19	41,3%
RG	2	3,5%	4	7,1%	5	8,3%	4	7,0%	5	9,1%	5	9,6%	6	12,8%	7	14,3%	6	13,0%
Umsatz	1	1,8%	1	1,8%	2	3,3%	3	5,3%	1	1,8%	2	3,8%	1	2,1%	5	10,2%	6	13,0%
EBIT	1	1,8%	1	1,8%	3	5,0%	4	7,0%	3	5,5%	3	5,8%	2	4,3%	4	8,2%	4	8,7%
JÜ	0	0,0%	0	0,0%	0	0,0%	1	1,8%	0	0,0%	1	1,9%	1	2,1%	3	6,1%	2	4,3%
EPS	0	0,0%	1	1,8%	2	3,3%	3	5,3%	4	7,3%	3	5,8%	4	8,5%	4	8,2%	5	10,9%
Cash-flow	0	0,0%	0	0,0%	1	1,7%	1	1,8%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%
Kapitalrendite	2	3,5%	3	5,4%	1	1,7%	2	3,5%	1	1,8%	0	0,0%	0	0,0%	0	0,0%	1	2,2%
k.A.	13	22,8%	8	14,3%	2	3,3%	2	3,5%	1	1,8%	1	1,9%	1	2,1%	1	2,0%	0	0,0%

Legende: abs. AKE = absolute Aktienkursentwicklung, rel. AKE = relative Aktienkursentwicklung, RG = Residualgewinn, JÜ = Jahresüberschuss, EPS = Ergebnis je Aktie, Kapitalrendite = Verhältnis aus Ergebnisgröße und Kapitaleinsatz (z.B. ROCE), k.A. = keine Angaben.

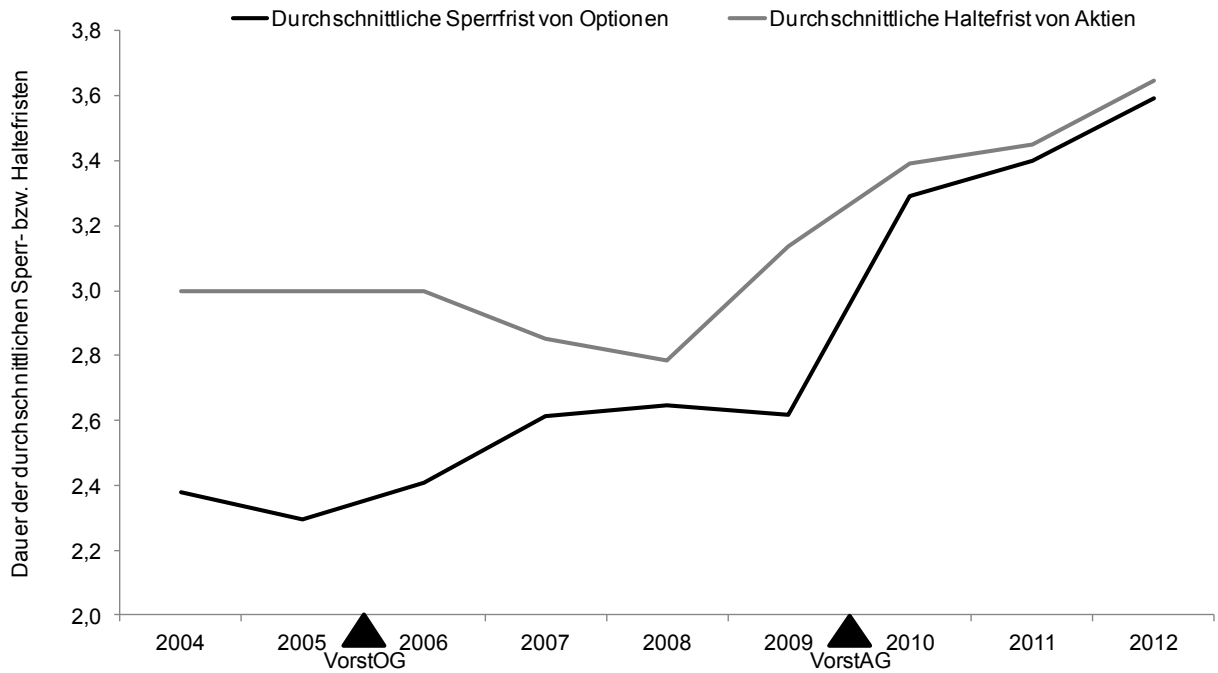
Branchen- und makroökonomischen Effekten ist und die auf die Handlungen des Vorstands zurückzuführende Kurssteigerung eher abbildet. Die Dominanz der absoluten Aktienkursentwicklung zur Bemessung der LTI-A lässt sich daher nur eingeschränkt mit Hilfe der *optimal contracting theory* erklären. Nach dem *managerial power approach* ist jedoch davon auszugehen, daß der Manager risikoärmere Vergütungskomponenten risikoreicheren vorzieht. Da aktienbasierte Vergütungskomponenten häufiger zu einer Auszahlung führen können, wenn sie an die absolute Aktienkursentwicklung gebunden sind, lässt sich diese Entwicklung zumindest teilweise mit Hilfe des *managerial power approach* erklären.

Der Zugriff auf aktienbasierte Komponenten wird vermehrt auch an buchhalterische Kennzahlen gebunden. Dabei soll nur dann auf die gewährten aktienbasierten Komponenten zugegriffen werden können, wenn auch die buchhalterische Performance die erwarteten Ziele erreicht. Dies widerspricht mitunter der Intention aktienbasierter Vergütungskomponenten aus Eigentümersicht. Der Aktienkurs spiegelt die Erwartungen an die zukünftige Performance des Unternehmens wider und soll langfristige Anreize schaffen. Eine Bindung an eine einperiodige historische Performancekennzahl läuft dem zuwider. Aus Sicht der Anteilseigner und im Sinne der *optimal contracting theory* ist eine derartige Ausgestaltung der LTI-A abzulehnen, da beispielsweise der Anreiz entstehen kann, wertschaffende Investitionsprojekte, die mit hohen Auszahlungen verbunden sind, zu unterlassen, um die aktuelle buchhalterische Performance nicht zu belasten. Auch aus der Perspektive des Managers ist diese Entwicklung nur schwer nachzuvollziehen.

Sperr- und Haltefristen

Die Ergebnisse zeigen, daß insbesondere Optionspläne, mit etwas mehr als zwei Jahren Sperrfrist, im Verhältnis zu Aktienplänen bis 2009 kurzfristiger gestaltet waren (*Abbildung 9*). Das VorstAG regelt eine Mindesthaltefrist von vier Jahre für neu aufgelegte Aktienoptionsprogramme ab dem Jahr 2010, weshalb sich die Länge der Zugriffssperren gleichermaßen erhöhen. Längere Zugriffssperren können sicherstellen, daß eine Auszahlung aus LTI-A nur dann erfolgt, wenn sich die Entscheidungen des Vorstands auch längerfristig in einem höheren Aktienkurs niederschlagen und sind aus Sicht der Anteilseigner zunächst positiv zu bewerten.

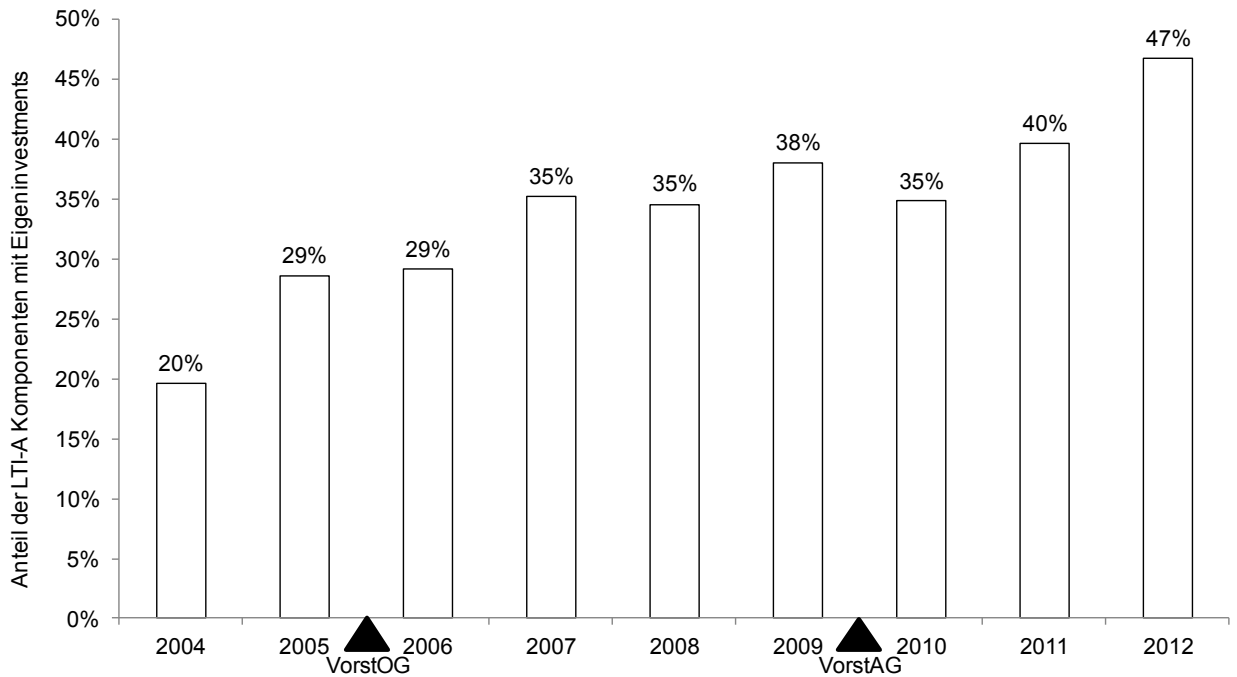
- Abbildung 9: Dauer der durchschnittlichen Sperr- und Haltefristen (in Jahren) -



Eigeninvestments

Eigeninvestments erfreuen sich zunehmender Beliebtheit (*Abbildung 10*).

- Abbildung 10: Eigeninvestments im Rahmen von LTI-A -



Im Jahr 2012 haben 47% der untersuchten Unternehmen im Rahmen der LTI-A Eigeninvestments implementiert. Dazu wird häufig ein Teil der variablen Vergütung oder ein Betrag, der sich an der Höhe der gewährten aktienbasierten Vergütung orientiert, in Aktien

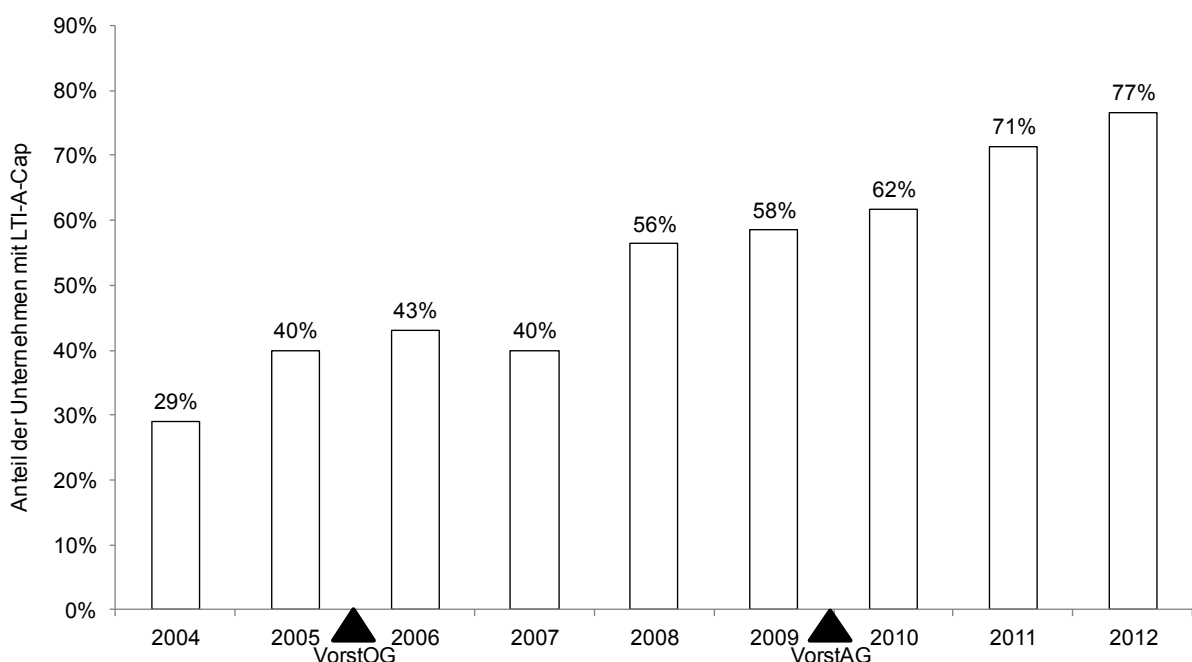
des Unternehmens investiert. Größen wie 10% des STI oder des Zuteilungswerts des LTI-A werden regelmäßig herangezogen. Dabei sind zwei verschiedene Vorgehensweisen möglich. Entweder müssen die mit eigenen Mitteln erworbenen Aktien für die gesamte Laufzeit des LTI-A gehalten werden und sind nicht an die Performanceziele des LTI-A gebunden, oder die eigenen Mittel des Managers werden zur „Fianzierung“ des LTI-A verwendet. So kann beispielweise 10% des STI in LTI-A umgerechnet und an Performanceziele gebunden werden, wodurch der Manager die gewährten Aktien des LTI-A zu einem bestimmten Teil selbst finanziert.

Eigeninvestments sollen aus Eigentümersicht zu einer Angleichung der Interessen zwischen Eigentümern und Managern führen, weshalb der steigende Verbreitungsgrad von Eigeninvestments aus Sicht der Anteilseigner positiv zu bewerten ist. Zusätzlich werden Vorstände durch das Einfordern von Eigeninvestments an das Unternehmen gebunden, da sie nun selbst als Eigentümer fungieren. Diese Entwicklung entspricht somit den Aussagen der *optimal contracting theory*. Da aus Sicht der Vorstände Eigeninvestments jedoch zu einem Einsatz des persönlichen Vermögens führen, wodurch das persönliche Risiko des Managers steigt, werden Eigeninvestments nach dem *managerial power approach* von den Managern abgelehnt.

Obergrenzen

Wie schon der STI und LTI-K, wird auch die Auszahlung aktienbasierter Komponenten regelmäßig gedeckelt (*Abbildung 11*).

- **Abbildung 11: Anteil der Unternehmen mit LTI-A-Cap** -



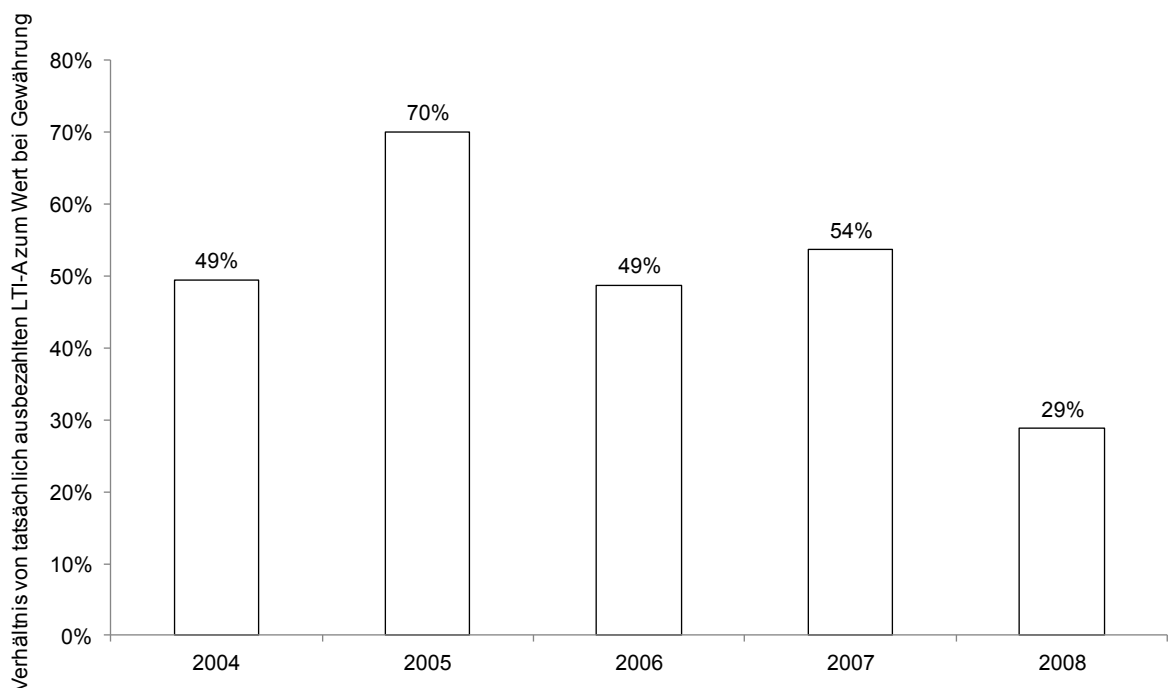
Die konkrete Ausgestaltung variiert jedoch von den Caps der kennzahlenbasierten Komponenten und es existiert eine Vielzahl von unterschiedlichen Obergrenzen. So greift ein Teil der Unternehmen auf den Basiskurs von Aktienoptionen bei der Bestimmung der maximalen Auszahlung zurück, andere orientieren sich an Zielwerten. Desweiteren werden Ausübungskurse, Zuteilungswerte sowie die Höhe des Eigeninvestments als Basis für eine Obergrenze eingesetzt.

Analog den bisherigen Überlegungen zu Obergrenzen sind auch im Rahmen von aktienbasierten Vergütungskomponenten Obergrenzen aus Sicht der Eigentümer und Vorstände einer kritischen Betrachtung zu unterziehen. Obergrenzen im Rahmen von aktienbasierten Vergütungskomponenten können dabei verhindern, daß Vorstände von sog. Windfall Profits profitieren. Demgegenüber stehen mögliche langfristige Anreizprobleme, da insbesondere wenn eine absolute Aktienkursentwicklung zugrunde gelegt wird, die Performanceziele schon früh erreicht werden könnten. Das Anreizproblem verschärft sich, wenn nun mindestens vierjährige Zugriffssperren nach VorstAG vereinbart werden müssen.

Zeitwert bei Gewährung vs. tatsächliche Auszahlung

Abbildung 12 zeigt, daß aktienbasierte Komponenten im Durchschnitt nicht vollumfänglich zur Auszahlung kommen.¹⁶

- Abbildung 12: Verhältnis von tatsächlich ausbezahlten LTI-A zum Wert bei Gewährung -



¹⁶ Aufgrund von maximal vierjährigen Zugriffssperren von LTI-A sind im Untersuchungszeitraum im Jahr 2012 LTI-A ausgelaufen die 2008 gewährt wurden. Deshalb ist die Analyse auf die Jahre 2004 bis 2008 beschränkt.

Der Zeitwert bei Gewährung war stets höher als die Auszahlung nach der Zugriffssperre. Dies kann unter anderem auf ambitionierten Ziele innerhalb der aktienbasierten Vergütungskomponenten zurückzuführen sein. Dies ist aus Sicht der Anteilseigner so lange zu begrüßen, so lange keine Resignation beim Vorstand eintritt, da die Motivation des Managers grundsätzlich durch ambitionierte Ziele gesteigert werden kann. Dementgegen steht die Tatsache, daß ambitionierte Ziele das Auszahlungsrisiko für den Manager steigern, weshalb der Manager nach dem *managerial power approach* eher niedrig gelegene Ziele präferiert.

Ein weiterer Grund für die geringe Auszahlung im Vergleich zum Zeitwert bei Gewährung kann aber auch die nur geringe Beeinflussbarkeit des Aktienkurses durch Manager sein. Es kann nicht davon ausgegangen werden, daß die Handlungen von Vorständen sich adäquat im Aktienkurs widerspiegeln werden, da Aktienkursentwicklungen von einer Vielzahl anderer Faktoren beeinflusst werden, die nicht durch die Handlungen des Vorstands beeinflusst werden können. Im Untersuchungszeitraum ist dabei insbesondere der Einfluss der Finanzkrise zu nennen. Diese mangelnde Beeinflussbarkeit des Aktienkurses durch den Vorstand wird durch längerfristige Zugriffssperren zumindest nicht verbessert.

5. Fazit

Die Ergebnisse zeigen, dass die regulatorischen Eingriffe durch das VorstOG, das VorstAG und den DCGK durchaus auf die Ausgestaltung der Vorstandsvergütung wirken. Durch das Inkrafttreten des VorstOG in 2005 sind Vergütungsberichte verpflichtend anzufertigen, weshalb die untersuchten Unternehmen zunehmend detailliert über die Ausgestaltung der Vergütungssysteme von Vorständen berichten. Allerdings ist die Komplexität der Vergütungssysteme im Untersuchungszeitraum nicht unerheblich gestiegen, woran die zahlreichen regulatorischen Einflüsse sicher ihren Anteil haben.

Eine besondere Wirkung entfalten das VorstAG und der DCGK ab dem Jahr 2010 auf die Ausgestaltung der Vergütungskomponenten, da seither die untersuchten Unternehmen vermehrt nicht-finanzielle Kennzahlen incentivieren und so ihre Vergütungssysteme nachhaltiger gestalten. Zudem werden ab dem Jahr 2010 längerfristige Vergütungskomponenten vermehrt gewährt; auch Obergrenzen erfahren aufgrund der Regelungen des VorstAG und des DCGK eine zunehmende Bedeutung. Die Forderung des DCGK nach einer Vorstandsvergütung, die sowohl positive als auch negative Entwicklungen abbilden kann, führt ab 2010 zu einem erhöhten Verbreitungsgrad von Malus-Systemen in der variablen Vorstandsvergütung, während diese in den Vorjahren keine Rolle spielten. Durch

Malus-Systeme hat der Vorstand eine schlechte Unternehmensperformance über den Ausfall seines Bonus hinaus mitzutragen. Dennoch sind 2012 erst in 12% der untersuchten Vergütungssysteme entsprechende Malus-Systeme implementiert.

Aus Anreizgesichtspunkten sind weitere Entwicklungen in der Vorstandsvergütung kritisch zu betrachten. Bei der Bemessung des Jahresbonus dominieren traditionelle Performancemaße, während wertorientierte Kennzahlen nur eine untergeordnete Rolle spielen. Durch die variable Vergütung traditioneller Kennzahlen kann nicht ohne weiteres von einer Incentivierung von am Unternehmenswert orientierten Entscheidungen ausgegangen werden; relative Kennzahlen, wie beispielsweise Kapitalrenditen, führen zu einem Unterinvestitions-, absolute Gewinnmaße dagegen zu einem Überinvestitionsproblem.

Auch die seit dem Inkrafttreten des VorstAG im Jahr 2009 vermehrt gewährten langfristigen kennzahlenbasierten Vergütungskomponenten führen zu ähnlichen Anreizproblemen. Zwar sind die Komponenten im Mittel 3-jährig bemessen, von einer Angleichung der Zeithorizonte von Vorständen und Anteilseigner kann aus ökonomischer Sicht jedoch nicht gesprochen werden. Die von den untersuchten Unternehmen als langfristig deklarierte kennzahlenbasierte Komponenten, stellen sich insbesondere in kleineren Unternehmen als nicht zukunftsgerichtet heraus und beziehen sich stattdessen auf eine meist dreijährige historische Entwicklung der Bemessungsgrundlage. Wertorientierte Kennzahlen werden in langfristigen kennzahlenbasierten Komponenten durchaus häufiger als im klassischen Jahresbonus als Bemessungsgrundlagen implementiert, es dominieren jedoch weiterhin traditionelle Performancegrößen.

Auch im Rahmen von aktienbasierten Vergütungskomponenten sind aus Anreizsicht problematische Entwicklungen festzustellen. So dominiert über den gesamten Untersuchungszeitraum die absolute Aktienkursentwicklung als Bemessungsgrundlage, was selbst bei einer schlechten Kursperformance im Vergleich zur Marktentwicklung zu einer Steigerung der Vorstandsvergütung führen kann. Zudem wird die Auszahlung von aktienbasierten Vergütungskomponenten häufig an historische Performancekennzahlen gebunden, wodurch Fehlanreize entstehen können. Obwohl Eigeninvestments über den gesamten Untersuchungszeitraum zunehmend gewährt werden, sind sie 2012 noch in weniger als der Hälfte aller untersuchten aktienbasierten Vergütungskomponenten implementiert.

Die vorliegenden Ergebnisse deuten insgesamt auf einen nicht zu unterschätzenden Erklärungsanteil des *managerial power approach* in der Ausgestaltung der Vorstandsvergütung hin. Dieser Ansatz beschreibt Manager, die ihre Vergütung derart

beeinflussen können, dass das Auszahlungsrisiko möglichst minimiert wird. Manager präferieren dementsprechend ein möglichst hohes Fixum und allenfalls kurzfristige variable Vergütungskomponenten. Die Ergebnisse der Analyse stehen damit im Einklang, da das Fixum über den gesamten Untersuchungszeitraum die dominierende Vergütungskomponente ist, während in der variablen Vorstandsvergütung kurzfristige Komponenten dominieren.

Der vorliegende Beitrag erweitert die bisherige Literatur in zweierlei Hinsicht. Die Ergebnisse zeigen erstens umfassend die Auswirkungen der regulatorischen Eingriffe auf die Gestaltung der Vorstandsvergütung über einen längeren Zeitraum und sind daher insbesondere für die regulatorische Praxis von Bedeutung. Die Ergebnisse zeigen dabei, dass von einer Verbesserung der Transparenz der Vorstandsvergütung nur eingeschränkt gesprochen werden kann. Die regulatorischen Eingriffe führen zwar zu einer umfassenderen Berichterstattung über Vorstandsvergütungssysteme, die Vielzahl an regulatorischen Eingriffen wirkt jedoch gleichzeitig komplexitätserhöhend. Aufgrund der durch die Regularien hervorgerufenen Vielzahl an unterschiedlichen Vergütungskomponenten, ist es kaum vorstellbar, dass Vorstände komplexe Entscheidungen auf Basis eines Optimierungskalküls ihrer Vergütungsfunktion treffen. Es bleibt deshalb die Frage offen, inwiefern die, durch die Regularien gewünschte Ausrichtung der Vorstandsvergütung an einer nachhaltigen Unternehmensentwicklung im Sinne der Anteilseigner, erzielt werden kann. Es stellt sich weiter die Frage, ob eine Incentivierung der Vorstände im Sinne der Anteilseigner zukünftig nicht mit einer Reduktion der Komplexität der Vergütungssysteme einhergehen muss.

Die Ergebnisse leisten zweitens einen Beitrag zum Diskurs zwischen *managerial power approach* und *optimal contracting theory*. Während die *optimal contracting theory* hilfreiche Instrumente zur angemessenen Gestaltung von Vergütungsverträgen liefert, deuten die Ergebnisse jedoch darauf hin, dass Eigentümer nicht die Macht haben, einen solchen Vertrag durchzusetzen. Denn die Analyse zeigt, dass Vorstandsvergütungssysteme aktuell eine Reihe von Möglichkeiten bieten, an guter Unternehmensperformance kurzfristig zu partizipieren, während Underperformance angesichts hoher Fixgehälter und weitgehend fehlender Malus-Systeme eher komfortabel abgemildert wird.

Angesichts der Befunde kann provozierend die Frage gestellt werden, ob nicht durch den starren Fokus der regulatorischen Praxis auf die Ausgestaltung der Vorstandsvergütung, die Gesamtverantwortung von Vorständen fälschlicherweise auf die Steigerung einiger weniger incentivierter Bemessungsgrundlagen reduziert wird. Ob deshalb Vorstände nicht eher langfristig orientierte Entscheidungen im Sinne der Anteilseigner treffen, wenn auf eine

variable Vergütung gänzlich verzichtet werden würde, ist eine weitere offene Frage. Überdies bleibt offen, ob angesichts der ohnehin beträchtlichen Höhe der Vorstandsvergütungen überhaupt noch von wirksamen Leistungsanreizen ausgegangen werden kann.

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The Role of different Forms of Value-based Management Implementations and their Effects on Value Drivers and Firm Performance

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Abstract:

We investigate performance effects of three different common implementations of value-based management (vbm) in German corporations: value-based internal control without monetary incentives tied to value-based metrics, value-based short-term, and long-term board compensation. Our results show that adopters of highly weighted value-based metrics in long-term board compensation components are associated with outperformance. Outperformance is thereby mainly driven through differences in investing, operating and financing decisions. Further, adopters of value-based metrics in short-term board compensation components are associated with minor outperformance. Adopters of only value-based internal control are even associated with underperformance. We also show the potential dark side of vbm implementations when it comes to asset milking. Adopters of value-based board compensation cut new investments which partly results in lower performance. The analysis is based on a two-stage-least-squares approach as well as a propensity score matched differences in differences approach in structural equation models. The results question existing literature in the field of value-based management that usually neglects the effects of vbm on value drivers and regularly applies an adopter / non-adopter approach, thereby ignoring the heterogeneity of vbm implementations in corporate practice. For practice the results are important as they show that partial implementation of vbm is insufficient in order to realize performance increases.

Keywords: Value-based management, board compensation, internal control, firm performance, two-stage-least-squares, value drivers

JEL: M41, M12, M52, J3

Data: Data on the implementation levels of value-based management is collected by hand. Remaining data is provided by Bloomberg data base.

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1 Introduction

Since the spreading of value-based management (vbm) (e.g. *Stewart* 1991, *Rappaport* 1986, *Young / O'Byrne* 2001) empirical research tries to find evidence that companies realize higher performance when applying value-based metrics for management control (*Wallace* 1997, *Hogan / Lewis* 2005, *Ryan / Trahan* 2007, *Ernstberger et al.* 2010). In order to realize such performance increases the concept of vbm aims at a consistent implementation of value-based metrics in all management control systems. A consistent implementation thereby requires that non-monetary dimensions of management control systems, such as periodic performance measurement, organizational strategies, targets and goals, as well as monetary dimensions such as compensation systems are tied to value-based metrics (*Malmi / Ikäheimo* 2003). When value-based metrics are applied inconsistently, it remains an open question whether performance increases can be realized. However, a vast amount of literature reports such inconsistent use of value-based metrics in corporate practice when focusing on board compensation systems and company internal control systems (*Pellens / Tomaszewski / Weber* 2000, *Aders et al.* 2003, *Malmi / Ikäheimo* 2003, *Becker / Kramarsch* 2006, *Weber* 2009, *Lueg* 2010, *Schäffer / Lewerenz* 2011, *Horster / Knauer* 2012, *Gitt / Völl / Kettenring* 2013). Most of the companies rely on value-based metrics for internal control but do not monetarily incentivize value-based metrics. It therefore surprises that the question about different implementations of vbm has largely escaped empirical research on vbm. This research regularly only investigates either value-based board compensation systems, value-based internal control systems or does not differentiate at all in an adopter / non-adopter approach (*Wallace* 1997, *Hogan / Lewis* 2005, *Ryan / Trahan* 2007, *Ernstberger et al.* 2010).

But even the separation between monetary and non-monetary management control systems ignores the various forms of incentivizing performance measures in practical compensation schemes. Board compensation systems regularly consist of several variable compensation components. These compensation components vary in incentive horizon (*Friedl / Pfeiffer* 2014) and are usually based on various performance measures (*Rapp / Wolff* 2011). Assuming diverging time horizons between managers and shareholders especially short-term value-based compensation components might not lead to decisions consistent with shareholders' interests. As solution, conceptual literature on vbm (e.g. *Stewart* 1991, *Young / O'Byrne* 2001) suggests long-term incentive schemes including bonus-bank systems in order to align managers' and shareholders' time horizons. Implicitly, it is assumed in these compensation systems that total variable compensation is determined by value-based metrics. However, companies usually provide several compensation components whereas each

component is differently weighted. Consequently, some components might be dominant, whereas others might only play a subordinate role for total compensation (*Malmi / Ikäheimo 2003*). Therefore, situations might arise, where value-based metrics are just poorly compensated with just a minor influence on total compensation and potentially just a minor influence on managerial actions. Accordingly, both issues regarding the incentive horizons and the weighting in total compensation are also uninvestigated in empirical literature.

Bringing all together, in the context of vbm the separation between monetary and non-monetary incentives, short and long-term board compensation components as well as the weight in total compensation, need to be further investigated. Accordingly, a more differentiated view on vbm implementations in empirical literature is demanded (see *Ittner / Larcker 2001, Malmi / Ikäheimo 2003, Lueg / Schäffer 2010, Burkert / Lueg 2013*). Therefore this research aims at closing the gap in existing vbm literature and we formulate the following main research questions:

RQ1: Is there a difference in performance between firms having implemented vbm and those which have not?

RQ2: Do potential performance differences depend on the form of vbm implementation?

The analysis proceeds as follows: In order to answer these questions, we conduct a sample of German public traded companies that were included in the DAX, MDAX, TecDAX and SDAX over the years 2004 to 2011. We measure the implementation of vbm in monetary management control systems by investigating board compensation systems and we measure the implementation of vbm in non-monetary management control systems by investigating company internal control systems that exclude compensation systems. Our research benefits from a unique situation in Germany, where the German Corporate Governance Code as well as the German Board Compensation Disclosure Law require mandatory disclosure of board compensation systems. Therefore, data on compensation components, their weighting and incentivized performance metrics are available in the annual report. Besides, in our sample period the German Accounting Standard No. 15 additionally requires disclosure of performance measures used for internal control purposes explicitly excluding board compensation. This allows us to measure the implementation of value-based metrics for internal control purposes.

Adopters of vbm are assumed to change investing, operating and financing decisions and eventually increase performance. In order to analyze resulting direct and indirect effects of

vbm on corporate performance, we apply a structural equation model. We identify several value drivers in accordance with conceptual and empirical literature on vbm and investigate how the different forms of vbm implementations are associated with these value drivers. Next, we investigate how these value drivers are linked to operating performance and eventually value-based performance. Additionally, we control for reverse causality when implementing vbm by applying two-stage-least-squares. Such an approach is regularly adopted in vbm literature (*Hogan / Lewis 2005, Ryan / Trahan 2007, Ernstberger et al. 2010*). In further analyses, we also apply propensity score matching based on the probability to implement vbm in the year prior to the actual adoption for a differences in differences analysis.

Our results show that companies adopting vbm in board compensation are associated with outperformance through the favorable influence on value drivers. Thereby, adopters of long-term value-based board compensation outperform adopters of short-term value-based board compensation. The positive effects on value drivers and performance mainly depend on the relative weight of value-based metrics in total compensation: The higher the relative weight the higher is performance. Adopters of vbm solely for internal control, that still compensate traditional measures, are not linked to outperformance, however, even underperform. The results therefore show that especially a consistent implementation in board compensation and internal control systems is key to realize performance increases. Further, the results are robust against different approaches to deal with endogeneity e.g. in our propensity score matching.

We contribute to existing literature on value-based management by showing that the adopter / non-adopter approach, which is regularly applied in empirical literature, cannot cover the variety of vbm implementations in corporate practice. This is especially important as partial, inconsistent implementations of vbm dominate in corporate practice. Our results thereby show that these partial implementations of vbm are ineffective to achieve performance increases. Therefore the results create an understanding for the differences between sophisticated vbm adopters, superficial vbm adopters and non-adopters. For practice the results are therefore of major importance, as they show that it is worth to invest time and money to consistently implement vbm. But the results also show that even when value-based metrics are applied consistently, they can lead to unfavorable decisions when used without the necessary caution.

From a theoretical point of view, we present results that are in accordance with agency theory prediction but also in line with goal-setting theory when multiple competing targets are applied. Results show that it is not sufficient to implement vbm without a relevant portion of total compensation linked to value-based metrics. Therefore, our results are in favor of the

pay-for-performance argument that has suffered intense criticism in the business press after the financial crisis.

In terms of methodology, we show the importance of accounting for moderation and mediation in empirical managerial accounting research, as the major part of our results arises from indirect effects. Additionally, we show robust ways to overcome the endogeneity issue by following the suggested steps of *Larcker / Rusticus* (2010) or by applying propensity score matching.

This article is structured as follows. In chapter 2 we review the relevant literature that deals with the implementation of vbm and the effects on performance. In chapter 3 we formulate the hypotheses. In chapter 4 we present the sample, data sources and applied models. Further, also the steps that we took in order to control for endogeneity are presented here. Results are presented and discussed in chapter 5. Chapter 6 concludes with final remarks, limitations and further research perspectives.

2 Literature Review

Relevant empirical studies for our research questions mainly focus on three different aspects. First, relevant research investigates to what degree vbm is spread among companies. For the German market, *Pellens et al.* (2000) and *Aders et al.* (2003) provide early insights into the practical implementation of vbm and show that it was widely spread among German companies. Also more recent results confirm that value-based metrics are commonly applied for management control (*Lueg* 2010, *Schäffer / Lewerenz* 2011, *Horster / Knauer* 2012 and *Gitt et al.* 2013). However value-based metrics are not the dominant metrics for management control and are regularly applied inconsistently. For example, *Gitt et al.* (2013) show that approximately only one third of the companies that apply value-based internal control also apply value-based board compensation.

Second, research also focuses on market reactions to an adoption of vbm. In an early study, *Kleiman* (1999) reports significant outperformance in stock returns of companies applying vbm. Additionally, he reports that companies that apply vbm increase operating performance. Similar to *Kleiman* (1999), *Rapp et al.* (2011) find that companies adopting vbm earn excess risk adjusted stock returns in the year of implementation and that these returns are not jeopardized in later years after the adoption. Accordingly, *Athanassakos* (2007) also shows results that companies realize higher stock returns when implementing vbm.

Third, literature also focuses on the influences of vbm on operating performance. *Ryan / Trahan* (2007) find that firms adopting vbm improve residual income significantly after the

adoption. However, they find that an implementation of value-based board compensation does not increase the effectiveness of vbm. These results are challenged by *Wallace* (1997), who finds that companies that implemented value-based compensation plans decrease investments, increase asset disposals and share repurchases as well as asset turnover and eventually also increase residual income. The results of *Hogan / Lewis* (2005) side with *Wallace* (1997) as they find that anticipated adopters of vbm in board compensation realize higher operating performance, manage their assets more efficiently and have higher shareholder-value compared to surprise non-adopters. At last, *Ernstberger et al.* (2010) do not find a significant positive effect of the adoption of vbm on return on assets and only partially confirming results on Tobin'sQ. The conflicting results between the studies might come up for the following reasons. First, the definition of value-based metrics is not consistent. *Ryan / Trahan* (2007) and *Rapp et al.* (2011) include ROI-based measures to value-based metrics, whereas *Wallace* (1997), *Hogan / Lewis* (2005) and *Ernstberger et al.* (2010) do not. Proponents of the approach to define ROI-based measures as value-based metrics argue that ROI-based measures would be easily comparable to cost of capital and therefore are equivalent to value-based metrics (*Ryan / Trahan* 2007, *Rapp et al.* 2011). However, there is no guarantee that this actually happens within companies. Additionally, companies using ROI-based measures in management control systems are in danger to face an underinvestment problem. This view is supported by *Balachandran* (2006), who finds that switching from earnings-based compensation plans to vbm in board compensation leads to decreasing investments, whereas the opposite occurs for a switch from ROI-based compensation plans. Second, the different methods used to identify the relationship between vbm and company performance make the results hard to compare. Some research accounts for the problem of endogeneity whereas some other research does not.¹ Third, the reviewed literature usually applies an adopter / non-adopter approach, thereby missing to account for the heterogeneity of vbm implementations in corporate practice. Fourth, in most applied methods the potential influences of vbm on value drivers are ignored, as vbm is directly associated with operating performance in the presence of value drivers as control variables. For example, *Ernstberger et al.* (2011) control for leverage when analyzing the association between vbm and operating performance, but do not account for the effects vbm might have on leverage.

¹ See *Lueg / Schäffer* (2010) for a more detailed discussion on the problems of research on vbm.

3 Theory and Hypotheses

Adopters of value-based metrics in management control systems are assumed to focus on the reduction of capital charges by decreasing invested capital or cost of capital (*Stewart 1991, Young / O'Byrne 2001*). In order to reduce capital charges changes in investing, operating and financing decisions are assumed by existing literature and shall briefly be shown (*Wallace 1997, Hogan / Lewis 2005*). In terms of investing decisions, existing literature assumes that due to the cost of capital discipline adopters of vbm invest less than non-adopters thereby choosing the value-maximizing investment portfolio in accordance with the net present value rule (*Preinreich 1937, Lücke 1955, Wallace 1997*). Further, adopters of vbm are assumed to sell ineffectively used assets that do not earn the cost of capital (*Wallace 1997*). In terms of operating decisions working capital is assumed to be reduced in order to reduce invested capital. Thereby, a decrease in receivables and inventory holdings as well as an increase in payables can be expected (*Wallace 1997, Hogan / Lewis 2005*). However, there is an optimal level for each of the working capital components. For example, an excessive decrease in inventory holdings might lead to a loss in flexibility (*Obermaier / Donhauser 2012*) whereas a decrease in receivables or an increase in payables might lead to tensions between customers and suppliers (*Deloof 2003*). Regarding financing decisions two different aspects are relevant: cash holdings and capital structure. Due to the cost of capital discipline adopters of vbm are assumed to decrease excess cash (*Wallace 1997*), as excess cash does not earn the cost of capital. Further, excess cash might be a result of managerial opportunism (*Myers 1984, Opler et al. 1999*). Additionally, adopters of vbm have the incentive to optimize capital structure to reduce cost of capital. Following pecking-order theory (*Myers / Majluf 1984*) it can be assumed that through the expected outperformance adopting companies might in fact hold higher portions of equity in order to reduce cost of capital by signaling financial strength.

Eventually, through the favorable influence on value-drivers linked to the investing, operating and financing decisions, we assume that adopters of vbm are associated with higher operating performance. Therefore we state the first hypothesis:

H1: Adopters of value-based management are associated with higher operating performance through the favorable influence of value drivers.

The magnitude of the influence on value-drivers might be dependent on the actual vbm implementation in management control systems. Generally, performance measures can be differently applied in management control systems, as they can be used for decision

facilitating and decision influencing purposes (*Demski / Feltham 1976*), depending on whether the information supplied refers to supporting one's own decisions (decision facilitating) or influencing the decisions of others (decision influencing). However, these two functions are not mutually exclusive but, as field research suggests, highly interdependent (*Obermaier / Müller 2008*): One and the same piece of information (e. g. on the development of residual income) can be used as a performance measure in an incentive system (decision influencing) as well as a trigger e.g. for investment portfolio optimization (decision facilitating). This differentiation corresponds with the results of a seminal study by *Simon et al.* (1954), revealing that accounting data are means for three ends: scorecard keeping, attention directing and problem solving. Scorecard keeping means, a company formulates targets and measures the status quo ("Am I doing well or badly?"). After measuring relevant indicators, the company receives information about differences between the targets set and the current state. The company can redirect the focus on one of these differences in the attention directing step („What problems should I look into?") and in the following find solutions to solve these problems („Of the several ways of doing the job, which is the best?").

The framework of *Simon et al.* (1954) acts on the assumption that the three process steps of scorecard keeping, attention directing and problem solving are consistent. It would be inefficient for example to draw attention to a certain metric and then measure something different. In our context this would mean that e.g. value-based metrics are applied in internal control systems for decision facilitating, but not tied to board compensation systems for decision influencing. If performance measures used in internal control systems are not consistent with the ones used in compensation systems, agency theory expects that managers will allocate their effort towards the task that they are compensated for, i.e. such managers will try to increase the performance measure of their compensation system (e.g. *Holmstrom / Milgrom 1991, Feltham / Xie 1994*). This may lead to value destructive decisions. However, this is what a vast array of literature has documented for the German market in the context of vbm (*Pellens et al. 2000, Aders et al. 2003, Becker / Kramarsch 2006, Weber 2009, Lueg 2010, Schäffer / Lewerenz 2011 Horster / Knauer 2012 and Gitt et al. 2013*). The majority of such companies apply traditional measures for compensation whereas they rely on value-based metrics for internal control only. So, they provide competing incentives. However, this does not necessarily mean that internal control systems without consistent monetary incentives are futile. According to *Locke / Latham (2002)* goals can affect performance by attracting attention towards goal-relevant dimension. The more ambitious these goals are, the higher is an individuals' effort, as long as personal abilities or commitment are not limited.

However, this also only holds in the absence of competing incentives. *Locke / Latham (2002)* state that “goal conflicts undermine performance if it motivates incompatible action tendencies” (p. 712). This is the case when value-based metrics are applied in internal control systems but not in board compensation systems. In such a conflict situation, we argue that monetary incentives should be stronger than goal-related incentives. Consequently, when value-based metrics are applied in board compensation systems, this should have a higher effect on operating performance compared to when value-based metrics are only applied for internal control and traditional measures are incentivized. This leads us to the second hypothesis:

H2: Companies applying value-based metrics in board compensation systems outperform companies that apply value-based metrics for internal control.

Thereby, variable board compensation components in German corporations usually consist of three different components: A short-term bonus which is based on one-year historic performance, long-term components that are based on multi-year performance developments and stock-based components (*Rapp / Wolff 2011, Friedl / Pfeiffer 2014*). As shown by *Rogerson (1997)* and *Reichelstein (1997)* value-based metrics can provide incentives in line with shareholder interests as long as managers’ discount rate equals shareholders’. However, we cannot assume that this holds in reality, as managers usually have a shorter time-horizon, e.g. through short contract periods, than shareholders. Therefore managers apply different discount rates, which might lead to unfavorable investment decisions. These diverging time horizons of managers and shareholders can be aligned when long-term future oriented compensation components are granted, such as bonus-banks (*Stewart 1991, Young / O’Byrne 2001, Jensen et al. 2004*). Through such components, managers might not forgo profitable investment projects with lower near term performance and act more in the shareholders’ interests. Therefore, we argue that companies that apply value-based metrics in long-term board compensation components will realize higher performance than companies that apply value-based metrics for short-term board compensation. We state the third hypothesis:

H3: Companies applying value-based metrics in long-term compensation components outperform companies that apply value-based metrics in short-term compensation components.

At last, we need to address the relevance of the pay-for-performance relation on different compensation components. Each compensation component has a different relevance for total compensation depending on the pay-for-performance relation that is assigned to these

components. Therefore it is possible that value-based metrics are implemented in, e.g. short-term compensation component, but this short-term component might also just determine a low percentage of total variable compensation (*Malmi / Ikäheimo* 2003). Therefore the majority of total variable compensation is determined by developments of traditional performance metrics in the remaining compensation components. In such a situation, we cannot expect that incentives consistent with shareholders' interests are provided. Consequently, we argue that the chosen pay-for-performance relation on value-based compensation components is of major importance. The higher the relative weight in total compensation, the higher should be the incentives and therefore performance. Accordingly, we state our last hypothesis:

H4: The higher the relative weight on value-based metrics in board compensation, the larger is the influence on value drivers stated in hypothesis 1.

4 Method

4.1 Sample

To investigate hypotheses 1 to 4, we base our analysis on a sample that consists of German industrial companies which were listed in the DAX, MDAX, TecDAX and SDAX in 2004 to 2011. To prevent survivorship bias, we follow these companies over the whole investigation period from 2004 to 2011. Companies were eliminated in case of bankruptcy, merger or acquisition. On average, the sample consists of 108 companies per year, starting with 119 companies in the year 2004 and declining to 95 in the year 2011 (table 1, panel A).

We rely on primary source data, as our data was collected by hand from annual reports. Information about the internal corporate control system was collected from management reports. The German Accounting Standard No. 15 regulates the content of management reports as a part of the annual reports in our sample period and also the description of the performance measures used in internal control system. Data for the compensation systems were taken from compensation reports. Such compensation reports are mandatory for German companies due to the German Board Compensation Disclosure Law and the German Corporate Governance Code. These compensation reports include information about board compensation systems, such as the design of the compensation components and thereby also about performance measures used to determine overall compensation and the weighting of each component.

ROI-based performance measures were classified as non-value-based. Additional data as well as index composition was taken from Bloomberg data base. When Bloomberg data was implausible, we validated it with data from annual reports and corrected it manually.

- Table 1: Number of observations and industry distribution -

<i>Panel A: Observations per year</i>		<i>Panel B: Observations per industry</i>		
Year	No. of observations	Industry	No. of observations	In %
2004	119	Automobile	49	5.7%
2005	115	Basic resources	16	1.9%
2006	112	Chemicals	64	7.4%
2007	110	Construction	32	3.7%
2008	107	Consumer	77	8.9%
2009	103	Food & Beverages	8	0.9%
2010	100	Industrial	241	28.0%
2011	95	Media	31	3.6%
Total	861	Pharma & Healthcare	74	8.6%
		Retail	69	8.0%
		Software	55	6.4%
		Technology	54	6.3%
		Telecommunication	19	2.2%
		Transportation & Logistics	48	5.6%
		Utilities	24	2.8%
		Total	861	

Table 1: Panel A: Number of observations per year. The sample is based on a total of 861 observations from German industry companies in the period from 2004 to 2011. Panel B: Industry distribution. The sample companies are well spread among industries, only the industrial segment is a little overweighted in the sample with 28% of all observations coming from this segment.

4.2 Models

We test model 1) represented by figure 1, in order to investigate the performance effects of vbm according to hypotheses 1 to 4. The following variables are applied:

Return on assets, roa EBIT divided by total assets, as a measure for the operating performance.

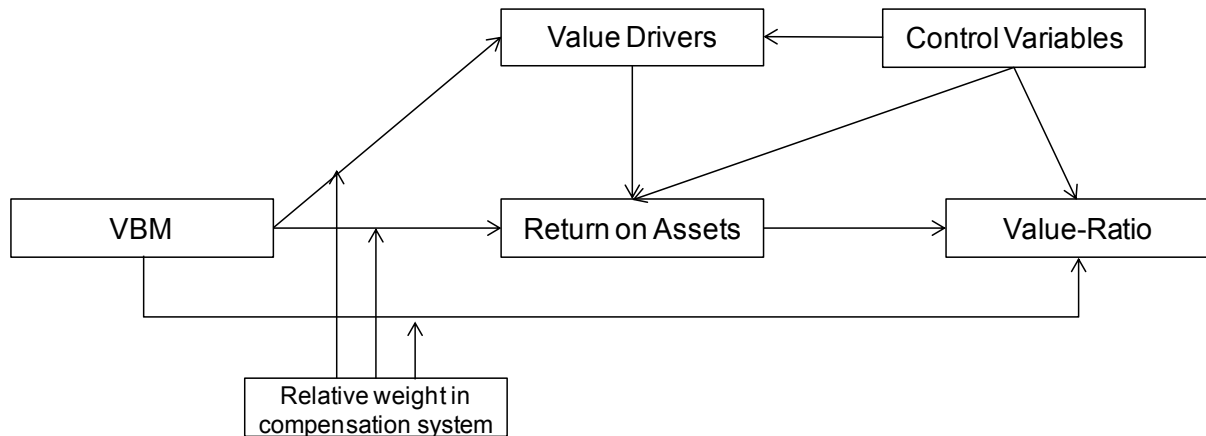
Value-ratio, vr Ratio of return on invested capital divided by WACC, as value-based performance metrics.

VBM - Dummy variables:

STBC application of vbm in short-term board compensation components. A compensation component is defined as short-term when the compensation is based on a one-year performance development.

STBC x perc_STI application of vbm in short-term board compensation components multiplied by the relative weight of the compensation component in total board compensation.

- Figure 1: Model 1) Graphical illustration of the assumed links between the different forms of value-based management and operating performance -



Return on assets, roa EBIT divided by total assets

Value-ratio, vr Ratio of return on invested capital divided by WACC

VBM – Dummy variables:

STBC application of vbm in short-term board compensation components.

STBC x perc_STI application of vbm in short-term board compensation components multiplied by the relative weight of the compensation component in total board compensation.

LTBC application of vbm in long-term board compensation components.

LTBC x perc_LTI application of vbm in long-term board compensation components multiplied by the relative weight of the compensation component in total board compensation.

VBIC application of vbm for internal control purposes.

Value Drivers:

cap_int PPE divided by total assets.

bs_capex investments in PPE and long-term intangible assets divided by total assets.

DSO days sales outstanding, calculated as total accounts receivable divided by total sales times 365.

DPO days payables outstanding, calculated as total accounts payable divided by total sales time 365.

DIO days inventory outstanding, calculated as total inventories divided by total sales times 365.

lev leverage, calculated as total debt divided by total equity.

bs_cash cash and cash equivalents divided by total assets.

Control variables:

perc_STI Percentage of short-term compensation components in total compensation.

perc_LTI Percentage of long-term compensation components in total compensation.

perc_FIX Percentage of fixed salary in total compensation.

lnSALES natural logarithm of company's sales in € million.

fcd Financial crisis dummy. Dummy variable that equals 1 for the years 2009 and 2010.

mtb market to book-ratio, calculated as market capitalization divided by total equity.

beta systematic risk factor.

ID Dummy variables for Z-1 industries.

YD Dummy variables for T-1 years.

LTBC	application of vbm in long-term board compensation components. A compensation component is defined as long-term when the compensation is based on a multi-year performance development.
LTBC x perc_LTI	application of vbm in long-term board compensation components multiplied by the relative weight of the compensation component in total board compensation.
VBIC	application of vbm for internal control purposes. In order to present the theoretically strongest results, we limit our investigation to those companies that apply value-based metrics as primary internal control variable.

In order to account for potential effects from under- or overinvestment prior to the adoption of vbm, we include variables to capture these effects. We include variables when either only ROI-based measures or earnings-based measures were applied in management control systems prior to adoption and when it is the first year after the vbm implementation. As we do not face such a clear situation when it comes to earnings-based performance measures according to the data, only a variable for ROI-based measures is included.

Value Drivers:

cap_int	PPE divided by total assets, as a measure for the degree of fixed assets and capital intensity of the company's business. Adopters of vbm are assumed to decrease capital intensity in order to reduce invested capital.
bs_capex	investments in PPE and long-term intangible assets divided by total assets, as a measure for companies' investment policy that influences current and future performance. Adopters of vbm are assumed to invest less than non-adopters due to the strict cost of capital discipline.
DSO	days sales outstanding, calculated as total accounts receivable divided by total sales times 365, as a measure of operating efficiency. Adopters of vbm are assumed to decrease DSO in order to reduce invested capital.
DPO	days payables outstanding, calculated as total accounts payable divided by total sales times 365, as a measure of operating efficiency. Adopters of vbm are assumed to increase DPO in order to reduce invested capital.

- DIO days inventory outstanding, calculated as total inventories divided by total sales times 365, as a measure of operating efficiency. Adopters of vbm are assumed to decrease DIO in order to reduce invested capital.
- lev leverage, calculated as total debt divided by total equity. Leverage measures company specific financing risk. Adopters of vbm are assumed to increase equity holdings due to higher operating performance in order to signal financial strength.
- bs_cash cash and cash equivalents divided by total assets, a measure for the degree of excess cash holdings. Adopters of vbm are assumed to reduce excess cash holdings that do not earn the cost of capital.

Control variables:

- perc_STI Percentage of short-term compensation components in total compensation.
- perc_LTI Percentage of long-term compensation components in total compensation.
- perc_FIX Percentage of fixed salary in total compensation.
- lnSALES natural logarithm of company's sales in € million, to control for company size-related performance differences.
- fed Financial crisis dummy. Dummy variable that equals 1 for the years 2009 and 2010 to control for performance developments due to the stock market crisis in 2008.
- mtb market to book-ratio, calculated as market capitalization divided by total equity, as a measure for companies' future growth options.
- beta systematic risk factor, especially influencing WACC.
- ID Dummy variables for Z-1 industries.
- YD Dummy variables for T-1 years.

We model paths from the different forms of value-based management adoptions, according to hypotheses 2 and 3, to value drivers and these value drivers are further assumed to have an effect on return on assets in accordance with hypothesis 1. We also model a direct path from vbm to return on assets consistent with existing literature and to test our hypothesis 1. Further, return on assets is thereby the numerator of value-ratio minus the effect through the difference in total assets and invested capital. Vbm might also have a direct effect on

value-ratio through reducing cost of capital by sending a strong signal to capital market participants (*Rapp et al.* 2011). The association between our vbm variables and the outcome variables is moderated by the relative weight of value-based compensation components in total compensation in accordance with hypothesis 4. We further allow for connections between value drivers. To measure the cash conversion cycle we allow for DIO to influence DSO as if more is produced also more raw materials need to be bought. Further, DPO influences DIO. New investments directly influence capital intensity, as when more is invested, more fixed assets are on the balance sheet. These new investments also influence cash holdings and also inventory holdings. We also design a path from cash holdings to leverage, DIO, DPO and DSO and from leverage to DIO and DPO. Leverage usually signals financial strength or weakness which might have an influence on the payment period but also on inventories and is highly interrelated with cash holdings. Further, robust clustered standard errors are applied.

In order to control for reverse causality when implementing vbm, we apply a two-stage-least-squares-approach (TSLS). The endogeneity problem when applying vbm is well known in vbm literature (*Wallace* 1997, *Balachandran* 2006, *Burkert / Lueg* 2013) and regularly addressed in empirical research (*Hogan / Lewis* 2005, *Ryan / Trahan* 2007, *Ernstberger et al.* 2010). However, most existing research that applies TSLS only provides weak first stage regressions that might lead to biased results. To confront this problem, we follow the suggested steps of *Larcker / Rusticus* (2010). *Larcker / Rusticus* (2010) state that when endogeneity exists, TSLS shall be preferred over OLS when the following condition holds:²

$$R_{zu}^2 < R_{xz}^2 \times R_{xu}^2 \quad (1)$$

R_{zu}^2	Endogeneity of selected instruments
R_{xz}^2	First-stage model R^2
R_{xu}^2	Endogeneity of the variable of interest

Formula (1) shows that TSLS is preferred over OLS, when the squared correlation of the selected instruments with the variable of interest, R_{xz}^2 , multiplied with the squared correlation between the variable of interest and the error term, R_{xu}^2 , is higher than the squared correlation between the selected instruments and the error term R_{zu}^2 . However, R_{zu}^2 and R_{xu}^2 are not directly measurable, hence *Larcker / Rusticus* (2010) suggest the following: “If the instrument selected by the researcher is moderately to highly correlated with x (which can be

² *Larcker / Rusticus* (2010) assume that finding perfect exogeneous instruments is not applicable in empirical research.

tested) and a compelling theoretical or practical argument can be made regarding why the instrument is considerably more exogenous than x , then the IV estimator will be preferred to the OLS estimator” (p. 191).

Therefore, we searched existing literature that deals with the problem of endogeneity in the context of vbm, to identify instruments that are potential drivers of a vbm implementation.³ In table 2 we sum up the determinants that were used in existing literature to explain the likeliness of implementing vbm systems and categorize them as either a positive, negative or indifferent driver of a vbm implementation in accordance with the found results in this literature. We use most of these determinants as instrument variables to predict the likeliness of applying vbm in our first stage logistic regression.

- Table 2: Determinants of adopting value-based management -

positive effect	negative effect	no effect
Economic profit before the adoption	Growth options	Operational performance
Geographic diversity	Financial slack	Capital structure
Company size	Investments	Executive shareholding
Company age	Company size	
Capital intensity	High cash bonus	
Investments	Operational performance	
Familiarity with other vbm systems within the company or peers	Working capital intensity	

Table 2: Determinants of applying vbm according to empirical literature on vbm.

Column 1 shows determinants that have a positive effect on the likeliness of applying vbm according to empirical literature. Column 2 shows negative determinants and Column 3 shows determinants that were assumed to have an effect on the likeliness to apply vbm but with no reported significant results.

We apply the following model:

Model 2)

$$\begin{aligned} \text{Prob}(\text{VBM}_{it}=1) = & \alpha + \beta_1 \times \Delta\text{ros_roa}_{it} + \beta_2 \times \text{lev}_{it} + \beta_3 \times \ln\text{SALES}_{it} + \beta_4 \times \text{bs_cash}_{it} + \\ & \beta_5 \times \text{bs_capex}_{it} + \beta_6 \times \text{cap_int}_{it} + \beta_7 \times \text{bs_wc}_{it} + \beta_8 \times \text{fat}_{it} + \beta_9 \times \text{DIO}_{it} + \\ & \beta_{10} \times \text{DPO}_{it} + \beta_{11} \times \text{DSO}_{it} + \beta_{12} \times \text{mtb}_{it} + \beta_{13} \times \text{beta}_{it} + \\ & \sum_{t=1}^{T-1} \gamma_t \times \text{Year_Dummy}_t + \sum_{z=1}^{Z-1} \delta_z \times \text{Industry_Dummy}_z + \sum_{m=1}^{M-1} \vartheta_m \times \text{Index_Dummy}_m \end{aligned}$$

VBM resembles the VBM-Dummy variables STBC, LTBC and VBIC as defined above.

³ We forgo detailed theoretical justifications for the applied determinants for the sake of brevity and refer to the original sources for further detail. Instruments were motivated from *Malmi / Ikäheimo* (2003), *Hogan / Lewis* (2005), *Ryan / Trahan* (2007), *Ernstberger et al.* (2010).

- Δ ros_roa Difference between return on sales and return on assets. We use this spread as a measure for the motivation of a company or a manager to implement vbm. As return on assets is a driver of residual income, a higher return on assets compared to return on sales might motivate companies and managers to adopt vbm.
- bs_wc working capital divided by total assets as a measure for the working capital intensity of the company's business model. Working capital intense companies might have the incentive to implement vbm when working capital determines a high portion of invested capital.
- fat fixed asset turnover defined as sales divided by total fixed assets. Companies might have an incentive to implement vbm when fixed assets are inefficiently used.

All other variables are defined as above.

In addition to the selected instruments, all models include dummy variables for T-1 years, Z-1 industries and also dummy variables for M-1 indices (DAX, MDAX, TecDAX or SDAX), in order to capture visibility effects. Depending on whether the implementation of value-based board compensation or internal control is measured, a dummy variable that predicts the implementation of the respective other system is also included. This variable is included in order to capture the influence of the typical implementation process of vbm in practice. Companies usually apply value-based metrics in internal control systems before introducing them in board compensation systems. Therefore, an application of vbm for internal control might be a strong predictor for the application of vbm in board compensation systems.

The regression results of the logistic regression predicting the likeliness of applying vbm are shown in table 3. A considerable portion of R² results from our time, industry and listing dummies. We find that especially after crisis times, companies tend to more regularly implement vbm. Besides, industry characteristics also play a major role when implementing vbm. Whereas we face many implementations in the industrial and retail segment, which are considered being particularly capital intense, there are barely implementations in the media, software and pharma industry, which are in contrast considered being very dependent on intangible assets. At last, we find that visibility at the capital market is also an important determinant for the application of vbm, as the most visible companies in the DAX index also

- Table 3: Results for the logistic regression predicting the likeliness to apply vbm (model 2) -

Number of observations: 757

	STBC	LTBC	VBIC
Intercept	-13.360 (0.00)	-25.630 (0.99)	-21.510 (0.00)
VBIC	1.1160 (0.02)	2.037 (0.02)	
VBBC			0.612 (0.20)
Δ ros_roa	-13.260 (0.02)	-15.980 (0.01)	-9.173 (0.12)
lev	-0.111 (0.19)	-0.900 (0.02)	-0.036 (0.64)
lnSALES	1.072 (0.00)	0.612 (0.25)	1.873 (0.00)
bs_cash	-9.959 (0.02)	-12.140 (0.10)	9.831 (0.00)
bs_capex	1.690 (0.83)	19.170 (0.22)	12.920 (0.13)
cap_int	-3.911 (0.16)	-7.787 (0.10)	2.484 (0.34)
bs_wc	-0.743 (0.66)	1.300 (0.72)	-2.714 (0.08)
fat	-0.207 (0.01)	-0.054 (0.49)	-0.088 (0.09)
DIO	-0.012 (0.29)	-0.038 (0.04)	0.034 (0.00)
DPO	0.011 (0.28)	0.040 (0.02)	-0.010 (0.32)
DSO	0.016 (0.12)	0.027 (0.14)	0.025 (0.05)
mtb	0.452 (0.00)	0.201 (0.34)	-0.507 (0.01)
beta	-0.085 (0.91)	0.411 (0.81)	-1.464 (0.05)
Time effects	yes	yes	yes
Industry effects	yes	yes	yes
Index effects	yes	yes	yes
McFadden R ²	0.3999	0.5850	0.6122

Table 3: p-values in parentheses.

Variable definitions:

STBC: dummy variable that equals 1 for companies applying short-term value-based board compensation and 0 else.

LTBC: dummy variable that equals 1 for companies applying long-term value-based board compensation and 0 else.

VBBC: dummy variable that equals 1 when either *STBC* or *LTBC* equal 1 and 0 else.

VBIC: dummy variable that equals 1 for companies applying value-based internal control and 0 else.

Δ ros_roa: difference in return on sales (EBIT divided by sales) and return on assets (EBIT divided by total assets).

lev: total debt divided by total equity.

lnSALES: natural logarithm of company's sales in € million.

bs_cash: cash and cash equivalence divided by total assets.

bs_capex: capital expenditure divided by total assets.

cap_int: fixed assets divided by total assets.

bs_wc: working capital divided by total assets.

fat: sales divided by fixed assets.

DIO: 365/(sales / inventory).

DPO: 365/(sales / accounts payable).

DSO: 365/(sales / accounts receivable).

mtb: market capitalization divided by total equity.

beta: systematic risk factor.

have the highest degree of vbm implementation, whereas there are barely implementations the less visible SDAX.

The remaining results for the applied instruments are largely in line with the results of *Hogan / Lewis (2005)*, *Ryan / Trahan (2007)*, *Ernstberger et al. (2010)*. Consistent with the argument

of *Ryan / Trahan (2007)*, we find that familiarity with vbm in internal control is a driver for the implementation of value-based board compensation, but not the other way around. Differences in performance comparing return on sales and return on assets is also a driver for the likeliness to implement vbm in board compensation. This is consistent with the argument of *Hogan / Lewis (2005)* and *Ryan / Trahan (2007)* who argue that managers that can benefit most from an introduction of value-based board compensation will try to implement it. Unsurprisingly, we find that larger companies are more likely to implement vbm. As argued by *Ernstberger et al. (2010)*, vbm can help to satisfy investors' needs by focusing on shareholder value and is therefore especially important for larger firms that are more visible for the capital market. Consistent with the findings of *Hogan / Lewis (2005)* we find that the higher financial slack, the lower is the likeliness of applying value-based board compensation. Further, when fixed asset turnover is low, companies are more likely to apply vbm. This finding is consistent with the strong cost of capital discipline connected to vbm (*Wallace 1997*). We find that a lower market-to-book ratio increases the likeliness to apply value-based internal control. This is consistent with *Malmi / Ikäheimo (2003)* who argue that the capital market might drive the implementation of vbm in order for the company to promote shareholders' interests.

Based on our model results we can now take a look at the overall goodness of our models in order to fulfill the requirement of formula (1). The model predicting the likeliness to apply short-term value-based board compensation has a pseudo R^2 of 0.3999 and is therefore the model with the lowest R^2 in table 3. Putting it into formula (1), we find that in order for TSLS to be preferred over OLS the following condition must hold: $R_{zu}^2 < 0.3999 \times R_{xu}^2$. This means that the squared correlation of a vbm application with the error term only needs to be 2.50 times larger than the squared correlation of the instruments with the error term. Compared to the applied models in existing literature this is a constraint that is rather easy to fulfill. The best model of *Hogan / Lewis (2005)* reports an R^2 of 0.1950 and the best model of *Ryan / Trahan (2007)* reports an R^2 of 0.2997, meaning that a TSLS approach with these models in a first stage requires the squared correlation of a vbm implementation with the error term to be 5.13 times and 3.34 times higher than the squared correlation of the instruments with the error term. Therefore we argue that our first stage model is well specified and provides us with robust predicted values to be plugged into our second stage model 1).

5 Empirical Results

5.1 Descriptive statistics

The results in table 4 show that more companies implement value-based internal control than value-based board compensation, whereas short-term compensation is more common than long-term compensation. STBC and LTBC are thereby almost mutually exclusive as companies either apply short-term or long-term value-based board compensation. We find the most consistent implementations of vbm in those companies that implement vbm in long-term board compensation, as in most of the cases also a value-based internal control system was implemented. Conversely, this result shows also that when companies implement value-based internal control, only a small portion implements it consistently. Partial implementations seem to be very common. The results therefore confirm the results of existing literature on the spreading of vbm in corporate practice.

- Table 4: Summary statistics for the pooled sample -

	Min	1st Quarter	Median	Mean	3rd Quarter	Max	Std. Dev
STBC	0.000	0.000	0.000	0.069	0.000	1.000	0.253
LTBC	0.000	0.000	0.000	0.044	0.000	1.000	0.206
VBIC	0.000	0.000	0.000	0.153	0.000	1.000	0.361
roa	-1.035	0.040	0.067	0.072	0.109	0.553	0.113
vr	-24.809	0.435	0.883	0.774	1.388	5.407	1.963
lev	0.059	0.971	1.604	2.032	2.492	25.69	1.969
lnSALES	2.488	6.172	7.404	7.595	8.971	11.917	1.922
bs_cash	0.001	0.039	0.079	0.107	0.144	0.632	0.095
bs_capex	0.003	0.020	0.035	0.043	0.056	0.178	0.030
cap_int	0.009	0.102	0.197	0.221	0.316	0.684	0.146
DIO	0.053	22.297	46.84	49.637	70.301	212.340	35.447
DPO	0.147	41.366	54.92	58.447	73.041	233.870	30.532
DSO	2.840	23.986	33.579	38.041	46.153	166.530	20.643
mtb	0.249	1.147	1.688	2.271	2.6162	19.173	1.960
beta	0.101	0.685	0.866	0.886	1.074	2.125	0.293

Table 4: Descriptive results for the pooled sample. Variables defined in figure 1.

5.2 Regression results

We find ultimately confirming results for hypothesis 1, as the indirect effects of vbm on performance account for a high portion of the total effects (table 5, panel C). The indirect effect of STBC on return on assets is thereby significantly negative (coefficient: -0.078 (0.08)), whereas STBCxperc_STI is positively associated with return on assets (coefficient: 0.088 (0.23)). The indirect effect of STBC on return on assets can thereby be interpreted as the effect when perc_STI is zero, whereas the indirect effect of STBCxperc_STI equals the effect of STBC on return on assets, when perc_STI rises by one unit. However, both effects are of equal size and significance and therefore offset each other eventually. The remaining indirect effect is not economically relevant. In contrast, LTBC is unrelated to return on assets indirectly (coefficient: 0.004 (0.79)), whereas LTBCxperc_LTI is significantly associated

-Table 5: Results for the structural equation model 1) -

Panel A: SEM output	cap_int	lev	DPO	DSO	DIO	bs_capex	bs_cash	roa	vr
STBC	0.003 (0.96)	6.540 (0.04)	36.894 (0.10)	79.631 (0.01)	-4.167 (0.84)	0.107 (0.03)	-0.120 (0.07)	-0.034 (0.70)	0.532 (0.41)
STBC x perc_STI	-0.026 (0.44)	-7.877 (0.12)	-37.469 (0.36)	-88.829 (0.06)	-61.004 (0.09)	-0.188 (0.03)	-0.012 (0.92)	0.165 (0.29)	-0.942 (0.43)
perc_STI	0.138 (0.00)	-1.069 (0.03)	-15.120 (0.03)	-18.720 (0.05)	24.043 (0.01)	0.007 (0.42)	0.045 (0.09)	0.051 (0.01)	0.101 (0.53)
LTBC	-0.071 (0.04)	-2.169 (0.02)	25.524 (0.00)	36.572 (0.00)	-3.502 (0.62)	-0.012 (0.24)	-0.009 (0.64)	-0.005 (0.80)	-0.015 (0.94)
LTBC x perc_LTI	-0.078 (0.06)	-0.469 (0.75)	-77.607 (0.01)	-37.430 (0.20)	-55.627 (0.02)	-0.074 (0.03)	-0.053 (0.39)	0.149 (0.03)	-1.380 (0.05)
perc_LTI	0.206 (0.00)	-1.703 (0.00)	-14.048 (0.05)	-16.149 (0.11)	39.590 (0.00)	0.032 (0.01)	0.027 (0.26)	0.023 (0.29)	0.052 (0.74)
VBIC	0.127 (0.00)	-0.843 (0.14)	-1.490 (0.74)	-46.851 (0.00)	41.508 (0.00)	0.032 (0.00)	0.120 (0.00)	-0.060 (0.00)	-0.037 (0.76)
bs_cash		-2.928 (0.00)	11.033 (0.27)	18.252 (0.20)	-58.220 (0.00)			0.055 (0.13)	
bs_capex	2.661 (0.00)				-172.60 (0.00)		-0.276 (0.00)	0.287 (0.01)	
DIO				0.313 (0.00)				0.000 (0.00)	
DSO								0.000 (0.71)	
DPO						-0.035 (0.61)		-0.001 (0.00)	
lev			2.387 (0.01)			-0.040 (0.93)		-0.009 (0.00)	
cap_int								-0.026 (0.21)	
roa									12.381 (0.00)
R-squared	0.576	0.330	0.194	0.379	0.586	0.219	0.348	0.587	0.770

Panel B: Path analyses	coef.	p-val.
STBC→bs_cash→roa	-0.008	(0.20)
STBC→bs_capex→roa	0.031	(0.07)
STBC→DIO→roa	0.008	(0.47)
STBC→DSO→roa	-0.003	(0.71)
STBC→DPO→roa	-0.036	(0.03)
STBC→lev→roa	-0.063	(0.02)
STBC→cap_int→roa	-0.007	(0.29)

Panel C: Combined effects	coef.	p-val.	coef.	p-val.
	indirect		total	
STBC→value drivers→roa	-0.078	(0.08)	-0.112	(0.16)
STBC→value drivers→roa→vr	-1.395	(0.15)	-0.863	(0.48)
	indirect		total	
STBCxperc_STI→value drivers→roa	0.088	(0.23)	0.253	(0.06)
STBCxperc_STI→value drivers→roa→vr	3.135	(0.06)	2.193	(0.32)

<i>Table 5 continued:</i>		coef.	p-val.		coef.	p-val.	coef.	p-val.
STBCxperc_STI→bs_cash→roa		0.002	(0.75)				indirect	total
STBCxperc_STI→bs_capex→roa		-0.054	(0.07)	LTBC→value drivers→roa	0.004	(0.79)	-0.002	(0.94)
STBCxperc_STI→DIO→roa		0.012	(0.49)	LTBC→value drivers→roa→vr	-0.019	(0.94)	-0.034	(0.92)
STBCxperc_STI→DSO→roa		0.003	(0.71)				indirect	total
STBCxperc_STI→DPO→roa		0.040	(0.19)	LTBCxperc_LTI→value drivers→roa	0.061	(0.08)	0.211	(0.00)
STBCxperc_STI→lev→roa		0.071	(0.10)	LTBCxperc_LTI→value drivers→roa→vr	2.613	(0.00)	1.233	(0.11)
STBCxperc_STI→cap_int→roa		0.013	(0.27)					
LTBC→bs_cash→roa		0.000	(0.78)					
LTBC→bs_capex→roa		-0.004	(0.27)					
LTBC→DIO→roa		0.001	(0.82)					
LTBC→DSO→roa		-0.001	(0.71)					
LTBC→DPO→roa		-0.014	(0.04)	VBIC→bs_cash→roa			coef.	p-val.
LTBC→lev→roa		0.019	(0.01)	VBIC→bs_capex→roa			0.007	(0.15)
LTBC→cap_int→roa		0.003	(0.28)	VBIC→DIO→roa			0.009	(0.02)
				VBIC→DSO→roa			-0.019	(0.00)
LTBCxperc_LTI→bs_cash→roa		-0.002	(0.63)	VBIC→DPO→roa			0.002	(0.71)
LTBCxperc_LTI→bs_capex→roa		-0.021	(0.08)	VBIC→lev→roa			0.001	(0.74)
LTBCxperc_LTI→DIO→roa		0.017	(0.17)	VBIC→cap_int→roa			0.008	(0.11)
LTBCxperc_LTI→DSO→roa		0.002	(0.72)				-0.003	(0.21)
LTBCxperc_LTI→DPO→roa		0.056	(0.01)					
LTBCxperc_LTI→lev→roa		0.003	(0.83)	VBIC→value drivers→roa			indirect	total
LTBCxperc_LTI→cap_int→roa		0.007	(0.27)	VBIC→value drivers→roa→vr			0.004	(0.74)
							-0.056	(0.00)
							-0.696	(0.00)
							-0.733	(0.00)

Table 5: p-values in parentheses. In addition to the variables above the following control variables are also included: *perc_FIX*, *lnSALES*, *fcd*, *mtb*, *beta*, *ID*, *YD*. Variables defined in figure 1. CFI: 0.928, RMSEA: 0.109, p-value: 0.000. Number of observations: 679.

with higher return on assets (coefficient: 0.061 (0.08)). Therefore, we do not face an offsetting effect as in the case of STBC but amplification through *perc_LTI*. Consequently, we can also confirm hypothesis 3, as the magnitude of the total effect on operating performance is higher for adopters of long-term value-based board compensation compared to short-term.

Further, the results also show that a major portion of the positive effects on return on assets arises from the moderation through *perc_STI* and *perc_LTI* (table 5, panel B&C). These results therefore support our hypothesis 4. When value-based metrics are implemented, however just poorly compensated, respectively more money is paid for an increase of traditional performance measures. The results are therefore in favor of the pay-for-performance argument.

Compared to existing literature, our results side with the results of *Wallace* (1997) and *Hogan / Lewis* (2005) who both find that value-based board compensation is associated with higher operating performance. The results are in conflict with *Ryan / Trahan* (2007). Our results especially add to existing literature, as in all of these investigations an adopter / non-adopter approach is applied, whereas we separate between different forms of vbm implementations. Therefore, the results in table 5 provide a more differentiated view on the effects of vbm on operating performance.

Table 5 panel C also reports the effects on operating performance of applying vbm for internal control without the application in board compensation. In contrast to the results of value-based board compensation, we find that the overall indirect effect on return on assets is only slightly positive (coefficient: 0.004 (0.74)) and therefore not economically relevant. In total, adopters of value-based internal control are associated with lower performance compared to non-adopters (-0.056 (0.00)). The results therefore ultimately confirm our hypothesis 2, where we argue that tying board compensation to value-based metrics is crucial for the success of a vbm implementation. In the context of existing literature, the results support the results of *Ernstberger et al.* (2010), who also do not report outperformance when value-based internal control is applied. The results again stand in conflict to the results of *Ryan / Trahan* (2005) who find outperformance after the adoption of vbm for internal control.

When we look at the specific value driver effects, we get a clear picture of what adopters of vbm in long-term board compensation components do differently in terms of investing, operating and financing decisions (table 5, panel A). Looking at investing decisions, we find that adopters of vbm in long-term board compensation components reduce new investments (LTBC: -0.012 (0.24); LTBCx*perc_LTI*: -0.074 (0.03)). A reduction of new investments is

expected by adopters of vbm, as such companies are assumed to have a strong focus on reducing capital charges. Consistently, adopters of vbm in long-term board compensation are associated with a lower degree of fixed assets in the balance sheet (LTBC: -0.071 (0.04), LTBCxperc_LTI: -0.078 (0.06)). However, we find that the reduction in new investments is actually linked to lower operating performance of LTBC and LTBCxperc_LTI (table 5, panel B), which might point towards a too extensive use of assets. This problem might occur, as managers who are incentivized through value-based metrics c.p. get punished for any increase in invested capital. Therefore they might try to realize investment projects by more extensively using existing machinery. Even though long-term board compensation components are provided, these compensation components still seem to fail in providing sustainable incentives to managers in line with shareholders' interests. Looking at the practical design of long-term board compensation components, we find that such components usually have a three year time horizon, which might in fact still be too short in order to prevent a too extensive use of assets for new investments. Therefore, it is necessary to use even value-based metrics with serious caution.

On the capital structure side (table 5, panel A), we see that adopters of long-term value-based board compensation rely more on equity financing compared to non-adopters (LTBC: -2.169 (0.02), LTBCxperc_LTI: -0.469 (0.75)), while there are no substantial differences in cash holdings (LTBC: -0.009 (0.64), LTBCxperc_LTI: -0.053 (0.36)). As adopters of vbm in long-term board compensation outperform in terms of return on assets and value-ratio, it might be that these companies hold more equity as a result of higher retained earnings. Accordingly, the results in table 5 show that operating performance is positively associated with more equity holdings and LTBC as well as LTBCxperc_LTI are positively associated with return on assets through leverage. These higher retained earnings are however not directly invested, as new investments are lower compared to non-adopters, which might partly explain the missing significant differences in cash holdings. The results could therefore be explained with pecking order theory (*Myers / Majluf* 1984), which states that companies prefer internal over external financing sources.

Regarding operating decisions (table 5, panel A) the results show that adopters of long-term value-based board compensation are associated with lower inventory holdings (LTBC: -3.502 (0.62), LTBCxperc_LTI: -55.627 (0.02)). Accordingly, this reduction in inventory holdings leads to a slight increase in return on assets for LTBC and also for LTBCxperc_LTI (table 5, panel B). In contrast to the expectations, adopters of long-term value-based board compensation decrease payables (table 5, panel A), which c.p. leads to an increase in working

capital (LTBC: 25.524 (0.00), LTBCxperc_LTI: -77.607 (0.01)). However, the decrease in payables is associated with an increase in return on assets, whereas the effect of LTBCxperc_LTI overcompensates the effect of LTBC (table 5, panel B). The result might come up as payables are considered being closely related to corporate performance, as high payables usually go hand in hand with low operating performance. In this context, *Deloof* (2003) and *Garcia-Teruel / Martinez-Solano* (2007) both argue that only low performers pay their bills late. As adopters of long-term value-based board compensation outperform, a reduction in payables is consistent. Further, in contrast to the expectations there are no economically relevant effects of long-term value-based board compensation on receivables as the net of LTBC and LTBCxperc_LTI is hardly economically relevant.

The picture is less clear when we look at short-term value-based board compensation (table 5, panel A). For most of the applied value-drivers, the signs on the coefficients of STBC and STBCxperc_STI are different at similar magnitude. Only in the case of inventory holdings and cash holdings, signs are equal, whereas significances and the magnitude of the coefficients vary substantially (table 5, panel A). Looking at the effects on return on assets (table 5, panel B), we find that also only through the reduction in inventory holdings, adopters of short-term value-based board compensation are positively associated with return on assets. In line with the findings on LTBC, adopters of short-term value-based board compensation are associated with reduced new investments as the coefficient of STBCxperc_STI overcompensates the effect of STBC, which also leads to a reduction in return on assets.

The differences in results between short-term and long-term value-based board compensation might come up for the following reason. Besides the difference in incentivized time horizon between STBC and LTBC and all the strings attached, adopters of vbm in long-term board compensation more consistently apply value-based metrics in board compensation. In 71% of all cases value-based metrics are applied as sole performance measures in long-term components, whereas only 50% of the adopters of short-term value-based board compensation rely on one performance measure. Consequently, adopters of short-term value-based board compensation rely on several more performance measures in board compensation than adopters of long-term value-based board compensation which can lead to even greater incentive conflicts. This might further prevent these companies from fully benefitting from vbm.

In case of value-based internal control our results in table 5 indicate that without the provision of monetary incentives based on value-based metrics no performance increases can

be realized. This is consistent with the agency theoretical argument that monetary incentives are crucial for allocating managerial actions, but also in line with goal-setting predictions when contradictory goals are set. Companies that apply value-based metrics for internal control but incentivize traditional performance measures might be “stuck in the middle” between vbm and traditional management and can therefore not realize any benefits from vbm.

Further analyses

We further use the results of the logistic regression in table 3 for propensity score matching, which provides another way to control for endogeneity. We match companies based on the results of the logistic regression in the year prior to the adoption. We then investigate the mean differences in value drivers and performance for the three year period before the adoption and the three year period after the adoption (*Balachandran 2006, Rapp et al. 2011*). This specific event window is chosen for two reasons: First, we do not know when managers in fact learn or decide that value-based metrics will be implemented in the future, but it can be assumed that they know before it is communicated in the annual report. Therefore it is necessary that the investigation period is long enough before the adoption year according to the annual report. Second, it might take some time for managers to fully understand the concept of vbm and to act accordingly by e.g. changing investment behavior. Therefore the investigation period post adoption also needs to be long enough. Propensity score matching however also brings disadvantages in our specific setting. First, we are unable to match for STBC as most of the adopting companies abandon STBC for LTBC or entirely within the 7 year investigation window. Further, we are unable to control for the pay-performance relation due to the fact that the matched companies commonly do not have any long-term board compensation components.

The results of the propensity score matching for value-based internal control (table 6) largely confirm the results in table 5. For VBIC we still do not report relevant positive effects on return on assets (coef: 0.008 (0.73)) or value-ratio (coef: 0.097 (0.08)) compared to the matched control firms. Further, the effects on value-drivers through VBIC are also consistent with the findings in table 5.

-Table 6: Results for the structural equation model 1) based on propensity score matching for VBIC

Panel A: SEM output	cap_int	lev	DPO	DSO	DIO	bs_capex	bs_cash	roa	vr
VBIC	0.009 (0.24)	-0.157 (0.48)	-0.578 (0.79)	-9.182 (0.00)	1.825 (0.60)	0.015 (0.23)	0.011 (0.62)	0.049 (0.00)	-0.016 (0.91)
bs_cash		0.053 (0.99)	1.184 (0.96)	10.760 (0.72)	-122.01 (0.02)			-0.638 (0.00)	
bs_capex	1.086 (0.00)				2.656 (0.97)		-0.500 (0.18)	-0.836 (0.00)	
DIO				0.113 (0.60)				-0.002 (0.00)	
DSO								0.003 (0.00)	
DPO					0.209 (0.41)			-0.002 (0.00)	
lev			-6.847 (0.04)		-0.974 (0.80)			-0.044 (0.00)	
cap_int								0.548 (0.00)	
roa									14.077 (0.00)

Panel B: Path analyses	coef.	p-val.	Panel C: Combined effects	coef.	p-val.	coef.	p-val.
VBIC→bs_cash→roa	-0.007	(0.62)	VBIC→value drivers→roa	-0.041	(0.08)	0.008	(0.73)
VBIC→bs_capex→roa	-0.013	(0.24)					
VBIC→DIO→roa	-0.004	(0.58)	VBIC→value drivers→roa→vr	0.113	(0.09)	0.097	(0.08)
VBIC→DSO→roa	-0.031	(0.00)					
VBIC→DPO→roa	0.001	(0.79)					
VBIC→lev→roa	0.007	(0.49)					
VBIC→cap_int→roa	0.005	(0.33)					

Table 6: p-values in parentheses. Results are based on the mean difference in value drivers and performance based on the three years prior adoption period and the three years post adoption period of value-based internal control systems. Large outliers were eliminated. In addition to the variables above the following control variables are also included: *perc_FIX*, *lnSALES*, *fcd*, *mtb*, *beta*, *ID*, *YD*.

Variables defined in figure 1. Number of observations: 20.

-Table 7: Results for the structural equation model 1) based on propensity score matching for LTBC

Panel A: SEM output	cap_int	lev	DPO	DSO	DIO	bs_capex	bs_cash	roa	vr		
LTBC	0.017 (0.03)	-0.168 (0.42)	2.054 (0.69)	4.752 (0.28)	-9.709 (0.00)	-0.011 (0.01)	0.029 (0.07)	-0.025 (0.00)	-0.148 (0.11)		
bs_cash		0.809 (0.56)	96.398 (0.20)	-50.111 (0.29)	68.713 (0.02)			0.420 (0.00)			
bs_capex	3.062 (0.00)				-56.739 (0.66)		0.367 (0.70)	-1.127 (0.02)			
DIO				0.971 (0.01)				-0.003 (0.00)			
DSO								0.000 (0.07)			
DPO					0.187 (0.06)			-0.001 (0.00)			
lev			-2.650 (0.67)		-1.075 (0.71)			-0.026 (0.00)			
cap_int								0.518 (0.00)			
roa									10.604 (0.00)		
Panel B: Path analyses			coef.	p-val.	Panel C: Combined effects			coef.	p-val.	coef.	p-val.
LTBC→bs_cash→roa			0.012	(0.09)	LTBC→value drivers→roa			indirect		total	
LTBC→bs_capex→roa			0.013	(0.13)				0.064	(0.00)	0.039	(0.01)
LTBC→DIO→roa			0.026	(0.00)	LTBC→value drivers→roa→vr			indirect		total	
LTBC→DSO→roa			0.002	(0.35)				0.414	(0.00)	0.266	(0.01)
LTBC→DPO→roa			-0.002	(0.68)							
LTBC→lev→roa			0.004	(0.42)							
LTBC→cap_int→roa			0.009	(0.07)							

Table 7: p-values in parentheses. Results are based on the mean difference in value drivers and performance based on the three years prior adoption period and the three years post adoption period of long-term value-based board compensation. Large outliers were eliminated. In addition to the variables above the following control variables are also included: *perc_FIX*, *lnSALES*, *fcd*, *mtb*, *beta*, *ID*, *YD*. Variables defined in figure 1. Number of observations: 20.

-Table 8: Results for the structural equation model 1) without controlling for endogeneity

Panel A: SEM Output	cap_int	lev	DPO	DSO	DIO	bs_capex	bs_cash	roa	vr
STBC	-0.049 (0.38)	2.413 (0.33)	-1.942 (0.82)	23.444 (0.00)	18.154 (0.01)	0.006 (0.66)	0.026 (0.32)	0.017 (0.39)	0.164 (0.43)
STBC x perc_STI	0.070 (0.50)	-3.416 (0.43)	8.953 (0.59)	-36.292 (0.01)	-42.711 (0.00)	-0.010 (0.72)	-0.092 (0.07)	-0.011 (0.78)	-0.133 (0.74)
perc_STI	0.125 (0.00)	-1.128 (0.01)	-19.155 (0.00)	-15.465 (0.11)	20.159 (0.02)	-0.006 (0.50)	0.038 (0.11)	0.077 (0.00)	0.047 (0.77)
LTBC	0.005 (0.86)	-0.816 (0.27)	9.000 (0.10)	0.742 (0.86)	-6.025 (0.20)	-0.001 (0.85)	0.001 (0.96)	-0.027 (0.01)	0.087 (0.49)
LTBC x perc_LTI	-0.117 (0.05)	1.067 (0.42)	-5.195 (0.72)	21.306 (0.18)	-6.264 (0.64)	-0.023 (0.15)	-0.012 (0.76)	0.109 (0.00)	-0.630 (0.06)
perc_LTI	0.194 (0.00)	-1.630 (0.00)	-25.175 (0.00)	-15.889 (0.13)	37.051 (0.00)	0.025 (0.03)	0.016 (0.53)	0.041 (0.03)	-0.006 (0.97)
VBIC	0.045 (0.01)	-0.200 (0.37)	0.560 (0.80)	-9.851 (0.00)	10.051 (0.00)	0.010 (0.00)	0.024 (0.02)	-0.001 (0.82)	-0.141 (0.01)
bs_cash		-3.356 (0.00)	12.271 (0.22)	-9.471 (0.47)	-40.921 (0.00)			0.003 (0.93)	
bs_capex	2.766 (0.00)				-146.12 (0.00)		-0.228 (0.02)	0.292 (0.01)	
DIO				0.249 (0.00)				-0.001 (0.00)	
DSO								0.000 (0.17)	
DPO						-0.043 (0.53)		-0.001 (0.00)	
lev			2.460 (0.01)			-0.191 (0.62)		-0.009 (0.00)	
cap_int								-0.042 (0.04)	
roa									12.268 (0.00)
R-squared	0.571	0.320	0.173	0.327	0.557	0.187	0.318	0.616	0.788

Panel B: Path analyses	coef.	p-val.	Panel C: Combined effects	coef.	p-val.	coef.	p-val.
STBC→bs_cash→roa	0.000	(0.93)				indirect	total
STBC→bs_capex→roa	0.002	(0.67)	STBC→value drivers→roa	-0.028	(0.21)	-0.011	(0.57)
STBC→DIO→roa	-0.009	(0.05)	STBC→value drivers→roa→vr	-0.133	(0.57)	0.031	(0.92)
STBC→DSO→roa	0.004	(0.20)				indirect	total
STBC→DPO→roa	-0.004	(0.54)	STBCxperc_STI→value drivers→roa	0.042	(0.30)	0.032	(0.41)
STBC→lev→roa	-0.022	(0.30)	STBCxperc_STI→value drivers→roa→vr	0.389	(0.42)	0.256	(0.65)
STBC→cap_int→roa	0.001	(0.64)					

<i>Table 8 continued:</i>	coef.	p-val.		coef.	p-val.	coef.	p-val.
STBCxperc_STI→bs_cash→roa	0.000	(0.93)				indirect	total
STBCxperc_STI→bs_capex→roa	-0.003	(0.72)	LTBC→value drivers→roa	0.005	(0.64)	-0.022	(0.07)
STBCxperc_STI→DIO→roa	0.022	(0.01)	LTBC→value drivers→roa→vr	-0.271	(0.06)	-0.184	(0.30)
STBCxperc_STI→DSO→roa	-0.005	(0.25)				indirect	total
STBCxperc_STI→DPO→roa	0.001	(0.97)	LTBCxperc_LTI→value drivers→roa	-0.003	(0.88)	0.106	(0.00)
STBCxperc_STI→lev→roa	0.029	(0.43)	LTBCxperc_LTI→value drivers→roa→vr	1.301	(0.00)	0.671	(0.09)
STBCxperc_STI→cap_int→roa	-0.002	(0.74)					
LTBC→bs_cash→roa	0.000	(0.96)					
LTBC→bs_capex→roa	0.000	(0.85)					
LTBC→DIO→roa	0.004	(0.11)					
LTBC→DSO→roa	0.000	(0.85)					
LTBC→DPO→roa	-0.006	(0.24)	VBIC→bs_cash→roa			coef.	p-val.
LTBC→lev→roa	0.008	(0.21)	VBIC→bs_capex→roa			0.000	(0.93)
LTBC→cap_int→roa	0.000	(0.97)	VBIC→DIO→roa			0.003	(0.04)
			VBIC→DSO→roa			-0.006	(0.00)
LTBCxperc_LTI→bs_cash→roa	0.000	(0.94)	VBIC→DPO→roa			-0.001	(0.21)
LTBCxperc_LTI→bs_capex→roa	-0.007	(0.21)	VBIC→lev→roa			0.000	(0.80)
LTBCxperc_LTI→DIO→roa	0.001	(0.85)	VBIC→cap_int→roa			0.002	(0.37)
LTBCxperc_LTI→DSO→roa	0.003	(0.35)				-0.002	(0.08)
LTBCxperc_LTI→DPO→roa	0.002	(0.85)					
LTBCxperc_LTI→lev→roa	-0.010	(0.35)	VBIC→value drivers→roa	-0.005	(0.19)	-0.006	(0.34)
LTBCxperc_LTI→cap_int→roa	0.007	(0.12)	VBIC→value drivers→roa→vr	-0.075	(0.35)	-0.216	(0.02)

Table 8: p-values in parentheses. In addition to the variables above the following control variables are also included: *perc_FIX*, *lnSALES*, *fcd*, *mtb*, *beta*, *ID*, *YD*. Variables defined in figure 1. CFI: 0.929, RMSEA: 0.154, p-value: 0.000. Number of observations: 686.

Also in terms of long-term value-based board compensation the results of the propensity score matching (table 7) are confirming the results in table 5. We find that overall, LTBC is positively associated with return on assets (coef: 0.039 (0.01)) and also value ratio (coef: 0.266 (0.01)). The effects on value drivers are largely in line with the results in table 5. Companies adopting long-term value-based board compensation are associated with more equity holdings, lower inventories and lower new investments. However, there are also some differences in the effects on value drivers compared to the results in table 5. Whereas according to table 5, long-term value-based board compensation is negatively associated with capital intensity and positively with return on assets, it is the other way around according to the results in table 7. According to the results in table 7, LTBC is positively associated with capital intensity, but still positively associated with return on assets (0.009 (0.07)). Further, results in table 5 show a reduction in cash holdings, whereas table 7 reports an increase in cash holdings. Still, overall the results of the propensity score matching are consistent with the results of the TSLS approach in table 5.

Complementary to the results in table 5 we further show the results without controlling for endogeneity in the TSLS approach. The results using the observed values are reported in table 8. The results in table 8 show that without controlling for endogeneity, there are almost no economically relevant effects of different vbm adoptions on value drivers and consequently also no relevant indirect effects on return on assets. The result in table 8 therefore is in conflict to both, the results in table 5 based on the TSLS approach, but also to the results in table 6 and 7 that are based the propensity score matching. We can therefore conclude in line with empirical literature (*Hogan / Lewis 2005, Ryan / Trahan 2007*), that controlling for endogeneity is of major importance when investigating the effects of vbm on operating performance.

6 Conclusion

Overall, we find results that are largely in line with our hypotheses. We find that companies that adopt value-based management for long-term board compensation are associated with an increase in return on assets and value ratio, whereas for the adopters of short-term value-based board compensation we also find outperformance but with a smaller magnitude. In terms of value-based internal control without the consequent implementation in board compensation, we find that such companies are not associated with higher performance and in fact underperform non-adopting companies. This result might come up as such companies still compensate traditional performance measures and therefore might in fact be

“stuck in the middle” between vbm and traditional control. Further, the positive results on value-based board compensation majorly arise from the relative weight of the specific compensation component in total compensation. Overall our results are therefore consistent with the agency theoretical expectation that monetary incentives provide a strong incentive to managers and we therefore find support for the relevance of the pay-for-performance argument. Additionally, our results also confirm the expectations from goal-setting theory that when multiple contradictory goals exist, overall performance might suffer.

Our results are limited as we do not cover the variety of non-monetary dimensions of managerial control systems. This is mainly due to data availability. Therefore we cannot present results how different applications of vbm for non-monetary dimensions of managerial control can influence company decisions. Further research could therefore look into the different forms of non-monetary applications of value-based metrics and their relevance for operating performance.

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Value-based Management: An Instrument For Underperformer?

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Abstract:

The consistency of value-based management implementations in corporate practice is a function of prior performance of the adopting company. Companies facing large performance problems compared to a matched control group tend to implement value-based management consistently in management control systems. After the adoption of value-based management these companies increase performance. In contrast, companies that implement value-based management only for non-monetary dimensions of management control systems do not underperform prior to the adoption. One part of these companies increases performance after the adoption and does not proceed in implementing value-based metrics in compensation systems. The remaining companies fail to increase performance and implement short-term value-based board compensation, which eventually leads to an increase in performance. The results are important for corporate practice as they show that value-based management is a viable instrument for management control especially in turnaround situations. Further the results help to explain the common partial implementations of value-based metrics in corporate practice. The results are also of major importance for existing literature on value-based management that does not differentiate between different forms of value-based management applications and neglects prior performance aspects.

Keywords: Value-based management, board compensation, internal control, short-term effects, long-term effects, event-study

JEL: M41, M12, M52, J3

Data: Data on the implementation levels of value-based management is collected by hand. Remaining data is provided by Bloomberg data base.

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1 Introduction

“It seems that for successful companies it is not necessary to implement value-based management at all cost”¹ (Lueg 2010, p. 344). In this quote, Lueg (2010) appropriately describes what is happening in corporate practice with regard to value-based management: Some companies heavily rely on value-based metrics in management control systems whereas others either partially implement them or fully rely on traditional measures (Malmi / Ikäheimo 2003). Especially partial implementations in non-monetary control systems without tying compensation to value-based metrics (from here on: “internal control”) seem to dominate in corporate practice (Schäffer / Lewerenz 2011, Horster / Knauer 2012, Gitt / Völl / Kettenring 2013). However, when value-based metrics are applied just for internal control, e.g. for target setting or performance measurement, but not as basis for monetary incentives, one might easily conclude that such companies only rhetorically implement vbm. In such cases traditional performance measures are still monetary incentivized. Respectively, when vbm is adopted in compensation systems one can assume that such companies experience a much deeper implementation throughout the whole company. As Wallace (1998) describes the issue: “As would be expected, the firms that include the measure within their incentive compensation plans have implemented the measure to a significantly greater degree.” (p. 7). However, what drives these partial implementations and what keeps companies from adjusting board compensation is widely unknown besides such assessments as from Lueg (2010).

In general, an implementation of value-based management (vbm) is, by its nature, linked to the expectation that operating performance rises after the adoption. Adopters expect performance improvements and an increase in company value in the post adoption periods. Therefore, vbm is generally viable for any company. However, the implementation of vbm is also costly and time intense. Therefore, especially successful companies might not be willing to invest in a vbm implementation at all, or implement it just partially. This argument resembles the quote of Lueg (2010). Conversely, this means that vbm might be essentially interesting for companies that face performance struggles. Such companies might be more willing to implement vbm consistently throughout all management control systems which includes compensation systems. In this context, literature shows that especially companies in turnaround situations put more focus on management control systems in order to maintain the

¹ Translated. Original quote: “Daher scheint es für erfolgreiche Unternehmen nicht notwendig zu sein, um jeden Preis eine wertorientierte Kennzahl [...] einzuführen” (Lueg 2010, p. 344).

overview of critical performance measures (*Moores / Yuen 2001*). Further, companies in turnaround often fundamentally change management control systems as they face high pressure to increase performance in a short period of time (*Simons 1995*).

Looking at empirical literature on the effects of vbm on performance, the issues regarding partial implementations and the prior performance situation is almost entirely neglected (*Wallace 1997, Hogan / Lewis 2005, Ryan / Trahan 2007*). However, taking into account prior performance might result in different hypotheses regarding the effects of vbm in the post adoption period, than those which have been stated so far in the aforementioned literature. Assuming that adopters of vbm are in fact underperformers might lead to different outcomes from vbm adoptions e.g. on investing decisions. Further, adopters of vbm being underperformers would explain why research regularly fails in documenting performance differences for adopting companies when it is not controlled for endogeneity (*Hogan / Lewis 2005, Lueg 2010*). Separating between different forms of vbm implementations also ultimately leads to the question, how different forms are interrelated in corporate practice and why partial implementations exist. Such results would be of major importance for corporate practice. Therefore this analysis aims at investigating the prior performance situation of adopting companies and also the interrelation between different forms of vbm. Further, it shall be investigated how performance develops after implementing vbm. Therefore, three overall research questions are stated:

- Q1: Does the consistency of value-based management implementations depend on prior performance developments?*
- Q2: Do adopters of value-based management increase performance after the adoption?*
- Q3: Are the different forms of value-based management implementations interrelated or exclusive?*

The analysis proceeds as follows: In order to answer the research questions, a sample that consists of companies adopting value-based metrics is conducted, based on industry companies that were listed in the German Prime Standard of the Frankfurt Stock Exchange in the years 2002 to 2012. In order to measure the application of vbm in non-monetary management control dimensions a company's internal control system (VBIC) is investigated and to measure the application of vbm in monetary management control dimensions a company's board compensation system is investigated. Thereby it is separated between two incentive horizons of value-based metrics: Short-term value-based board compensation (STBC) where compensation is based on a one-year development of value-based metrics and

long-term value-based board compensation (LTBC) where compensation is based on a multi-year development. Incentive horizon is especially important in the case of diverging time horizons between managers and shareholders (*Rogerson 1997, Reichelstein 1997*). Data on compensation and internal control systems is available for German companies that are obligated to design their annual reports in accordance with the German Accounting Standard No. 15 (GAS 15) and the Board Compensation Disclosure Law as well as the German Corporate Governance Code. In the sample period, the GAS 15 regulates the disclosure of performance measures used to control the company such as for corporate planning or for periodic performance measurement thereby explicitly excluding compensation systems. Compensation systems, their components as well as the incentivized performance measures need to be disclosed due to the Board Compensation Disclosure Law and the German Corporate Governance Code. To present robust results an event-study approach is applied, using the matching approach of *Hendricks / Singhal (2005)*, where matching is based on size and industry. The matching process particularly excludes prior performance matching, as it is a main interest of the study to investigate prior performance differences. A three year period before and after the adoption of vbm is analyzed by investigating a set of performance drivers such as cash holdings, investment behavior, working capital management and leverage. Thereby the performance situation of adopting companies shall be analyzed. Further, the interrelation between the different forms of vbm is analyzed by investigating and comparing the different implementation years and their link to performance developments.

The results show that there are mainly three types of companies that implement vbm in corporate practice. First, there are companies that underperform heavily in terms of operating performance compared to matched peers prior to the adoption. These companies decide to implement vbm consistently in long-term board compensation and also internal control systems. After the adoption, these companies increase operating performance compared to matched peers. Second, there are companies that only implement value-based internal control systems. These companies are characterized by almost equal performance compared to matched peers prior to the adoption. After the adoption, these companies also tend to slightly increase performance. However, the increase in performance cannot be traced back to effects on operating, investing and financing decisions in accordance with the concept of vbm. It therefore remains open whether the increase in performance is due to a vbm adoption or just a consequence of cost discipline. Third, there are companies that also underperform matched peers prior to the adoption of vbm, but instead of implementing vbm consistently like the first category of companies, these companies only implement value-based internal control. As a

consequence they do not increase performance post adoption, due to the underperformance compared to matched peers and the partial implementation of vbm. However, these companies implement short-term value-based board compensation 2-3 years after adopting value-based internal control. Only after this implementation, these companies also increase performance.

The results contribute to existing literature in several ways. The results create an understanding why companies decide to partially implement vbm. The results show that for some companies it is enough to partially implement vbm, whereas especially companies in performance struggles choose to implement value-based management consistently. Therefore, the results might motivate a whole new view on vbm: vbm as a turnaround instrument. However, in the context of empirical literature, this issue is uninvestigated. Therefore the results are especially important for empirical literature on vbm that does usually not differentiate between different forms of vbm implementations in corporate practice. The results show why such an undifferentiated view on vbm implementations might lead to biased results. The different effects after an adoption of vbm depend on the prior performance situation. Whereas prior underperformers increase inventories, companies with similar prior performance decrease inventories. Therefore the effects might cancel each other out when pooled and when it is not controlled for endogeneity. The results hereby also contribute to hypotheses stating in vbm literature which usually follows textbook assumptions (*Stewart 1991, Young / O'Byrne 2001*). For managers the results are also important as they show that a consistent vbm implementation in management control systems is a useful tool in turnaround situations. However, also a partial implementation might have positive effects on performance, when underperformance is not overwhelming.

The article is structured as follows. In chapter 2 the relevant literature is reviewed and discussed. The theoretic basement is presented in chapter 3, which also includes the formulation of the hypotheses. Sample, matching process and results are presented in chapter 4. The discussion of the results in the context of theory and existing literature are presented in chapter 5. The analysis ends with a conclusion in chapter 6.

2 Literature Review

For the stated research questions, those studies that investigate performance effects of vbm implementations using event study methods are the ones to be reviewed. As the overall number of studies on vbm is generally low, the literature review narrows down to eventually four studies of *Wallace (1997), Kleiman (1999), Hogan / Lewis (2005)* and *Ryan / Trahan*

(2007). *Ryan / Trahan* (2007) find that adopters of vbm increase residual income after the adoption of vbm compared to a matched control group. However, residual income increases are not further enhanced when value-based metrics are tied to board compensation. These results of *Ryan / Trahan* (2007) are challenged by *Wallace* (1997), *Kleiman* (1999) and *Hogan / Lewis* (2005) who investigate companies that apply value-based board compensation. All three find that the adoption of value-based metrics for board compensation purposes has favorable effects on performance drivers and also on performance. However, neither of them discusses the prior adoption performance situation or analyses different forms of vbm implementations. As in the case of *Ryan / Trahan* (2007) and partly *Hogan / Lewis* (2005) the prior performance aspect is completely neutralized by applying endogeneity controlling methods. Such methods leave the question unanswered, why there are only marginal effects from vbm implementations when endogeneity is present. For example, *Hogan / Lewis* (2005) also provide results without controlling for endogeneity and these results are a lot weaker. This might be the case as for some companies it might be necessary to implement vbm due to lower prior performance, whereas others might not need to do so (*Lueg* 2010). Eventually there might be no differences in performance. Further, also *Kleiman* (1999) shows in his descriptive results that adopters of vbm are in fact underperforming in terms of return on assets. This issue is however almost entirely uninvestigated in the context of vbm.

3 Theory and Hypotheses

Explaining partial implementations

Adaptations to management control systems are regularly done along the life cycle a company. Especially in turnaround in the revival stage, companies focus more intensively on management control systems, as measuring the development of turnaround relevant performance measures is critical (*Moore / Yuen* 2001). A special role is thereby dedicated to managers. As shown by *Simons* (1995) managers in so called strategic turnaround situations change corporate strategy and also management control systems, due to the short-term need to increase performance. Generally, management control systems and corporate strategy are highly interdependent as *Henri* (2006) shows: A change in management control systems is highly related to a switch in a company's strategy. When a new strategy is implemented, e.g. goals are adjusted in accordance and linked to new performance measures.

In order to overcome performance issues, a change in management control systems in accordance with the value-based management framework might be especially relevant (*Ittner / Larcker* 2001). The framework is mainly concerned with designing management control

systems to facilitate creating shareholder value. Management control systems can thereby generally be separated into non-monetary and monetary dimensions. Whereas non-monetary dimensions of management control such as goal-setting or periodic performance measurement can thereby be classified as decision-facilitating situations, monetary dimensions such as board compensation systems can be classified as decision-influencing situations (*Demski / Feltham 1976*). Accordingly, VBIC resembles decision facilitating whereas STBC and LTBC resemble decision influencing. This separation is especially important from a theoretical point, as monetary incentives in a multi-task environment are considered being the major determinant for a managers' effort allocation (*Holmstrom / Milgrom 1991, Feltham / Xie 1994*).

In the context of strategic turnaround especially monetary incentives design might be crucial for the success of the turnaround. In strategic turnaround companies regularly face inertia but also a high pressure to increase performance in the short run. In order to overcome inertia, compensation systems are therefore regularly adapted and variable compensation is tied to new critical performance measures to overcome inertia (*Simons 1995*). When companies decide to apply vbm while facing turnaround, it can therefore be assumed that such companies implement vbm consistently also within the compensation system. Consistent thereby means an implementation of value-based metrics for both internal control and board compensation in order to facilitate creating shareholder value in the long run. This is in particular important in terms of board compensation, as board compensation systems usually consist of several variable compensation components with different time horizons. Short-term oriented compensation components, that incentivize one year historic performance developments, are thereby insufficient to motivate managers to create long-term shareholder value in times of turnaround. However, *Moores / Yuen (2001)* show that companies in turnaround in particular focus on the development of long-term performance drivers. Therefore it can be assumed that especially companies in a strategic turnaround implement LTBC and VBIC. In accordance, the first hypothesis is stated:

H1: Companies adopting value-based management simultaneously for long-term compensation and internal control underperform prior to the adoption.

But not only in strategic turnaround situations management control systems are adapted however also in companies facing strategic evolution. Strategic evolution can thereby be described as a less intense turnaround phase. According to *Simons (1995)* such companies come from a stronger performance level, but in order to maintain their competitive position such companies also adapt management control systems. Compared to strategic turnaround

companies, strategic evolution companies are assumed to adapt management control systems just to a smaller degree as performance pressure is comparatively low.

Also for companies in strategic evolution implementing vbm can be desirable, as they are in need for changes in strategy and management control systems to secure future performance. However, it is unlikely that companies are willing to bear the costs of a consistent implementation of vbm in a short period of time or even simultaneously. This might actually lead to partial implementations of vbm. It is unlikely that such companies, without the actual need, implement vbm in compensation systems before the organization and especially managers can get used to the characteristics of the new performance measure by implementing VBIC at first. Therefore it can be assumed that companies in a strategic evolution phase might implement VBIC only, without changing monetary incentives. This way the organization and especially managers can get used to the new performance measure by e.g. including it in periodic internal reporting or using it for planning purposes without risking compensation. In accordance, the second hypothesis is stated:

H2: Companies adopting value-based management for internal control only, just slightly underperform prior to the adoption.

After the implementation of value-based internal control, there might be some companies willing to further pursue vbm, whereas others might be satisfied with internal control only. Especially, companies that do not increase performance by implementing VBIC might have the incentive to further pursue vbm. This might not be the case for companies that increase performance after an implementation of VBIC and targets are achieved. Further pursuing vbm would then imply adapting compensation systems and tie board compensation to value-based metrics. Whether value-based metrics are implemented in STBC or LTBC is thereby hard to predict. Following the argument that companies did in fact not increase performance through an adoption of VBIC might motivate them to implement vbm consistent with textbook concepts in the second try (Stewart 1991, Young / O'Byrne 2001). This would imply that long-term future oriented compensation components such as bonus banks are implemented. However, the failure to increase performance after VBIC might also lead to skepticism within the organization, which might prevent such a rather revolutionary implementation. Therefore such companies might only take another incremental step. A further incremental step is thereby the implementation of value-based metrics in the widely accepted short-term compensation components. A long-term compensation of value-based metrics in contrast would require most of the companies to implement a completely new compensation component. However, this is unlikely after the prior failure to increase performance with

VBIC. Irrespective of whether STBC or LTBC are implemented, for some companies value-based board compensation might not just be implemented by companies facing large performance struggles, but also be an evolutionary step when VBIC does not lead to an increase in performance. Accordingly, the next hypothesis is stated:

H3: Companies that do not increase performance after the adoption of value-based internal control implement value-based board compensation.

Prior and post adoption performance

When value-based metrics are applied in management control systems it can be assumed that the adopting company only chooses investment projects that maximizes company value, as investment decisions based on value-based metrics are in line with the NPV-rule (*Preinreich 1937, Lücke 1955*). Therefore neither underinvestment through the sole application of ROI-based measures in management control systems can occur, nor an overinvestment issue closely linked to the application of earnings-based performance measures. Besides investment behavior, working capital and capital structure are assumed to be in the focus of adopting companies, as adopters are supposed to have a strong focus on invested capital as a driver of residual income (*Stewart 1991, Young / O'Byrne 2001*). However, depending on whether a LTBC or VBIC company in accordance with hypothesis 1 and 2 is investigated, different effects of an adoption of vbm need to be assumed. The effects are dependent on the prior to adoption performance situation and on the overall pressure that lies on the company.

LTBC

The assumption that LTBC are underperforming companies leads to other than the textbook hypothesis on vbm which are common in empirical literature (*Stewart 1991, Wallace 1997, Young / O'Byrne 2001, Hogan / Lewis 2005, Ryan / Trahan 2007*). Directly influenced by prior underperformance might be cash holdings of LTBC. Cash holdings might be lower compared to non-adopters due to lower operating cash flows. Consequently, LTBC should hold lower cash reserves compared to non-adopters in the prior-adoption period. Assuming that with the adoption of vbm operating performance increases, thereby more operating cash flows are generated, LTBC might increase cash holdings. Performance struggles and lower generated cash increase the reliance on external financing sources, especially debt. It can therefore be assumed that LTBC experience higher leverage than non-adopters prior to the adoption of vbm. After the adoption of vbm performance and therefore retained earnings are assumed to increase, thereby decreasing the degree of debt financing.

invest in projects that are profitable according to the net present value rule (*Wallace 1997*). Additionally, reductions in inventory holdings as well as receivables can be expected (*Wallace 1997, Hogan / Lewis 2005*) as well as an increase in payables in order to reduce working capital. Regarding financing decisions adopters of vbm are assumed to decrease excess cash and also optimize capital structure (*Wallace 1997*) by holding more equity due to outperformance after the adoption. Eventually, also VBIC are assumed to increase performance, however at a lower level than LTBC. VBIC come from a higher performance level than LTBC and therefore, further increases are harder to achieve. The last hypothesis is stated in accordance:

H5: Adopters of value-based metrics in accordance with hypothesis 2 are associated with an/a:

- decrease in cash holdings*
- decrease in leverage*
- decrease in new investments*
- decrease in inventories*
- decrease in receivables*
- increase in payables*
- increase in operating performance*

4 Method

4.1 Sample

The sample consists of companies adopting value-based metrics in either internal control, short-term or long-term board compensation components that were listed in the German Prime Standard of the Frankfurt Stock Exchange in the years 2002 to 2012. Adopters were identified by analyzing the companies' annual reports. The study benefits from the fact that German companies are obligated to publish the performance measures they base their internal control system and board compensation on. ROI-based measures are not defined as value-based metrics due to the well known underinvestment issue that is linked to these performance measures when applied in management control systems. For companies that have already adopted value-based management in the year 2002 the sample period has been expended. The number of companies is reduced by companies without data for at least one year prior to adoption and in the adoption period. Additionally, companies with unclear year of adoption have been eliminated, for example in the case of a spin-off or merger. In total 45 companies implemented value-based internal control systems and 11 companies implemented long-term value-based board compensation (table 1).

4.2 Matching Process

The matching process of *Hendricks / Singhal* (2005) is applied and the companies are matched by two main criteria:

- 1) The matching company must have the same 4-digit GICS as the adopting company. Therefore it is controlled for industry effects.
- 2) The matching company must be within the range of factor 3 in sales in the year of adoption.

- Table 1: Implementations of VBIC and LTBC per year -

Year	VBIC	LTBC
1994	1	
1995		
1996	1	
1997		
1998	2	
1999	3	1
2000	1	1
2001	3	
2002	5	1
2003	1	
2004	3	
2005	4	
2006	1	
2007	5	2
2008	4	1
2009	2	2
2010	8	2
2011	1	1
2012		
total	45	11

Table 1: The second column documents when VBIC was implemented, whereas the third column documents when companies implemented LTBC.

Additionally, German companies are preferred over European and European over Global companies in the matching process when there are no German companies satisfying criterion 1) and 2). As especially operating performance before and after the adoption is in the focus, companies are not matched based on prior performance. Therefore also a matching based on a propensity score is also not applicable as this would neutralize the prior performance aspect.

Matching companies afterwards have been analyzed whether they are adopters of value-based management themselves in all of the investigated years. A company that applied value-based metrics in neither internal control or board compensation systems was disqualified. To identify adopters of vbm among the matching companies that were not German, several steps have been taken. First, the companies' homepages have been checked. Second, key words regarding vbm have been searched in annual reports, registration documents, corporate governance reports, SEC filings and proxy filings. Example keywords were: Economic Value

Added, Economic Profit, Cash Value Added, CFROI, Cost of Capital, WACC, Capital Charge, Value Based Management, Value Added. At last, a web search with the company name and the keywords has been done.

After the matching process, the following performance drivers and operating performance measures are investigated for adopters and matching companies in the three years prior and post the adoption of vbm:

Return on sales:	EBIT divided by sales, as a measure for the operating performance.
Return on assets:	EBIT divided by total assets, as a measure for the operating performance which is also a driver of residual income.
Value ratio:	Return on invested capital divided by wacc. Value-ratio serves as a value-based performance measure.
CAPEX:	Investments in property, plant and equipment as well as long-term intangible assets divided by sales, as measure for investment behavior.
DIO:	Days inventory outstanding calculated as total inventories divided by total sales time 365, as measure for operating efficiency.
DSO:	Days sales outstanding, calculated as total accounts receivables divided by total sales times 365, as measure for operating efficiency.
DPO:	Days payables outstanding, calculated as total accounts payable divided by total sales times 365, as measure for operating efficiency.
Leverage:	Total debt divided by total equity, as measure for capital structure.
Cash holdings	Cash and cash equivalents divided by total assets, as measure for liquidity.

In order to measure the effects of a vbm adoption according to hypothesis 4 and 5 the control adjusted change in the applied measures is calculated based on the year prior to adoption (*Hendricks / Singhal 2005*). The control adjusted change measures the development of a variable of the adopting company compared to the development of the same variable of

the matched company. One-tailed Wilcoxon signed rank tests are applied due to the predicted directions in the hypotheses.

5 Empirical Results

In order to analyze the relevant groups of vbm adopters for hypotheses 1,2 and 4,5 without bias, first the interrelations between the different forms of vbm according hypothesis 3 need to be clarified. The analysis hereby shows that three different categories of adopting companies exist. First, there are companies that adopt LTBC. These companies almost exclusively simultaneously implement VBIC, which partly already confirms hypothesis 1.² Second, there are companies that implement VBIC and do not further proceed with implementing value-based board compensation. Of the 45 companies that implement VBIC in the sample period, 27 only implement VBIC and do not further proceed in implementing vbm. Third, 8 of the 45 companies that implement VBIC implement STBC on average 2-3 years after adopting VBIC.³ The result is therefore only partly confirming hypothesis 3, which assumes that value-based board compensation is an evolutionary step after the implementation of VBIC. It seems that this does only apply for STBC and not for LTBC. Consequently, in order to present robust results, for hypotheses 1 and 4 LTBC are investigated. For hypotheses 2 and 5 those companies that implement VBIC but do not implement STBC in the future are analyzed. Thereby the effect of a partial implementation of vbm can be isolated. At last, in order to shed some light on why some companies implement STBC after VBIC and others do not, the companies that implement VBIC and afterwards STBC are also analyzed.

Prior adoption period

For LTBC the results show underperformance compared to peers prior to the adoption of vbm (table 2, panel B). Underperformance is thereby highest in return on sales, lower in return on assets and lowest in value-based performance. Compared to the matched control group, LTBC underperform peers in the year prior to adoption in return on sales, return on assets and value-ratio by -58%, -35% and -19% (table 2, panel B). In contrast, for VBIC, that do not implement STBC in the future, the analysis shows that these companies come from a much stronger performance situation compared to LTBC (table 2, panel A). In the year prior to adoption, VBIC underperform in return on sales (-14%) and return on assets (-13 %), but have similar performance levels in terms of value-ratio (+7%). Similar results come up when

² 1 company applies ROI-based measures for internal control and 1 company does not report the necessary data.

³ For the remaining 10 companies either only incomplete information could be found, VBIC was abandoned again within the sample period or in the case of 2 companies, VBIC and STBC are implemented simultaneously.

looking at the whole prior adoption periods of LTBC and VBIC. The results are therefore consistent with hypotheses 1 and 2 and show that prior performance heavily drives the consistency of vbm implementations. Further, underperformance seems to take place mostly in traditional performance metrics and less in value-based performance. This might further explain the implementation of vbm in these companies (*Hogan / Lewis 2005*).

The operating underperformance of LTBC is further associated with lower cash holdings in the year prior to adoption by -39% (table 2, panel B). This liquidity shortage results in fewer inventory holdings (-44% in the year prior to adoption compared to matched peers) and new investments (-49%) in order to generate liquidity. Further, LTBC are also associated with faster payment requirement for their customers (-15%) which further points towards liquidity needs. In terms of new investments, LTBC invest less than matched peers in the year prior to adoption (-49%). The spread compared to matched peers thereby increases until the adoption of vbm. Lower performance also means that less earnings and cash flows are generated that can be used for further investments or operational spending. This increases the dependency on debt financing. Accordingly, LTBC are also to a higher degree debt financed compared to peers. The results show that leverage is higher by 8% in the year prior to adoption. LTBC also face higher DPO in the year prior to adoption by 28% which might be a result of lower performance and liquidity problems. However, DPO rises sharply in the year prior to adoption, whereas in periods -2 and -3 payables are on a competitive level. The increase in payables happens simultaneously to the decrease in cash holdings and inventory holdings, which ultimately shows the performance struggles of LTBC prior to adoption.

In contrast, VBIC, that do not implement STBC in the future, hold just slightly more inventories than matched peers before the adoption and especially in the year prior to the adoption (+8%) (table 2, panel A). Cash holdings as well as leverage and new investments are on a similar level compared to matched peers in the prior adoption period.

Post adoption period

Consistent with hypothesis 4, LTBC increase performance in the post adoption period (table 3).⁴ Comparing the average performance in the prior-adoption period to the average performance in the post-adoption period, LTBC increase return on sales by 66%, return on assets by 31% and value-ratio by 31% (table 3, panel A). Also compared to the matched control group LTBC are associated with an increase in operating performance and these increases do not reverse in later years of the adoption (table 3, panel B). Compared to

⁴ Due to the low amount of observations, the discussion is limited to the economic relevance of the effects and not to the significance levels.

matched peers LTBC increase the level of return on sales by 1.1%, 0.9% and 3.2% in the three years after the adoption. Similar results are also reported for return on assets and value-ratio. The results are therefore consistent with hypothesis 4 and show that a consistent implementation of vbm can be a viable turnaround tool. Further, inventories of LTBC increase in the year of vbm adoption in absolute terms by 23% (table 3, panel A). Compared to matched peers DIO also increase by 5.43, 0.42 and 5.97 in the three years after the adoption (table 3, panel B). This is consistent with the prediction under hypothesis 4 that a further reduction of inventories is implausible for companies that already needed to reduce inventories in order to generate liquidity. Similar applies for cash holdings that increase sharply in the year of adoption by 44% and further by 35% in the year after the adoption (table 3, panel A). Also compared to matched peers the negative coefficient in the early years after the adoption eventually turns positive thereby indicating that cash holdings increase (table 3, panel B). The increase in performance of LTBC consequently leads to an increase in equity financing. From on average 73% debt financing in the pre-adoption periods, LTBC decrease the relative portion of debt to on average 69% in the post adoption periods (table 3, panel A) and also the control adjusted change in leverage is negative (table 3, panel B). Confirming results for hypothesis 4 are also reported for new investments compared to matched peers (table 3, panel B). Compared to the year of adoption LTBC increase the level of new investments compared to matched peers by 1.4%, 0.1% and 0.2% until the third year after adoption (table 3, panel B). In contrast to the expectations under hypothesis 4, the results show a decrease in receivables and an increase in payables in the post adoption periods compared to matched peers.

Comparing the results on prior and post adoption performance of LTBC, the results show that the textbook assumptions regarding vbm adoptions do not hold for companies that do in fact implement vbm consistently. Instead, companies that adopt vbm consistently are underperformers prior to the adoption and therefore hypotheses regarding the post adoption periods need to be adjusted in accordance. Therefore the results in table 3 might explain the weak results of *Hogan / Lewis (2005)* when they do not control for endogeneity and state hypotheses in accordance with the textbook assumptions on vbm (*Stewart 1991, Young / O'Byrne 2001*). The results on LTBC are therefore especially important for future hypothesis stating for companies that adopt vbm, as they present vbm as a viable turnaround tool, which is largely ignored in existing literature.

In line with the results on LTBC, adopters of VBIC, that do not adopt STBC in the future, also realize performance increases (table 4). VBIC increase operating performance compared

to matched peers in terms of return on sales, return on assets and slightly in value ratio in the post adoption period (table 4, panel B). Consistent with hypothesis 5, VBIC increase the level of return on sales by 2%, return on assets by 1.6% and value-ratio by 0.223 until the third year of adoption compared to the matched control group. The increases in performance however cannot be traced back to favorable influences on performance drivers in accordance with the vbm concept stated under hypothesis 5. Therefore it remains an open question whether the implementation of vbm is actually the reason for the increases in operating performance. An alternative explanation would be that adopters of VBIC implement vbm to center the company's focus on performance rather than substantially changing the company's business in accordance with vbm. Not to forget, such companies still compensate traditional performance measures which might further explain the missing effects on performance drivers. Further, the compensation of traditional performance measures might also explain why VBIC increase return on sales by a higher magnitude than value-ratio. Therefore, it can be concluded that such companies only implement vbm rhetorically.

The results show that companies adopting VBIC and in the future STBC do not realize performance increases after the adoption of VBIC in contrast to the adopters of VBIC that do not implement STBC (table 5). Instead, they are confronted with a reduction in return on sales and return on assets and partly also value-ratio in the years after the adoption of VBIC (table 5, panel B). The control adjusted development in the level of return on sales is only slightly positive until the second year after the adoption and negative in the third. Performance development is even worse in return on assets. The control adjusted change in the level of return on assets is -1.6%, -1.0% and -2.4% in the three years after the adoption. Further, such companies are associated with an increase in inventories compared to matched peers, a reduction in cash holdings and new investments and an increase in debt financing in the years after the adoption. Relying on these results it does not surprise that these companies further proceed in implementing vbm after some periods and decide to implement STBC.

Compared to the effects from VBIC, the control adjusted results for STBC could not be more opposed (table 5, panel C). Compared to matched peers, STBC increase return on sales, return on assets as well as value ratio. Outperformance is further not reversing in the later periods of adoption. STBC increase cash holdings, decrease inventories and also leverage in the post adoption periods. Reflecting on the results in table 3 and 4, it seems that for some companies it is in fact enough to implement VBIC only, whereas for others need to implement vbm consistently. A reason for the lack of success of the VBIC implementation can be found in table 6. Table 6 shows the prior adoption situation of companies that implement VBIC with

- Table 2: Median values for companies adopting VBIC without STBC & LTBC and matched companies for the prior adoption periods -

Panel A: VBIC without STBC

VBIC	Return on sales		Return on assets		CAPEX		DIO		DSO		DPO		Leverage		Cash holdings		Value ratio	
	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0
pre	0.062	0.078	0.071	0.068	0.043	0.049	46.46	41.23	42.40	57.47	26.29	36.95	0.694	0.651	0.040	0.040	0.851	0.951
-3	0.049	0.080	0.067	0.074	0.055	0.107	41.33	36.18	54.44	59.50	26.71	40.05	0.718	0.676	0.019	0.027	0.497	1.036
-2	0.073	0.086	0.080	0.073	0.057	0.043	47.29	42.87	39.69	52.05	26.74	39.76	0.699	0.656	0.033	0.040	0.954	0.972
-1	0.063	0.073	0.059	0.068	0.041	0.035	45.50	42.19	44.47	61.26	31.64	32.98	0.660	0.652	0.052	0.042	1.230	1.148

Panel B: LTBC

LTBC	Return on sales		Return on assets		CAPEX		DIO		DSO		DPO		Leverage		Cash holdings		Value ratio	
	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0
pre	0.029	0.101	0.042	0.080	0.040	0.058	43.41	63.93	50.87	61.79	37.68	35.32	0.730	0.652	0.037	0.060	0.543	1.123
-3	0.029	0.081	0.046	0.094	0.051	0.058	45.02	57.48	51.44	62.50	35.04	36.91	0.722	0.641	0.036	0.070	0.689	0.897
-2	0.029	0.109	0.040	0.084	0.047	0.067	42.83	70.46	42.81	59.48	34.79	36.72	0.744	0.641	0.039	0.052	0.771	1.285
-1	0.033	0.077	0.041	0.063	0.036	0.070	36.96	65.68	53.57	62.94	43.25	33.81	0.719	0.663	0.036	0.060	0.648	0.796

Table 2: Variable definitions:

Return on sales: EBIT divided by sales.

Return on assets: EBIT divided by total assets.

Value ratio: Return on invested capital divided by wacc.

CAPEX: Investments in property, plant and equipment as well as long-term intangible assets divided by sales.

DIO: Days inventory outstanding.

DSO: Days sales outstanding.

DPO: Days payables outstanding.

Leverage: Total debt divided by total equity.

Cash holdings: Cash and cash equivalents divided by total assets.

- Table 3: LTBC -

Panel A: Median values for the adopting companies

years	Return on sales	Return on assets	CAPEX	DIO	DSO	DPO	Cash holdings	Leverage	Value ratio
pre	0.029	0.042	0.040	43.406	50.873	37.678	0.037	0.730	0.543
-3	0.029	0.046	0.051	45.024	51.443	35.038	0.036	0.722	0.689
-2	0.029	0.040	0.047	42.831	42.809	34.785	0.039	0.744	0.771
-1	0.033	0.041	0.036	36.963	53.567	43.248	0.036	0.719	0.648
0	0.043	0.048	0.037	45.552	50.659	41.319	0.052	0.711	0.581
1	0.034	0.057	0.033	45.259	44.382	37.410	0.070	0.674	0.790
2	0.061	0.052	0.030	46.364	44.120	37.575	0.074	0.691	1.021
3	0.048	0.058	0.027	50.969	45.263	35.416	0.070	0.686	0.974
post	0.048	0.055	0.033	47.149	45.321	37.735	0.065	0.691	0.711

Panel B: Control adjusted differences in median based on the year prior to adoption

years	Return on sales		Return on assets		CAPEX		DIO		DSO		DPO		Cash holdings		Leverage		Value ratio	
	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median
0 to -1	10	0.004 (0.24)	10	0.008 (0.07)	10	-0.012 (0.68)	10	-0.377 (0.37)	10	-0.453 (0.85)	9	4.235 (0.86)	9	-0.026 (0.77)	10	0.000 (0.66)	8	0.709 (0.01)
1 to -1	10	0.011 (0.24)	10	0.012 (0.14)	10	0.014 (0.10)	9	5.431 (0.27)	10	-3.806 (0.14)	9	0.774 (0.42)	9	-0.021 (0.48)	10	-0.024 (0.20)	8	0.607 (0.08)
2 to -1	9	0.009 (0.15)	9	0.012 (0.11)	9	0.001 (0.27)	9	0.417 (0.37)	9	-4.288 (0.44)	8	3.087 (0.73)	9	-0.006 (0.57)	9	-0.033 (0.20)	7	0.753 (0.16)
3 to -1	9	0.032 (0.03)	9	0.035 (0.02)	9	0.002 (0.22)	9	5.974 (0.39)	9	-14.67 (0.04)	8	4.507 (0.88)	7	0.004 (0.44)	9	-0.029 (0.33)	7	1.310 (0.06)

Table 3: p-values based on Wilcoxon Signed Rank Tests in parentheses. Variables defined in table 2.

future STBC. VBIC with future STBC are associated with underperformance somewhere between the fierce performance situation of LTBC and the minor underperformance of VBIC without future STBC. Also in terms of vbm implementations these companies seem to choose a middle way. It is therefore not surprising that for such companies it is not enough to just slightly adjust management control systems with VBIC, but instead, these companies are in need of a complete turnaround. However, they do not implement vbm consistently as LTBC, but instead need more time to tie board compensation to value-based metrics. The results therefore show that the consistency of vbm implementation increases with the underperformance prior to the adoption.

Compared to the existing literature, the results present a more differentiated view on the motives for implementing vbm. *Kleiman* (1999) shows that compared to the S&P 500 companies adopters of the EVA-concept perform worse in terms of operating margin. However, he misses to account for the different forms of vbm adoptions in corporate practice. The results in table 2 and 6 therefore help to further understand the results of *Kleiman* (1999). *Hogan / Lewis* (2005) further show in their descriptive results that the 72 anticipated adopter of value-based board compensation underperform in various performance dimensions in the three year period before the adoption of vbm. However, also *Hogan / Lewis* (2005) similar to *Kleiman* (1999) do not further separate between the forms of value-based board compensation and do not adjust hypotheses in accordance. The results are further consistent with the finding of *Hogan / Lewis* (2005) that companies benefitting the most from an adoption of value-based metrics in compensation plans are more likely to implement it. Besides, *Ryan / Trahan* (2007) find that when vbm is already implemented within the company higher performance drives the implementation of value-based board compensation. This cannot be fully supported by the results in table 5 and 6 on STBC compensation. The results in table 5 and 6 show that especially those companies that do not succeed with performance increases after the adoption of VBIC further proceed with implementing value-based board compensation.

- Table 4: VBIC that do not implement STBC in the future -

Panel A: Median values for the adopting companies

years	Return on sales	Return on assets	CAPEX	DIO	DSO	DPO	Cash holdings	Leverage	Value ratio
pre	0.062	0.071	0.043	46.458	42.402	26.294	0.040	0.694	0.851
-3	0.049	0.067	0.055	41.331	54.438	26.708	0.019	0.718	0.497
-2	0.073	0.080	0.057	47.289	39.693	26.741	0.033	0.699	0.954
-1	0.063	0.059	0.041	45.498	44.465	31.643	0.052	0.660	1.230
0	0.075	0.081	0.034	46.102	48.666	28.654	0.050	0.623	1.102
1	0.078	0.079	0.043	46.369	47.287	30.268	0.060	0.657	1.164
2	0.083	0.064	0.044	46.292	43.964	33.883	0.073	0.669	0.949
3	0.096	0.084	0.039	43.997	46.926	35.771	0.080	0.666	1.169
post	0.086	0.083	0.033	44.979	44.861	32.615	0.064	0.669	1.068

Panel B: Control adjusted differences in median based on the year prior to adoption

years	Return on sales		Return on assets		CAPEX		DIO		DSO		DPO		Cash holdings		Leverage		Value ratio	
	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median
0 to -1	27	-0.002 (0.42)	27	0.008 (0.30)	25	-0.006 (0.51)	27	0.004 (0.56)	23	-1.618 (0.37)	25	-2.252 (0.80)	24	-0.003 (0.47)	27	0.005 (0.73)	22	-0.220 (0.88)
1 to -1	27	0.012 (0.07)	27	0.013 (0.06)	25	-0.001 (0.77)	27	0.720 (0.83)	25	2.577 (0.50)	26	0.637 (0.37)	24	0.004 (0.45)	27	0.016 (0.92)	22	0.183 (0.17)
2 to -1	25	0.015 (0.21)	24	0.010 (0.46)	23	-0.001 (0.64)	25	-0.749 (0.65)	24	1.569 (0.27)	24	0.411 (0.23)	22	0.004 (0.79)	25	0.055 (0.98)	21	0.044 (0.56)
3 to -1	24	0.020 (0.07)	23	0.016 (0.26)	22	-0.003 (0.48)	22	0.705 (0.23)	22	-0.366 (0.45)	22	6.983 (0.21)	21	0.002 (0.75)	24	0.036 (1.00)	20	0.223 (0.43)

Table 4: p-values based on Wilcoxon Signed Rank Tests in parentheses. Variables defined in table 2.

- Table 5: VBIC that adopt STBC in the future -

Panel A: Median values for the adopting companies

years	Return on sales	Return on assets	CAPEX	DIO	DSO	DPO	Cash holdings	Leverage	Value ratio
pre	0.051	0.038	0.056	38.215	66.111	35.019	0.038	0.739	0.440
-3	0.055	0.032	0.057	38.568	69.009	33.598	0.034	0.763	0.285
-2	0.050	0.035	0.064	37.863	67.248	35.518	0.052	0.753	1.336
-1	0.042	0.052	0.049	42.242	60.658	35.122	0.038	0.715	0.440
0	0.056	0.064	0.037	43.823	67.526	38.155	0.036	0.754	1.111
1	0.055	0.036	0.041	44.358	77.684	42.773	0.043	0.783	0.941
2	0.084	0.090	0.046	40.236	47.058	34.459	0.042	0.746	1.216
3	0.078	0.069	0.041	39.015	62.871	33.710	0.029	0.787	1.108
post	0.060	0.050	0.042	43.244	60.876	37.678	0.038	0.762	1.164

Panel B: Control adjusted differences based on median values based on the year prior to adoption of VBIC.

years	Return on sales		Return on assets		CAPEX		DIO		DSO		DPO		Cash holdings		Leverage		Value ratio	
	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median
0 to -1	6	0.008 (0.08)	6	0.004 (0.22)	5	-0.007 (0.02)	6	10.19 (0.78)	6	15.54 (0.72)	6	0.550 (0.66)	6	-0.006 (0.72)	6	0.039 (0.78)	4	-0.473 (0.09)
1 to -1	6	0.003 (0.15)	6	-0.016 (0.29)	5	-0.011 (0.02)	6	7.531 (0.85)	6	15.06 (0.96)	6	1.054 (0.04)	6	-0.014 (0.71)	6	0.022 (0.71)	4	0.220 (0.41)
2 to -1	4	0.001 (0.06)	4	-0.010 (0.06)	4	-0.008 (0.31)	4	0.989 (0.22)	3	10.40 (0.69)	4	-11.26 (0.59)	4	-0.055 (0.31)	4	0.062 (0.59)	3	0.584 (0.19)
3 to -1	3	-0.006 (0.13)	3	-0.024 (0.13)	3	-0.017 (0.44)	3	3.719 (0.56)	2	43.02 (0.63)	3	-3.372 (0.44)	3	-0.047 (0.56)	3	0.137 (0.56)	2	-0.690 (0.63)

Panel C: Control adjusted differences based on median values based on the year prior to adoption of STBC.

years	Return on sales		Return on assets		CAPEX		DIO		DSO		DPO		Cash holdings		Leverage		Value ratio	
	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median	N	Median
0 to -1	7	-0.021 (0.23)	7	0.012 (0.11)	7	-0.001 (0.15)	7	-0.553 (0.47)	7	-6.669 (0.16)	7	-3.307 (0.95)	7	0.013 (0.66)	7	-0.042 (0.02)	6	0.289 (0.08)
1 to -1	7	0.006 (0.59)	7	0.041 (0.53)	7	-0.012 (0.23)	7	-0.160 (0.59)	7	1.852 (0.41)	7	8.829 (0.66)	7	0.030 (0.85)	7	-0.108 (0.01)	6	0.160 (0.28)
2 to -1	7	0.036 (0.19)	7	0.043 (0.05)	7	-0.010 (0.15)	7	-0.678 (0.34)	7	0.096 (0.53)	7	4.809 (0.41)	7	0.024 (0.81)	7	-0.116 (0.01)	6	0.387 (0.28)
3 to -1	7	0.035 (0.29)	7	0.035 (0.08)	7	-0.008 (0.29)	7	-0.344 (0.59)	7	-0.354 (0.77)	7	11.34 (0.08)	7	-0.002 (0.89)	7	-0.109 (0.01)	6	0.570 (0.11)

Table 5: p-values based on Wilcoxon Signed Rank Tests in parentheses. Variables defined in table 2. The number observations vary from Panel B to Panel C after year 2 as in this year some companies already implement STBC and are therefore considered only in Panel C. Further, the implementations of VBIC in the companies of Panel B happen in the mid 1990s which leads to data availability problems.

- Table 6: Median values for companies adopting VBIC and future STBC and matched companies for the prior adoption period -

VBIC	Return on sales		Return on assets		CAPEX		DIO		DSO		DPO		Leverage		Cash holdings		Value ratio	
	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0	=1	=0
pre	0.051	0.083	0.038	0.077	0.056	0.051	38.22	48.83	66.11	46.60	35.02	30.47	0.038	0.036	0.739	0.585	0.440	1.436
-3	0.056	0.083	0.064	0.075	0.037	0.065	43.82	50.13	67.53	50.92	38.16	33.87	0.036	0.042	0.754	0.585	1.111	1.583
-2	0.056	0.080	0.064	0.071	0.037	0.060	43.82	34.87	67.53	52.18	38.16	27.34	0.036	0.027	0.754	0.620	1.111	1.733
-1	0.042	0.077	0.052	0.079	0.049	0.047	42.24	31.87	60.66	39.64	35.12	29.96	0.038	0.041	0.715	0.574	0.440	1.285

Table 6: Variable definitions in table 2.

6 Conclusion

The results show that consistent implementations of vbm can be found in companies that underperform their matched control group the highest prior to adoption. Further, such companies also hold lower cash, have higher leverage and also need to reduce new investments and inventories in order to generate liquidity. The consistent implementation of vbm leads to an increase in performance after the adoption, which goes in line with an increase in inventories, new investments, cash holdings and a decrease in leverage. Therefore, the results presented a whole new view on vbm, as vbm seems to be a viable turnaround instrument especially attractive to companies facing performance struggles.

The results further show that partial implementations of vbm, only in internal control systems, seem to be enough for the majority of adopters of vbm that do not face large performance struggles. However, such companies also do not provide monetary incentives to increase value-based metrics and there are only minor changes in value drivers compared to a matched control group. The control adjusted results even show that implement value-based internal control hold slightly higher inventories and also more cash reserves. Still, such companies increase performance after the adoption of vbm for internal control purposes however mainly in traditional performance measures. This is however not the case for all companies that implement value-based internal control. Some need to go the extra mile and implement value-based metrics in compensation systems in order to increase performance. Such companies tend to implement value-based metrics for short-term board compensation 2-3 years after the adoption of vbm for internal control. The extra step is needed in order to realize performance improvements.

One might consider the lower number of observations compared to the existing literature as a limitation of the study. However, the sample that is investigated covers almost any listed company that potentially implements vbm in the German landscape. Such companies are usually larger and more visible. Further, there are barley adopters of vbm among the smaller companies. A further extension of the sample therefore is implausible. However, a limitation of the analysis is the lack of generalizability. It cannot be ruled out that the special disclosure requirements in Germany motivate some companies to especially focus on the design of internal control and board compensation systems before disclosing them. Further, even the high disclosure requirements in Germany do not allow a separation between different forms of value-based internal control, such as capital budgeting or goal setting. Further research could especially have a look at these different forms of value-based internal control e.g. by conducting surveys.

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Capital Market Effects of High Quality Investor Relations Activities - The European Evidence

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Abstract:

High quality Investor Relations (IR) activities have significant effects on corporate stock. The analysis shows that companies with high quality IR activities are associated with less volatile stock prices, higher stock liquidity, more analysts following and eventually with an increase in market valuation. Further, the results are robust against controlling for endogeneity and investigating relevant subsamples. Besides, a portfolio of the top 100 IR companies outperforms the risk-free rate in an equal and value-weighted setting and an industry-matched portfolio in a value-weighted setting. The results are especially important as they help to create an understanding why companies heavily invest in undertaking IR activities. IR activities can continuously provide capital market participants with value relevant information and aim to build a trustful relationship with capital market participants. Therefore the results are equally important for companies and investors. A new measure for the quality of IR activities is applied by the results of the Thomson Extel Pan European Investor Relations Survey (TEPEIRS) and the sample is based on the MSCI Europe companies pooled with the top 100 IR companies according to TEPEIRS from 2006 to 2012.

Keywords: Investor Relations, Voluntary Corporate Disclosure, Market Valuation, Stock Returns

JEL: M20, G14, G15

Data availability: The data investigated in this study is primarily provided from Bloomberg database. The data on the IR quality has been provided on request by Thomson Extel.

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1 Introduction

IR activities induce a continuous form of communication to the capital market by providing analysts and especially investors with value relevant information, e.g. in one-on-one meetings with IR officers or senior management, by participating in conferences or organizing roadshows, or by offering permanent contact opportunities with the company (Byrd *et al.* 1993, Bushee / Miller 2012, Ragas *et al.* 2014). IR activities are thereby especially concerned with building up and maintaining credibility in the company and its management as well as personal relationships. To provide all these services, companies are willing to invest high amounts of money. A study of the IR Magazine in 2010 reveals that on average a continental European listed company provides a budget of 730 thousand Euro per year for IR activities such as traveling costs, not counting salary and annual report costs. Budget thereby increases with company size and some of the larger companies provide budgets of over 2.5 million Euro per year. Confirming results are also reported by academic research of Ragas *et al.* (2014) and Bushee / Miller (2012). But besides these monetary aspects, opportunity costs might be of even higher relevance especially for larger companies. Companies see one-on-one meetings on roadshows and conferences as the most important communication channel with the capital market (Marston 2008) and in such meetings important investors regularly get access to the CEO, CFO or senior management for detailed discussions.

Even though these numbers show the importance of IR activities in corporate practice, only little is known about the benefits from these investments from empirical studies. In the existing quantitative literature on the effects of corporate disclosure on corporate stock, that has been conducted for over two decades (e.g. Welker 1995, Botosan 1997, Bushee / Noe 2000, Leuz / Verrecchia 2000, Botosan / Plumlee 2002), IR activities are usually neglected. When IR activities are part of the analysis, the measures for IR quality are quite surprising, as usually the AIMR score is applied that is computed only from analysts' opinions, or the number of analysts covering the company (Leuz / Verrecchia 2000). However, IR activities are primarily targeted towards investors and go further than just disclosing information, which is ignored when applying the AIMR component. In this context, Bushee / Miller (2012) point out that the AIMR score is not a viable measurement for the quality of IR activities, as it is hardly decomposable into its components of which only one is in fact linked to IR quality. This measurement issue might partially explain the documented results. According to Botosan / Plumlee (2002) IR activities are not associated with cost of equity capital and Bushee / Noe

(2000) show that high quality IR activities, according to the AIMR score, lead to higher stock price volatility.

So far, dedicated studies on IR activities frequently focused on exploring IR activities in corporate practice using survey data (e.g. *Byrd et al.* 1993, *Marston / Straker* 2001, *Marston* 2008, *Laskin* 2011, *Ragas et al.* 2014), whereas quantitative studies are still rare. These qualitative studies conclude that IR activities might be beneficial for companies and capital market by increasing the number of analysts following, increasing stock liquidity and lowering stock price volatility. According results are shown by the existing quantitative IR literature which however almost exclusively focuses on the effects on corporate stock when companies initiate IR programs (*Vlittis / Charitou* 2012, *Bushee / Miller* 2012, *Kirk / Vincent* 2014). However these results are just of minor interest to companies that are confronted with setting yearly IR budgets when being already active in IR. Therefore, especially the investigation of differences in IR quality and its effects on corporate stock are demanded (*Kirk / Vincent* 2014). To the author's best knowledge, no empirical study exists that investigates capital market effects of such quality differences in IR activities, besides the unpublished working papers of *Agarwal et al.* (2008) & (2010). Such an investigation would be of major practical importance to understand whether the efforts that companies are willing to make in order to undertake IR activities are worthwhile. This analysis therefore aims to reduce the gap in existing literature. The following overall research question is stated:

RQ: Does the quality of IR activities influence companies' stocks?

The analysis proceeds as follows: First, the potential influences of quality differences in IR activities on market valuation are analyzed. High quality IR discloses information to investors continuously, thereby considering different investment focuses and horizons. Therefore, high quality IR activities should lead to a decrease in stock price deviation as information asymmetries might be reduced. Additionally, high quality IR activities might have better processes to target new investors and also increase the amount of analysts following, which should be associated with an increase in stock liquidity. If high quality IR activities lead to a decrease in stock price deviation and to an increase in stock liquidity, eventually market valuation should increase. In order to investigate the direct and indirect effects of IR quality on information asymmetries, number of analysts, liquidity and market valuation structural equation models are applied. Due to the endogenous nature of IR quality, further analysis aim at controlling for this issue, using a two-stage-least-squares approach. Second, capital market might need some time to fully reflect the quality differences in IR activities in stock prices, which might lead to stock price outperformance of companies with

high quality IR activities. In order to analyze the potential stock price outperformance, Carhart four factor models (*Fama / French 1993, Carhart 1997*) are conducted and returns are measured over the risk-free rate and over an industry-matched portfolio to simulate real investment strategies. The analysis is based on a European sample, precisely on the companies included in the MSCI Europe index pooled with the top IR companies in the period from 2006 to 2012. For the structural equation model yearly observations are applied and for the Carhart four factor models monthly observations are used. In order to overcome the measurement problem related to the AIMR score, the top IR companies are identified using the results of the Thomson Extel Pan European Investor Relations Survey (TEPEIRS) which is conducted on a yearly basis. TEPEIRS has several advantages compared to the regularly applied AIMR score. TEPEIRS is not only based on analysts' opinion but mainly relies on feedback from buy-side participants. Besides, TEPEIRS does only account for the quality of IR activities and is based on similar quality measures that companies apply to internally measure the quality of their IR activities (*Ragas et al. 2014*) and so provides congruency.

The results ultimately show that investments in the quality of IR activities are worthwhile. Results show that companies with high quality IR activities lower stock price deviation, increase stock turnover as well as the number of analysts and in the end increase market valuation. However, no significant effects are reported on the influence of IR quality on bid-ask-spread as well as on the influence of bid-ask-spread on market valuation. Further analyses show that the results are stable for subsamples and also stable when controlling for endogeneity in a two-stage-least-squares approach. Additionally, a portfolio of the top 100 IR companies outperforms the risk-free rate in an equal and value weighted setting when controlling for common risk factors and outperforms an industry-matched portfolio when returns are weighted by market value.

This research contributes to the existing literature in several ways. It is the first study that particularly analyzes the effects of quality differences in IR activities on corporate stock and therefore helps to fill the gap in existing literature. Existing studies usually deal with the effects of engaging in IR activities (*Vlittis / Charitou 2012, Bushee / Miller 2012, Kirk / Vincent 2014*). Such results are of minor importance for larger companies that already engage in IR activities and face the highest costs in terms of budget and opportunity costs. Therefore, the results of this analysis are needed in order to create an understanding why companies heavily invest in undertaking IR activities. Further, the reported results heavily undermine the results of existing literature where undifferentiated measures for IR quality are applied.

Besides, empirical investigations about corporate disclosure usually deal with the quality of written disclosure instruments such as the annual report or in recent years especially sustainability reports and CSR disclosure (e.g. *Richardson / Welker* 2001, *Dhaliwal et al.* 2011, *Dhaliwal et al.* 2012, *Clarkson et al.* 2013, *Matsumura et al.* 2014). The results might therefore help to switch researchers' focus towards IR as a unique form of voluntary corporate disclosure that continuously provides the capital market with value-relevant information and focuses on a lasting relationship with capital market participants. This switch is needed as capital market participants especially seem to reward personal meetings and cherish the access to senior management and also board members, however so far, not much is known about potential influences on corporate stock.

From a methodological point of view the results contribute to literature as they show that measures based on survey data, such as TEPEIRS, can be a viable research tool and lead to robust results. Additionally, the importance of controlling for cross-sectional dependence when investigating stock returns is discussed and it is shown that cross-sectional dependence between stock returns is a major driver for the outcome of portfolio analyses.

The following analysis is structured as follows. In chapter 2 the relevant literature on IR activities is reviewed. Chapter 3 shows the link between the quality of IR activities and market valuation. In chapter 4 the measurement of IR quality is discussed, followed by the description of the sample and the description of the applied structural equation model. In chapter 5 the results of the model are presented and discussed. The analysis ends with a conclusion in chapter 6.

2 Literature Review

Qualitative studies

The first string of literature on IR investigates operational actions of IR programs and tries to shed light on whether or not IR activities can be beneficial for companies and capital market participants. This research is usually based on surveys and does not investigate the effect of IR activities on corporate stock quantitatively. The studies thereby conclude that IR activities can be beneficial by increasing the number of analysts following the company (*Brennan / Tamarowski* 2000), reducing stock price deviation or increasing stock liquidity (*Brennan / Tamarowski* 2000, *Laskin* 2011). For example, *Byrd et al.* (1993) argue that stock price deviation can be reduced by targeting and attracting long-term investors, whereas *Günther / Otterbein* (1996) stress the importance of IR activities to reduce the risk of over- and undervaluation. As most important IR activity, building a trustful relationship with

providers of financial capital is identified (*Brennan / Tamarowski* 2000). Thereby, *Byrd et al.* (1993) point out that disclosing “good and bad news with equal alacrity and openness” (p. 50) is the core of the IR business. In order to build a trustful relationship, *Marston* (2008) documents that one-on-one meetings are ranked as the most important instrument used by IR to communicate with investors. For performance evaluation of IR activities, *Ragas et al.* (2014) report that influencing share price however is not considered being a good target for IR activities and IR professionals instead measure their effectiveness by the following four goals: Internal assessment of the C-suite, relationship assessment, outreach assessment and external market behavior. Internal assessment of the C-suite means the feedback from members of the board of management and relationship assessment is described as feedback from the financial community. Outreach assessment deals with the visibility and attention that IR activities can generate by participating in e.g. conferences. External market behavior includes indicators such as stock trading liquidity, news media coverage and awards. Overall, the studies document an increase in the importance of IR activities in corporate practice in the past years (*Byrd et al.* 1993, *Marston / Straker* 2001).

Quantitative studies

Literature on corporate disclosure regularly focuses on either the determinants of corporate disclosure quality (e.g. *Lang / Lundholm* 1993, *Francis et al.* 2008), or on the effects of corporate disclosure on corporate stock and cost of capital. The latter shall be reviewed and summarized in the following as it is the relevant stream of literature for the overall research question.¹

Welker (1995) finds that the top third companies according to the AIMR score realize 50% lower relative bid-ask-spread compared to the bottom third. Both, *Botosan* (1997) and *Botosan / Plumlee* (2002) report results that corporate disclosure quality is negatively associated with cost of equity capital, where *Botosan* (1997) applies a self-constructed measure for corporate disclosure quality and *Botosan / Plumlee* (2002) apply the AIMR score. Also applying the AIMR score, *Bushee / Noe* (2000) conclude that corporate disclosure quality is negatively associated with stock price deviation. At last, *Leuz / Verrecchia* (2000) find that companies that switch from German-GAAP to IFRS or US-GAAP reduce bid-ask-spread and stock price volatility and increase stock liquidity. Whereas most studies do not consider differences in disclosure instruments, in some studies IR activities are mentioned at least on a side note. For example *Botosan / Plumlee* (2002) find that the quality of IR

¹ For a detailed discussion on corporate disclosure literature and on the methodologies applied please refer to *Tran* (2011).

activities is not associated with cost of equity capital and *Bushee / Noe* (2000) conclude that IR activities attract more transient investors and therefore the quality of IR activities is associated with higher stock price volatility. These results on IR activities are especially challenged through studies dedicated to IR activities. For example, results of *Bushee / Noe* (2000) are undermined by the results of *Bushee / Miller* (2012) who particularly focus on the effects of initiating IR activities and conclude that IR activities do not lead to an increase in stock price volatility. *Bushee / Miller* (2012) especially identify the application of the AIMR score in *Bushee / Noe* (2000) as a reason for the differences in results. But not only is the measurement of IR quality critical, but also the methods applied in existing literature. For example, *Farragher et al.* (1994) analyze the effects of IR quality on analysts' forecast dispersion and accuracy. Using Spearman rank correlation tests they find that for companies with high quality IR activities analysts' forecasts are less dispersed, as analysts can benefit from a clear guidance towards future company performance. Even though the results are in line with the assumptions from the presented qualitative studies, Spearman rank correlation tests are not sufficient in order to present robust results.

Besides these conflicting results on IR activities in more traditional literature, some dedicated studies on IR activities have developed by the studies of *Vlittis / Charitou* (2012), *Bushee / Miller* (2012) and *Kirk / Vincent* (2014). All studies however focus on companies that start engaging in IR activities and apply event-study methodology. While these results are important, as they can facilitate the question whether or not to undertake IR activities, they are less important for the majority of listed companies that already undertake IR activities and face the question whether or not to intensify IR. Overall, the number of dedicated quantitative studies is very rare and is a main motivation for the following analysis. *Vlittis / Charitou* (2012) find significant abnormal returns after the announcement of an IR engagement and that in the year after the announcement information asymmetries are reduced, stock liquidity is increased and the engaging firms are more visible on the capital market. *Bushee / Miller* (2012) find that smaller, less visible companies increase institutional investors' ownership, increase the number of analysts following the company, media coverage and market valuation after engaging in IR activities compared to a matched control group. Confirming results, just for larger companies that do not face visibility issues, are presented by *Kirk / Vincent* (2014) who find that firms initiating IR activities increase the number of analysts issuing forecasts for the company, stock liquidity, institutional investors' ownership and eventually market valuation. In addition to these three studies, there are two complementary studies from *Agarwal et al.* (2008) & (2010) that focus on quality differences in IR activities. *Agarwal et*

al. (2008) analyze the annually nominated companies in the category “Best Overall IR” of the American IR Magazine in the years 2000 to 2002. They document that nominees outperform in terms of stock returns over the risk-free rate in the period before and after the nomination and that stock liquidity is higher compared to non-nominees. In a complementary study, *Agarwal et al.* (2010) find that nominees for the overall best IR activities by the American IR Magazine are higher valued by the capital market than companies that are not nominated.

3 Theoretical Background and Hypotheses Development

Companies invest heavily in undertaking IR activities (*Byrd et al.* 1993, *Bushee / Miller* 2012, *Ragas et al.* 2014). By doing so, they try to secure access to financial capital (*Laskin* 2011). IR manages the relationship to sell-side participants, mainly analysts and buy-side participants and aims to build and maintain a trustful relationship. The importance of the relationship and trust aspect lies deep in the nature of IR and is already pointed out by *Hartmann* (1968) in the German context. He defines IR as: “voluntary efforts of senior management to gain and increase the confidence of investors, the popularity and reputation of the company, through a long-term and continuous program of company inside policy and outside targeting actions” (p. 70).² As main financial target, it is assumed that IR should secure a fair valuation of the company’s stock, by lowering high expectations and raising low expectations towards future company performance, which lowers information asymmetries (*Byrd et al.* 1993, *Laskin* 2011, *Bassen et al.* 2010). „For this reason, we claim that the ultimate goal of investor relations should not be to maximize the price at which shares trade, but rather to make shares trade in a narrow range centered at their intrinsic values. Equivalently, the primary goal should be to make stock prices more informative” (*Bassen et al.* 2010, p. 56).

High quality IR activities therefore cover two different aspects: Voluntary disclosure of information in order to influence expectations and building and maintaining capital markets’ confidence in the company (*Vlittis / Charitou* 2012, *Kirk / Vincent* 2014). Influencing expectations through disclosing information thereby can lead to a decrease in cost of capital. One stream of theory argues that the degree of investors’ uncertainty to predict future company cash flows is an increasing function of cost of capital, as investors’ uncertainty leads to an estimation error. However, it was unclear until the analysis of *Lambert et al.* (2007),

² Translated. Original quote: ”Investor Relations sind [...] die freiwilligen Bemühung der obersten Geschäftsleitung durch ein geplantes, langfristiges und kontinuierliches Programm von nach innen gerichteter Politik und nach außen zielenden Handlungen das dauernde Vertrauen der Investor-Öffentlichkeit zu gewinnen und zu vermehren und den Beliebtheits- und Bekanntheitsgrad des Unternehmens zu erhöhen“ (*Hartman* 1968, p. 70).

whether the effect on cost of capital arising from an estimation error is diversifiable in large economies (*Botosan / Plumlee 2002*). Cost of capital decrease with an increase in corporate disclosure quality, as average information precision of investors rises and not necessarily because information asymmetries are reduced (*Lambert et al. 2011*). A decrease in information asymmetries leads to a decrease in cost of capital, only when the average information precision of investors increases as well. When an increase in information asymmetries leads to an increase in market illiquidity, cost of capital increase as well, even when the average information precision remains constant (*Diamond / Verrecchia 1991, Welker 1995*).

In this context, high quality IR continuously and consistently provides individually matched information to various types of investors, such as equity, debt or also SRI investors with different investment horizons, but also to sell-side analysts. High quality IR is in regular contact with sell-side analysts thereby reducing analysts' costs of gathering and analyzing information that is available on the market (*Merton 1987, Brennan / Tamarowski 2000*). As a part of that disclosure aspect, high quality IR also states clear and trustful performance guidance for the short, medium and long-term. Such disclosure might align performance expectations and might also reduce monitoring costs of investors, as investors have more detailed information about the investing activities of the company they own shares of.

Besides managing existing investors, IR can also target new investors and attract them to buy company shares (*Bushee / Miller 2012*). High quality IR thereby usually targets long-term investors to stabilize investor base and reduce volatility (*Byrd et al. 1993*). High quality IR activities include regularly meetings with investors on roadshows, conferences, in one-on-one meetings or investor/analyst days (*Kirk / Markov 2013*). One-on-one meetings are thereby even considered being the most important communication channel between a company and the capital market (*Marston 2008*), where investors are regularly granted access to senior management and also to board members, which can be important in terms of credibility of the external performance guidance. Further, credibility might prevent investors from selling company stock in bad economic times (*Brennan / Tamarowski 2000, Laskin 2011*).

As a result, by maintaining old investors and attracting new investors, by providing additional value-relevant information to the market and managing expectations and by reducing information gathering and analyses costs of analysts, the quality of IR activities should be negatively related with information asymmetries and positively related with stock liquidity and analysts' coverage. Therefore the following hypotheses are stated:

H1a: Companies with high quality IR activities are associated with higher amount of analysts following than companies with low quality IR activities.

H1b: Companies with high quality IR activities are associated with lower information asymmetries than companies with low quality IR activities.

H1c: Companies with high quality IR activities are associated with higher stock liquidity than companies with low quality IR activities.

An increase in stock liquidity and a decrease in information asymmetries c.p. lead to a decrease in cost of capital. Further, an increased number of analysts covering the company can increase stock liquidity (*Bushee / Miller 2012, Kirk / Vincent 2014*) and also reduce information asymmetries, which might lead to more frequent trading. Consequently market valuation should increase (*Agarwal et al. 2008, Agarwal et al. 2010, Bushee / Miller 2012, Kirk / Vincent 2014*). Therefore the following hypothesis is formulated:

H2: Companies with high quality IR activities achieve higher market valuation than companies with low quality IR activities.

However, capital market might need some time (*Edmans 2011*) to fully reflect the value of high quality IR activities in stock price, which might lead to temporary stock return outperformance (*Vlittis / Charitou 2012*). When the capital market knows about the benefits from IR activities, it might still need some periods to fully understand these benefits and reflect them in price. Therefore the following hypothesis is stated:

H3: Companies with high quality IR activities outperform in terms of stock returns.

4 Method

4.1 IR Quality Measurement and Sample Selection

IR Quality Measurement - TEPEIRS

In order to investigate hypotheses 1 to 3 a measure for the quality of IR activities is needed that does not suffer from the AIMR score weaknesses and covers the disclosure aspect and more importantly the quality of all IR instruments. Therefore the results of the yearly conducted Thomson Extel Pan European Investor Relations Survey (TEPEIRS) are applied. In this context, *Bushee / Miller (2012)* argue that empirical studies based on the AIMR score are biased in the sense that the AIMR score only covers analysts' opinion about the quality of corporate disclosure and IR quality. In contrast, TEPEIRS is based on votes from participants from the sell- and buy-side. Further, *Botosan / Plumlee (2002)* argue that the IR related

component of the AIMR score is hard to extract, as implicitly in the AIMR score all of a company's disclosure activities beyond the annual and quarterly report are considered being a part of IR. This does not necessarily cover the IR related aspects beyond disclosure. To overcome this issue, TEPEIRS ranking is compiled from multiple criteria from seven equally weighted key areas for IR quality according to Thomson Extel:

- 1) Consistency and transparency of investor relations
- 2) Quality of service from investor relations team
- 3) Business knowledge and insights of investor relations team
- 4) Quality of one-to-one meetings
- 5) Quality of non-deal roadshows/visits
- 6) Proactivity of senior executives
- 7) Quality of formal disclosure

For each category buy-side and sell-side participants are allowed to vote on a scale from 1 to 5, whereas buy-side votes are weighted by assets under management and sell-side votes in accordance with their ranking in the previous year's sell-side quality assessment of Thomson Extel. The 7 components cover the voluntary disclosure aspects such as the consistent and continuous provision of information to capital market (*Byrd et al. 1993, Laskin 2011, Bassen et al. 2010*), as well as the quality of IR instruments, such as one-on-one meetings which are of major importance in order to build up relationships and grant access to senior management (*Marston 2008*). Further, comparing the categories included in TEPEIRS with the external targets that are set by IR professionals for their internal performance assessment according to *Ragas et al. (2014)* TEPEIRS guarantees congruency. Therefore, TEPEIRS is a useful and viable measure for the quality of IR activities.

Sample Selection

Hypotheses 1 and 2 are analyzed using the top 100 IR companies identified by TEPEIRS in a pooled sample with the MSCI Europe Index companies on a yearly basis. The top 100 were picked, as the market especially learns about these companies by the disclosure of Thomson Extel.³ As most of the top 100 IR companies are also listed in the MSCI Europe Index, this procedure can help to provide a level playing field. As a result, the analyses of hypotheses 1 and 2 are based on a total of 3,676 yearly observations (table 1).

³ The list of the top 100 IR companies was provided upon request from Thomson Extel.

- Table 1: Number of observations in the sample for hypotheses 1 and 2 -

Year	No. of observations
2006	601
2007	615
2008	494
2009	489
2010	490
2011	493
2012	494
Total	3,676

Table 1: Number of observations applied to investigate hypotheses 1 and 2. Hypotheses 1 and 2 are analyzed using the top 100 IR companies identified by TEPEIRS in a pooled sample with the MSCI Europe Index companies on a yearly basis. As most of the top 100 IR companies are also listed in the MSCI Europe Index, this procedure guarantees a level playing field in terms of size and profitability. As a result, the analyses for hypotheses 1 and 2 are based on a total of 3,676 yearly observations.

In line with the geographic distribution of the top 100 IR index, the pooled sample is also largely depended on companies from Great Britain, Germany and France (table 2). In total, the sample is representative for the whole European market.

Hypothesis 3 is analyzed using a Carhart four factor models based on the risk factors from *Fama / French* (1993) and *Carhart* (1997). Risk factors are taken from Kenneth French's website for the European market. Monthly observations total to 8,045 in the equal weighted setting and 7,934 observations in the value weighted setting (table 3).

4.2 Models

Model 1)

In order to investigate hypothesis 1a/b/c and 2, as well as the links between the applied measures, a structural equation model 1) shown by figure 1. Hypothesis 1 states that high quality IR activities lead to lower information asymmetries, to higher stock liquidity and more analysts' covering the company. In order to measure information asymmetries, annualized stock price deviation based on a monthly data is applied. To measure stock liquidity, bid-ask-spread and stock turnover are applied and as a measure for market valuation market-to-book ratio is used. The paths are designed in accordance with the assumed directions in hypotheses 1 and 2. Further, a link between the number of analysts and stock liquidity is designed as analysts are assumed to spread information and thereby increase stock liquidity (*Bassen et al.* 2010, *Kirk / Vincent* 2014). Following the same logic, a reduction in stock price deviation reduces the perceived risk of investors which might also lead to more frequent trading and a reduction in bid-ask-spread (*Bushee / Noe* 2000). Additionally, three categories of control variables are included in each model to control for company and market specific influences as

- Table 2: Geographic and industry distribution of the pooled sample underlying the regression analysis for hypotheses 1 and 2 -

Panel A: Industry distribution			Panel B: Location distribution		
Industry	No. of observations	%	Location	No. of observations	%
Banks	335	9.11	Great Britain	792	21.5
Insurance	208	5.66	France	486	13.2
Telecommunications	200	5.44	Germany	342	9.3
Food	173	4.71	Switzerland	247	6.7
Media	140	3.81	Sweden	233	6.3
Commercial Services	139	3.78	Italy	220	6.0
Retail	125	3.40	Spain	212	5.8
Electric	117	3.18	US	190	5.2
Chemicals	113	3.07	Netherlands	182	5.0
Engineering&Construction	113	3.07	Finland	126	3.4
Oil&Gas	113	3.07	Belgium	106	2.9
Pharmaceuticals	109	2.97	Denmark	101	2.7
REITS	93	2.53	Austria	74	2.0
Healthcare-Products	89	2.42	Norway	74	2.0
Mining	88	2.39	Greece	68	1.8
Diversified Finan. Serv.	85	2.31	Ireland	60	1.6
Building Materials	81	2.20	Portugal	58	1.6
Transportation	77	2.09	Jersey	44	1.2
Miscellaneous Manufactur.	73	1.99	Luxembourg	34	0.9
Auto Manufacturers	65	1.77	Bermudas	15	0.4
Aerospace/Defense	63	1.71	Cyprus	4	0.1
Machinery-Diversified	61	1.66	Guernsey	4	0.1
Iron/Steel	59	1.61	Gibraltar	2	0.1
Oil&Gas Services	55	1.50	Canada	1	0.0
Beverages	54	1.47	Russia	1	0.0
Computers	47	1.28	Total	3,676	
Apparel	43	1.17			
Semiconductors	42	1.14			
Auto Parts&Equipment	37	1.01			
Electrical Compo&Equip	37	1.01			
Airlines	35	0.95			
Holding Companies-Divers	35	0.95			
Gas	33	0.90			
Software	33	0.90			
Forest Products&Paper	32	0.87			
Lodging	30	0.82			
Household Products/Wares	28	0.76			
Metal Fabricate/Hardware	28	0.76			
Water	28	0.76			
Leisure Time	27	0.73			
Agriculture	24	0.65			
Entertainment	24	0.65			
Real Estate	24	0.65			
Advertising	22	0.60			
Electronics	22	0.60			
Internet	20	0.54			
Distribution/Wholesale	19	0.52			
Home Furnishings	19	0.52			
Private Equity	18	0.49			
Investment Companies	17	0.46			
Cosmetics/Personal Care	16	0.44			
Hand/Machine Tools	16	0.44			
Healthcare-Services	16	0.44			
Home Builders	13	0.35			
Office/Business Equip	12	0.33			
Energy-Alternate Sources	11	0.30			
Environmental Control	10	0.27			
Packaging&Containers	9	0.24			
Food Service	7	0.19			
Machinery-Constr&Mining	7	0.19			
Pipelines	4	0.11			
Biotechnology	3	0.08			
Total	3,676				

Table 2: Panel A reports the industry distribution according to the GICS of the sample underlying hypotheses 1 and 2. Results show that no industry is dominating the sample. Panel B shows the geographic distribution of the sample. Most companies in the sample are located in Great Britain followed by France and Germany. Overall the sample is representative for the whole European market.

- Table 3: Number of observations in the sample for hypothesis 3 -

Year	Equal weighted	Value weighted
2006	1,145	1,111
2007	1,152	1,146
2008	1,140	1,117
2009	1,116	1,104
2010	1,140	1,128
2011	1,176	1,164
2012	1,176	1,164
Total	8,045	7,934

Table 3: Number of monthly observations to investigate hypothesis 3. The second column shows the number of observations in an equal weighted setting and the third column in a value weighted setting. As the portfolio analysis is based on monthly return data, there are on average 1,150 observations per year, totaling to 8,045 observations in the equal weighted setting and 7,934 observations in the value weighted setting, underlying the analysis for hypothesis 3.

well as macroeconomic factors. Robust, clustered standard errors are applied. Data is provided by Bloomberg and the relevant tickers can be found in the Appendix.

The following variables are applied:

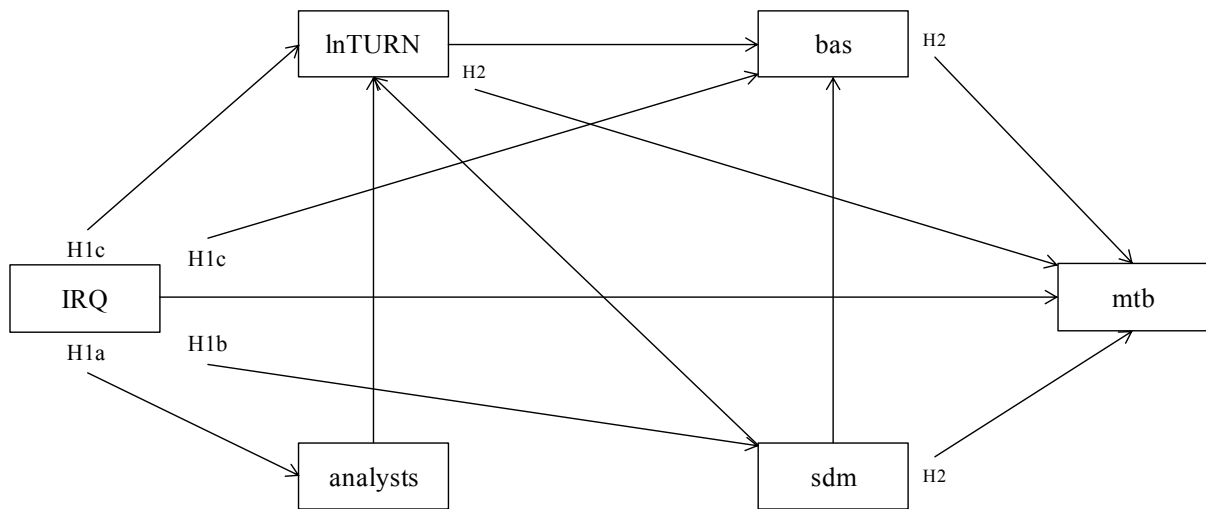
- IRQ Dummy variable that equals 1 when the company was listed among the top 100 IR companies identified by TEPEIRS, and 0 else.
- lnTURN natural logarithm of stock turnover.
- analysts Number of analysts issuing earnings forecasts for the company.
- sdm Annualized standard deviation of the stock's total return based on monthly returns.
- bas bid-ask-spread calculated as $(\text{Ask Price} - \text{Bid Price}) / (\text{Bid Price})$.
- mtb Market to book-ratio: Market capitalization divided by total equity.

Further, the following control variables are applied in each path regression.

Control variables

- vr value ratio calculated as return on invested capital divided by cost of capital. *vr* is a measure for a company's operating performance in relation to its cost of capital and therefore important for investors.
- lev leverage, total debt divided by total equity. *lev* is a measure for company specific financing risk, which is supposed to have a positive relationship with stock price deviation.

- Figure 1: Model 1) - Assumed links between IR quality and market valuation -



Variable definitions:

IRQ is a dummy variable that equals 1 when the company was listed among the top 100 investor relations companies identified by TEPEIRS.

lnTURN is the company's stock turnover.

analysts is the number of analysts issuing earnings forecasts for the company.

sdm is the annualized standard deviation of the stock's total return based on monthly returns.

bas is the bid-ask-spread based on monthly stock prices calculated as $(ask-price - bid-price)/(bid-price)$.

mtb is the market capitalization divided by total equity.

- lnTA natural logarithm of the company's total assets in million Euro. *lnTA* serves as a measure for company size and should capture size related differences among the investigated companies.

- capex cash outflow for investments in property, plant and equipment as well as investments in long-term intangible assets divided by sales. *capex* measures a company's investment intensity.

- esi Economic Sentiment Indicator (ESI) is measure for investors' sentiment in the European market.⁴ Investors' sentiment can generally be measured by either surveying investors or using market measures (*Baker / Wurgler 2007, Finter et al. 2012*). Whereas *Baker / Wurgler (2007)* and *Finter et al. (2012)* construct complex sentiment indices, the ESI is a survey based measure.

- euribor monthly EURIBOR, as a measure for macroeconomics effects.

- infl monthly inflation of the EU25 countries, as measure for macroeconomic effects. When inflation is high, trading activities should be positively influenced.

⁴ Source: http://ec.europa.eu/economy_finance/db_indicators/surveys/index_en.htm, last accessed: 30.07.2014)

fed	Dummy variable that takes the value 1 for the years 2008 and 2009 as financial crisis years.
ID	Industry dummies for Z-1 industries.

Model 2)

Hypothesis 3 states that companies with high quality IR activities might realize higher stock returns as the capital market needs time to fully reflect the value of IR in stock price. In order to analyze potential stock return outperformance, Carhart-4-factor models are conducted.

$$R_m = \alpha + \beta_1 \times \text{RMRF}_m + \beta_2 \times \text{SMB}_m + \beta_3 \times \text{HML}_m + \beta_4 \times \text{MOM}_m$$

R_m Return of the portfolio in month m over the risk-free rate, R_f , or an industry-matched portfolio.

R_m therefore equals the return of a real investment strategy of buying the portfolio including the top 100 IR companies according to TEPEIRS and selling either the risk-free asset or the industry-matched portfolio.

R_f , RMRF, SMB, HML and MOM are taken from Kenneth French's website for the European market. The companies in the industry-matched portfolio were identified by the 4-digit GICS, whereas companies of similar size were chosen. Companies that were ranked once in the sample period among the top 100 IR companies were disqualified. Additionally, this model is estimated in two different specifications. Standard OLS regression in a pooling-model with robust standard errors first according to *Newey / West* (1987) is used and second according to *Driscoll / Kraay* (1998), which also controls for cross-sectional dependence. Especially the correction for cross-sectional dependence is of major importance, as IR activities include disclosure of market risks and other information that might not just influence the disclosing company's stock. In this context *Hilary / Shen* (2013) document that especially analysts play a major role in transferring information from one company to another. But also in semi-strong efficient capital markets, value-relevant information disclosed by another company should be fast reflected in price. In order to investigate what outperformance a real investment strategy would have realized, standard errors according to *Newey / West* (1987) are enough. However, when it comes to the identification of the reasons for potential outperformance, it is important to analyze what role cross-sectional dependence of stock prices plays. In addition, *Hribar / McInnis* (2012) control for investors' sentiment in their portfolio analysis, which is why also in model 2, the aforementioned ESI is included.

5 Empirical Results

Hypotheses 1 and 2

Descriptive statistics

- Table 4: Descriptive statistics for the pooled sample underlying hypotheses 1 and 2 -

Panel A: pooled sample

	Min.	1st Q.	Median	Mean	3rd Q.	Max.	Std.dev.
IRQ	0.0000	0.0000	0.0000	0.1888	0.0000	1.0000	0.3914
lev	0.0272	1.0707	1.8178	3.9421	3.5452	29.7819	5.5258
vr	-538.5571	0.5388	0.9754	0.8393	1.4876	18.2132	9.7127
lnTA	5.1780	8.4840	9.5400	9.7570	10.8370	15.7850	1.7788
capex	-0.0410	0.0230	0.0448	0.1221	0.0924	51.5000	0.9066
sdm	0.0000	0.0548	0.0741	0.0838	0.1019	0.5271	0.0432
bas	-0.0294	0.0010	0.0016	0.0022	0.0027	0.0794	0.0039
lnTURN	17.5800	21.9000	22.6500	22.7300	23.5100	26.4300	1.2099
analysts	0.0000	14.0000	21.0000	21.7072	59.0000	59.0000	9.7883
mtb	0.0314	1.0881	1.8789	2.8302	3.1983	29.6532	3.2971
euribor	0.5500	1.2650	1.9740	2.5990	4.0840	4.8110	1.4895
esi	79.6000	91.0167	101.3417	99.2282	111.9833	111.9833	10.4153
Infl	1.5000	2.1000	2.3000	2.4850	3.2000	3.3000	0.5913

Panel B: IRQ = 1

	Min.	1st Q.	Median	Mean	3rd Q.	Max.	Std.dev.
lev	0.0343	1.0866	1.7726	3.8936	3.4846	28.6842	5.4106
vr	-2.8446	0.5981	0.9842	1.1041	1.4386	5.9952	0.8767
lnTA	6.2020	9.5590	10.4560	10.6390	11.5730	15.7850	1.6901
capex	0.0024	0.0287	0.0475	0.0821	1.7440	1.7440	0.1313
sdm	0.0196	0.0501	0.0668	0.0773	0.0956	0.4640	0.0408
bas	-0.0124	0.0007	0.0011	0.0015	0.0017	0.0188	0.0020
lnTURN	19.6100	23.1000	23.9300	23.8400	24.6600	26.3800	1.1686
analysts	1.0000	24.0000	31.0000	30.6411	59.0000	59.0000	9.2264
mtb	0.2301	1.0885	1.7426	2.5137	2.9040	26.5762	2.6568

Panel C: IRQ = 0

	Min.	1st Q.	Median	Mean	3rd Q.	Max.	Std.dev.
lev	0.0272	1.0695	1.8284	3.9532	3.5584	29.7819	5.5528
vr	-538.5571	0.5263	0.9726	0.7787	1.4961	18.2132	10.7576
lnTA	5.1780	8.3300	9.2310	9.5500	10.6530	15.0810	1.7356
capex	-0.0410	0.0218	0.0437	0.1314	51.5000	51.5000	1.0051
sdm	0.0000	0.0560	0.0752	0.0853	0.1037	0.5271	0.0436
bas	-0.0294	0.0011	0.0017	0.0024	0.0029	0.0794	0.0041
lnTURN	17.5800	21.7800	22.4500	22.4800	23.1700	26.4300	1.0711
analysts	0.0000	13.0000	19.0000	19.6793	52.0000	52.0000	8.7195
mtb	0.0314	1.0880	1.9039	2.9025	3.2720	29.6532	3.4230

Table 4: Descriptive results for the pooled sample (panel A), for the sample of high quality IR companies (panel B) and for the remaining companies (panel C).

Variable definitions:

lev is total debt divided by total equity.

vr is the return on invested capital divided by wacc.

lnTA is the natural logarithm of the company's total assets (in € million).

capex are investments in property, plant and equipment as well as long-term intangible assets divided by sales.

euribor is the yearly euribor.

esi is the European investors' sentiment index.

infl is the inflation of the EU25 countries.

Remaining variable definitions in figure 1. Bloomberg fields can be found in the appendix.

Table 4 reports that around 19% of all observations are based on top IR companies. The top 100 IR companies are larger in terms of total assets than the rest of companies in the sample. On average, a top 100 IR company has total assets of 41,731 million Euro whereas the sample average lies at 14,047 million Euro. Correlation coefficients are presented in table 5.

- Table 5: Correlation coefficients for the variables of the pooled sample underlying hypotheses 1 and 2 -

	IRQ	analysts	lev	mtb	lnTA	sdm	capex	bas	vr	lnTURN
IRQ		0.41 ***	0.00	-0.03 *	0.25 ***	-0.09 ***	0.04 **	-0.23 ***	0.01	0.42 ***
analysts	0.43 ***		0.07 ***	-0.12 ***	0.47 ***	-0.02	0.02	-0.35 ***	-0.08 ***	0.61 ***
lev	0.00	0.08 ***		-0.09 ***	0.4 ***	0.07 ***	-0.26 ***	0.02	-0.13 ***	0.1 ***
mtb	-0.05 ***	-0.12 ***	-0.06 ***		-0.49 ***	-0.31 ***	-0.03	-0.02	0.56 ***	-0.1 ***
lnTA	0.24 ***	0.48 ***	0.57 ***	-0.36 ***		0.02	-0.06 ***	-0.18 ***	-0.33 ***	0.55 ***
sdm	-0.07 ***	-0.01	0.13 ***	-0.15 ***	0.08 ***		-0.02	0.21 ***	-0.25 ***	-0.04 **
capex	-0.02	-0.05 ***	-0.04 **	0.02	-0.05 ***	0.00		0.00	-0.03 **	0.05 ***
bas	-0.09 ***	-0.11 ***	0.06 ***	-0.02	0.00	0.12 ***	0.01		-0.02	-0.39 ***
vr	0.01	0.01	-0.12 ***	0.42 ***	0.01	-0.01	0.00	0.00		-0.05 ***
lnTURN	0.43 ***	0.64 ***	0.16 ***	-0.11 ***	0.56 ***	-0.02	-0.05 ***	-0.15 ***	0.02	

Table 5: Spearman correlation coefficients above the diagonal. Pearson correlation coefficients below the diagonal. Variables defined in figure 1 and table 4.

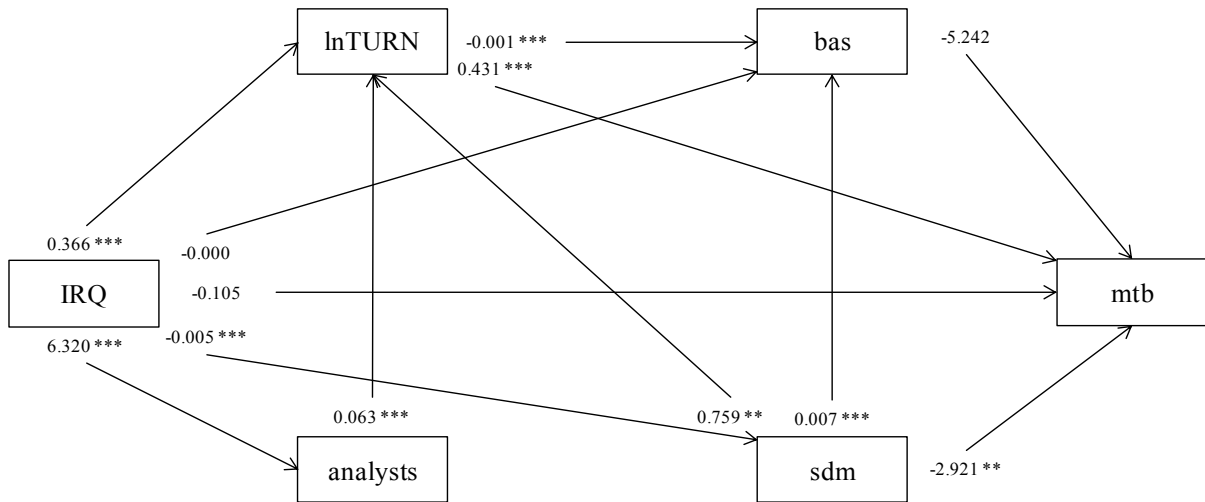
Significance levels: p-value < 0.01 “***”; < 0.05 “**”; < 0.1 “*”.

Regression Results

Figure 2 shows the estimated links between the applied variables. An increase in the quality of IR activities increases the number of analysts issuing forecasts for the company (figure 2). High quality IR companies increase the number of analysts by 32% (z-value: 18.51) compared to the mean number of analysts following companies with low quality IR activities. The result therefore confirms hypothesis 1a that states that the costs for the gathering and analyses of information through analysts is reduced through high quality IR activities, which leads to an increase in the number of analysts issuing forecasts (*Brennan / Tamarowski* 2000). The results complement findings of *Bushee / Miller* (2012) and *Kirk / Vincent* (2014), who also report that IR activities are positively associated with analysts following whereas both investigate the effects of an IR initiation.

Figure 2 further shows that information asymmetries are reduced with an increase in the quality of IR activities, which lowers the price span in which a company’s stock trades (*Günther / Otterbein* 1996, *Bassen et al.* 2010). The findings are consistent with hypothesis 1b and are largely in line with the expectations from the qualitative studies on IR activities (*Byrd et al.* 1993, *Brennan / Tamarowski* 2000, *Laskin* 2011). Compared to the mean standard deviation of low quality IR stocks, top IR companies achieve a reduction in stock price deviation of 5.9% (z-value: 3.10). This result undermines the prediction of *Bushee / Noe*

- Figure 2: Main results from the structural equation model 1) -



Variables defined in figure 1. Significance levels: p-value < 0.01 “***”; < 0.05 “**”; < 0.1 “*”.

(2000) who state that higher quality IR activities should lead to an increase in stock price volatility as more transient investors are attracted when the quality of IR activities rises. However, the results especially side with and complement the results of *Bushee / Miller* (2012) who investigate in particular small companies that start with IR activities and also with the results of *Vlittis / Charitou* (2012).

Consistent with hypothesis 1c, the quality of IR activities is positively associated with stock turnover (figure 2). Stock liquidity is higher by 1.7% (z-value: 10.71) compared to the mean stock liquidity of companies with low quality IR activities. The results are therefore in line with *Vlittis / Charitou* (2012) and *Kirk / Vincent* (2014) as well as with the expectations of *Laskin* (2011). In contrast, the results are not supportive when bid-ask-spread is applied as measure for liquidity as the results show that the quality of IR activities is negatively associated with bid-ask-spread, however not significant on a conventional level (figure 2). Further, bid-ask-spread is also not significantly associated with market-to-book ratio, which leads to overall no significant effects of IR quality on market-to-book ratio through bid-ask-spread. These results do not stand against the results of *Welker* (1995), but presents are more differentiated view. *Welker* (1995) finds that the top scorers in the AIMR rating realize lower bid-ask-spreads than companies with low AIMR score. Here, as the quality of IR activities is investigated solely, a different picture arises.

Last, the results in figure 2 do not show a direct positive effect of the quality of IR activities on market valuation but instead show a negative however statistically insignificant of IR quality on market-to-book ratio. This result stands in contrast to the results of *Kirk /*

- Table 6: Structural equation model and path analyses for the top 100 IR companies -

Panel A: SEM output

	<u>analysts</u>	<u>lnTURN</u>	<u>bas</u>	<u>sdm</u>	<u>mtb</u>
IRQ	6.320 ***	0.366 ***	-0.000	-0.005 ***	-0.105
analysts		0.063 ***			
lnTURN			-0.001 ***		0.431 ***
bas					-5.242
sdm		0.759 **	0.007 ***		-2.921 **
vr	0.294 *	0.059 ***	0.000 ***	-0.002 ***	0.967 ***
lnTA	2.806 ***	0.323 ***	0.000 ***	-0.005 ***	-0.970 ***
lev	-0.046	-0.018 ***	0.000	0.001 ***	0.223 ***
capex	-0.210 ***	0.005	0.000	0.000	0.131 ***
euribor	-2.158 ***	0.309 ***	0.000 *	-0.005 ***	0.131
infl	2.574 ***	-0.143 ***	0.000	0.006 ***	-0.388 ***
esi	0.005	0.005	-0.000	0.001 **	-0.034
fcd	1.780 **	0.043	0.000	0.057 ***	-1.294 ***

Panel B: Path analyses

	<u>indirect</u>	<u>total</u>
IRQ → mtb	0.347 ***	0.242 **
IRQ → lnTURN → mtb	0.158 ***	
IRQ → bas → mtb	0.001	
IRQ → sdm → mtb	0.014 *	
IRQ → lnTURN → bas → mtb	0.001	
IRQ → analysts → lnTURN → bas → mtb	0.001	
IRQ → analysts → lnTURN → mtb	0.172 ***	
IRQ → sdm → bas → mtb	0.000	
IRQ → sdm → lnTURN → mtb	-0.002 *	
IRQ → sdm → lnTURN → bas → mtb	-0.000	

Table 6: Panel A shows the results of the SEM. Dummy variables based on the GICS sector level are applied. Panel B shows the results for the individual paths. Variables defined in figure 1 and table 4. Significance levels: p-value < 0.01 “***”; < 0.05 “**”; < 0.1 “*”
Number of observations: 3,238.

Vincent (2014) who find that engaging in IR activities leads directly to higher market valuation.

Path analyses are shown in table 6, panel B. An increase in the number of analysts issuing research reports is assumed to increase stock liquidity through spreading information (Brennan / Tamarowski 2000, Kirk / Vincent 2014). The results in table 6, panel A show that the number of analysts is positively associated with stock turnover and stock turnover is positively associated with market-to-book ratio in accordance with hypothesis 2. Therefore high quality IR activities are also positively associated with market-to-book ratio through the path IRQ→analysts→lnTURN→mtb (coefficient: 0.172 ***). In contrast, bid-ask-spread is not significantly associated with market-to-book ratio and therefore, this path remains insignificant after all.

As shown in figure 2, high quality IR activities lead to a reduction in information asymmetries. A reduction in information asymmetries might have different favorable effects on corporate stock. First, a reduction in information asymmetries can lead to an increase in information precision and so lead to a decrease in cost of capital and eventually to an increase in market valuation (*Lambert et al.* 2011). Accordingly, the results (table 6, panel B) show that stock price standard deviation is negatively associated with market-to-book ratio, which leads to a positive effect on market-to-book ratio through the path $IRQ \rightarrow sdm \rightarrow mtb$ (coefficient: 0.014 *) consistent with hypothesis 2. Second, a decrease in stock price deviation might also lead to an increase in stock price informativeness, as information asymmetries are assumed to lead to a loss in price informativeness (*Chen et al.* 2014). *Chen et al.* (2014) particularly show that in a market where there are short and long-term oriented investors information asymmetries lead to a reduction in the sensitivity of short-term investor's trades to their private information regarding the development of company fundamentals which eventually leads to a decrease in stock price informativeness. Third, information asymmetries are a driver of stock illiquidity as investors are less willing to trade when information asymmetries are high (*Diamond / Verrecchia* 1991, *Welker* 1995). Therefore, a reduction in information asymmetries might actually lead to an increase in stock liquidity. However, this relationship does not hold according to the results in table 6, panel B that shows that stock price standard deviation is positively associated with liquidity. In contrast to the direct effect from IR quality on stock turnover, this indirect effect is only marginal with a coefficient of -0.004 but still leads to a slightly negative effect on market-to-book ratio over the path $IRQ \rightarrow sdm \rightarrow \lnTURN \rightarrow mtb$ (coefficient: -0.002 *) which is in contrast to hypothesis 2. In contrast, an increase in stock price deviation is positively associated with bid-ask-spread, however does not lead to neither a statistically significant nor economically relevant effect on market-to-book ratio.

The increase in stock turnover also leads to an increase in market-to-book ratio through the path $IRQ \rightarrow \lnTURN \rightarrow mtb$ (coefficient: 0.158 ***) consistent with hypothesis 2 (table 6, panel B). The results are therefore in line with the results of *Kirk / Vincent* (2014) who also report an increase in market valuation through an increase in stock turnover. The increase in stock turnover also leads to a reduction in bid-ask-spread, however, bid-ask-spread is not significantly linked to market-to-book ratio according to the model in table 6. An increase in stock turnover is an important outcome from an increase in IR quality, as it reduces the impact that information asymmetries have on cost of capital. When stock liquidity is low, investors undertaking larger trades face heavy trading costs through the price impact of their trades. By

increasing stock turnover, this price impact of larger trades is reduced and *Lambert et al.* (2011) show that average information precision remains the determining factor of cost of capital that can be influenced by corporate disclosure.

High quality IR activities are positively associated with market-to-book ratio indirectly through favorably influencing the number of analysts following the company, stock liquidity and standard deviation. The total indirect effect is therefore positive and highly significant with a coefficient of 0.347 (***) (table 6, panel B). High quality IR activities therefore lead to a total increase in market valuation by 0.242 (***). The result partially confirm the results of *Bushee / Miller* (2012) and *Kirk / Vincent* (2014) who find that companies that engage in IR activities realize higher market-valuation, measured by the book-to-market ratio. Therefore the results in table 6 add to the findings of *Bushee / Miller* (2012) and *Kirk / Vincent* (2014) as the results show that also quality differences in IR activities lead to higher market valuation.

Hypothesis 3

Regression Results

Table 7 shows that a portfolio of the top 100 IR companies according to TEPEIRS earns significant outperformance over the risk-free rate in both weighting schemes, when controlling for heteroskedasticity and autocorrelation. Table 7 therefore recreates an investment strategy that buys a portfolio of the top 100 IR companies and sells either the risk-free asset or an industry-matched portfolio. The portfolio earns an alpha over the risk-free asset of 1.6 bp when weighted equally and 2.5 bp when weighted by market value. Comparing the returns of the top 100 IR companies portfolio to an industry-matched portfolio, results change depending on the weighting scheme. Whereas in an equal weighted setting the portfolio consisting of the high quality IR companies realizes lower returns compared to the industry-matched portfolio (alpha = -1.5 bp), it outperforms the industry-matched portfolio in the value weighted setting (alpha = 0.2 bp). This means that few larger stocks in the portfolio dominate the results, as companies with high market value are higher weighted in the value weighted setting compared to the equal weighted setting (*Fama / French* 2008). Especially the top 30% companies by market cap realize higher stock returns compared to the remaining companies over the whole sample period. Whereas the top 10% by size realized 0.811% return per month, companies of the bottom 10% by size realized only 0.474% per month in the sample period. Comparing the results to the outcomes of the results in figure 2 and table 6, it seems that the capital market is aware of the benefits from high quality IR companies, but cannot fully price the value of IR activities efficiently and therefore needs time to do so.

-Table 7: Regression results for model 2) - Newey / West (1987) standard errors -

	equal-weighted		value-weighted	
	over risk-free rate	over industry-matched portfolio	over risk-free rate	over industry-matched portfolio
Intercept	0.01589 *** (0.00238)	-0.01515 *** (0.00134)	0.02473 *** (0.00194)	0.00246 ** (0.00121)
RMRF	0.60151 *** (0.00618)	-0.08268 *** (0.00263)	0.60788 *** (0.00513)	-0.12544 *** (0.00264)
SMB	-0.12167 *** (0.01001)	-0.47443 *** (0.00714)	-0.31835 *** (0.00796)	-0.38033 *** (0.00713)
HML	0.05959 ** (0.02129)	0.02608 *** (0.00640)	-0.10060 *** (0.01732)	0.083225 *** (0.00690)
MOM	-0.18946 *** (0.00996)	0.01538 ** (0.00536)	-0.07630 *** (0.00646)	0.10599 *** (0.00316)
ESI	-0.00012 *** (0.00002)	0.00015 *** (0.00001)	-0.00021 *** (0.00002)	-0.00005 *** (0.00001)

Table 7: Regression results for hypothesis 3. Hypothesis 3 states that companies with high quality investor relations achieve stock price outperformance.

RMRF, SMB, HML, MOM are risk factors taken from Kenneth French's website.

The models are estimated using OLS with standard errors according to *Newey / West* (1987).

Significance levels: p-value < 0.01 "****"; < 0.05 "***"; < 0.1 "**".

Therefore, the top 100 IR companies are slightly higher valued and also earn slightly higher stock returns.

The standard errors of the regression model in table 7 are calculated in accordance with *Newey / West* (1987) and therefore are robust against heteroskedasticity and autocorrelation. However, also cross-sectional dependence of stock returns might play a major role in general when investigating stock price movements and especially in the context of corporate disclosure, as shown in the model section. As there are many companies of the same industry in the portfolio, cross-sectional dependence of stock returns is interesting to investigate.

Looking at the results in table 8, they show that the portfolio of the top 100 IR companies does not outperform the risk-free rate in neither the equal weighted nor value weighted setting. Besides, also the outperformance over an industry-matched portfolio is not significant anymore in the value-weighted setting and the underperformance in the equal-weighted setting is just borderline significant. Only the classical CAPM risk factor, RMRF, and SMB seem to have a significant effect when controlling for cross-sectional dependence as well. Therefore the results show that most of the significances shown in table 7 are realized due to cross-sectional dependence of stock returns and not ultimately due to high quality IR activities.

- Table 8: Regression results for model 2) - Driscoll / Kraay (1998) standard errors -

	equal-weighted		value-weighted	
	over risk-free rate	over industry-matched portfolio	over risk-free rate	over industry-matched portfolio
Intercept	0.01589 (0.02176)	-0.01515 * (0.00915)	0.02473 (0.01836)	0.00246 (0.01094)
RMRF	0.60151 *** (0.05860)	-0.08268 *** (0.03047)	0.60788 *** (0.04805)	-0.12544 *** (0.02224)
SMB	-0.12167 (0.08767)	-0.47443 *** (0.07305)	-0.31835 *** (0.07073)	-0.38033 *** (0.07286)
HML	0.05959 (0.20857)	0.02608 (0.06867)	-0.10060 (0.15990)	0.083225 (0.06891)
MOM	-0.18946 * (0.10318)	0.01538 (0.05383)	-0.07630 (0.06294)	0.10599 *** (0.03351)
ESI	-0.00012 (0.00023)	0.00015 * (0.00009)	-0.00021 (0.00019)	-0.00005 (0.00011)

Table 8: Regression results for hypothesis 3. Hypothesis 3 states that companies with high quality investor relations achieve stock price outperformance. RMRF, SMB, HML, MOM are risk factors taken from Kenneth French's website. The models are estimated using OLS with standard errors according to *Driscoll / Kraay* (1998). Significance levels: p-value < 0.01 "***"; < 0.05 "**"; < 0.1 "*".

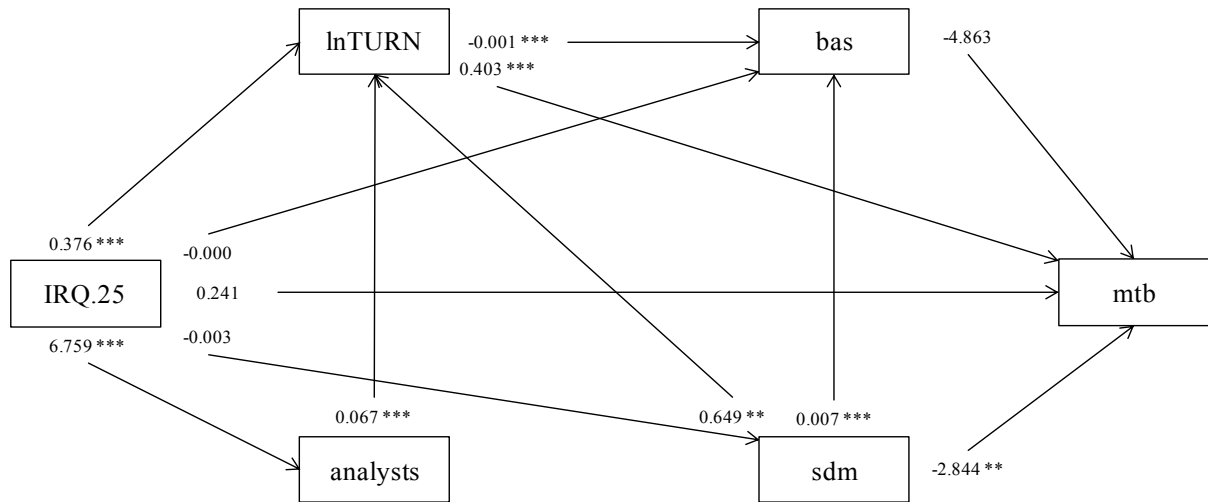
Robustness Checks

In addition to the analyses presented above, further analyses are conducted particularly addressing the endogeneity problem and also investigating subsamples.⁵ It remains an open issue whether moving up in the top 100 has any effect on market valuation. Due to the ordinal nature of the data regressing the ranks would imply that the company on the first position has a 100 times better IR business than the company on position 100, which cannot be assumed. Therefore, instead of a dummy variable for the top 100, a dummy variable only for the top 25 is applied. The headline results for the structural equation model can be found in figure 3 and the detailed results as well as path analyses can be found in table 9.

The results in figure 3 and table 9 show that moving further up in the TEPEIRS ranking also leads to higher market valuation. Whereas the dummy variable measuring the top 100 IR companies has a direct negative, however insignificant association with market-to-book ratio (figure 2 and table 6), the top 25 companies are directly positive associated with market-to-book ratio, however also insignificant on a conventional level (p-value: 0.169). Nevertheless, compared to the remaining companies in the sample, that also include rank 26 to 100 now, the

⁵ For a detailed discussion of endogeneity in corporate disclosure please refer to *Larcker / Rusticus* (2010)

- Figure 3: Structural equation model for the top 25 IR companies -



IRQ.25 is a dummy variable that equals 1 when the company was listed among the top 25 investor relations companies identified by TEPEIRS. Remaining variables defined in figure 1. Significance levels: p-value < 0.01 “***”; < 0.05 “**”; < 0.1 “*”.

top 25 according to TEPEIRS are associated with higher stock liquidity and also more analysts following the company and the coefficients on both variables are even higher than those of the original results. The overall effect consequently shows that the top 25 according to TEPEIRS achieve a higher market-to-book ratio by 0.588 (***) compared to the top 100 that achieve a higher market-to-book ratio by 0.242 (***)

In order to control for endogeneity, a propensity score matching as in the case of *Kirk / Vincent* (2014) is not possible for this analyses, as a unique corporate event is clearly missing, due to the volatility in the index. Instead a two-stage-least-squares (tsls) approach is adopted where in the first stage the probability that a company is ranked among the top 100 IR companies is predicted and the predicted values are then inserted into the structural equation model shown in figure 1. The quality of tsls thereby depends on the degree of endogeneity and also the quality of variables chosen to predict the probability to be among the top 100 IR companies (*Larcker / Rusticus* 2010). Therefore the following model is estimated, whereas the predicting variables are motivated from *Kirk / Vincent* (2014) as well as *Lang / Lundholm* (1993):

Model 3)

$$\text{Prob}(\text{IRQ}_{it}=1) = \alpha + \beta_1 \times \text{mtb}_{it} + \beta_2 \times \text{lnTA}_{it} + \beta_3 \times \text{lev}_{it} + \beta_4 \times \text{sdm}_{it} + \beta_5 \times \text{capex}_{it} + \beta_6 \times \text{bas}_{it} + \beta_7 \times \text{vr}_{it} + \beta_8 \times \text{lnTURN}_{it} + \beta_9 \times \text{analysts}_{it} + \sum_{n=1}^{N-1} \gamma_n \times \text{ID}_n + \sum_{z=1}^{Z-1} \delta_z \times \text{CD}_z$$

All variables are defined as in section 4.2

- Table 9: Structural equation model for the top 25 IR companies according to TEPEIRS -

Panel A: SEM output

	<u>analysts</u>	<u>lnTURN</u>	<u>bas</u>	<u>sdm</u>	<u>mtb</u>
IRQ.25	6.759 ***	0.376 ***	-0.000	-0.003	0.241
analysts		0.067 ***			
lnTURN			-0.001 ***		0.403 ***
bas					-4.863
sdm		0.649 **	0.007 ***		-2.844 **
vr	0.298 *	-0.020 ***	0.000 ***	-0.005 ***	0.966 ***
lnTA	3.228 ***	0.335 ***	0.000 ***	-0.002 ***	-0.974 ***
lev	-0.088 ***	0.057 ***	0.000	0.001 ***	0.224 ***
capex	-0.210 ***	0.006	0.000	0.000	0.130 ***
euribor	-2.175 ***	0.315 ***	0.000 **	-0.005 ***	0.136
infl	2.517 ***	-0.155 ***	0.000	0.006 ***	-0.385 ***
esi	0.018	0.006	-0.000	0.001 **	-0.034
fcd	1.940 **	0.051	0.000	0.056 ***	-1.297 ***

Panel B: Path analyses

	<u>indirect</u>	<u>total</u>
IRQ.25 → mtb	0.347 ***	0.588 ***
IRQ.25 → lnTURN → mtb	0.152 ***	
IRQ.25 → bas → mtb	0.001	
IRQ.25 → sdm → mtb	0.009	
IRQ.25 → lnTURN → bas → mtb	0.001	
IRQ.25 → analysts → lnTURN → bas → mtb	0.002	
IRQ.25 → analysts → lnTURN → mtb	0.183 ***	
IRQ.25 → sdm → bas → mtb	0.000	
IRQ.25 → sdm → lnTURN → mtb	-0.001	
IRQ.25 → sdm → lnTURN → bas → mtb	0.000	

Table 9: Panel A shows the results of the SEM. Dummy variables based on the GICS sector level are applied. Panel B shows the results for the individual paths. *IRQ.25* is a dummy variable that equals 1 when the company was listed among the top 25 investor relations companies identified by TEPEIRS. Remaining variables defined in figure 1 and table 4. Significance levels: p-value < 0.01 “***”, < 0.05 “**”, < 0.1 “*”
Number of observations: 3,238.

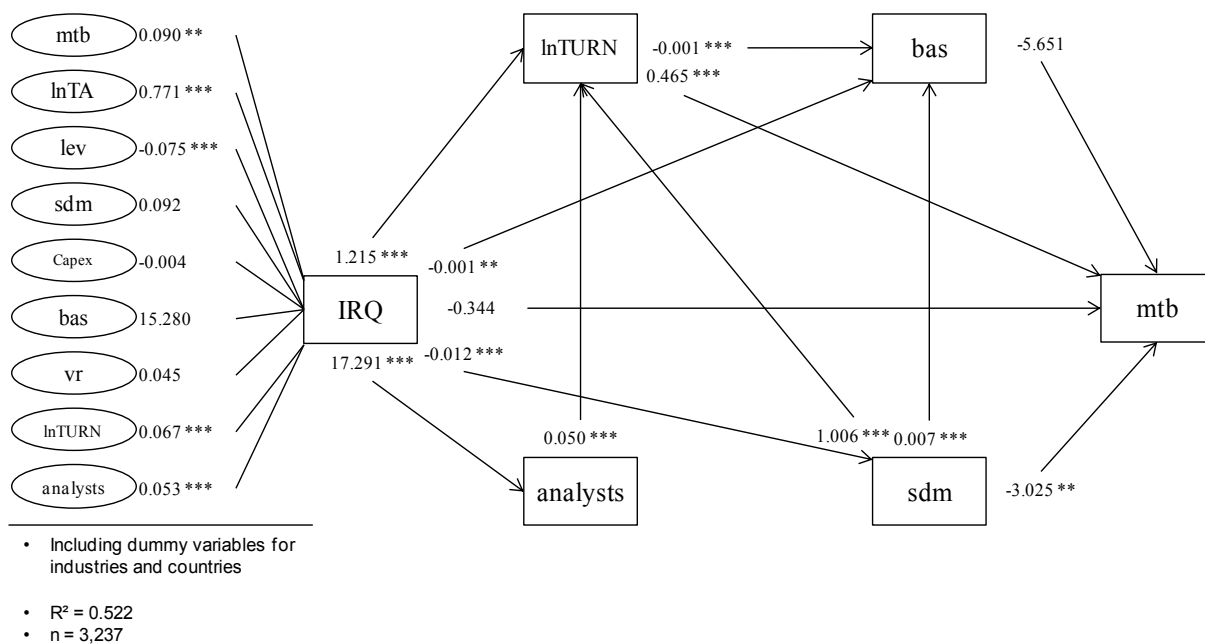
CD country dummies for Z-1 countries.

The results of the logistic regression as well as main results are reported in figure 3, whereas the overall quality of the model indicates well chosen instruments. The results for the structural equation model and path analyses are shown in table 10. Compared to the results in table 6 where the observed values of IRQ are applied there are no major differences in the

results. Therefore, it can be concluded that endogeneity does not play a major role in the analysis.

Further, all models have also been tested by applying Tobins'Q measured as the sum of market capitalization, total debt, preferred equity and minorities divided by total assets, leading to the overall the same results.

- Figure 4: Structural equation model for the endogeneity controlled variable -



Variables defined in figure 1 and table 4.

Significance levels: p-value < 0.01 "***"; < 0.05 "**"; < 0.1 "*".

Regressions investigating hypothesis 3 are also tested using a feasible GSL model that only accounts for cross-sectional dependence. Compared to the results presented in table 7 and 8, the top 100 IR companies do realize outperformance compared to the risk-free rate in the equal weighted setting with an alpha = 8.1 bp (t-value = 5.87) and in the value weighted setting with an alpha = 2.0 bp (t-value = 2.13). Compared to an industry matched portfolio the portfolio of the top 100 IR companies does not realize significant outperformance, with negative coefficients in both weighting schemes. This shows that cross-sectional dependence alone already accounts for most of the significance drops reported in table 7.

- Table 10: Structural equation model and path analyses for the endogeneity controlled variable -

Panel A: SEM output

	<u>analysts</u>	<u>lnTURN</u>	<u>bas</u>	<u>sdm</u>	<u>mtb</u>
prob_IR	17.291 ***	1.215 ***	-0.001 **	-0.012 ***	-0.344
analysts		0.050 ***			
lnTURN			-0.001 ***		0.465 ***
bas					-5.651
sdm		1.006 ***	0.007 ***		-3.025 **
vr	0.168	0.055 ***	0.000 ***	-0.005 ***	0.966 ***
lnTA	1.644 ***	0.282 ***	0.000 ***	-0.001	-0.965 ***
lev	0.071 **	-0.011 ***	0.000	0.001 ***	0.222 ***
capex	-0.210 ***	0.002	0.000	0.000	0.131 ***
euribor	-2.200 ***	0.277 ***	0.000 *	-0.005 ***	0.126
infl	2.528 ***	-0.112 ***	0.000	0.006 ***	-0.387 ***
esi	-0.016	0.004	-0.000	0.001 **	-0.033
fcd	1.429 **	0.029	0.000	0.057 ***	0.161 ***

Panel B: Path analyses

	<u>indirect</u>	<u>total</u>
prob_IR → mtb	1.005 ***	0.661 ***
prob_IR → lnTURN → mtb	0.565 ***	
prob_IR → bas → mtb	0.004	
prob_IR → sdm → mtb	0.036 **	
prob_IR → lnTURN → bas → mtb	0.004	
prob_IR → analysts → lnTURN → bas → mtb	0.003	
prob_IR → analysts → lnTURN → mtb	0.398 ***	
prob_IR → sdm → bas → mtb	0.001	
prob_IR → sdm → lnTURN → mtb	-0.006 **	
prob_IR → sdm → lnTURN → bas → mtb	-0.000	

Table 10: Panel A shows the results of the SEM. Dummy variables based on the GICS sector level are applied. Panel B shows the results for the individual paths. *prob_IR* are the predicted values using the logistic regression shown in model 1). Remaining variables defined in figure 1 and table 4. Significance levels: p-value < 0.01 “***”, < 0.05 “**”, < 0.1 “*”
Number of observations: 3,237.

6 Conclusion

The analysis shows that quality differences in IR activities significantly influence corporate stock. Overall the results are in accordance with theoretical expectations of the stated hypotheses, but differ from existing results on IR quality in literature. Companies with high quality IR activities increase the number of analysts following, lower stock price deviation and increase stock liquidity. Through the increase in the number of analysts following stock liquidity is further enhanced. Eventually through the favorable influence on number of analysts, information asymmetries and stock liquidity market valuation increases.

Further, results show that a portfolio of the high quality IR companies outperforms the risk-free rate in both the equal and value weighted setting, but only outperforms an industry-matched portfolio in the value weighted setting. This latter result is mainly driven by large stocks that outperform the remaining smaller stocks in the portfolio in terms of stock returns.

The results are important especially for larger companies that already engage in IR activities. The results show that even large companies can lower cost of capital and increase market valuation when the quality of their IR activities is high. Therefore, high quality IR activities can be a competitive advantage in the race for capital.

The results are also important for investors. Investors can earn significant outperformance when investing in companies with high quality IR activities and selling the risk-free asset or an industry-matched portfolio. In combination with less deviating stock prices, a higher liquidity of stocks from companies with high quality IR activities and more analysts issuing forecasts for such companies, such stocks can be profitable investments.

The results are limited, as the results only focus on the effects of IR activities on corporate stock, however IR activities are not limited solely to equity investors, but also focus on debt investors. It would be interesting to see whether IR does also affect cost of debt or other related parameters such as bond ratings.

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Appendix

Relevant Bloomberg fields:

SALES_REV_TURN; EBIT; BS_TOT_ASSET; TOTAL_EQUITY;
TOTAL_INVESTED_CAPITAL; ROC_WACC_RATIO; RETURN_ON_INV_CAPITAL;
WACC; TOBIN_Q_RATIO ; CUR_MKT_CAP; PE_RATIO; TURNOVER; VOLUME