Essays on Empirical Corporate Finance and Corporate Governance

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Erik Fernau

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Dekan:	Dr. Jürgen M. Schneider
Referent:	Prof. Dr. Erik Theissen
Korreferentin:	Prof. Dr. Alexandra Niessen-Ruenzi

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Chapter 1

Introduction

In their seminal paper, Miller und Modigliani (1961) show that payout policy does not affect firm value. Following their reasoning, firm value is solely determined by investment policy, whereas the payout to shareholders corresponds to the difference between investments and earnings. Even though Miller und Modigliani (1961) only discuss dividends as payout method, their argument can readily be applied to stock repurchases as well. When firm value is solely determined by investment policy, not only the amount of payout, but also the composition of the payout into dividends and stock repurchases is irrelevant from the perspective of shareholders. However, the dividend irrelevance proposition by Miller and Modigliani (1961) rests on the assumption of perfect capital markets. This dissertation examines implications of deviations from the assumption of perfect capital markets for payout policy and board structure empirically.

Perfect capital markets do not allow for tax differentials between different payout methods and do not imply a different market reaction to changes in the payout of dividends and stock repurchases. Chapter 4 of this dissertation analyzes the determinants of the amount and the composition of payout in the presence of market frictions. Another potential reason for the relevance of payout policy from the perspective of shareholders is based on agency conflicts between managers and shareholders. In their seminal paper Jensen and Meckling (1976) show that managers do not always act in the best interests of shareholders. These conflicts of interests manifest in cases, where firms generate large amount of free cash flow (Jensen, 1986). Payout policy can play an important role in this context as an increase in the amount of payout reduces the amount of cash which is left to the discretion of the management. Even though payout policy can serve as a disciplining device for the management, Allen and Michaely (2003) refer to the role of the board as one shortcoming

of this explanation. They question why boards that are aware of the overinvestment of management are not able to better monitor the management in the first place. Following this reasoning, Chapter 2 and 3 of this dissertation deal with the role of the (supervisory) board within the German corporate governance system.

The work by Modigliani and Miller (1958), Miller and Modigliani (1961) and Jensen and Meckling (1976) inspired much of the subsequent research in the field of corporate finance and corporate governance. Relaxing the assumptions of perfect capital markets, many studies in the field of corporate finance are concerned with the question of how the financing structure and payout policy should be determined in order to increase shareholders' welfare. Similarly, studies in the field of corporate governance often investigate how corporate governance structures should be chosen in order to limit agency costs and increase shareholders' welfare. In this context, Chapters 2 and 3 of this dissertation analyze the monitoring of the management by the supervisory board as one important aspect of the corporate governance structure. The research in corporate finance and corporate governance is also concerned with the factors that determine the financing structure/payout policy and corporate governance structures of a firm. Chapters 2 and 4 of this dissertation investigate the determinants of executive compensation, director compensation and payout policy.

Due to their closely related research topics, empirical studies in the field of corporate finance and corporate governance apply similar empirical methodologies. One of the most important issues confronting these studies is the problem of endogeneity. Endogeneity refers to the correlation between explanatory variables and the error term in a regression and can stem from three different sources: simultaneity, measurement errors, and omitted variables (Roberts and Whited, 2013). Simultaneity occurs if the causality between two variables could go either way, e.g. does a corporate governance characteristic drive corporate performance or does corporate performance lead to the implementation of a certain corporate governance characteristic? Measurement errors are caused by variables of interests that are measured incorrectly. This dissertation puts a special emphasis on the omitted variables problem. Endogeneity due to omitted variables arises if a factor that influences the dependent variable is not included in the regression and thereby appear in the error term. One way to deal with the omitted variables problem is the use of panel data. The

use of panel data allows controlling for the impact of past realizations of the dependent variable on their current realization. This is particularly relevant for path-dependent variables like capital structure or dividend payouts. However, the estimates of the coefficient of the lagged dependent variable are biased when the OLS or within-group estimator (WG) are used. Consistent estimates can be obtained by the GMM-in-systems (GMM (SYS)) estimator (Blundell and Bond, 1998), which is used in Chapter 4. Factors that are unobservable and thus difficult to quantify are another reason for an omitted variables problem. Important sources of unobserved heterogeneities are manager characteristics such as their skills, abilities and knowledge. These characteristics potentially influence firm performance but are difficult to quantify and observe. Standard panel data methods are usually sufficient to cope with unobserved heterogeneity of managers over a short-time horizon. In contrast, empirical studies over a longer time horizon (where the turnover of managers is more relevant) or empirical studies that are explicitly interested in measuring these unobserved heterogeneities call for advanced panel data methods that are used in Chapter 3.

The predominant part of the research in the field of corporate finance and corporate governance is based on the US market. The US market is characterized, among other things, by a dispersed ownership structure and by a one-tier board system, where the tasks of advising and monitoring the management are combined in the board of directors. The corporate governance system of German firms exhibits fundamental differences to the US. Focusing on German firms allows investigating, whether the empirical evidence based on the institutional environment of US firms can be supported for firms operating in a different corporate governance system. In addition, new research questions derive from the peculiarities of the German corporate governance system.

In three self-contained essays, this dissertation deals with the impact of board structure on firm performance and with determinants of executive compensation, director compensation, and payout policy. Each of the three chapters is based on panel data sets of German firms. Distinguishing features of the institutional environment of German firms lead to new and interesting insights compared to the evidence for the US market.

The institutional environment of German and US firms in terms of their payout policy differs substantially. It was not before 1998, when a law came into force that allowed firms

to repurchase up to 10% of their shares. Prior to the adoption of this law stock repurchases were essentially prohibited in Germany. Furthermore, the relative tax treatment of dividends and stock repurchases changed considerably following a major tax reform in 2001. Therefore, the institutional environment of German firms allows us[1] to analyze how the introduction of stock repurchases in 1998 and a major tax reform in 2001 affected the payout policy of German firms. Using different Lintner-type partial adjustment models we test competing theories regarding the choice of dividends and stock repurchases as payout methods in Chapter 4. The two-tiered board system is another important aspect that distinguishes the German system from the US system of corporate governance. German firms are required to set up an executive board which is responsible for running the firm and a supervisory board which is responsible for monitoring the members of the executive board. In the German two-tiered system of corporate governance, chief executive officers (CEOs) often become a member or the chairman of the supervisory board of the same company upon retirement. We refer to this practice as CEO transitions. Chapter 2 explores the impact of former CEOs on the supervisory board on firm value, operating performance and executive as well as director compensation. The strict institutional separation of managers with leadership/advisory and managers with monitoring tasks within the two-tiered board system also enables the investigation of their absolute and relative importance in explaining firm performance in Chapter 3. The three chapters are summarized in the following.

Chapter 2.[2] Chapter 2 is based on CEO transitions as a distinguishing feature of the German two-tiered board system. This practice has been discussed controversially because of potential conflicts of interest. On the one hand, the former CEO should monitor a management team that he just left. Close personal relations with his former colleagues could result into too cozy relations. These potential conflicts of interests might be detrimental to firm performance. On the other hand the former CEO might also be able to fulfill his monitoring task more effectively than other supervisory board members as he has arguably accumulated firm and industry expertise during his tenure. A former CEO on the

[1]Chapters 2 and 4 of this dissertation are based on joint work with coauthors, whereas Chapter 3 is based on sole-authored work. This is indicated by the use of the corresponding personal pronouns throughout the introduction and the following chapters of this dissertation.

[2]This chapter is based on joint work with Christian Andres and Erik Theissen (Andres et al., 2013c).

supervisory board could also affect executive compensation as the personal connections between the former CEO in his task as a supervisor and his former colleagues can lead to a leniency bias which potentially causes higher executive compensation. As a former CEO on the supervisory board is also involved in setting the pay of the supervisory board members he may also use his impact to his own benefit and lobby for an increase in the compensation of the supervisory board. The consequences of former CEOs as members of the supervisory board have also been analyzed by some recent papers for the German market. In general these papers find no conclusive evidence regarding the effects of former CEOs on firm performance. A different paper by Fiss (2006) finds lower executive compensation in firms with a former CEO as chairman of the supervisory board and high ownership concentration. However, all these papers analyze individual aspects of CEO transitions.

In contrast to this, our paper provides the first comprehensive analysis of the economic consequences of CEO transitions. Our paper contributes to the literature in several other ways: We go beyond the usual dummy variable approach to capture former CEOs on the supervisory board by analyzing whether the amount of time the former CEO and the current executives spent together on the executive board also affects executive compensation. In addition to that, the impact of CEO transitions on director compensation has not been investigated before. We also go beyond the existing literature with regard to performance implications of CEO transitions. This is the first paper that explores the impact of former CEOs on the supervisory board on long-run performance. To this end, we construct portfolios of firms with a former CEO on the supervisory board and investigates the effect of CEO transitions by the Fama-French 3-factor, the Carhart 4-factor model and by calculating buy-and-hold-returns based on the market model. We use a panel data set covering 150 German listed firms over a 10-year period and find the following results: Consistent with the existence of a leniency bias, we show that executive compensation increases significantly with the joint tenure of the former CEO and the current executives on the executive board. Using a difference-in-differences methodology, we also find that per-capita executive compensation increases significantly after a CEO transition. We further find weak evidence that the compensation of the members of the supervisory board is also higher. Short-run event study results indicate that the announcement of the transition of a retiring CEO to the supervisory board is considered as good news. Thus, despite the

increases in executive compensation, we can conclude that CEO transitions are not a cause of concern for shareholders.

Chapter 3.[3] Whereas Chapter 2 focuses on former CEOs as a specific type of monitors, this chapter explores the importance of managers with monitoring tasks on a more general level. Monitoring of executives is one way of constraining managerial abuse and protecting the interests of shareholders. Even though the board of directors has a dual role as advisor and monitor of executives (Adams and Ferreira, 2007), empirical studies for the one-tier board system of the US focus primarily on the monitoring function of the board of directors (Adams et al., 2010). Most studies follow an empirical setting that is similar to Chapter 2 as the monitoring function is assumed to be related to observable board characteristics like the size of the board or the proportion of outside directors on the board. However, unobserved heterogeneity of managers with monitoring tasks could also affect the effectiveness of the monitoring function, but received little attention by prior research. In contrast to this, a growing strand of the literature has shown an impact of individual managers with leadership tasks on firm policies and firm performance. The vast majority of these studies focus on the impact of executives and especially CEOs on firm performance. There are also some studies that focus on the impact of individual managers who are presumed to have monitoring functions, i.e. outside directors. However, all these studies focus on the impact of individual managers with the same tasks; i.e. they only analyze the impact of managers with leadership *or* monitoring tasks, but do not analyze their relative importance. Furthermore, the assignment of monitoring and advisory tasks to individual managers would be difficult for the one-tier board system. As already mentioned the German corporate governance system is characterized by a two-tiered board system with an executive and a supervisory board that can also be found in several European countries. The two-tiered board system allows the cleanest separation (Adams and Ferreira, 2007) of the leadership/advisory and monitoring task on the level of individual managers as the advisory function is assigned to the individual members of the executive and the monitoring function to the individual members of the supervisory board.

The study in this chapter analyzes the impact of unobserved heterogeneity of managers with monitoring and leadership/advisory tasks and compares their relative importance in

[3]This chapter is based on sole-authored work (Fernau, 2013).

explaining firm performance of German firms. The empirical methodology used in this study is based on Abowd, Kramarz, and Margolis (AKM method) (1999) and builds upon the recent progress in the adequate estimation of manager fixed effects. This method allows a more precise estimation of unobserved heterogeneity on the level of individual managers and the investigation of a larger number of managers. This study adds to the literature in the following important aspects: To the best of my knowledge, this is the first study that investigates the absolute and relative impact of managers with fundamentally different tasks. This allows an evaluation of the importance of managers with monitoring tasks in absolute terms and relative to managers with leadership/advisory tasks in explaining firm performance. Second, the inclusion of the fixed effects of managers with monitoring tasks allows the reexamination of the link between the board structure and firm performance. This allows me to test the robustness of the size and the significance of some board characteristics in the presence of manager fixed effects. Third, the empirical setting allows a different investigation of the controversial issue discussed in Chapter 2 of this dissertation. When manager fixed effects are interpreted as proxy for skills the empirical setting of this study allows the reinvestigation of the changes of former executives to the supervisory board of the same firm upon retirement on the level of individual managers. Using a comprehensive panel data set of 889 German listed firms for the period 1993-2011 and controlling for a wide array of observable board, manager and firm characteristics, my results can be summarized as follows: The results suggest that fixed effects of managers with leadership/advisory and monitoring tasks are almost equally important in explaining firm performance. Moreover, a considerable smaller part of the variance in firm performance is explained by observable board characteristics than by the unobserved heterogeneity of individual managers with monitoring tasks (e.g. skills, motivation or reputation). The results indicate omitted variable bias problems in regression models without manager fixed effects as the size and the significance of some board characteristics changes in regressions accounting for manager fixed effects. Corroborating the findings of earlier studies and the findings in Chapter 2, CEO transitions are not a cause of concern for shareholders. The interpretation of manager fixed effects as skills yields another interesting insight into the working of the two-tiered system. The results suggest that firm performance only depends on the aggregate skills in both boards, but not on the skill distribution between or within the executive and supervisory board.

Chapter 4.[4] Whereas Chapter 2 and 3 are based on the two-tiered board structure of German firms, Chapter 4 builds upon the institutional setting for the payout policy of German firms. The changes in the institutional setting of German allow us to analyze how the introduction of stock repurchases in 1998 and a major tax reform in 2001 affected the payout policy of German firms and thereby to test competing theories regarding the choice between dividends and stock repurchases as payout methods. Two central questions that attracted the attention of financial economists for a long time with regard to payout policy are the following: How do firms decide on the amount of cash to be paid out to shareholders and which payout method should they use? As early as in 1956 Lintner developed a partial adjustment model for dividend payouts that is still the workhorse of many empirical investigations in this field. At the time when Lintner developed his model dividends were by far the more important payout method than stock repurchases. However, the volume of stock repurchases increased significantly since then and even surpassed the volume of dividend payouts in recent years (Grullon and Michaely, 2002). This gives raise to the question if and how stock repurchases can be integrated in a Lintner-type partial adjustment of total payout. How stock repurchases should be integrated in a Lintner-type partial adjustment model hinges on the economic reasons that drive the choice between dividends and stock repurchases as payout methods. The Lintner model should be better in explaining total payouts rather than dividends if the assumptions of Miller and Modigliani (1961) apply and both payout methods are good substitutes for each other. In contrast to this the model specification could change with the tax regime if tax differentials drive the choice between dividends and stock repurchases. When one follows the financial flexibility hypothesis brought forward by Jagannathan et al. (2000), a Lintner-type partial adjustment model have to consider different kinds of earnings, i.e. permanent earnings, that determine the payout of dividends and transitory earnings that drive stock repurchases.

In this chapter we test these competing theories for the choice between dividends and stock repurchases by using Lintner-type partial adjustment models. The paper adds to the literature in the following ways: This is the first paper that analyzes the implications of the introduction of stock repurchases for the magnitude and determinants of dividend payouts within the framework of partial adjustment models. Moreover, we evaluate whether

[4]This chapter is based on joint work with Christian Andres, Markus Doumet and Erik Theissen (Andres et al., 2013b).

Lintner-type partial adjustment models are better in explaining dividend payouts or total payouts and do not restrict our sample to firms with a particular history of payout decisions as in Skinner (2008). Using the decomposition of earnings into a permanent and a transitory part, this is to the best of our knowledge, the first paper that tests the flexibility hypothesis (brought forward by Jagannathan et al., 2000) within a Lintner-type partial adjustment model. We also account for the role of special dividends as a potential substitute for the payout of transitory earnings prior to the introduction of stock repurchases. Using GMM-in-systems estimations and a large panel of German firms covering the period 1988-2008, our results can be summarized as follows: Our results are inconsistent with the hypothesis that dividends and stock repurchases are close substitutes. They are also inconsistent with the prediction that tax considerations are a major driver of payout decisions. Rather, our results support the flexibility hypothesis which predicts that dividends are used to disburse permanent earnings while stock repurchases are used to disburse transitory earnings.

Chapter 2

Should I Stay or Should I Go?

Former CEOs as Monitors

2.1 Introduction

One distinguishing feature of the German corporate governance system is the two-tiered board structure with an executive board and a supervisory board. The executive board runs the firm while the main task of the supervisory board is to monitor the executive board. The members of the supervisory board are elected by shareholders and employees (according to German co-determination laws). The supervisory board, in turn, nominates the members of the executive board and sets their pay.

A person cannot be a member of both boards simultaneously. What can and often does happen, though, is that the CEO,[1] after retiring, becomes a member of the supervisory board. We refer to this practice as CEO transitions. In the majority of the cases (about 60% in our sample) a former CEO who becomes a member of the supervisory board is then elected chairman of the board. This is potentially important because the chairman of the supervisory board almost always also chairs the compensation committee.

[1]The German Stock Corporation Act (*Aktiengesetz*) stipulates that the board members manage the firm jointly and decide by majority vote. The law explicitly prohibits that one member (or a group of members) can decide against the majority of the members of the executive board. The executive board is not required to have a chairman. If a chairman is appointed (as is the case in most corporations), his powers are less broad than those of a CEO in a UK or US corporation. It may therefore be incorrect to translate "chairman of the executive board" as "CEO". However, for expositional efficiency, we stick to the term CEO.

The transition of a former CEO to the supervisory board has been discussed controversially. On the one hand the former CEO has accumulated firm and industry expertise, which should allow him to fulfill his monitoring task effectively. On the other hand he becomes the supervisor of the management team that he just left. This entails the danger of too cozy relations. The personal connection likely leads to a leniency bias, which may result in higher executive compensation. In addition, the former CEO may be reluctant to criticize or revoke decisions he took during his tenure as CEO. He may even exert pressure on his successor not to challenge the strategy or organizational structure he implemented during his tenure. In consequence, a former CEO who becomes chair of the supervisory board may impede necessary changes.

These potential conflicts of interest have sparked regulatory change. In 2005 a provision dealing with the issue was added to the German Corporate Governance Code.[2] It recommended that "it shall not be the rule" for the former CEO or a former executive board member to become chairman of the supervisory board. This provision had little practical effect. Therefore a new law was enacted and came into force in 2009. It introduced a "cooling-off period" for former executives who wish to become supervisory board members. A person who was a member of an exchange-listed firm's executive board within the past two years cannot become a member of the same firm's supervisory board.[3] This provision is not limited to the position of chairman (as was the case under the code's recommendation).

It is a priori unclear whether the advantages or the disadvantages of having a former CEO on the supervisory board dominate (and, consequently, whether or not the new law can be justified on economic grounds). We therefore address this issue empirically. We construct a panel data set covering 150 German listed firms over a 10-year period. We use this data set to analyze three questions. First, we ask whether the promotion of a former CEO to the supervisory board affects firm value. To answer this question we perform both short-term and long-term event studies. Second, we analyze whether the presence of a former CEO on the supervisory board affects the operating performance of the firm. Third, we investigate

[2]The German Corporate Governance Code works according to the comply-or-explain principle. Compliance is not mandatory. Rather, firms have to publish an annual declaration of conformity that states their degree of compliance. See Section 2.2 and Andres and Theissen (2008) for more details.

[3]There is an exception that is tailored to family firms. See Section 2.2 below for details.

whether the level of executive compensation or the level of director compensation[4] is different in firms in which a former CEO serves on the supervisory board. To this end we estimate panel regressions and perform a difference-in-differences analysis.

Our findings can be summarized as follows. The short-run event study results indicate that firm value increases when a former CEO becomes a member of the supervisory board. The result of the long-run event study and of the analysis of operating performance point in the same direction but are mostly insignificant. Executive compensation increases in the amount of time the former CEO and the current executives were jointly sitting on the executive board. This joint tenure time is a proxy for the strength of the personal relation between the former CEO and the current executives. In a difference-in-differences analysis we find that per-capita executive compensation increases after a CEO transition. This effect is not only statistically significant, but also economically significant. The annual per capita compensation of the members of the executive board is found (after controlling for other variables such as firm size) to increase by about € 123,000 when the departing CEO becomes an ordinary member of the supervisory board and by about € 276,000 when the departing CEO becomes the chairman of the supervisory board. Results with respect to director compensation are less clear but, if anything, point towards higher director compensation in firms with a former CEO on the supervisory board. When considered in isolation, the results on executive and director compensation appear to support the critics of CEO transitions. However, because the analysis of share price and operating performance indicates a positive performance effect of CEO transitions, our findings do not support the conclusion that CEO transitions are disadvantageous to shareholders.

Our paper is related to several strands of the literature. First, and most importantly, it is related to some recent papers that have also analyzed the transition of former CEOs to the supervisory board of German listed corporations. Both Bermig and Frick (2010) and Grigoleit et al. (2011) analyze whether firms with a former CEO at the helm of the supervisory board have higher firm values or deliver better operating performance. While Bermig and Frick (2010) find some evidence of a *negative* effect, Grigoleit et al. (2011) conclude that there is "no significant relation between supervisory board membership of former executive board members and firm performance" (p. 608). Grigoleit (2011) uses

[4]We use the term "executives" for the members of the executive board and the term "directors" for the members of the supervisory board.

short-run event study methodology and concludes that the announcement of a CEO transition has no significant impact on share prices. Bresser and Valle Thiele (2008) find that the current CEO of a firm is more likely to be replaced in response to poor performance when a former CEO chairs the supervisory board. Fiss (2006) reports that executive compensation is lower in firms that have a former CEO at the helm of the supervisory board *and* that have high ownership concentration. All papers alluded to above focus on individual aspects of CEO transitions. Ours is the first paper that provides a comprehensive analysis of the economic consequences of CEO transitions. It is also the first paper that use a difference-in-differences approach to study the effects on executive compensation of CEO transitions, and it is the first paper that analyzes director compensation in addition to executive compensation.

On a more general level our paper is related to the literature on the magnitude and determinants of executive compensation (see the surveys by Murphy, 1999; Aggarwal, 2008; Frydman and Jenter, 2010; for evidence from Germany, see Schmid, 1997; Elston and Goldberg, 2003; Kaserer and Wagner, 2004; Haid and Yurtoglu, 2006). We draw on this literature to determine the set of control variables to be included in our analysis of executive compensation.

Our paper is further related to several papers that analyze the relation between executive compensation and board structure. Hallock (1997) and Core et al. (1999) report that executive compensation in US firms with reciprocally interlocking boards[5] is higher than in other firms. Agrawal and Nasser (2012), also using US data, find that the presence of an independent director who is also a blockholder reduces executive pay. Lawrence and Stapledon (1999), on the other hand, find no evidence that the proportion of independent directors on the boards of Australian firms affects executive compensation. Fahlenbrach et al. (2010) find that the appointment of the CEO of another firm as outside director does not affect CEO compensation. Boyle and Roberts (2010) analyze a sample of New Zealand firms in some of which the CEO is a member of the compensation committee. They document higher pay increases (but not higher pay levels) and lower pay–performance sensitivity in these firms. Evans et al. (2010) discuss whether a departing CEO should be

[5]Hallock (1997) defines an interlocking board as follows. "[T]he current CEO of firm A serves as a director of firm B and the current CEO of firm B serves as a director of firm A" (p. 331).

retained on the board of US firms. They do not, however, analyze whether this decision has implications for executive compensation.

Finally, our paper is related to the literature on the duality of the CEO and chairman of the board roles in UK and US corporations. While this literature addresses the question whether one person should hold these two titles *at the same time*, we ask whether one person should hold these titles *serially*. Fama and Jensen (1983), Jensen (1993) and others argue that management and control should be separated. Brickley et al. (1997) challenge this view. They provide a thorough discussion of potential costs and benefits of separate titles. The results of their empirical analysis lead them to tentatively conclude that "the widespread practice of combining the titles of CEO and chairman is indeed efficient" (p. 218) and "that legislative reforms forcing separate titles are misguided" (pp. 218-219). Such a reform obviously implements a "one size fits all" approach. This has been criticized by Dey et al. (2011). These authors find that firms that split the CEO and chairman titles in response to environmental pressure "have significantly lower announcement returns and subsequent performance" (p. 1595). This supports the view that one size may not fit all. A similar argument may apply to the new German law (mentioned above and discussed in more detail in the next section) that came into force in 2009.

Our paper contributes to the literature in a number of important ways. As noted above, it is the first paper that provides a comprehensive analysis of the implications of CEO transitions for firm value, operating performance, and executive compensation. We are also the first to analyze whether the amount of time the former CEO and current executives spent together on the executive board affects executive pay. Finally, ours is the first paper that considers the impact of CEO transitions on director compensation. As a side product of our analysis, we deliver an up-to-date analysis of the determinants of executive and director compensation in Germany. We also go beyond the existing literature by analyzing long-run performance. Specifically, we build portfolios of firms with a former CEO on the supervisory board and test for abnormal long-run performance using the Fama-French 3-factor and the Carhart 4-factor model. In addition, we calculate buy-and-hold-returns based on the market model.

Our results are important in several respects. First, they contribute to the regulatory debate about the desirability of having a former CEO on the supervisory board. Against the

background of our evidence, the new law which came into force in 2009 and which impedes, or at least delays, the transition of a former CEO to the supervisory board is questionable. Second, our finding that a former CEO serving on the supervisory board exerts his influence to increase executive compensation supports the existence of a leniency bias. The result that executive compensation is increasing in the amount of time the former CEO and the current executives spent together on the executive board supports the view that stronger personal relations and common experiences increase the leniency bias. Our finding (albeit weak) that director compensation tends to be higher when a former CEO is at the helm of the supervisory board is consistent with the view that former CEOs exert their influence not only to the benefit of their successors and former colleagues, but also to their own benefit. Finally, on a more general level our results deliver insights into the working of a two-tiered board structure. This is particularly relevant because the introduction of the statute of the Societas Europaea (SE) allows SEs in all European Union countries, including those that formerly allowed only one-tier boards, to adopt a two-tiered board structure. The German experience with two-tiered boards may provide some guidance on the optimal organizational form.

The remainder of this paper is structured as follows. Section 2.2 describes the institutional setting. Section 2.3 develops the hypotheses. Section 2.4 presents the data set and some descriptive statistics. The design and results of our performance analysis are discussed in Section 2.5. Section 2.6 contains the results of our analysis of executive and director compensation, and Section 2.7 presents our conclusions.

2.2 Institutional setting

This section briefly reviews the institutional background and corporate governance regulations in Germany. The German equity market is characterized by concentrated ownership structures and an inactive market for corporate control (Franks and Mayer, 2001). Consequently, monitoring by blockholders is an important corporate governance mechanism. Among these blockholders, founding families, domestic financials (banks and insurance companies), and other domestic corporations have traditionally been the most important ones. In recent years, however, bank equity ownership in non-financial firms has diminished (Dittmann et al., 2010) and foreign investors have gained importance.

To make the German corporate governance system more transparent, particularly for foreign investors, Germany introduced the Corporate Governance Code in 2002. The German Corporate Governance Code (hereafter "the code") contains recommendations and suggestions deemed to constitute "good governance." The code is updated regularly and contains sections on shareholders and the general meeting, the executive board, the supervisory board, cooperation between these two boards, transparency, and the reporting and auditing of annual financial statements.

Firms are not obliged to follow the recommendations of the code. However, the Stock Corporation Act (*Aktiengesetz*, *AktG*) requires that listed firms publish an annual declaration of conformity. It must contain the information that the recommendations of the code "have been and are being complied with or which of the code's recommendations are not being applied."[6,7] This is referred to as the "comply-or-explain principle" and is a building block of corporate governance regulations in a large number of European and non-European countries.

The German Stock Corporation Act stipulates a two-tiered board structure with an executive board and a supervisory board. The executive board (*Vorstand*) is responsible for running the firm. The supervisory board (*Aufsichtsrat*), which is composed of shareholder and employee representatives,[8] monitors the executive board, appoints and dismisses executives, and sets their remuneration. The final decision about executive compensation is made by the whole supervisory board. The decision may be prepared by a compensation committee. Usually, the chairman of the supervisory board also chairs the compensation committee.[9]

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[6]This is a translation of Article 161 of the *Aktiengesetz* adopted from http://www.corporate-governance-code.de/eng/entsprechenserklaerung/index.html, the official homepage of the Corporate Governance Commission. Besides *recommendations* the code also contains *suggestions*. No declaration of conformity must be made with respect to suggestions.

[7]Even though all exchange-listed corporations are obliged to publish a declaration of conformity, companies have been very reluctant to comply with some recommendations of the code. For example, only a small minority of firms complied with the recommendation to publish executive remuneration on an individual basis (Andres and Theissen, 2008).

[8]According to several codetermination laws, German corporations must allow employee representatives on the supervisory board. Simply put, one-third (one-half) of supervisory board seats are filled with employee representatives in companies with more than 500 (2,000) employees.

[9]The German Corporate Governance Code recommends that, in case a compensation committee exists, the chairman of the supervisory board shall also chair that committee. During 2003–2007, compliance rates with this recommendation were between 86% and 100% for firms included in the DAX, MDAX, or SDAX indices and exceeded 95% in most years (von Werder and Talaulicar, 2007).

It is not uncommon for CEOs of German corporations to become either a member or the chairman of the supervisory board of the same firm upon retirement. This "tradition" has been criticized by shareholder rights groups since it is likely that conflicts of interest arise (see Section 2.3 for a discussion). In 2005 a provision dealing with the issue was added to the code. It recommended that "it shall not be the rule" for the former CEO or a former executive board member to become chairman of the supervisory board. As stated above, firms do not have to follow the recommendations of the code. In addition, this particular recommendation cannot be interpreted as a general ban, since it only stated that the transfer from the executive to the supervisory board "shall not be the rule." Consequently, the provision had little practical effect.

In 2009 a new law on the "appropriateness of management board compensation" (*VorstAG*) came into force. Among other things, the law introduced a "cooling-off period" for former executives who wish to become supervisory board members: According to § 100 (2) of the AktG, a person who was a member of an exchange-listed firm's executive board within the past two years cannot become a member of the same firm's supervisory board.[10] This provision is not limited to the position of chairman (as was the case under the recommendation of the code). Potential conflicts of interest were stated as the main reason for the new rule. Our data covers the period 1998–2007 and is thus not affected by the new law.

2.3 Hypotheses

This paper's main objective is to analyze whether the transition to the supervisory board of a retiring CEO has implications for firm value, the operating performance, or the compensation of executives or directors. As already stated in the introduction there are arguments in favor of both positive and negative effects.

During his tenure a CEO accumulates firm and industry expertise and builds relations to suppliers, customers, large owners and creditors. Upon transition to the supervisory board

[10]The law also contains an exception from the ban: If the suggestion to elect the former executive to the supervisory board is due to shareholders (with a quorum of 25% of votes), a former executive can directly become member of the supervisory board without taking the two-year waiting period into account. The exception was explicitly tailored to the interests of family firms, where founders or other family members should be able to monitor executives after their retirement.

after retirement he thus should be in a position to fulfill his monitoring task effectively and to provide valuable advice to the executive board. According to the stewardship theory of management, managers will use their expertise and their connections in the best interest of the firm. As a consequence, the appointment of a retiring CEO to the supervisory board should be regarded as good news by investors. We therefore have

> *H2.1a* (*Share price performance - "stewardship theory"*): Share prices react positively to the announcement that a retiring CEO will become a member of the supervisory board.

If the stewardship theory holds, the appointment should also improve the operating performance of the firm. We thus have

> *H2.2a* (*Operating performance - "stewardship theory"*): Firms with a former CEO on the supervisory board have better operating performance.

The stewardship theory essentially assumes that there are no conflicts of interest between the former CEO and the firm. This does not have to be the case. In his new role as supervisor the former CEO may be reluctant to criticize or revoke decisions he took during his tenure as CEO. He may even exert pressure on his successor (the new CEO) not to challenge the strategy or organizational structure he implemented during his tenure. In consequence, a former CEO who becomes chair of the supervisory board may impede necessary changes. The German legislator adopted such a more skeptical view. In the proposed resolution for the decision on the law on the “appropriateness of management board compensation” in parliament, it was argued that it is “alarming” that former executives are given the opportunity to constrain actions of the current executive board to correct strategic mistakes or to resolve irregularities that lead back to their time as CEO (Bundestag, 2009).

This more pessimistic view on the role of the former CEO results in the "agency theory" counterparts of hypotheses 2.1a and 2.2a above.

> *H2.1b* (*Share price performance - "agency theory"*): Share prices react negatively to the announcement that a retiring CEO will become a member of the supervisory board.

H2.2b (*Operating performance - "agency theory"*): Firms with a former CEO on the supervisory board have worse operating performance.

As noted earlier, a former CEO who becomes a member of the supervisory board also becomes involved in setting executive pay. This is particularly true in cases in which the former CEO is elected chairman of the supervisory board, because the chair of the supervisory board almost always also chairs the compensation committee.

There are several arguments that suggest that executive compensation will be higher when a former CEO is on the supervisory board. The former CEO will typically have close personal relations with his former colleagues on the executive board. Out of a feeling of (excessive) loyalty to his former colleagues he may feel inclined to give in to their requests for higher compensation. In many cases, the evaluation of the performance of an executive (particularly with respect to long-term objectives) includes a subjective assessment besides objective performance measures. This is referred to as "subjective performance evaluation" (Prendergast and Topel, 1993). Prendergast (1999) points out that the principal's discretionary authority often leads to a positive bias, the so-called leniency bias.[11] Giebe and Gürtler (2012) present a model in which supervisor leniency is consistent with optimal contracts under informational asymmetries in a three-tiered hierarchy – principal, supervisor, and agent, which is precisely the environment we observe in public firms in which the supervisor (i.e. the supervisory board) is not the ultimate principal (i.e. shareholders). In our context, personal connections between the former CEO (who is now the supervisor) and his fellow executives can lead to favoritism (Prendergast and Topel, 1996) and will most likely exacerbate the leniency bias. As a result, executives may receive higher remuneration packages in firms in which one of their former peers serves as member of the supervisory board.

Previous research (e.g. Fiss, 2006; Westphal and Zajac, 1995) has found that greater similarity between the CEO and the board results in higher pay. Fiss (2006, p. 1017) argues that "it seems appropriate to expand similarity between executives and the board to also include similar experiences." Obviously, a retiring CEO who becomes a member of the

[11]The most obvious reason for a positive leniency bias lies in the fact that it is simply unpleasant for a supervisor to offer negative ratings to an agent, which is why the supervisor refrains from doing so (Prendergast, 1999). Subrahmanyam (2008) offers an alternative explanation based on the concept of social networks.

supervisory board shares many experiences with the management team. The level of similar experiences is increasing in the amount of time the retiring CEO and the current executives have been sitting on the executive board together. Therefore we do not only analyze whether the presence of a former CEO on the supervisory board per se affects executive compensation, but also whether executive compensation is increasing in the average joint board tenure of the former CEO and the current executives.

We have argued above that a former CEO may want to prevent his successor (the new CEO) from changing the strategy or organizational structure the retiring CEO implemented during his tenure. Granting higher remuneration may be a component of an implicit contract towards this objective.

The aforementioned arguments lead to our third and fourth hypothesis.

> *H2.3* (*executive compensation - role dummy*): The compensation of the members of the executive board is higher when a former CEO is a member (or the chairperson) of the supervisory board.
>
> *H2.4* (*executive compensation - joint tenure*): The compensation of the members of the executive board is increasing in the time the retiring CEO and the current executives have been sitting on the executive board together.

If a former CEO exerts influence to increase the compensation of the members of the executive board after retiring from the board, he will not directly benefit from this activity. He thus may also use his influence on the compensation process to lobby for an increase in the remuneration of the members of the supervisory board. Further, the former CEO may be thankful for having been elected into the supervisory board[12] and may, therefore, lobby for higher director compensation out of a feeling of reciprocity towards the other members (as also argued by Bebchuk and Friend, 2005 in a related context).

However, changes in the remuneration of the supervisory board require the shareholders' consent. Consequently, any proposal aimed at increasing the compensation of supervisory board members must be made public prior to the shareholders' meeting and may thus attract the attention of shareholders and the general public. It is an empirical question

[12]Formally the former CEO will be elected by the shareholders' meeting. However, the supervisory board is very influential in proposing candidates for the board.

whether or not a newly appointed supervisory board chairman will take this risk. To answer it, we test an additional hypothesis.

H2.5 (*director compensation*): The compensation of the members of the supervisory board is higher when a former CEO is a member (or the chairman) of the supervisory board.

2.4 Data and descriptive statistics

Our analysis of the transfer of CEOs to the supervisory board is based on the 150 firms included in the DAX (30 firms), MDAX (70 firms[13]), or SDAX (50 firms) indices as of December 31, 2002 for the sample period 1998-2007. The focus of our study is twofold: First, we analyze whether the promotion of a former CEO to the supervisory board affects firm value and operating performance. Second, we investigate the influence that a former CEO who joined the supervisory board upon retirement may have on the level of executive and director compensation.

To address the first issue, we focus on CEO turnover events. During our sample period, we identify a total of 167 CEO turnover events. When analyzing the performance implications of the promotion of a former CEO to the supervisory board, we need to take into account that the decision to offer a former CEO a seat on the supervisory board is most likely not random. A CEO who is fired will certainly not be invited to become a member of the supervisory board. Therefore, when constructing a control group of firms in which the CEOs are not transferred to the supervisory board, we exclude all cases in which a CEO was fired (58 observations) and examine only cases in which a CEO stepped down voluntarily, usually because he reached retirement age. To identify cases of forced and unforced turnover we analyze press releases as well as additional news coverage of the turnover. Our sample consists of 107 unforced CEO turnover events (we lose two observations because of missing share price data). In 59 cases (55%), the departing CEO becomes a member of the supervisory board while in the remaining 48 cases (45%) the CEO steps down and leaves the firm.

[13]In 2003 the number of firms in the MDAX was reduced to 50.

Panel A in Figure 2.1 shows the frequency of these two constellations for each year of our sample period. For the group of CEO transitions to the supervisory board, Figure 2.1 further distinguishes between cases where the former CEO becomes the chairman of the supervisory board or an ordinary board member. The frequency of CEO transitions increases more or less steadily until 2003 (14 CEO transitions) and then decreases in the subsequent period 2004-2007.

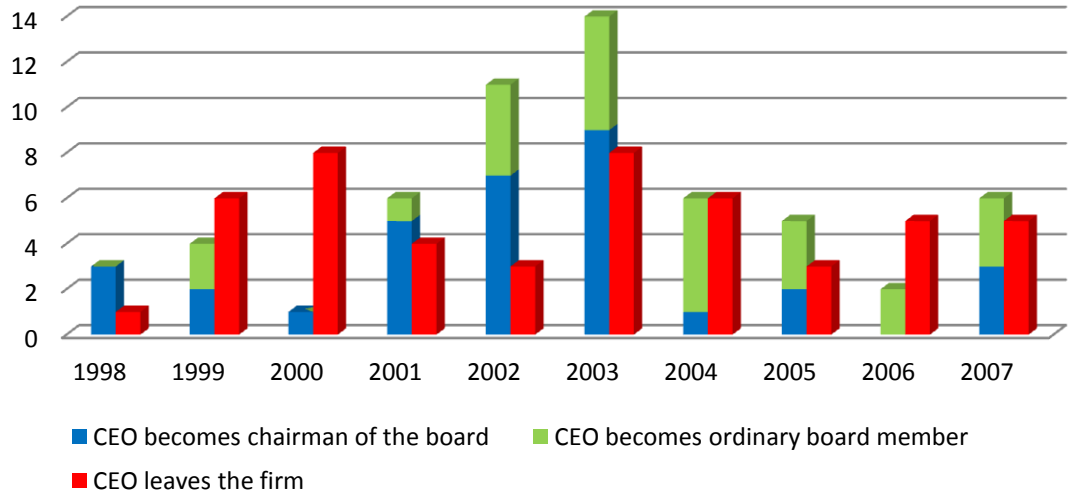
In order to investigate differences in the level of executive or director compensation in firms with and without a former CEO on the supervisory board, we construct a panel data set with additional control variables covering these 150 firms over the sample period 1998-2007. Missing data items reduce the size of our initial panel data set to 1,405 firm-year observations. We gather data on the composition of executive and supervisory boards for all sample firms over the period 1998-2007 from the *Saling*/*Hoppenstedt Aktienführer*. In addition, we collect information on the composition of executive boards for the years 1982, 1985, and 1987-1997.

Based on these data, we determine for each firm-year whether the chairman or any member of the supervisory board had previously been the CEO of the firm. We define three dummy variables. The first is set to one for all firm-years in which the chair or any member of the supervisory board is a former CEO of the firm, and zero otherwise. The second (third) is set to one for all firm-years in which the former CEO is the chairman (an ordinary member) of the supervisory board, and zero otherwise.[14] During our sample period the number of former CEOs on supervisory boards increased from 30 in 1998 (25.21% of observations in that year) to 42 in 2007 (31.58%) with a high of 46 in 2005 (31.94%). Over the whole sample period, 62 firms (41.33% of the firms in our sample) had a former CEO on the supervisory board of the same firm for at least one year. It is noteworthy that there is not only cross-sectional variation in the data, but also a high degree of longitudinal variation. Out of 62 firms that have a former CEO on the supervisory board at some point in time, only 14 firms have a former CEO in this position over the entire sample period. Panel B in Figure 2.1 depicts the frequency of the three different constellations for each year of the sample period.

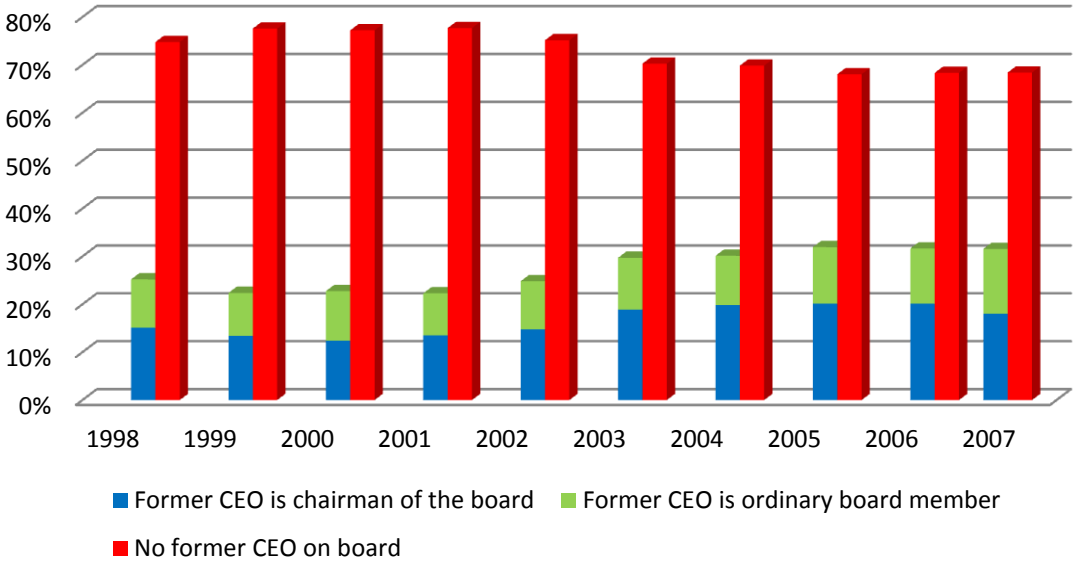
[14]Our sample contains 29 firm-year observations where the former CEOs were members of the supervisory board. One was the chair of the board while the other one was an ordinary board member. In these cases we set the dummy for "Former CEO is chairman of the supervisory board" to one and the dummy for "Former CEO is an ordinary board member" to zero.

Figure 2.1: Descriptive statistics on different categories of unforced CEO turnovers (Panel A) and the composition of the supervisory board (Panel B) for each sample year

Panel A: CEO turnover



Panel B: Firm-year observations



This figure shows the frequency of unforced CEO turnover events and former CEOs on the supervisory board for the sample period 1998-2007. Based on press releases and additional news coverage, CEO turnovers are categorized into forced and unforced turnovers. Panel A shows the frequency of unforced CEO turnovers for each year of the sample period. Unforced CEO turnovers are further subdivided into the three categories *CEO becomes chairman of the board*, *CEO becomes an ordinary board member* and *CEO leaves the firm*. Panel B depicts different categories of the composition of the supervisory board for each year of the sample period. A firm-year observation is assigned to *former CEO is chairman of the board* if the chairman of the supervisory board in the respective year was the CEO of the same firm in at least one of the previous years between 1987 and 2006 or in 1985 or in 1982. The variable *former CEO is ordinary board member* equals one for the years 1998–2007 if an ordinary member of the supervisory board in the respective year was the CEO of the same firm in at least one of the previous years between 1987 and 2006 or in 1985 or in 1982. All other firm-year observations are assigned to the category *no former CEO on board*.

During most of our sample period, firms were not required to publish executive compensation on an individualized basis.[15] The commercial code did, however, require the disclosure of the aggregate compensation of the members of both boards. We collect this data from the annual reports for the fiscal years ending in 1998-2007 and combine it with information on the number of board members to obtain the per capita compensation of the board members.

As mentioned above, concentrated ownership potentially leads to closer monitoring, since large blockholders have both the incentive and power to effectively control management. Hartzell and Starks (2003) find a negative relation between institutional ownership concentration and executive compensation. Similar findings for the German market are reported in Elston and Goldberg (2003), Kaserer and Wagner (2004), and Haid and Yurtoglu (2006). In addition, Bertrand and Mullainathan (2001) find that executives in firms without a large external blockholder tend to be rewarded for luck.

To account for the relation between ownership structure and executive compensation, we collect data on all common and preferred shareholdings exceeding the threshold of 5% from the *Saling*/*Hoppenstedt Aktienführer*.[16] We construct two dummy variables to distinguish closely held firms from widely held firms. A firm is said to be closely held according to a 50% (25%) threshold if the largest shareholder holds at least 50% (25%) of the voting equity.[17] If the largest shareholder holds less than 50% (25%) we classify the firm as widely held at the respective level. We follow the classification method proposed by da Silva et al. (2004) to determine the controlling shareholder at the ultimate level for each firm-year. The ownership data in Panel A of Table 2.1 is based on this methodology.

[15]Only from 2006 onward did the law require the individualized disclosure of the compensation of the members of the executive board (but not of the members of the supervisory board) and its composition (fixed and variable parts). Prior to 2006 the German code recommended individual disclosure, but only a minority of firms complied with this recommendation.

[16]During our sample period, shareholdings had to be registered with the German Financial Supervisory Authority (BaFin) when they exceeded the threshold of 5%. In some but not all cases, shareholdings of less than 5% were also reported in *Saling*/*Hoppenstedt Aktienführer*. For reasons of data consistency, we also apply a 5% threshold in these cases.

[17]In addition to shareholder concentration, the identity of the controlling shareholder is a potentially important determinant of executive compensation. Identification of the controlling shareholder is complicated by the fact that German corporations often have complex control structures (Franks and Mayer, 2001). For example, a family can own a holding company that then owns the majority of a listed firm. If we only considered ownership at the first tier, we would misclassify the firm as being controlled by the holding company while it is in fact family controlled (Franks et al., 2012). Thus, we focus on ultimate ownership to identify the identity of the largest shareholder.

39% (63%) of the firms in our sample are classified as closely held based on a 50% (25%) threshold.[18] We also collect the percentage of shares held by the CEO, the chairman of the board, as well as by the entire executive and supervisory board, respectively. The fraction of shares held by the members of the executive or supervisory board exceeds a 50% (25%) threshold for 21% (38%) of all firm-years.

Table 2.1 also describes the ownership characteristics separately for firms with and without a former CEO on the supervisory board. The results suggest that widely and closely held firms are almost equally likely to have a former CEO on the supervisory board. Out of a total of 383 firm-years with a former CEO on the board, 249 (170) or 65% (44%) are widely held based on a 50% (25%) threshold. These values are similar to the 61% and 36% (858 and 514 out of 1,405 firm-years, respectively) for the whole sample. On the other hand, widely held firms are more likely to have a former CEO as chairman of the supervisory board: 176 (133) of 234 firm-year observations (75% (57%)) with a former CEO as chairman of the supervisory board relate to widely held firms based on a 50% (25%) threshold.

The existence of controlling shareholders entails the risk of conflicts of interest between large and small shareholders. However, a second large shareholder can mitigate these conflicts and prevent the controlling shareholder from expropriating minority shareholders. To capture this effect, we follow the approach of Gugler and Yurtoglu (2003) and divide our sample into "checked" and "unchecked" firms. Unchecked firms are those without a second large shareholder holding more than 5% of the voting shares, whereas checked firms are closely held and have at least one additional shareholder holding more than 5% of the votes. According to this definition, 12% (29%) of the firm-year observations in our sample are classified as checked based on a 50% (25%) threshold.

In accordance with previous studies (Boyd, 1996; Gorton and Schmid, 2004; Linn and Park 2005), we also control for firm size, board and CEO characteristics, firm performance, growth opportunities, codetermination, and bank representation in our panel regressions.[19] Information on codetermination was collected from *Saling*/*Hoppenstedt Aktienführer*. We

[18]Among these firms, most companies are owned by families (69%), followed by other shareholders (21%), industrial (6%), and financial firms (4%). The results are similar for a 25% threshold.

[19]Codetermination is defined as the number of employee representatives on the supervisory board divided by the total number of supervisory board members.

follow Dittmann et al. (2010) in our definition of bank representation and check whether any supervisory board member is a current or retired member of the bank's executive board. The other variables were obtained from Datastream. In our panel regressions with director compensation as independent variable we also include the number of board meetings in a year (obtained from the annual reports). This variable serves as a proxy for the effort associated with a board membership.

Descriptive statistics and detailed definitions of these variables are presented in Panel B of Table 2.1. The means of most control variables are very similar for firms with and without a former CEO on the supervisory board. However, firms with a former CEO as chairman of the supervisory board are on average larger and firms with a former CEO as ordinary supervisory board member exhibit a higher share price performance and higher percentage of shares held by the executive board.

2.5 Performance analysis

2.5.1 Event studies

We begin our empirical analysis by examining the market reaction to CEO turnover announcements. Over the sample period from 1998-2007, we identify a total of 167 turnover announcements. As hypothesized above, the transition of a former CEO to the supervisory board of the same firm might either be perceived as positive (*H2.1a*) or negative (*H2.1b*) news by market participants. We use the procedure described in the previous section to exclude all cases in which a CEO was fired (58 observations) and examine only cases in which a CEO stepped down voluntarily, leaving us with a sample of 107 announcements.[20] As noted previously we exclude cases of forced CEO turnover.

We follow a standard event study approach (Brown and Warner, 1985), and estimate market-model parameters over the period from t=-250 to t=-31 (relative to the announcement day t=0). Our event period covers the 61 day period from t=-30 to t=+30. Statistical significance is tested using a t-test, the standardized cross-sectional t-statistic proposed by Boehmer et al. (1991) and the Corrado (1989) rank test.

[20]Two observations are dropped due to a lack of share price information.

Table 2.1: Descriptive statistics sorted by year

Panel A	Former CEO is on board	Former CEO is chairman	Former CEO is ordinary board member	No former CEO is on board	All observations
Largest 50	134 (0.35)	58 (0.25)	76 (0.51)	413 (0.40)	547 (0.39)
Widely 50	249 (0.65)	176 (0.75)	73 (0.49)	609 (0.60)	858 (0.61)
Largest 25	213 (0.56)	101 (0.43)	112 (0.75)	678 (0.66)	891 (0.63)
Widely 25	170 (0.44)	133 (0.57)	37 (0.25)	344 (0.34)	514 (0.37)
Sum	383	234	149	1,022	1,405
Checked 50	53 (0.14)	24 (0.10)	29 (0.19)	110 (0.11)	163 (0.12)
25	104 (0.27)	51 (0.22)	53 (0.36)	305 (0.30)	409 (0.29)

Panel B	Former CEO is on board	Former CEO is chairman	Former CEO is ordinary board member	No former CEO is on board	All observations
Total assets	60,300	90,700	11,900	21,700	32,300
Market capitalization	9,219,249	12,400,000	3,971,024	4,898,059	6,078,574
Executive board size	5.073	5.278	4.752	4.156	4.406
Supervisory board size	13.556	14.402	12.228	11.021	11.712
Board meetings	4.953	4.991	4.894	5.215	5.140
CEO tenure	7.211	7.201	7.228	9.633	8.995
Joint tenure	2.085	2.313	1.973	0.000	0.569
Codetermination	0.390	0.400	0.376	0.337	0.352
Bank representation	0.258	0.209	0.336	0.227	0.236
Tobin´s Q	1.049	1.134	0.908	1.102	1.088
Share price performance	0.066	0.029	0.126	0.064	0.065
ROA	0.078	0.077	0.080	0.080	0.079
ROE	0.036	0.035	0.038	0.031	0.033
Stake executive board	10.063	2.650	21.705	12.133	11.569
Stake supervisory board	13.122	14.021	11.711	10.586	11.278

This table presents descriptive statistics for all sample firms and for sample firms sorted by dummy variables for the supervisory board composition. Panel A contains information on binary variables. Firms are categorized according to the variables *former CEO is on board*, *former CEO is chairman*, *former CEO is ordinary board member* and *no former CEO on board*. A firm-year observation is assigned to *former CEO is on board* (*is chairman/is ordinary board member*) if any supervisory board member (the chairman of the supervisory board/an ordinary supervisory board member) in the respective year was the CEO of the same firm in at least one of the previous years between 1987 and 2006 or in 1985 or in 1982. All other firm-year observations are assigned to *no former CEO on board*. Panel A contains information on binary ownership variables. For each variable, the number (left column) and percentage (right column) of firms for each category are presented; the percentages are expressed in relation to the total number of firms in each category. *Largest 50*(*25*) corresponds to the number of firms with a largest shareholder holding at least 50% (25%) of the voting equity. Firms are classified as *widely 50* (*25*) if their largest shareholder holds less than 50% (25%) of the voting equity. A firm is said to be *checked 50* (*25*) if the firm has a largest shareholder holding at least 50% (25%) of the voting equity and a second largest shareholder holding at least 5% of the voting shares. Panel B contains the means of cardinal variables for all sample firms and for sample firms sorted by dummy variables for the supervisory board composition. *Total assets* is measured as the book value of total assets in units of € 1,000; *market capitalization* is measured as the total market value of equity; *executive* (*supervisory*) *board size* is defined as the number of executive (supervisory) board members; *board meetings* is defined as the number of supervisory board meetings in the respective fiscal year; *CEO tenure* is defined as the number of years that the current CEO has served on the executive board (as either CEO or ordinary member); *joint tenure* is measured as average number of years that the former CEO spent together with the current executive board member on the executive board for firms with a former CEO on the supervisory board and zero otherwise; *codetermination* is calculated as the number of employee representatives on the supervisory board divided by the total number of supervisory board members; *bank representation* is a dummy that is set to one if a bank representative is a member of the supervisory board. *Tobin's Q* is computed as the market value of equity plus total assets minus the book value of equity, divided by total assets; *share price performance* is defined as the stock return minus the return of the CDAX performance index over the respective fiscal year; *ROA* is calculated as the ratio of earnings before interest and taxes to total assets; *ROE* is defined as income before extraordinary items over book value of equity and *stake executive* (*supervisory*) *board* measures the percentage of shares held by the executive (supervisory) board.

For the full sample of unforced turnover events, we find announcement returns that are close to zero and statistically insignificant (see Panel A of Table 2.2). This implies that the information of an unforced CEO turnover per se is not regarded as value relevant information on average. However, a more detailed analysis reveals significant differences in the market reaction, depending on whether the CEO will stay as member of the supervisory board or leave the firm. Panel B of Table 2.2 presents cumulative abnormal returns for CEO turnover announcements in which the departing CEO does not become member of the supervisory board. The announcement day return is -0.87%, significant at the 5% level based on the t-test. Cumulative abnormal returns for various event windows range from -0.68% (event window [-5;+5]) to -5.31% (event window [-30;+30]). The t-tests suggest that the CARs are significant while the two other test-statistics point towards insignificance. These findings indicate that the unforced departure of a CEO (i.e. a CEO who is not forced out of their job) is, if anything, seen as a loss of a valuable resource by shareholders. The share price reaction in those cases where the departing CEO becomes a member of the supervisory board is presented in Panel C. The CARs are positive irrespective of the event window considered. The CARs for longer event windows ([-30;+30] and [-10;+30]) are large in magnitude (5.30% and 4.92%, respectively) and statistically significant.

In additional analyses, we run OLS-regression that relate abnormal announcement returns to firm characteristics such as size, ownership structure, bank representation on the board, and industry.[21] We find some evidence that the positive effect documented in Panel C of Table 2.2 is significantly related to firm size. The value of a departing CEO (measured as a percentage of the market value of equity) seems to be negatively related to firm size.

In sum, our short-term event study provides evidence in favor of hypothesis *H2.1a*. On average, market participants seem to attribute value to the expertise of a retiring CEO and accordingly regard the announcement of a transition to the supervisory board as good news. Conversely, firm value is reduced when retiring CEOs say goodbye. We analyze a series of alternative specifications to test the robustness of our results.

[21]The results of this robustness check are given in Table A.2 in the appendix of this chapter.

Table 2.2: Short-run announcement returns

Panel A: All CEO turnover events

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	54 : 53	0.54%	0.28	0.06	0.34
[-10;+30]	49 : 48	2.13%	1.35	1.13	1.08
[-5;+5]	58 : 49	1.26%	1.54	0.33	0.67
[-1;+5]	53 : 54	-0.33%	-0.51	-0.64	-0.29
[0;+5]	55 : 52	-0.42%	-0.70	-0.84	-0.47
[0;+3]	45 : 62	-0.23%	-0.47	-0.65	-0.02
[0;+1]	46 : 61	-0.36%	-1.02	-0.94	0.43
[0]	60 : 47	-0.31%	-1.24	-0.80	0.84

Panel B: CEO leaves the firm

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	21 : 27	-5.31%	-1.81*	-1.94*	-1.34
[-10;+30]	24 : 24	-1.30%	-0.54	-0.71	-0.54
[-5;+5]	23 : 25	-0.68%	-0.54	-0.56	-0.54
[-1;+5]	23 : 25	-1.71%	-1.72*	-0.76	-0.68
[0;+5]	24 : 24	-1.80%	-1.95*	-0.97	-0.97
[0;+3]	17 : 31	-1.14%	-1.51	-0.85	-0.53
[0;+1]	20 : 28	-0.93%	-1.74*	-0.94	-0.53
[0]	22 : 26	-0.87%	-2.32**	-1.15	-0.78

Panel C: CEO becomes supervisory board member

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	33 : 26	5.30%	2.07*	1.71*	1.55
[-10;+30]	35 : 24	4.92%	2.35**	2.49**	1.88*
[-5;+5]	35 : 24	2.84%	2.62***	1.00	1.34
[-1;+5]	30 : 29	0.79%	0.91	-0.13	0.16
[0;+5]	31 : 28	0.70%	0.88	-0.19	0.16
[0;+3]	28 : 31	0.51%	0.77	-0.04	0.40
[0;+1]	26 : 33	0.11%	0.24	-0.36	1.01
[0]	38 : 21	0.16%	0.47	0.02	1.76

This table contains cumulative abnormal returns (CARs) of unforced CEO turnover announcements for different event windows (expressed relative to the announcement date t=0). Panel A presents results for the full sample (107 observations), while Panel B (C) shows abnormal announcement returns for the subsample of CEOs who leave the firm (become member of the supervisory board) (48 and 59 observations, respectively). T-statistics, the test statistic proposed by Boehmer et al. (1991), and the non-parametric Corrado (1989) test are reported in columns 4, 5, and 6. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

First, we examine whether the future role of the former CEO on the supervisory board (i.e. chairman or ordinary board member) is systematically related to announcement returns.[22] We find qualitatively similar abnormal returns for the two groups. Second, we separate all events into two categories, depending on whether the decision of the CEO to leave or stay

[22]The results of this robustness check are given in Table A.3 in the appendix of this chapter.

was announced at the same time as the retirement or at a later stage.[23] Again, we do not find substantial differences between the two groups. Finally, we test whether the announcement of other potentially value-relevant information affects abnormal announcement returns. Controlling for confounding events, we are left with a sample of 99 CEO transitions.[24] Abnormal returns for this subsample are again very similar to those reported in Table 2.2.

In addition to the short-run event study, we examine the long-run market performance following CEO turnover events. In particular, we estimate the abnormal performance for a portfolio of sample firms with a former CEO on the supervisory board for up to 12 months following the month of transition. As before, we consider all CEO turnover events, cases in which the CEO leaves the firm, and cases in which a former CEO becomes member of the supervisory board. We use the Fama-French 3-factor and the Carhart 4-factor models for the calendar-time approach and the market-model for the buy-and-hold approach.[25] Data on the Carhart factors is obtained from the Centre for Financial Research in Cologne.[26]

In contrast to the results presented above, we do not find significant abnormal returns in the long-run event study. As can be seen in Table 2.3 this holds for virtually all specifications, independent of the event window or the expected return model used. The signs of the intercept coefficients obtained in the calendar-time approach are in line with the results of the short-run event study (Panels B and C of Table 2.3). For firms with CEOs who leave the firm, the alpha coefficient is negative. For firms in which the CEO changes to the supervisory board, the coefficient is found to be positive. In both cases, however, the coefficients are not statistically significant at conventional levels. The analysis of buy and hold returns yields very similar results. The buy and hold returns are mostly negative for those firms where the CEO leaves the firm and are always positive in those cases where the departing CEO becomes a member of the supervisory board. Again, however, the

[23]The results of this robustness check are given in Table A.4 in the appendix of this chapter.

[24]The results of this robustness check are given in Table A.5 in the appendix of this chapter.

[25]As discussed in Loughran and Ritter (2000) the calendar-time approach suffers from a potential bias, as all event months are weighted equally. It thus potentially overweighs returns of portfolios with only very few observations, while underweighting returns of portfolios with many observations. As a robustness test, we calculate BHARs relative to a group of matched firms. In a first step, we identify potential matches by selecting all (non-event) firms that fall within a range of 0.05 (0.1 as an alternative) in terms of market-to-book value to each of our event firms. In a second step, for each event firm, we identify the firm with the lowest deviation in the momentum-factor (relative to our event firm) and use it as a matched firm to compute BHARs. The results of this robustness check are given in Table A.6 in the appendix of this chapter. Results obtained by this approach are very similar to the returns in Table 2.3.

[26]A detailed description of the data can be found in Artmann et al. (2012).

coefficients are insignificant (with one exception).[27]

Table 2.3: Long-run announcement returns

Panel A: 3-Factor model – calendar-time

	Alpha (t-statistic)	Beta (t-statistic)	SMB (t-statistic)	HML (t-statistic)	Number of observations
All turnover events	-0.006 (-0.12)	1.193*** (13.88)	0.618*** (4.89)	0.405*** (3.46)	137
CEO leaves firm	-0.007 (-1.28)	0.871*** (7.95)	0.314** (2.18)	0.357*** (2.81)	118
CEO becomes board member	0.006 (1.00)	1.252*** (12.96)	0.601*** (4.23)	0.299** (2.27)	137

Panel B: 4-Factor model – calendar-time

	Alpha (t-statistic)	Beta (t-statistic)	SMB (t-statistic)	HML (t-statistic)	MOM (t-statistic)	Number of observations
All turnover events	0.003 (0.51)	1.072*** (10.84)	0.519*** (3.96)	0.435*** (3.76)	-0.228** (-2.37)	137
CEO leaves firm	-0.006 (-1.02)	0.832*** (6.76)	0.281* (1.86)	0.369*** (2.88)	-0.080 (-0.71)	118
CEO becomes board member	0.009 (1.50)	1.137*** (10.17)	0.507*** (3.43)	0.327** (2.50)	-0.215** (-1.98)	137

Panel C: Buy-and-hold returns

	BHAR (t-statistic) All turnover events	BHAR (t-statistic) CEO leaves firm	BHAR (t-statistic) CEO becomes board member
2 months	-1.51% (-0.85)	-4.22%* (-1.82)	0.74% (0.28)
4 months	1.34% (0.48)	-2.67% (-0.66)	4.67% (1.22)
6 months	-0.15% (-0.05)	-4.05% (-0.88)	3.10% (0.75)
8 months	0.81% (0.22)	-4.93% (-1.01)	5.58% (1.04)
10 months	3.98% (0.81)	-2.33% (-0.40)	9.22% (1.22)
12 months	6.96% (1.20)	2.87% (0.35)	10.36% (1.26)

This table contains results of long-run event studies following unforced CEO turnover announcements. Abnormal performance is measured for a portfolio of sample firms for up to 12 months following the month of the CEO change. Panels A and B present abnormal returns for a calendar-time approach based on the Fama-French 3-factor and the Carhart 4-factor model, while Panel C contains buy-and-hold returns based on a market-model approach. Factor information for the German market is obtained from the Centre for Financial Research Cologne. The number of observations corresponds to the number of months with a positive number of firms in the portfolio. In each month, firms are included in our portfolio "all turnover events (CEO leaves firm/CEO becomes board member)" if an unforced CEO turnover has occurred within the previous 12 months (and the CEO left the firm or changed to the supervisory board). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

[27]In additional analyses, we estimate abnormal announcement returns for subsamples based on firm characteristics such as size, ownership structure, bank representation on the board, and industry. The results of this robustness check are given in Table A.7 (and in Panels C and D of A.6 using the matched firm approach) in the appendix of this chapter. Again, however, the coefficients for almost all subsamples are insignificant.

2.5.2 Operating performance

As argued above, we expect former CEOs who serve on the supervisory board to also affect operating performance. This effect can either be positive (*H2.2a*) or negative (*H2.2b*) depending on whether potential benefits – former CEOs act as stewards of the firm and hence support their successors with their firm and industry expertise – outweigh potential agency costs (impeding necessary changes, too cozy relations between former and new CEO). In the following, we compare the operating performance of firms with former CEOs on their supervisory boards with firms in which CEOs leave the firm (voluntarily) using a difference-in-differences approach.

In the analysis, we use the same sample as described in Section 2.5.1, but lose a few observations due to missing data. Operating performance is measured as return on assets (ROA) and return on equity (ROE). We examine both "raw" operating performance (measured as the average ROA and ROE, respectively) and "excess" operating performance (calculated as the excess performance relative to a group of control firms matched on industry, size, and prior performance as in Fahlenbrach et al., 2011). In all cases we compare the average operating performance in the two years prior to the CEO turnover event to the performance in the two years following the event. The event year itself is excluded from the analysis.

Results of the difference-in-differences analysis are displayed in Table 2.4. The analysis of changes in raw operating performance (Panel A) shows evidence (significant at the 10% level) of a better performance of firms in which a former CEO is transferred to the supervisory board when operating performance is measured by the ROE but not when it is measured by the ROA. The analysis of excess operating performance (Panel B) yields insignificant estimates. Results of additional tests that take the position of the former CEO on the supervisory board (i.e. chairman or ordinary member) into account lead to qualitatively similar results.[28]

[28]The results of this robustness check are given in Table A.8 (former CEO becomes chairman of the supervisory board) and Table A.9 (former CEO becomes ordinary supervisory board member) in the appendix of this chapter. The analysis indicates that the results for raw operating performance are driven by cases where the former CEO becomes an ordinary supervisory board member.

Table 2.4: Operating performance

Panel A: Raw performance

	Former CEO changes to the supervisory board	Former CEO does not change to the supervisory board	Difference
ROA			
Average ROA (t-2, t-1)	0.077	0.074	0.003 (0.210)
Average ROA (t+1, t+2)	0.077	0.063	0.014 (0.105)
Change in ROA	-0.000 (-0.014)	-0.011 (-1.084)	**0.011 (0.784)**
Observations	52	35	
ROE			
Average ROE (t-2, t-1)	0.033	0.041	-0.009 (-0.669)
Average ROE (t+1, t+2)	0.034	0.011	0.023 (1.585)
Change in ROE	0.001 (0.159)	-0.030* (-1.881)	**0.032* (1.848)**
Observations	52	35	

Panel B: Excess performance

	Former CEO changes to the supervisory board	Former CEO does not change to the supervisory board	Difference
ROA			
Average excess ROA (t-2, t-1)	0.013	0.017	-0.003 (-0.530)
Average excess ROA (t+1, t+2)	0.020	0.029	-0.008 (-0.599)
Change in excess ROA	0.007 (0.777)	0.012 (0.867)	**-0.005 (-0.371)**
Observations	35	50	
ROE			
Average excess ROE (t-2, t-1)	0.008	0.017	-0.009 (-0.114)
Average excess ROE (t+1, t+2)	0.034	-0.003	0.037 (0.394)
Change in excess ROE	0.026 (0.334)	-0.020 (-0.959)	**0.046 (0.483)**
Observations	48	33	

This table contains the results of a difference-in-differences analysis of operating performance around unforced CEO turnover events. We compare firms in which a former CEO changes to the supervisory board to firms in which a retiring CEO leaves the firm. *ROA* is calculated as the ratio of earnings before interest and taxes to total assets. *ROE* is defined as income before extraordinary items over book value of equity. *Excess ROA* and *excess ROE* are measured relative to a control group of firms matched on industry, size and prior performance. See Fahlenbrach et al. (2011) for details regarding the construction of our measures of excess operating performance. The difference-in-differences analysis compares average (*excess*) *ROA* and average (*excess*) *ROE* under the old CEO (average of years t-2 and t-1) to average (excess) performance under the new CEO (years t+1 and t+2, relative to the turnover year (t=0)). Each cell shows the estimated coefficient. The figures in the third row and third column (in bold in the lower right cell) of each sub-panel show the estimated coefficients and t-values (in parentheses) (of the difference-in-differences estimator). The superscript * denotes statistical significance at the 10% level.

The largely insignificant results are somewhat contradictory to those of the short-run event study. A possible explanation is that changes in operating performance only reflect changes in cash flow and/or accounting profits while the event study abnormal returns also reflect changes in the firm's cost of capital (i.e. discount rate news).

2.6 Executive and director compensation

We begin our compensation analysis by examining the time pattern of director and executive compensation (see Panel A of Table 2.5). Per capita director compensation during our sample period amounted to € 43,853 per year. Over our sample period it increased from € 30,757 in 1998 to € 60,437 in 2007. This corresponds to an increase of 96.5%, or a compound annual growth rate of 7.8%. Per capita executive compensation is more than 20 times higher than per capita director compensation (€ 944,344 compared to € 43,853). The time pattern is similar. Average executive compensation increased by 124.0% over our sample period, which corresponds to a compound annual growth rate of 9.4%.

As argued before, we expect a higher director and executive compensation for firms with a former CEO on the supervisory board (*H2.3*, *H2.4* and *H2.5*). The means, medians and standard deviations of director and executive compensation are displayed in Panel B of Table 2.5.[29] We also test for significant differences between the means and medians of firms with a former CEO on the supervisory board (or with a former CEO as chairman of the board/ordinary board member, respectively) and firms without a former CEO serving on the supervisory board. We observe higher executive and director compensation for firms with a former CEO on the supervisory board. The differences are significant in 10 out of 12 cases. The results further suggest that these differences are more pronounced in cases in which the former CEO is at the helm of the supervisory board. The univariate analysis thus provides evidence in favor of our hypotheses *H2.3, H2.4* and *H2.5*.

[29]We lose 34 (46) firm-year observations due to a lack of compensation data for the executive (supervisory) board.

Table 2.5: Descriptive statistics for director and executive compensation sorted by year (Panel A) and by dummy variables for the composition of the supervisory board (Panel B)

Panel A	1999	2001	2003	2005	2007	1998–2007
Executive compensation						
Mean	649,684	770,631	902,040	1,136,793	1,449,404	944,344
Median	517,833	580,000	656,000	811,500	1,140,925	656,000
Std. dev.	580,240	720,443	839,870	1,161,696	1,165,000	907,752
Observations	122	145	145	140	131	1,359
Director compensation						
Mean	32,404	42,546	40,085	48,184	60,437	43,853
Median	24,010	25,250	27,157	36,690	43,333	30,000
Std. dev.	27,686	67,578	34,854	38,748	49,675	48,899
Observations	126	146	145	140	131	1,371

Panel B	Former CEO is on board	Former CEO is chairman	Former CEO is ordinary board member	No former CEO is on board
Executive compensation				
Mean	1202,105***	1366,321***	945,795	844,659
	(6.61)	(8.12)	(1.49)	
Median	763,600***	907,667***	648,071	619,833
	(5.65)	(6.59)	(1.41)	
Std. dev.	1205,028	1313,252	962,825	739,380
Observations	379	231	148	980
Director compensation				
Mean	59,037***	65,227***	49,374***	38,051
	(7.24)	(7.61)	(2.77)	
Median	46,667***	50,000***	37,083***	25,841
	(8.65)	(8.81)	(3.79)	
Std. dev.	49,487	54,772	38,052	47,430
Observations	379	231	148	992

This table presents descriptive statistics for director and executive compensation. For each variable, Panel A shows the mean, median, standard deviation, and number of observations for selected years from 1998 to 2007 and for the entire sample period. The variable *director compensation* is measured as the total compensation of the supervisory board in Euros divided by the number of supervisory board members in the respective year. The variable *executive compensation* is measured as the total compensation of the executive board in Euros divided by the number of executive board members in the respective year. A firm-year observation is assigned to *former CEO is on board* (*is chairman*/*is ordinary board member*) if any supervisory board member (the chairman of the supervisory board/an ordinary supervisory board member) in the respective year was the CEO of the same firm in at least one of the previous years between 1987 and 2006 or in 1985 or in 1982. All other firm-year observations are assigned to the category *no former CEO on board*. Panel B contains the mean, median, standard deviation and number of observations sorted by dummy variables for the supervisory board composition. Values in parentheses in the first three columns correspond to test statistics for tests of equality of means and medians across firm-years assigned to the categories *former CEO is on board* (*is chairman*/*is ordinary board member*) and the category *no former CEO on board*. The superscript *** denote statistical significance of the differences at the 1% level.

The empirical literature has identified a number of factors that have a significant impact on executive (and director) compensation. We therefore estimate the following multivariate panel regression model for our analysis of the determinants of director and executive compensation:

$$y_{it} = \alpha + \beta(\text{Former CEO on board}) + \gamma(\text{control variables}) + \tau(\text{year dummies}) + \varepsilon_{it} \quad (2.1)$$

where y_{it} is our measure of per capita compensation for firm i at time t. The presence of a CEO on the supervisory board is captured in two different ways. In models (1) and (3) of Table 2.6 and 2.9 we include a dummy variable that is set to one when a former CEO is a current member of the supervisory board. In models (2) and (4) we include two dummy variables. The first dummy is set to one when a former CEO is the current chair of the supervisory board. The second dummy is set to one when a former CEO acts as an ordinary member (but not as the chair) of the supervisory board. Of all firm-years in which a former CEO acts as director of the same firm, about 61% are cases in which the former CEO is the chairman of the supervisory board.

In models (5) to (8) in our regressions with per capita executive compensation as the dependent variable we replace the dummies by continuous variables that measures the average time (measured in years) the former CEO (who now is a member of the supervisory board) was sitting on the executive board jointly with the current executive board members.[30] We refer to this variable as "joint tenure". The larger its value the more intense will be the personal relation between the current CEO and the current executives, and the larger will be the set of joint experiences they share. In models (5) and (7) we estimate one slope coefficient for all cases in which a former CEO sits on the supervisory board. In models (6) and (8) we estimate different slope coefficients for cases in which the former CEO is the chair or an ordinary member of the supervisory board, respectively. We do not include the "joint tenure" variable in our regressions with director compensation as the dependent variable because it is not plausible that the compensation of the members of

[30]The joint tenure variable is zero in all cases in which a departing CEO does not become a member of the supervisory board. We estimate an alternative specification were we include the tenure of the departing CEO (whether or not he becomes a member of the supervisory board) instead of the joint tenure variable. The results of this robustness check are given in Table A.10a (A.16) in the appendix of this chapter for regressions with executive (director) compensation as dependent variable. The results are similar to those reported in Table 2.6.

the supervisory board depends on how long one of its members (the former CEO) sat on the executive board together with the current executives.

We include firm size (measured by either the log of total assets or the log of market capitalization[31]), the size of the executive (supervisory) board (measured as the log of the number of executives (supervisory board members)), codetermination, bank representation on the supervisory board, as well as Tobin's Q (defined as the market value of equity plus the book value of debt over the book value of total assets) as control variables. In addition, in models (1) and (2) (as well as in models (5) and (6) in our regressions with executive compensation as dependent variable) we include abnormal share price performance measured over one year and index-adjusted using the CDAX performance index) as performance measure whereas accounting performance (return on assets, defined as earnings before interest and taxes over total assets) is used as performance measure in models (3) and (4) (as well as in models (7) and (8) in our regressions with executive compensation as dependent variable).

For our analysis of the determinants of executive compensation we include CEO tenure (number of years that the current CEO has served on the executive board) as additional control variable.[32] In our regressions with per capita director compensation as the dependent variable we control for the number of board meetings. Finally, we include year dummies. In our baseline specification, the ownership structure is captured by two dummy variables (largest shareholder holds more than 50%[33]; checked or unchecked).

[31]In the tables we report the results obtained when using the log of market capitalization as our size measure. Results are similar when we use the log of total assets instead. The results of this robustness check are given in Table A.10 (A.16) in the appendix of this chapter for regressions with executive (director) compensation as dependent variable. We also included leverage as an additional control variable. The results of this robustness check are given in Table A.11 (A.17) in the appendix of this chapter for regressions with executive (director) compensation as dependent variable. Again the results were similar to those reported in Table 2.6 and 2.9.

[32]We do not control for CEO tenure in our regressions with director compensation as the dependent variable because it is not obvious that the tenure of the current CEO should be related to the compensation of the members of the supervisory board.

[33]In additional regressions we use an alternative definition based on a 25% threshold. The results of this robustness check are given in Table A.11 (A.17) in the appendix of this chapter for regressions with executive (director) compensation as dependent variable. We further re-estimate our models using the shareholdings of the largest shareholder instead of a dummy variable. Finally, we also estimate models in which we include dummy variables that control for the identity of a controlling shareholder (family, industrial firm, financial institution, other). The results of these robustness checks are given in Table A.12 (A.18) in the appendix of this chapter for regressions with executive (director) compensation as dependent variable. The results of all these specifications are qualitatively and quantitatively similar to those reported in Table 2.6 and 2.9.

We employ the fixed effects estimator in all regressions because a Hausman test indicates that the regressors are correlated with the error term. We test for serial correlation and heteroskedasticity using the test procedures proposed by Baum (2001) and Drukker (2003).[34] Due to the presence of heteroskedasticity and serial correlation, our regression results are based on the estimator proposed in Driscoll and Kraay (1998).

2.6.1 Executive compensation

Table 2.6a and 2.6b report the results of fixed effects regressions with per capita executive compensation as the dependent variable (expressed in thousands of Euros). In Table 2.6a the presence of a former CEO on the supervisory board is captured by dummy variables. The presence of a former CEO on the supervisory board has a positive but insignificant effect on executive compensation. In Table 2.6b we explicitly control for the joint tenure. Again we find that all coefficients are positive, and four out of six are significant. Thus, in firms in which a former CEO sits on the supervisory board, per-capita executive compensation is increasing in the average time the former CEO and the current executives spent on the executive board together. This is consistent with our hypothesis 2.4. The effect is driven by those cases in which the former CEO is at the helm of the supervisory board.

With respect to the control variables, we find that per-capita executive compensation is increasing in firm size. This is consistent with previous findings (see Schmid, 1997 for evidence from Germany and Murphy, 1985; Jensen and Murphy, 1990; Gabaix and Landier, 2008 for international evidence). Per-capita executive compensation is further decreasing in the size of the executive board and increasing in CEO tenure. The latter finding is consistent with results reported in Hill and Phan (1991) and Bertrand and Mullainathan (2001).

Previous papers found that executive compensation is lower in firms with concentrated ownership (see Hartzell and Starks, 2003 for the US; Sapp, 2008 for Canada and Schmid, 1997; Elston and Goldberg, 2003 and Kaserer and Wagner, 2004 for Germany). Our results point in the same direction. The coefficient on the dummy variable that identifies firms with a dominating shareholder is negative and statistically significant in all eight models.

[34]The test procedure developed by Baum (2001) is based on Greene (2000, p. 598), and Drukker's (2003) method follows Wooldridge (2002, pp. 282-283).

The existence of a second large shareholder, on the other-hand side, has a positive and significant impact on executive compensation. As argued in Gorton and Schmid (2000) bank representatives serving on the supervisory board may have a positive influence on a firm's governance. Our findings can be interpreted as supportive of this reasoning, as we find a significantly negative influence on executive compensation. The equity stake held by executive directors has no impact on executive compensation. On the other hand, the stake held by members of the supervisory board is significantly positively related to per-capita executive compensation.

Our results so far were based on an analysis of the *level* of executive and director compensation. An alternative and more direct way to test whether the presence of a former CEO on the supervisory board affects executive and director compensation is to test whether compensation *changes* after a CEO transition event. We therefore now turn to a difference-in-differences analysis of CEO turnover events.

Our treatment group consists of CEOs who step down and become members of the supervisory board of the same firm. We analyze three treatment groups, (1) all cases in which a departing CEO becomes a member of the supervisory board, (2) only cases in which the departing CEO becomes the chairman of the supervisory board and (3) only cases in which the departing CEO becomes an ordinary member of the supervisory board. These CEOs usually step down because they have reached retirement age. We construct a control group that consists of unforced CEO turnovers (as defined previously) but only contains cases in which the departed CEO did not become a member of the supervisory board. A control group that also includes forced CEO turnovers would be inappropriate. The control group is the same for all three treatment groups described above.

We want to test whether per-capita executive compensation changes significantly when a departing CEO becomes a member of the supervisory board. To this end we compare the average per-capita compensation in the two years prior to the CEO turnover to the average per-capita compensation in the five years after the turnover. The year of the turnover is discarded. We use a five-year average after the turnover because the typical term of an executive's contract in Germany is five years. It may thus take up to five years until the contracts of all executives have been renewed.

Table 2.6a: Determinants of executive compensation

	(1)	(2)	(3)	(4)
Constant	-1808.25**	-1811.21**	-1659.16*	-1658.08*
	(-2.88)	(-2.81)	(-2.04)	(-2.01)
Former CEO on board	123.31		103.07	
	(1.29)		(1.06)	
Former CEO is chairman		125.42		102.42
		(1.38)		(1.12)
Former CEO is ordinary		119.14		104.48
board member		(1.02)		(0.85)
Ln (number of executives)	-517.90***	-517.97***	-493.88***	-493.85***
	(-4.10)	(-4.11)	(-4.10)	(-4.12)
CEO tenure	7.02***	7.03***	6.29***	6.29***
	(5.42)	(5.38)	(5.51)	(5.47)
Stake executive board	0.82	0.82	0.35	0.35
	(0.53)	(0.53)	(0.23)	(0.23)
Stake supervisory board	4.10**	4.09**	3.98**	3.99**
	(2.44)	(2.46)	(2.44)	(2.45)
Largest shareholder > 50%	-100.60**	-100.64**	-95.92**	-95.90**
	(-2.87)	(-2.85)	(-2.30)	(-2.30)
Checked	141.01**	140.97**	137.10**	137.12**
	(2.78)	(2.77)	(2.29)	(2.28)
Codetermination	-4.94	-5.60	58.11	58.33
	(-0.03)	(-0.04)	(0.46)	(0.47)
Bank representation	-223.80***	-223.63***	-234.51***	-234.56***
	(-7.39)	(-7.54)	(-7.08)	(-7.19)
Ln (market capitalization)	276.17***	276.41***	259.50***	259.41***
	(5.59)	(5.49)	(4.18)	(4.14)
Share price performance	-17.63	-17.56		
	(-0.73)	(-0.74)		
ROA			545.25*	545.30*
			(1.88)	(1.88)
Tobin´s Q	-49.97	-50.01	-47.53	-47.52
	(-1.19)	(-1.19)	(-1.15)	(-1.15)
R^2 within	0.344	0.344	0.340	0.340
Observations	1,281	1,281	1,287	1,287

This table shows the results of fixed effects regressions with per capita executive compensation as the dependent variable. The variable *executive compensation* is measured as the total compensation of the executive board in units of € 1,000 divided by the number of executive board members in the respective year. The first column shows the independent variables. *Former CEO is on board* (*is chairman*/*is ordinary board member*) is equal to one, if any supervisory board member (the chairman of the supervisory board/an ordinary supervisory board member) in the respective year was the CEO of the same firm in at least one of the previous years between 1987 and 2006 or in 1985 or in 1982 and zero otherwise. *Ln (number of executives)* is defined as the natural logarithm of the number of executive board members. *CEO tenure* is defined as the number of years that the current CEO has served on the executive board (as either CEO or ordinary member). *Stake executive* (*supervisory*) *board* measures the percentage of shares held by members of the executive (supervisory) board. *Largest shareholder > 50%* is a dummy that is set to one for all firms with a largest shareholder holding at least 50% of the voting equity. A firm is said to be *checked* if *largest shareholder > 50%* is set to one and the second largest shareholder holds at least 5% of the voting shares. *Codetermination* is defined as the number of employee representatives divided by the number of supervisory board members in the respective year; *bank representation* is a dummy that is set to one if a supervisory board member represents the interest of a bank. *Ln* (*market capitalization*) is defined as the natural logarithm of the total market value of equity; *share price performance* is computed as the annual return in the previous year minus the return of the CDAX performance index; *ROA* is calculated as the ratio of earnings before interest and taxes to total assets; and *Tobin's Q* is defined as the market value of equity plus total assets minus the book value of equity, divided by total assets. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 2.6b: Determinants of executive compensation

	(5)	(6)	(7)	(8)
Constant	-1797.40**	-1798.31**	-1652.85*	-1655.94*
	(-2.95)	(-2.95)	(-2.11)	(-2.12)
Former CEO on board*	37.89**		35.12*	
joint tenure	(2.43)		(1.99)	
Former CEO is chairman*		39.50**		34.82*
joint tenure		(2.54)		(1.99)
Former CEO is ordinary		23.08		23.38
board member*joint tenure		(1.28)		(1.09)
Ln (number of executives)	-511.79***	-510.39***	-489.15***	-488.33***
	(-4.05)	(-4.06)	(-4.04)	(-4.05)
CEO tenure	6.43***	6.26***	5.93***	5.79***
	(5.54)	(5.09)	(4.94)	(4.56)
Stake executive board	0.77	0.83	0.34	0.38
	(0.50)	(0.54)	(0.22)	(0.25)
Stake supervisory board	4.19**	4.20**	4.06**	4.07**
	(2.35)	(2.33)	(2.33)	(2.32)
Largest shareholder > 50%	-98.65**	-99.08*	-93.30*	-93.65*
	(-2.78)	(-2.72)	(-2.18)	(-2.12)
Checked	139.59**	135.14*	136.48**	133.02**
	(2.80)	(2.75)	(2.32)	(2.28)
Codetermination	-25.89	-37.94	39.74	31.45
	(-0.19)	(-0.29)	(0.36)	(0.30)
Bank representation	-225.74***	-224.18***	-235.76***	-234.63***
	(-6.15)	(-6.35)	(-5.99)	(-6.15)
Ln (market capitalization)	277.42***	277.96***	260.52***	261.14***
	(5.64)	(5.64)	(4.26)	(4.26)
Share price performance	-15.20	-14.79		
	(-0.63)	(-0.61)		
ROA			551.90*	548.23*
			(1.91)	(1.89)
Tobin´s Q	-52.55	-52.78	-49.73	-49.75
	(-1.26)	(-1.27)	(-1.21)	(-1.21)
R^2 within	0.345	0.345	0.341	0.341
Observations	1,281	1,281	1,287	1,287

This table shows the results of fixed effects regressions with per capita executive compensation as the dependent variable. *Executive compensation* is measured as total compensation of the executive board in units of € 1,000 divided by the number of executive board members. The first column shows the independent variables. *Former CEO is on board* (*is chairman*/*is ordinary board member*) equals one, if any supervisory board member (the chairman of the supervisory board/an ordinary supervisory board member) in the respective year was the CEO of the same firm in at least one of the previous years between 1987-2006 or in 1985 or in 1982 and zero otherwise. *Joint tenure* measures the average number of years that the former CEO spent together with the current executive board member on the executive board. *Ln* (*number of executives*) is defined as the natural logarithm of the number of executive board members. *CEO tenure* is defined as the number of years that the current CEO has served on the executive board (as either CEO or ordinary member). *Stake executive* (*supervisory*) *board* measures the percentage of shares held by members of the executive (supervisory) board. *Largest shareholder > 50%* is equal to one if the largest shareholder holds at least 50% of the voting equity. *Checked* equals one if *largest shareholder > 50%* is set to one and the second largest shareholder holds at least 5% of the voting shares. *Codetermination* is defined as the number of employee representatives divided by the number of supervisory board members; *bank representation* is a dummy equal to one if a supervisory board member represents the interest of a bank. *Ln* (*market capitalization*) is defined as the natural logarithm of the total market value of equity; *share price performance* is computed as the annual return in the previous year minus the return of the CDAX performance index; *ROA* is calculated as the ratio of earnings before interest and taxes to total assets; *Tobin's Q* is defined as the market value of equity plus total assets minus the book value of equity, divided by total assets. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 2.7: Director and executive compensation: Difference-in-differences

Panel A: **Executive compensation**	Treatment group (1)	Control group (2)	Difference (3)
CEO changes to the board			
Before	1,020,818	707,939	312,879
After	1,568,073	990,482	577,591**
Difference	547,255***	282,543***	264,711
Observations	45	23	
CEO becomes chairman			
Before	1,211,208	707,939	503,269*
After	1,760,873	990,482	770,390*
Difference	549,665***	282,543***	267,122
Observations	27	23	
CEO becomes ordinary board member			
Before	735,233	707,939	27,294
After	1,278,873	990,482	288,391
Difference	543,640***	282,543***	261,097
Observations	18	23	

Panel B: **Director compensation**	Treatment group (1)	Control group (2)	Difference (3)
CEO changes to the board			
Before	53,104	28,179	24,924***
After	78,518	44,409	34,109***
Difference	25,414***	16,229***	9,185
Observations	44	24	
CEO becomes chairman			
Before	57,172	28,179	28,992***
After	81,624	44,409	37,215***
Difference	24,452***	16,229***	8,223
Observations	27	24	
CEO becomes ordinary board member			
Before	46,643	28,179	18,463***
After	73,584	44,409	29,175**
Difference	26,941***	16,229***	10,712
Observations	17	24	

This table shows the levels and changes of director and executive compensation around unforced CEO turnovers using the difference-in-differences methodology. *Before* corresponds to the average per capita executive (director) compensation (in Euro) in the last two years of the CEO under consideration on the executive board, whereas *after* refers to the average per capita executive (director) compensation (in Euro) in the five years following the CEO turnover. All firms whose former CEO transfers to the supervisory board (becomes the chairman of the supervisory board/becomes an ordinary supervisory board member) are defined as the treatment group, whereas all firms whose retiring CEO leaves the firm are defined as the control group. The third row shows the difference in director or executive compensation before and after CEO turnover. The third column gives the differences between the treatment and control groups before and after CEO turnover and the difference between the differences in executive or director compensation before and after CEO turnover for the treatment and control groups. The mean is reported for each table cell. For the third row and third column, t-tests are used to test if the mean difference is significantly different from zero. The superscripts ** and *** denote significance at the 5% and 1% level, respectively. Panel A (B) contains the analysis for executive (director) compensation.

Panel A in Table 2.7 shows the results of the difference-in-differences analysis. Per-capita executive compensation in the treatment groups increase by about € 540,000. The increase is remarkably similar in the three treatment groups. The increase in the control group is about € 280,000. The difference, although large, is not statistically significant. This may be due to the fact that the analysis so far includes neither the control variables introduced above, nor firm or year fixed effects. We therefore estimate the following regression model using the fixed effects estimator:

$$y_{it} = \alpha + \beta(\text{post}) + \gamma(\text{post*treatment}) + \delta(\text{control variables}) + \tau(\text{year dummies}) + \varepsilon_{it} \quad (2.2)$$

y_{it} is our measure of per-capita executive compensation in firm i at time t. *Treatment* is a dummy variable that is equal to one (for the pre- and the post-period) if the former CEO becomes a member of the supervisory board in the post-period, and zero otherwise. *Post*treatment* is our difference-in-differences estimator. It captures the difference between the change in per capita executive pay from the pre- to the post-period between the treatment and control groups. The results are shown in Table 2.8. Consistent with the descriptive results shown in Table 2.7 above, the coefficient for *post*treatment* is positive. The magnitude of the effect ranges from € 123,000 in cases in which the departing CEO becomes an ordinary member of the supervisory board to € 277,000 in cases in which he becomes the chair. In all cases, the effect is statistically significant. Thus, our difference-in-differences analysis provides support for our hypothesis that executive compensation increases when a former CEO becomes a member (or the chairman) of the supervisory board.[35]

[35]As for the analysis of the level of executive and director compensation we perform several robustness checks. We re-estimate our models using the log of total assets as size measure. We also included leverage as an additional control variable (see Table A.13 in the appendix of this chapter). Furthermore we use an alternative definition for a controlling shareholder based on a 25% threshold and account for the shareholdings of the largest shareholder instead of a dummy variable (see Table A.14 in the appendix of this chapter). Finally we control for the identity of the largest shareholder (see Table A.15 in the appendix of this chapter). The results of almost all these specifications are qualitatively and quantitatively similar to those reported in Table 2.8. The coefficient for *post*treatment* is only insignificant for the last robustness test in Table A.15 in cases in which the departing CEO becomes an ordinary member of the supervisory board. However, the magnitude of the effect also amounts to €123,000.

Table 2.8: Determinants of executive compensation: Difference-in-differences

	Former CEO changes to the supervisory board		Former CEO becomes chairman of the board		Former CEO becomes ordinary board member	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-216.26	-310.44	-2687.14*	-2736.14*	908.73	724.82
	(-0.24)	(-0.33)	(-1.82)	(-1.89)	(0.82)	(0.61)
Post	-40.21	-30.75	-6.45	6.46	-210.62	-201.56
	(-0.53)	(-0.44)	(-0.10)	(0.11)	(-1.38)	(-1.43)
Post*treatment	158.79**	163.81*	274.76***	277.17**	122.52*	123.34*
	(2.81)	(2.05)	(3.09)	(2.55)	(1.94)	(1.78)
Ln (number of executives)	-626.78**	-609.37*	-549.88*	-533.46*	-680.25*	-657.62*
	(-2.16)	(-2.04)	(-1.99)	(-1.84)	(-2.12)	(-1.93)
CEO tenure	14.19***	13.69***	21.39***	19.95***	-7.46	-7.08
	(6.64)	(5.66)	(4.95)	(4.38)	(-0.82)	(-0.94)
Largest shareholder > 50%	359.61***	334.01***	373.89**	345.10***	286.44***	274.40***
	(3.17)	(3.23)	(2.91)	(2.98)	(3.87)	(3.87)
Checked	-9.50	13.27	-35.05	15.14	109.43	115.06*
	(-0.14)	(0.19)	(-0.46)	(0.21)	(1.75)	(1.85)
Stake executive board	-3.48	-3.68	-3.76	-3.13	-5.47	-6.27
	(-0.71)	(-0.78)	(-0.58)	(-0.49)	(-0.91)	(-1.07)
Stake supervisory board	-1.43	-1.71	-3.42	-3.38	-3.09	-3.34
	(-0.38)	(-0.45)	(-0.76)	(-0.72)	(-0.81)	(-0.81)
Codetermination	205.49	183.35	551.30	554.95	-360.38	-355.61
	(0.33)	(0.31)	(0.83)	(0.90)	(-0.38)	(-0.37)
Bank representation	-441.68***	-491.36***	-161.85**	-197.73**	-708.84***	-749.11***
	(-5.22)	(-5.45)	(-2.35)	(-2.83)	(-4.27)	(-3.94)
Ln (market capitalization)	73.26	72.14	173.77**	170.79**	91.56*	95.52*
	(1.72)	(1.52)	(2.36)	(2.34)	(1.84)	(1.78)
Share price performance	107.64*		146.43**		70.76	
	(2.01)		(2.49)		(1.20)	
ROA		2527.51*		1959.34		1030.71
		(2.05)		(1.74)		(0.68)
Tobin´s Q	53.36	36.49	50.94	49.51	86.64	62.94
	(0.89)	(0.57)	(0.90)	(0.80)	(0.81)	(0.43)
R^2 within	0.369	0.385	0.428	0.439	0.344	0.346
Observations	413	413	301	301	238	238

This table shows the results of fixed effects regressions using difference-in-differences methodology with per capita *executive compensation* as the dependent variable. *Executive compensation* is the total compensation of the executive board (in € 1,000), divided by the number of executive board members. The first column lists the independent variables. *Post* is equal to one in the period after the CEO turnover, and zero otherwise. *Post*treatment* is the difference-in-differences estimator. In columns 1 & 2 (3 & 4/5 & 6) the treatment group consists of all 41 firms whose former CEO transfers to the supervisory board (25 (16) firms where he becomes the chairman of the supervisory board (an ordinary supervisory board member)). The control group consists of 18 firms whose departing CEO did not become a member of the supervisory board. *Ln* (*number of executives*) is the natural logarithm of the number of executive board members. *CEO tenure* is the number of years that the current CEO served on the executive board (as either CEO or ordinary member). *Largest shareholder > 50%* is equal to one if the largest shareholder holds at least 50% of the voting equity. *Checked* equals one if *largest shareholder > 50%* is set to one and the second largest shareholder holds at least 5% of the voting shares. *Codetermination* is defined as the number of employee representatives divided by the number of supervisory board members; *bank representation* is a dummy that is set to one if a supervisory board member is a bank representative; *stake executive* (*supervisory*) *board* is the percentage of shares held by members of the executive (supervisory) board; *ln* (*market capitalization*) is the natural logarithm of the total market value of equity; *share price performance* is computed as the annual return in the previous year minus the return of the CDAX performance index. *ROA* is calculated as the ratio of earnings before interest and taxes to total assets; *Tobin's Q* is the market value of equity plus total assets minus the book value of equity, divided by total assets. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Summarizing our results on executive compensation, we find some evidence in support of hypotheses *H2.3* and *H2.4*. Executive compensation in firms with a former CEO on the supervisory board is higher than executive compensation in the control firms (Table 2.5). When we control for other determinants of executive compensation we obtain positive but insignificant coefficients for the difference in executive compensation (Table 2.6a). In firms in which a former CEO sits on the supervisory board, per capita executive compensation is increasing in the joint tenure (the average time the former CEO and the current executives spent together on the executive board).

This supports hypothesis 2.4 and the existence and relevance of a leniency bias (Table 2.6b). The strongest results are obtained in the difference-in-differences analysis. When a former CEO becomes the a member (or the chairman) of the supervisory board upon retirement, we observe a significant increase in per capita executive compensation relative to a control group of firms that do not transfer their retiring CEO to the supervisory board.

2.6.2 Director compensation

Table 2.9 contains our regression results with per capita director compensation as the dependent variable. The results indicate that a former CEO serving as ordinary member of the supervisory board does not affect the level of director compensation. However, when the former CEO chairs the supervisory board, per capita director compensation is significantly (at the 10% level) higher than in firms without a former CEO on the board (specifications (2) and (4)). We thus find at least partial support for hypothesis 2.5. We further find that director compensation increases in firm size. The presence of a bank representative on the supervisory board is negatively related to per capita compensation. We also note that the explanatory power of the model is much lower than that of the model for executive compensation discussed above.

Table 2.9: Determinants of director compensation

	(1)	(2)	(3)	(4)
Constant	-36.06**	-43.50**	-23.24	-30.99
	(-2.52)	(-2.35)	(-1.31)	(-1.51)
Former CEO on board	3.80		3.32	
	(1.82)		(1.55)	
Former CEO is chairman		8.64*		7.72*
		(2.14)		(1.96)
Former CEO is ordinary		-5.60		-6.07
board member		(-1.27)		(-1.30)
Ln (number of directors)	1.17	1.80	-0.50	0.18
	(0.16)	(0.24)	(-0.07)	(0.02)
Largest shareholder > 50%	4.74	4.69	6.05	5.99
	(0.52)	(0.52)	(0.67)	(0.67)
Stake executive board	0.07	0.07	0.06	0.07
	(0.85)	(0.89)	(0.81)	(0.84)
Stake supervisory board	-0.09*	-0.09**	-0.09*	-0.09**
	(-2.15)	(-2.38)	(-2.13)	(-2.34)
Checked	-2.40	-2.58	-3.18	-3.44
	(-1.01)	(-0.97)	(-1.06)	(-1.06)
Codetermination	-35.13	-38.59	-31.61	-34.85
	(-1.59)	(-1.65)	(-1.55)	(-1.63)
Bank representation	-6.86***	-6.24**	-5.67**	-5.20*
	(-3.22)	(-2.92)	(-2.58)	(-2.25)
Board meetings	0.41	0.41	0.70***	0.70**
	(1.70)	(1.62)	(3.58)	(3.14)
Ln (market capitalization)	7.30***	7.83***	6.29***	6.83***
	(12.22)	(9.12)	(7.20)	(7.00)
Share price performance	-0.21	-0.08		
	(-0.13)	(-0.05)		
ROA			29.49*	29.77*
			(2.09)	(2.03)
Tobin´s Q	-1.41*	-1.43*	-2.42***	-2.42***
	(-1.91)	(-1.95)	(-3.54)	(-3.50)
R^2 within	0.069	0.072	0.071	0.074
Observations	1,195	1,195	1,198	1,198

This table shows the results of fixed effects regressions with per capita *director compensation* as the dependent variable. The variable *director compensation* is measured as the total compensation of the supervisory board in units of € 1,000 divided by the number of supervisory board members in the respective year. The first column shows the independent variables. The variable *Former CEO is on board* (*is chairman*/*is ordinary board member*) is equal to one, if any supervisory board member (the chairman of the supervisory board/an ordinary supervisory board member) in the respective year was the CEO of the same firm in at least one of the previous years between 1987 and 2006 or in 1985 or in 1982 and zero otherwise. *Ln* (*number of directors*) is defined as the natural logarithm of the number of supervisory board members. The variable *largest shareholder > 50%* is a dummy that is set to one for all firms with a largest shareholder holding at least 50% of the voting equity, and zero otherwise. The variable *stake executive* (*supervisory*) *board* measures the percentage of shares held by members of the executive (supervisory) board. *Checked* equals one if *largest shareholder > 50%* is set to one and the second largest shareholder holds at least 5% of the voting shares. The variable *codetermination* is defined as the number of employee representatives divided by the number of supervisory board members in the respective year; *bank representation* is a dummy that is set to one if a supervisory board member represents the interest of a bank. *Board meetings* is measured as the number of board meetings in the respective year; *ln* (*market capitalization*) is defined as the natural logarithm of the total market value of equity; *share price performance* is computed as the annual return in the previous year minus the return of the CDAX performance index, *ROA* is calculated as the ratio of earnings before interest and taxes to total assets; and *Tobin's Q* is defined as the market value of equity plus total assets minus the book value of equity, divided by total assets. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

As in the previous section, we perform a difference-in-differences analysis of the change in director compensation around unforced CEO turnovers. Descriptive results are included in Panel B of Table 2.7. The results of fixed effects regressions (including the same control variables as before) are displayed in Table 2.10. The coefficient of the difference-in-differences estimator is only positive in cases in which the former CEO is chair of the supervisory board, but never statistically significant.[36]

In summary, the evidence in favor of hypothesis 2.5 is modest. Per-capita director compensation is higher in firms in which a former CEO sits on the supervisory board (Table 2.5).

When we control for other variables that affect director compensation (Table 2.9) we obtain significantly positive coefficients only for those cases in which the former CEO chairs the supervisory board (and only at the 10% level). The difference-in-differences analysis does not yield significant results.

We offer a potential explanation for these weak results (and in particular those of the difference-in-differences analysis). If a former executive who is now a member or the chair of the supervisory board exerts his influence to increase the compensation of the members of the supervisory board, he is effectively increasing his own pay. This may well be interpreted as self-dealing by shareholders and the public. One such case occurred during our sample period and attracted a lot of attention. Former Lufthansa CEO Jürgen Weber became chairman of the supervisory board right after stepping down as CEO. In one of the first board meetings, the new supervisory board proposed a resolution to double the base salary of all members of the supervisory board and to triple the salary of the chairman (which the annual general meeting approved). These decisions led to an outcry in the German public and the media accused the supervisory board of self-dealing at the expense of employees and shareholders (Spiegel, 2003). As a reaction, Mr. Weber decided to donate his pay raise as chairman to charity. With regard to our hypothesis, the public attention to Mr. Weber's actions may imply that former executives are more reluctant to raise their own

[36]Again we perform robustness checks based on the same criteria as for the analysis of the level of director compensation. The results of these robustness checks are given in Table A.19, A.20 and A.21 in the appendix of this chapter. The results of all these specifications are qualitatively and quantitatively similar to those reported in Table 2.10.

Table 2.10: Determinants of director compensation: Difference-in-differences

	Former CEO changes to the supervisory board		Former CEO becomes chairman of the board		Former CEO becomes ordinary board member	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-252.70***	-121.28***	-405.90***	-235.70***	-230.55***	-221.89***
	(-6.85)	(-3.27)	(-6.33)	(-3.83)	(-3.82)	(-3.33)
Post	3.20	2.51	5.78	5.53	9.49	6.37
	(0.70)	(0.62)	(1.64)	(1.64)	(1.05)	(0.78)
Post*treatment	-0.05	0.92	2.69	3.03	-3.23	-1.22
	(-0.01)	(0.15)	(0.51)	(0.59)	(-0.37)	(-0.14)
Ln (number of directors)	-11.77	-12.78	-9.58	-12.50	-4.45	-1.16
	(-0.77)	(-0.88)	(-0.77)	(-0.96)	(-0.16)	(-0.04)
Largest shareholder > 50%	-10.94**	-10.39*	-8.05*	-7.95	-17.56***	-14.26***
	(-2.46)	(-2.03)	(-1.86)	(-1.68)	(-6.07)	(-3.24)
Checked	6.89	5.82	9.88**	9.05**	11.74**	9.10
	(1.70)	(1.28)	(2.88)	(2.33)	(2.39)	(1.62)
Stake executive board	0.35*	0.29	0.40*	0.36*	1.02***	0.73**
	(1.92)	(1.53)	(2.10)	(1.77)	(3.21)	(2.33)
Stake supervisory board	-0.08	-0.13	0.09	0.07	-0.19	-0.25
	(-0.85)	(-1.24)	(1.10)	(0.73)	(-1.50)	(-1.65)
Codetermination	-27.71*	-26.25*	-24.66	-23.19	-36.22	-37.73
	(-1.96)	(-1.83)	(-1.39)	(-1.29)	(-1.36)	(-1.39)
Bank representation	-15.76*	-17.20**	-10.33*	-11.63**	-14.68	-16.70
	(-2.11)	(-2.19)	(-1.91)	(-2.16)	(-1.01)	(-1.03)
Board meetings	1.92	2.05*	1.69	1.71	3.16*	3.31**
	(1.72)	(1.78)	(1.03)	(0.99)	(2.04)	(2.29)
Ln (market capitalization)	14.91***	14.46***	21.37***	21.33***	11.96***	11.31***
	(11.41)	(10.09)	(9.09)	(7.38)	(6.39)	(7.09)
Share price performance	-4.53		-6.20		-7.99*	
	(-1.11)		(-1.03)		(-1.84)	
ROA		90.71**		74.01**		92.66
		(2.37)		(2.43)		(1.44)
Tobin´s Q	-2.35**	-4.42***	-0.79	-2.77***	-0.72	-6.32
	(-2.58)	(-3.40)	(-0.69)	(-3.02)	(-0.21)	(-1.13)
R^2 within	0.292	0.300	0.465	0.469	0.240	0.243
Observations	385	385	287	287	217	217

This table shows the results of fixed effects regressions using difference-in-differences methodology with per capita *director compensation* as the dependent variable. *Director compensation* is the total compensation of the supervisory board (in € 1,000), divided by the number of supervisory board members. The first column lists the independent variables. *Post* is equal to one in the period after the CEO turnover, and zero otherwise. *Post*treatment* is the difference-in-differences estimator. In columns 1 & 2 (3 & 4/5 & 6) the treatment group consists of all 48 firms whose former CEO transfers to the supervisory board (29 (19) firms where he becomes the chairman of the supervisory board (an ordinary supervisory board member)). The control group consists of 12 firms whose departing CEO did not become a member of the supervisory board. *Ln (number of directors)* is defined as the natural logarithm of the number of supervisory board members. *Largest shareholder > 50%* is equal to one if the largest shareholder holds at least 50% of the voting equity. *Stake executive* (*supervisory*) *board* measures the percentage of shares held by members of the executive (supervisory) board. *Checked* equals one if *largest shareholder > 50%* is set to one and the second largest shareholder holds at least 5% of the voting shares. *Codetermination* is defined as the number of employee representatives divided by the number of supervisory board members; *bank representation* is a dummy that is set to one if a supervisory board member is a bank representative*; board meetings* is measured as the number of board meetings in the respective year*; ln* (*market capitalization*) is defined as the natural logarithm of the total market value of equity; *share price performance* is computed as the annual return in the previous year minus the return of the CDAX performance index; *ROA* is calculated as the ratio of earnings before interest and taxes to total assets, and *Tobin's Q* is defined as the market value of equity plus total assets minus the book value of equity, divided by total assets. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

salary and the salary of the supervisory board in general due to the risk of being accused of self-dealing.

2.7 Conclusion

CEO transitions have been discussed controversially. While proponents argue that the firm and industry expertise of former CEOs make them good monitors and valuable advisors, the critics point at various conflicts of interest and their potentially negative consequences. Based on a panel of 150 German firms, this paper provides evidence that executive pay increases when a former CEO becomes a member or the chairman of the supervisory board. The increase is economically significant at € 123,000 and € 276,000, respectively. We further document that executive compensation is increasing in the joint tenure of the former CEO and the current executives on the executive board. This is consistent with previous results by Fiss (2006) and Westphal and Zajac (2005) who argue that greater similarity between the CEO and the board results in higher pay.

We only find weak evidence in favor of an increase in director compensation. We argue that the effect is weak because the former CEOs on the supervisory board may be afraid of allegations of self-dealing.

Our short-run event study results imply that the stock market considers the announcement of a CEO transition as good news. The result of the long-run event study and of the analysis of operating performance point in the same direction but are mostly insignificant.

In summary, we can conclude that CEO transitions, despite the fact that they are associated with increasing executive compensation, are not a cause of concern for shareholders. Consequently, the new law which came into force in 2009 and which aims at preventing, or at least delaying, CEO transitions cannot be justified on the grounds of shareholder protection.

A Appendix to Chapter 2

Table A.1: Variable definitions to Chapter 2

This table presents the definitions of the variables used in the Appendix to Chapter 2. Information on board meetings is obtained from annual reports. All other board and manager characteristics as well as ownership structure are obtained or derived from the *Saling*/*Hoppenstedt Aktienführer*. All other firm characteristics are obtained from Datastream.

Variable	Definition
Board characteristics	
Bank representation	A dummy that is set to one if a supervisory board member represents the interest of a bank and zero otherwise.
Board meetings	Number of board meetings in the respective year.
Codetermination	Number of employee representatives divided by the number of supervisory board members.
Director compensation	Total compensation of the supervisory board in units of € 1,000 divided by the number of supervisory board members.
Executive compensation	Total compensation of the executive board in units of € 1,000 divided by the number of executive board members.
Ln (number of directors)	Natural logarithm of the number of supervisory board members.
Ln (number of executives)	Natural logarithm of the number of executive board members.
No bank representation	A dummy that is set to one if no supervisory board member represents the interest of a bank and zero otherwise.
Stake executive board	Percentage of shares held by members of the executive board.
Stake supervisory board	Percentage of shares held by members of the supervisory board.
Manager characteristics	
CEO tenure	Number of years that the current CEO has served on the executive board (as either CEO or ordinary member).
Former CEO tenure	Number of years that the former CEO has served on the executive board (as either CEO or ordinary member).
Joint tenure	Average number of years that the former CEO spent together with the current executive board member on the executive board for firms with a former CEO on the supervisory board and zero otherwise.

Manager characteristics (continued)	
Former CEO is chairman	A dummy that equals one, if the chairman of the supervisory board was the CEO of the same firm in at least one of the previous years between 1987-2006 or in 1985 or 1982 and zero otherwise.
Former CEO is on board	A dummy that equals one, if any supervisory board member was the CEO of the same firm in at least one of the previous years between 1987-2006 or in 1985 or 1982 and zero otherwise.
Former CEO is ordinary board member	A dummy that equals one, if an ordinary supervisory board member was the CEO of the same firm in at least one of the previous years between 1987-2006 or in 1985 or 1982 and zero otherwise.
Firm characteristics	
Checked	A firm is said to be *checked* if the firm has a largest shareholder holding at least 50% (25%) of the voting equity and a second largest shareholder holding at least 5% of the voting shares.
Excess ROA	ROA minus the average ROA of a control group of firms matched on industry, size and prior performance. See Fahlenbrach et al. (2011) for details regarding the construction of our measures of excess operating performance.
Excess ROE	ROE minus the average ROE of a control group of firms matched on industry, size and prior performance. See Fahlenbrach et al. (2011) for details regarding the construction of our measures of excess operating performance.
Family > 50%	A dummy that is set to one for all firms with a family holding at least 50% of the voting equity, and zero otherwise. We follow the classification method proposed by da Silva et al. (2004) to determine the controlling shareholder at the ultimate level.
Finance & services	All firms classified as either "Finance & Insurance", "Personal & Business Services" or "Health & Legal Services" according to SIC one-digit codes.
Financials > 50%	A dummy that is set to one for all firms with a financial firm holding at least 50% of the voting equity, and zero otherwise. We follow the classification method proposed by da Silva et al. (2004) to determine the controlling shareholder at the ultimate level.
Industrials > 50%	A dummy that is set to one for all firms with an industrial firm at least 50% of the voting equity, and zero otherwise. We follow the classification method proposed by da Silva et al. (2004) to determine the controlling shareholder at the ultimate level.
Largest shareholder > 25%	A dummy that is set to one for all firms with a largest shareholder holding at least 25% of the voting equity and zero otherwise.
Largest shareholder > 50%	A dummy that is set to one for all firms with a largest shareholder holding at least 50% of the voting equity and zero otherwise.

Firm characteristics (continued)	
Leverage	Ratio of the book value of total debt to total assets.
Ln (market capitalization)	Natural logarithm of the total market value of equity.
Ln (total assets)	Natural logarithm of the book value of total assets in units of € 1,000.
Manufacturing	All firms classified as "Manufacturing" according to SIC one-digit codes.
Mining & construction	All firms classified as either "Mining", "Construction", "Transportation" or "Wholesale & Retail Trade" according to SIC one-digit codes.
Others > 50%	A dummy that is set to one for all firms with a largest shareholder other than a family, a financial firm or an industrial firm holding at least 50% of the voting equity, and zero otherwise. We follow the classification method proposed by da Silva et al. (2004) to determine the controlling shareholder at the ultimate level.
Ownership 0-25	A dummy that is set to one for all firms with a largest shareholder holding not more than 25% of the voting equity and zero otherwise.
Ownership 25-50	A dummy that is set to one for all firms with a largest shareholder holding more than 25% and up to 50% of the voting equity and zero otherwise.
Ownership 50+	A dummy that is set to one for all firms with a largest shareholder holding more than 50% of the voting equity and zero otherwise.
ROA	Ratio of earnings before interest and taxes to total assets.
ROE	Income before extraordinary items over book value of equity.
Share price performance	Annual return in the previous year minus the return of the CDAX performance index.
Size quartile 1	Observations belonging to the quartile of smallest firms based on market capitalization as size measure.
Size quartile 2	Observations belonging to the quartile of the second smallest firms based on market capitalization as size measure.
Size quartile 3	Observations belonging to the quartile of second largest firms based on market capitalization as size measure.
Size quartile 4	Observations belonging to the quartile of largest firms based on market capitalization as size measure.
Stake largest shareholder	Percentage of shares held by the largest shareholder.
Tobin´s Q	Market value of equity plus total assets minus the book value of equity, divided by total assets.

Table A.2: Short-run announcement returns – regression analysis

This table shows the results of OLS regressions with cumulative abnormal returns (CARs) as the dependent variable. Cumulative abnormal returns (CARs) of unforced CEO turnover announcements are measured for different event windows (expressed relative to the announcement date t=0). The first column lists the independent variables. All variables are defined as in Table A.1. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts * and ** denote significance at the 10% and 5%, respectively.

	[-30;+30]	[-5;+5]	[0;+5]	[0;+1]
Constant	0.010	0.104	0.040	0.029
	(1.26)	(1.51)	(0.81)	(1.62)
CEO becomes chairman	0.004	-0.005	-0.003	0.011
of the board	(0.68)	(-0.12)	(-0.09)	(1.00)
Bank representation	-0.009	0.005	-0.010	-0.017
	(-1.63)	(0.12)	(-0.31)	(-1.39)
Finance & services	-0.002	-0.003	-0.012	-0.019
	(-0.27)	(-0.59)	(-0.31)	(-1.32)
Manufacturing	-0.002	0.019	0.021	-0.007
	(-0.41)	(0.39)	(0.59)	(-0.59)
Ownership 0-25	0.000	0.027	0.020	-0.021
	(0.00)	(0.47)	(0.48)	(-1.39)
Ownership 25-50	0.007	-0.007	0.001	-0.004
	(0.99)	(-0.11)	(0.02)	(-0.23)
Size quartile 1	-0.004	-0.150**	-0.083*	-0.013
	(-0.58)	(-2.35)	(-1.80)	(-0.80)
Size quartile 2	-0.006	-0.122**	-0.057	-0.010
	(-0.88)	(-2.09)	(-1.35)	(-0.63)
Size quartile 3	-0.008	-0.073	-0.039	-0.014
	(-1.07)	(-1.10)	(-0.81)	(-0.78)
R^2	0.122	0.158	0.110	0.141
Observations	59	59	59	59

Table A.3: Short-run announcement returns – ordered by the position of the former CEO on the supervisory board

This table contains cumulative abnormal returns (CARs) of unforced CEO turnover announcements for different event windows (expressed relative to the announcement date t=0). Panel A presents results for the subsample of CEOs who become chairmen of the supervisory board, while Panel B shows abnormal announcement returns for the subsample of CEOs who become ordinary members of the supervisory board (34 and 25 observations, respectively). T-statistics, the test statistic proposed by Boehmer et al. (1991), and the non-parametric Corrado (1989) test are reported in columns 4, 5, and 6. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: CEO becomes chairman of the board

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	18 : 16	2.17%	0.72	0.98	1.35
[-10;+30]	22 : 12	3.79%	1.53	2.12**	1.80
[-5;+5]	22 : 12	1.35%	1.05	0.37	0.81
[-1;+5]	19 : 15	-0.01%	-0.10	-0.27	-0.08
[0;+5]	19 : 15	-0.17%	-0.18	-0.33	0.07
[0;+3]	16 : 18	0.18%	0.24	-0.06	0.48
[0;+1]	16 : 18	0.24%	0.44	-0.27	0.80
[0]	23 : 11	0.18%	0.46	0.06	1.82*

Panel B: CEO becomes ordinary supervisory board member

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	15 : 10	9.56%	2.16**	1.44	0.90
[-10;+30]	13 : 12	6.46%	1.78*	1.35	0.89
[-5;+5]	13 : 12	4.88%	2.59***	1.09	1.21
[-1;+5]	11 : 14	2.00%	1.33	0.15	0.36
[0;+5]	12 : 13	1.89%	1.36	0.11	0.18
[0;+3]	12 : 13	0.95%	0.84	0.01	0.08
[0;+1]	10 : 15	0.06%	-0.08	-0.32	0.68
[0]	15 : 10	0.12%	0.22	-0.09	0.68

Table A.4: Short-run announcement returns – decision of the CEO to leave or stay was announced at the same time as the retirement

This table contains cumulative abnormal returns (CARs) of unforced CEO turnover announcements for different event windows (expressed relative to the announcement date t=0). The table contains only cases where the decision of the CEO to leave or stay was announced at the same time as the retirement. Panel A presents results for the full sample (92 observations), while Panel B (C) shows abnormal announcement returns for the subsample of CEOs who leave the firm (become member of the supervisory board) (48 and 44 observations, respectively). T-statistics, the test statistic proposed by Boehmer et al. (1991), and the non-parametric Corrado (1989) test are reported in columns 4, 5, and 6. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: All CEO turnover events

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	48 : 44	0.54%	0.54	0.24	0.31
[-10;+30]	52 : 40	1.57%	1.57	1.19	0.96
[-5;+5]	48 : 44	1.43%	1.43	0.21	0.40
[-1;+5]	45 : 47	-0.66%	-0.66	-0.67	-0.58
[0;+5]	46 : 46	-0.89%	-0.89	-0.86	-0.69
[0;+3]	37 : 55	-0.35%	-0.35	-0.42	-0.04
[0;+1]	42 : 50	-0.94%	-0.94	-0.71	0.54
[0]	51 : 41	-1.17%	-1.17	-0.53	1.10

Panel B: CEO leaves the firm

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	21 : 27	-5.31%	-1.81*	-1.94*	-1.34
[-10;+30]	24 : 24	-1.30%	-0.54	-0.71	-0.54
[-5;+5]	23 : 25	-0.68%	-0.54	-0.56	-0.54
[-1;+5]	23 : 25	-1.71%	-1.72*	-0.76	-0.68
[0;+5]	24 : 24	-1.80%	-1.95*	-0.97	-0.97
[0;+3]	17 : 31	-1.14%	-1.51*	-0.85	-0.53
[0;+1]	20 : 28	-0.93%	-1.74*	-0.94	-0.53
[0]	22 : 26	-0.87%	-2.32**	-1.15	-0.78

Panel C: CEO becomes supervisory board member

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	27 : 17	8.17%	2.73***	2.12**	1.72*
[-10;+30]	28 : 16	7.07%	2.87***	2.72***	1.87*
[-5;+5]	25 : 19	3.40%	2.67***	0.85	1.08
[-1;+5]	22 : 22	0.89%	0.87	-0.16	-0.16
[0;+5]	22 : 22	0.73%	0.78	-0.21	-0.04
[0;+3]	20 : 24	0.85%	1.10	0.33	0.45
[0;+1]	22 : 22	0.27%	0.49	0.01	1.27
[0]	29 : 15	0.29%	0.77	0.46	2.30**

Table A.5: Short-run announcement returns – no confounding events

This table contains cumulative abnormal returns (CARs) of unforced CEO turnover announcements for different event windows (expressed relative to the announcement date t=0). This table does not include cases with other potentially value-relevant information which could affect abnormal announcement returns. Panel A presents results for the full sample (99 observations), while Panel B (C) shows abnormal announcement returns for the subsample of CEOs who leave the firm (become member of the supervisory board) (46 and 53 observations, respectively). T-statistics, the test statistic proposed by Boehmer et al. (1991), and the non-parametric Corrado (1989) test are reported in columns 4, 5, and 6. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: All CEO turnover events

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	48 : 51	0.35%	0.17	-0.05	0.05
[-10;+30]	53 : 46	1.55%	0.93	0.65	0.56
[-5;+5]	55 : 44	1.43%	1.66*	0.55	0.87
[-1;+5]	49 : 50	-0.13%	-0.19	-0.33	0.01
[0;+5]	52 : 47	-0.11%	-0.17	-0.39	-0.06
[0;+3]	44 : 55	0.02%	0.04	-0.16	0.36
[0;+1]	45 : 54	-0.15%	-0.42	-0.44	0.89
[0]	58 : 41	-0.16%	-0.63	-0.14	1.27

Panel B: CEO leaves the firm

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	19 : 27	-5.84%	-1.94*	-2.13**	-1.59
[-10;+30]	22 : 24	-2.27%	-0.91	-1.08	-0.93
[-5;+5]	22 : 24	-1.27%	-0.99	-0.84	-0.79
[-1;+5]	21 : 25	-2.01%	-1.97**	-0.91	-0.79
[0;+5]	23 : 23	-1.91%	-2.02**	-1.01	-0.96
[0;+3]	16 : 30	-1.26 %	-1.64	-0.98	-0.69
[0;+1]	19 : 27	-1.04%	-1.90*	-1.09	-0.64
[0]	21 : 25	-0.91%	-2.35**	-1.15	-0.76

Panel C: CEO becomes supervisory board member

	Pos : Neg	CAR	t-test	Boehmer test	Corrado test
[-30;+30]	29 : 24	5.72%	2.08**	1.75*	1.43
[-10;+30]	31 : 22	4.86%	2.15**	2.16**	1.56
[-5;+5]	33 : 20	3.77%	3.23***	1.64	1.88*
[-1;+5]	28 : 25	1.51%	1.62	0.53	0.69
[0;+5]	29 : 24	1.45%	1.68*	0.65	0.74
[0;+3]	28 : 25	1.13%	1.61	0.97	1.08
[0;+1]	26 : 27	0.61%	1.23	0.86	1.78*
[0]	37 : 16	0.48%	1.37	1.43	2.41**

Table A.6: Long-run announcement returns – matched-firm-approach

This table contains results of long-run event studies following unforced CEO turnover announcements. Abnormal performance is measured for a portfolio of sample firms for up to 12 months following the month of the CEO change. Abnormal performance is measured for a portfolio of sample firms for up to 12 months following the month of the CEO change. Abnormal performance is measured as buy-and-hold returns relative to a group of matched firms. In a first step, we identify potential matches by selecting all (non-event) firms that fall within a range of 0.05 (Panel A) or 0.1 (Panel B) in terms of market-to-book value to each of our event firms. In a second step, for each event firm, we identify the firm with the lowest deviation in the momentum-factor (relative to our event firm) and use it as a matched firm to compute BHARs. Panel C and D present results for the subsample of firms where the CEO changes to the supervisory board upon retirement. Panel C (D) contains the results based on the approach used in Panel A (B) ordered by different firm characteristics. The first column in Panel C and D lists the firm characteristics. All variables are defined as in Table A.1. Factor information for the German market is obtained from the Centre for Financial Research Cologne. The number of observations corresponds to the number of months with a positive number of firms in the portfolio. In each month, firms are included in our portfolio "all turnover events (CEO leaves firm/CEO becomes board member)" if an unforced CEO turnover has occurred within the previous 12 months (and the CEO left the firm or changed to the supervisory board). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Buy-and-hold returns – 0.05 deviation

	BHAR (t-statistic) All turnover events	BHAR (t-statistic) CEO leaves firm	BHAR (t-statistic) CEO becomes board member
2 months	-1.40%	-6.72%**	2.84%
	(-0.60)	(-2.34)	(0.82)
4 months	-0.31%	-4.05%	2.66%
	(-0.08)	(-0.93)	(0.45)
6 months	-0.82%	-8.44%	5.24%
	(-0.17)	(-1.34)	(0.75)
8 months	-1.19%	-8.38%	4.54%
	(-0.24)	(-1.44)	(0.59)
10 months	0.43%	-3.54%	3.58%
	(0.07)	(-0.52)	(0.40)
12 months	7.17%	5.03%	8.88%
	(1.07)	(0.52)	(0.95)

Panel B: Buy-and-hold returns – 0.1 deviation

	BHAR (t-statistic) All turnover events	BHAR (t-statistic) CEO leaves firm	BHAR (t-statistic) CEO becomes board member
2 months	-0.45%	-4.99%	3.17%
	(-0.16)	(-1.53)	(0.77)
4 months	2.88%	-1.88%	6.67%
	(0.70)	(-0.38)	(1.07)
6 months	-0.14%	-10.04%	7.74%
	(-0.03)	(-1.34)	(0.34)
8 months	-0.05%	-11.05%	8.70%
	(-0.01)	(-1.01)	(0.96)
10 months	2.84%	-3.16%	7.62%
	(0.38)	(-0.38)	(0.63)
12 months	9.96%	4.97%	13.94%
	(1.27)	(0.27)	(1.22)

Panel C: Buy-and-hold returns – 0.05 deviation

	2 months	4 months	6 months	8 months	10 months	12 months
Mining &	4.40%	4.93%	8.03%	9.39%	0.90%	-0.46%
construction	(1.43)	(0.67)	(0.91)	(1.02)	(0.08)	(-0.05)
Manufacturing	5.92%	7.40%	8.17%	8.29%	10.34%	17.77%
	(0.97)	(0.73)	(0.68)	(0.74)	(0.71)	(1.10)
Finance & services	-4.04%	-7.85%	-2.26%	-6.03%	-7.08%	-0.86%
	(-0.91)	(-0.91)	(-0.22)	(-0.35)	(-0.44)	(-0.06)
Bank	1.51%	1.34%	6.62%	-0.08%	-0.04%	-2.12%
representation	(0.22)	(0.10)	(0.48)	(-0.01)	(-0.29)	(-0.18)
No bank	3.57%	3.37%	4.50%	7.04%	7.71%	14.85%
representation	(0.90)	(0.55)	(0.56)	(0.83)	(0.66)	(1.16)
Ownership 0-25	10.27%**	11.42%	17.10%	12.90%	13.79%	21.00%
	(2.02)	(1.31)	(2.06)	(1.26)	(1.09)	(1.50)
Ownership 25-50	-6.84%	-7.61%	-5.53%	2.11%	-2.27%	7.46%
	(-1.15)	(-1.23)	(-0.36)	(0.18)	(-0.17)	(0.60)
Ownership 50+	-3.47%	-5.95%	-9.51%	-11.06%	-12.58%	-15.80%
	(-0.58)	(-0.40)	(-0.57)	(-0.55)	(-0.58)	(-0.77)
Size quartile 1	5.07%	-7.70%	-14.78%	-16.33%	-16.44%	-1.69%
	(1.16)	(-1.26)	(-1.33)	(-1.29)	(-1.62)	(-0.20)
Size quartile 2	7.83%	19.15%*	29.37%**	32.39%**	24.99%	15.89%
	(0.94)	(1.73)	(2.37)	(2.07)	(1.59)	(1.07)
Size quartile 3	-11.05%	-15.51%	-8.18%	-8.14%	-16.89%	-16.18%
	(-1.61)	(-1.16)	(-0.51)	(-0.52)	(-0.91)	(-0.90)
Size quartile 4	8.98%	14.22%	14.25%	9.69%	22.55%	37.78%
	(1.32)	(0.97)	(0.97)	(0.64)	(0.94)	(1.34)

Panel D: Buy-and-hold returns – 0.1 deviation

	2 months	4 months	6 months	8 months	10 months	12 months
Mining &	3.59%	9.36%*	13.19%	13.84%	7.74%	10.16%
construction	(0.88)	(1.65)	(1.64)	(1.48)	(0.64)	(0.88)
Manufacturing	10.22%	18.22%*	21.48%*	21.04%	26.45%	32.41%*
	(1.46)	(1.84)	(1.80)	(1.54)	(1.48)	(1.73)
Finance & services	-10.31%**	-16.88%	-21.90%	-18.08%	-27.61%	-17.78%
	(-2.05)	(-1.68)	(-1.55)	(-1.00)	(-1.10)	(-0.99)
Bank	-2.30%	3.41%	10.97%	8.36%	-0.15%	6.45%
representation	(-0.33)	(0.30)	(0.86)	(0.61)	(-0.81)	(0.53)
No bank	6.14%	8.44%	5.99%	8.89%	11.84%	18.00%
representation	(1.21)	(1.13)	(0.60)	(0.74)	(0.75)	(1.10)
Ownership 0-25	11.09%*	11.67%	8.85%	11.05%	8.65%	21.11%
	(1.66)	(1.03)	(0.67)	(0.73)	(0.41)	(1.06)
Ownership 25-50	-6.85%	-0.27%	14.19%	13.91%	12.13%	15.20%
	(-1.11)	(-0.04)	(1.20)	(1.21)	(0.98)	(1.14)
Ownership 50+	-3.88%	2.82%	-1.09%	-1.56%	1.30%	-2.79%
	(-0.71)	(0.48)	(-0.10)	(-0.10)	(0.08)	(-0.17)
Size quartile 1	-3.08%	-18.05%*	-23.74%	-27.01%*	-38.74%	-18.65%
	(-0.58)	(-1.75)	(-1.56)	(-1.71)	(-1.49)	(-0.96)
Size quartile 2	-13.44%	25.34%**	35.68%***	39.22%**	38.57%**	33.76%***
	(-0.37)	(2.26)	(2.62)	(2.34)	(2.44)	(2.67%)
Size quartile 3	-9.86%	-3.26%	2.94%	2.54%	-2.00%	-5.03%
	(-1.49)	(-0.70)	(0.28)	(0.81)	(-0.15)	(-0.36)
Size quartile 4	11.87%	23.10%	16.36%	20.46%	33.83%	46.65%
	(1.28)	(1.33)	(0.86)	(0.86)	(1.04)	(1.33)

Table A.7: Long-run announcement returns – ordered by firm characteristics

This table contains results of long-run event studies following unforced CEO turnover announcements ordered by firm characteristics. Abnormal performance is measured for a portfolio of sample firms for up to 12 months following the month of the CEO change. The table is based on the subsample of firms where the former CEO becomes a member of the supervisory board. The first column lists the firm characteristics. All variables are defined as in Table A.1. Panels A and B present abnormal returns for a calendar-time approach based on the Fama-French 3-factor and the Carhart 4-factor model, while Panel C contains buy-and-hold returns based on a market-model approach. Factor information for the German market is obtained from the Centre for Financial Research Cologne. The number of observations corresponds to the number of months with a positive number of firms in the portfolio. In each month, firms are included in our portfolio "CEO becomes board member" if an unforced CEO turnover has occurred within the previous 12 months and the CEO changed to the supervisory board. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: 3-Factor model – calendar-time

	Alpha (t-statistic)	Beta (t-Statistic)	SMB (t-statistic)	HML (t-Statistic)	Number of observations
Mining & construction	0.010	1.227***	0.869***	0.766***	92
	(1.05)	(8.27)	(3.71)	(2.64)	
Manufacturing	-0.000	1.079***	0.519***	0.462***	115
	(-0.03)	(9.36)	(3.24)	(2.80)	
Finance & services	0.005	1.029***	0.198	-0.009	112
	(0.65)	(7.33)	(1.04)	(-0.05)	
Bank representation	-0.003	0.887***	0.216	0.678***	91
	(-0.44)	(7.51)	(1.36)	(3.99)	
No bank representation	0.010	1.299***	0.540***	0.101***	137
	(1.52)	(11.00)	(3.12)	(0.63)	
Ownership 0-25	0.002	1.393***	0.891***	0.827***	118
	(0.39)	(14.00)	(5.96)	(4.65)	
Ownership 25-50	-0.001	0.681***	0.226	0.565***	104
	(-0.24)	(6.10)	(1.37)	(2.97)	
Ownership 50+	0.009	0.910***	0.122	-0.256	100
	(1.05)	(5.70)	(0.55)	(-1.38)	
Size quartile 1	-0.003	1.379***	0.219	0.292	69
	(-0.42)	(10.46)	(1.05)	(1.38)	
Size quartile 2	0.011	1.138***	0.633***	0.135	105
	(1.28)	(8.29)	(3.00)	(0.53)	
Size quartile 3	-0.003	0.855***	0.487***	0.211	97
	(-0.36)	(6.48)	(2.57)	(1.25)	
Size quartile 4	0.012	0.863***	0.411	0.347	88
	(1.15)	(4.76)	(1.57)	(1.37)	

Panel B: 4-Factor model – calendar-time

	Alpha (t-statistic)	Beta (t-Statistic)	SMB (t-statistic)	HML (t-Statistic)	MOM (t-statistic)	Number of observations
Mining &	0.010	1.216***	0.862***	0.765***	-0.017	92
construction	(1.04)	(6.37)	(3.42)	(2.62)	(-0.09)	
Manufacturing	-0.000	1.077***	0.516***	0.462***	-0.006	115
	(-0.02)	(8.38)	(3.02)	(2.78)	(-0.04)	
Finance & services	0.008	0.937***	0.107	0.035	-0.208	112
	(1.04)	(6.06)	(0.53)	(0.20)	(-1.40)	
Bank representation	0.001	0.750***	0.089	0.668***	-0.276*	91
	(0.21)	(5.52)	(0.52)	(3.99)	(-1.96)	
No bank	0.012*	1.238***	0.491***	0.117	-0.114	137
representation	(1.69)	(8.95)	(2.68)	(0.72)	(-0.85)	
Ownership 0-25	0.007	1.233***	0.750***	0.828***	-0.314**	118
	(1.10)	(10.65)	(4.79)	(4.77)	(-2.55)	
Ownership 25-50	0.001	0.628***	0.174	0.553***	-0.134	104
	(0.09)	(5.02)	(1.00)	(2.91)	(-0.95)	
Ownership 50+	0.005	1.028***	0.221	-0.308*	0.286	100
	(0.50)	(5.91)	(0.97)	(-1.65)	(1.63)	
Size quartile 1	-0.003	1.358***	0.202	0.292	-0.036	69
	(-0.32)	(8.41)	(0.91)	(1.37)	(-0.23)	
Size quartile 2	0.013	1.076***	0.579**	0.132	-0.120	105
	(1.40)	(6.45)	(2.56)	(0.52)	(-0.67)	
Size quartile 3	-0.003	0.876***	0.501**	0.200	0.047	97
	(-0.44)	(5.88)	(2.56)	(1.16)	(0.32)	
Size quartile 4	0.013	0.829***	0.379	0.346	-0.078	88
	(1.19)	(3.99)	(1.36)	(1.36)	(-0.35)	

Panel C: Buy-and-hold returns

	2 months	4 months	6 months	8 months	10 months	12 months
Mining &	-0.95%	0.43%	0.56%	1.56%	0.74%	2.61%
construction	(-0.17)	(0.07)	(0.08)	(0.20)	(0.07)	(0.23)
Manufacturing	7.25%*	11.55%*	8.44%	9.97%	16.36%	18.71%
	(1.83)	(1.67)	(1.22)	(1.08)	(1.21)	(1.24)
Finance & services	-9.08%***	-3.81%	-4.08%	1.15%	3.54%	2.04%
	(-2.86)	(-1.15)	(-0.70)	(0.14)	(0.36)	(0.22)
Bank representation	-1.77%	5.70%	5.73%	6.02%	7.75%	1.29%
	(-0.55)	(1.52)	(1.12)	(1.12)	(1.34)	(0.21)
No bank	1.93%	4.19%	1.84%	5.37%	9.92%	14.67%
representation	(0.54)	(0.78)	(0.33)	(0.71)	(0.92)	(1.25)
Ownership 0-25	3.11%	7.66%	6.21%	8.59%	14.71%	18.39%
	(0.68)	(1.10)	(0.89)	(0.92)	(1.05)	(1.22)
Ownership 25-50	0.07%	1.89%	2.59%	2.81%	2.08%	-1.39%
	(0.02)	(0.42)	(0.37)	(0.44)	(0.34)	(-0.16)
Ownership 50+	-3.17%	1.32%	-2.33%	2.17%	4.75%	4.84%
	(-0.80)	(0.34)	(-0.41)	(0.26)	(0.55)	(0.56)
Size quartile 1	-3.61%	-3.88%	-2.73%	-3.95%	1.75%	1.41%
	(-1.22)	(-1.36)	(-0.70)	(-0.99)	(0.27)	(0.23)
Size quartile 2	1.81%	3.57%	3.48%	8.07%	10.96%	7.80%
	(0.44)	(0.78)	(0.62)	(0.88)	(1.28)	(0.93)
Size quartile 3	-2.08%	0.08%	-2.74%	-0.14%	-3.51%	-10.56%**
	(-1.23)	(0.03)	(-0.56)	(-0.04)	(-0.86)	(-2.31)
Size quartile 4	7.26%	19.93%	15.19%	19.24%	29.02%	45.10%
	(1.44)	(1.38)	(1.02)	(0.98)	(0.98)	(1.44)

Table A.8: Operating performance – former CEO becomes chairman of the supervisory board vs. former CEO does not change to the supervisory board

This table contains the results of a difference-in-differences analysis of operating performance around unforced CEO turnover events. We compare firms in which a former CEO becomes the chairman of the supervisory board to firms in which a retiring CEO leaves the firm. All variables are defined as in Table A.1. The difference-in-differences analysis compares average (*excess*) *ROA* and average (*excess*) *ROE* under the old CEO (average of years t-2 and t-1) to average (excess) performance under the new CEO (years t+1 and t+2, relative to the turnover year (t=0)). Each cell shows the estimated coefficient. The figures in the third row and third column (in bold in the lower right cell) of each sub-panel show the estimated coefficients and t-values (in parentheses) (of the difference-in-differences estimator). The superscript * denotes statistical significance at the 10% level.

Panel A: Raw performance

	Former CEO changes to the supervisory board	Former CEO does not change to the supervisory board	Difference
ROA			
Average ROA	0.088	0.074	0.014
(t-2, t-1)			(0.918)
Average ROA	0.072	0.063	0.010
(t+1, t+2)			(0.641)
Change in ROA	-0.016*	-0.011	**-0.005**
	(-1.744)	(-1.084)	**(-0.330)**
Observations	33	35	
ROE			
Average ROE	0.046	0.041	0.005
(t-2, t-1)			(0.400)
Average ROE	0.036	0.011	0.025
(t+1, t+2)			(1.423)
Change in ROE	-0.011	-0.030*	**0.020**
	(-0.159)	(-1.881)	**(1.103)**
Observations	33	35	

Panel B: Excess performance

	Former CEO changes to the supervisory board	Former CEO does not change to the supervisory board	Difference
ROA			
Average excess ROA	0.008	0.017	-0.008
(t-2, t-1)			(-1.436)
Average excess ROA	0.019	0.029	-0.010
(t+1, t+2)			(-0.575)
Change in excess ROA	0.010	0.012	**-0.001**
	(0.923)	(0.867)	**(-0.474)**
Observations	32	35	
ROE			
Average excess ROE	0.004	0.017	-0.013*
(t-2, t-1)			(-1.873)
Average excess ROE	0.112	-0.003	0.115
(t+1, t+2)			(1.316)
Change in excess ROE	0.107	-0.020	**0.128**
	(1.202)	(-0.959)	**(1.451)**
Observations	30	33	

Table A.9: Operating performance – former CEO becomes ordinary supervisory board member vs. former CEO does not change to the supervisory board

This table contains the results of a difference-in-differences analysis of operating performance around unforced CEO turnover events. We compare firms in which a former CEO becomes an ordinary member of the supervisory board to firms in which a retiring CEO leaves the firm. All variables are defined as in Table A.1. The difference-in-differences analysis compares average (*excess*) *ROA* and average (*excess*) *ROE* under the old CEO (average of years t-2 and t-1) to average (excess) performance under the new CEO (years t+1 and t+2, relative to the turnover year (t=0)). Each cell shows the estimated coefficient. The figures in the third row and third column (in bold in the lower right cell) of each sub-panel show the estimated coefficients and t-values (in parentheses) (of the difference-in-differences estimator). The superscript * denotes statistical significance at the 10% level.

Panel A: Raw performance

	Former CEO changes to the supervisory board	Former CEO does not change to the supervisory board	Difference
ROA			
Average ROA (t-2, t-1)	0.058	0.074	-0.016 (-0.887)
Average ROA (t+1, t+2)	0.085	0.063	0.023 (0.016)
Change in ROA	0.028 (1.445)	-0.011 (-1.084)	**0.039*** **(1.948)**
Observations	19	35	
ROE			
Average ROE (t-2, t-1)	0.009	0.041	-0.032* (-1.762)
Average ROE (t+1, t+2)	0.031	0.011	0.020 (0.964)
Change in ROE	0.022 (1.051)	-0.030* (-1.881)	**0.053*** **(1.962)**
Observations	19	35	

Panel B: Excess performance

	Former CEO changes to the supervisory board	Former CEO does not change to the supervisory board	Difference
ROA			
Average excess ROA (t-2, t-1)	0.022	0.017	0.006 (0.629)
Average excess ROA (t+1, t+2)	0.022	0.029	-0.006 (-0.334)
Change in excess ROA	-0.000 (-0.002)	0.012 (0.867)	**-0.012** **(-0.569)**
Observations	18	35	
ROE			
Average excess ROE (t-2, t-1)	0.014	0.017	-0.002 (-0.202)
Average excess ROE (t+1, t+2)	-0.095	-0.003	-0.092 (-0.852)
Change in excess ROE	-0.110 (-0.766)	-0.020 (-0.959)	**-0.089** **(-0.823)**
Observations	18	33	

Table A.10a: Determinants of executive compensation – tenure of the former CEO & total assets

This table shows the results of fixed effects regressions with per capita executive compensation as the dependent variable. The first column shows the independent variables. All variables are defined as in Table A.1. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
Constant	-1806.53**	-1772.61**	-4008.29***	-4005.41***
	(-2.89)	(-2.80)	(-4.19)	(-4.18)
Former CEO on board*	13.49			
Former CEO tenure	(1.77)			
Former CEO is chairman*		10.79		
Former CEO tenure		(1.49)		
Former CEO is ordinary		20.50*		
board member*f. CEO ten.		(1.99)		
Former CEO on board			89.11	
			(1.06)	
Former CEO is chairman				84.15
				(1.06)
Former CEO is ordinary				98.28
board member				(0.96)
Ln (number of executives)	-517.68***	-518.16***	-570.17***	-570.07***
	(-4.10)	(-4.09)	(-4.37)	(-4.37)
CEO tenure	7.76***	7.71***	6.79***	6.77***
	(5.54)	(5.25)	(5.84)	(5.74)
Stake executive board	0.66	0.65	0.21	0.21
	(0.44)	(0.44)	(0.15)	(0.14)
Stake supervisory board	4.19**	4.19**	3.79*	3.79*
	(2.45)	(2.45)	(2.06)	(2.08)
Largest shareholder > 50%	-95.57**	-93.41**	-63.05	-63.00
	(-2.95)	(-2.79)	(-1.66)	(-1.65)
Checked	134.06**	135.08**	97.78*	97.92*
	(2.82)	(2.84)	(2.06)	(2.07)
Codetermination	-18.80	-12.89	-118.89	-117.34
	(-0.13)	(-0.09)	(-0.69)	(-0.69)
Bank representation	-231.37***	-234.32***	-207.57***	-208.00***
	(-6.62)	(-6.58)	(-4.65)	(-4.74)
Ln (market capitalization)	276.32***	273.52***		
	(5.62)	(5.51)		
Ln (total assets)			417.21***	416.96***
			(5.92)	(5.91)
Share price performance	-15.86	-16.40	46.29	46.01
	(-0.65)	(-0.68)	(1.40)	(1.39)
Tobin´s Q	-52.34	-52.15	53.95**	53.84**
	(-1.24)	(-1.23)	(2.68)	(2.67)
R^2 within	0.346	0.346	0.347	0.347
Observations	1,281	1,281	1,289	1,289

Table A.10b: Determinants of executive compensation – total assets

This table shows the results of fixed effects regressions with per capita executive compensation as the dependent variable. The first column shows the independent variables. All variables are defined as in Table A.1. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(5)	(6)
Constant	-3981.61***	-3986.24***
	(-4.08)	(-4.09)
Former CEO on board*joint tenure	28.30*	
	(2.03)	
Former CEO is chairman*joint tenure		30.88*
		(2.21)
Former CEO is ordinary board member*joint tenure		11.71
		(0.65)
Ln (number of executives)	-565.37***	-564.31***
	(-4.34)	(-4.36)
CEO tenure	6.41***	6.20***
	(4.46)	(4.06)
Stake executive board	0.19	0.24
	(0.13)	(0.16)
Stake supervisory board	3.85*	3.86*
	(2.02)	(2.01)
Largest shareholder > 50%	-61.39	-62.14
	(-1.65)	(-1.65)
Checked	96.78*	92.37*
	(2.08)	(2.02)
Codetermination	-134.37	-146.98
	(-0.84)	(-0.94)
Bank representation	-208.75**	-207.10***
	(-4.35)	(-4.46)
Ln (total assets)	416.70***	417.58***
	(5.67)	(5.66)
Share price performance	48.32	49.08
	(1.44)	(1.44)
Tobin´s Q	52.34**	52.27**
	(2.63)	(2.65)
R^2 within	0.347	0.347
Observations	1,289	1,289

Table A.11a: Determinants of executive compensation – leverage & largest shareholder > 25%

This table shows the results of fixed effects regressions with per capita executive compensation as the dependent variable. The first column shows the independent variables. All variables are defined as in Table A.1. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts ** and *** denote significance at the 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)
Constant	-1863.77**	-1866.72**	-1711.39**	-1707.51**
	(-2.49)	(-2.45)	(-2.91)	(-2.84)
Former CEO on board	122.70		128.21	
	(1.30)		(1.43)	
Former CEO is chairman		124.80		125.57
		(1.40)		(1.44)
Former CEO is ordinary		118.54		133.39
board member		(1.02)		(1.27)
Ln (number of executives)	-517.37***	-517.44***	-525.76***	-525.69***
	(-4.12)	(-4.13)	(-4.20)	(-4.20)
CEO tenure	7.00***	7.00***	7.39***	7.38***
	(5.62)	(5.57)	(5.58)	(5.37)
Stake executive board	0.82	0.82	1.26	1.26
	(0.53)	(0.53)	(0.96)	(0.96)
Stake supervisory board	4.07**	4.06**	4.41**	4.41**
	(2.52)	(2.54)	(2.76)	(2.79)
Largest shareholder > 50%	-98.09***	-98.13***		
	(-3.32)	(-3.29)		
Largest shareholder > 25%			-204.67***	-204.96***
			(-5.92)	(-6.10)
Checked	140.00**	139.96**	83.84***	83.86***
	(2.86)	(2.85)	(3.93)	(3.94)
Codetermination	-3.32	-3.98	9.27	10.06
	(-0.02)	(-0.03)	(0.06)	(0.07)
Bank representation	-222.49***	-222.32***	-223.69***	-223.91***
	(-7.51)	(-7.65)	(-7.18)	(-7.25)
Ln (market capitalization)	278.97***	279.21***	274.52***	274.22***
	(5.03)	(4.95)	(5.89)	(5.79)
Share price performance	-17.35	-17.28	-12.85	-12.92
	(-0.72)	(-0.72)	(-0.53)	(-0.53)
Tobin´s Q	-50.74	-50.77	-47.76	-47.71
	(-1.16)	(-1.16)	(-1.16)	(-1.15)
Leverage	60.77	60.76	-12.85	-12.92
	(0.40)	(0.39)	(-0.53)	(-0.53)
R^2 within	0.344	0.344	0.348	0.348
Observations	1,281	1,281	1,281	1,281

Table A.11b: Determinants of executive compensation – leverage & largest shareholder > 25%

This table shows the results of fixed effects regressions with per capita executive compensation as the dependent variable. The first column shows the independent variables. All variables are defined as in Table A.1. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts ** and *** denote significance at the 5%, and 1% level, respectively.

	(5)	(6)	(7)	(8)
Constant	-1849.80**	-1857.74**	-1701.45**	-1703.87**
	(-2.50)	(-2.52)	(-2.96)	(-2.96)
Former CEO on	37.72**		35.74**	
board*joint tenure	(2.45)		(2.31)	
Former CEO is		39.43**		37.48**
chairman*joint tenure		(2.56)		(2.39)
Former CEO is ordinary		22.74		21.28
board member*joint tenure		(1.25)		(1.25)
Ln (number of executives)	-511.32***	-509.86	-518.51***	-517.12***
	(-4.07)	(-4.08)	(-4.13)	(-4.15)
CEO tenure	6.42***	6.24	6.60***	6.44***
	(5.58)	(5.09)	(5.00)	(4.56)
Stake executive board	0.77	0.84	1.15	1.20
	(0.50)	(0.54)	(0.88)	(0.92)
Stake supervisory board	4.16**	4.16	4.49**	4.49**
	(2.42)	(2.40)	(2.65)	(2.64)
Largest shareholder > 50%	-96.29***	-96.41**		
	(-3.25)	(-3.18)		
Largest shareholder > 25%			-193.97***	-192.43***
			(-5.43)	(-5.58)
Checked	138.64**	134.04**	82.06***	80.01***
	(2.90)	(2.85)	(4.07)	(3.95)
Codetermination	-24.27	-36.26	-10.47	-22.66
	(-0.18)	(-0.28)	(-0.08)	(-0.18)
Bank representation	-224.50***	-222.74***	-226.71***	-225.03***
	(-6.30)	(-6.51)	(-6.08)	(-6.31)
Ln (market capitalization)	280.05***	280.95***	275.68***	276.26***
	(5.03)	(5.03)	(5.92)	(5.92)
Share price performance	-14.94	-14.48	-193.97***	-192.43***
	(-0.61)	(-0.59)	(-5.43)	(-5.58)
Tobin´s Q	-53.26	-53.59	-10.83	-10.47
	(-1.23)	(-1.23)	(-0.45)	(-0.43)
Leverage	57.28	64.91	-50.56	-50.85
	(0.35)	(0.39)	(-1.23)	(-1.24)
R^2 within	0.345	0.345	0.348	0.348
Observations	1,281	1,281	1,281	1,281

Table A.12a: Determinants of executive compensation – stake largest shareholder & identity largest shareholder

This table shows the results of fixed effects regressions with per capita executive compensation as the dependent variable. The first column shows the independent variables. All variables are defined as in Table A.1. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
Constant	-1650.14**	-1641.23**	-1872.97**	-1874.00**
	(-2.86)	(-2.78)	(-2.93)	(-2.85)
Former CEO on board	112.15		117.64	
	(1.21)		(1.23)	
Former CEO is chairman		106.29		118.37
		(1.22)		(1.31)
Former CEO is ordinary		123.49		116.19
board member		(1.11)		(0.98)
Ln (number of executives)	-526.69***	-526.59***	-505.52***	-505.55***
	(-4.14)	(-4.15)	(-3.93)	(-3.94)
CEO tenure	6.58***	6.55***	6.85***	6.85**
	(6.13)	(5.86)	(5.21)	(5.13)
Stake executive board	1.37	1.37	0.01	0.01
	(0.94)	(0.95)	(0.01)	(0.01)
Stake supervisory board	4.48**	4.49**	3.14**	3.14**
	(2.86)	(2.90)	(2.38)	(2.40)
Stake largest shareholder	-3.53***	-3.54***		
	(-4.22)	(-4.39)		
Family > 50%			17.40	17.37
			(1.09)	(1.08)
Financials > 50%			-242.16***	-242.13***
			(-4.95)	(-5.20)
Industrials > 50%			-200.87*	-200.88*
			(-1.90)	(-1.89)
Others > 50%			-228.49*	-228.48*
			(-2.23)	(-2.23)
Checked	127.18**	127.44**	131.12**	131.11**
	(2.89)	(2.90)	(2.60)	(2.60)
Codetermination	-19.47	-17.81	5.72	5.49
	(-0.13)	(-0.12)	(0.04)	(0.04)
Bank representation	-229.93***	-230.45***	-203.45***	-203.40***
	(-7.28)	(-7.36)	(-7.30)	(-7.15)
Ln (market capitalization)	273.11***	272.45***	280.54***	280.63***
	(5.86)	(5.77)	(5.58)	(5.47)
Share price performance	-14.99	-15.16	-22.83	-22.81
	(-0.63)	(-0.64)	(-0.97)	(-0.98)
Tobin´s Q	-45.52	-45.39	-50.90	-50.92
	(-1.12)	(-1.11)	(-1.19)	(-1.19)
R^2 within	0.350	0.350	0.350	0.350
Observations	1,280	1,280	1,281	1,281

Table A.12b: Determinants of executive compensation – stake largest shareholder & identity largest shareholder

This table shows the results of fixed effects regressions with per capita executive compensation as the dependent variable. The first column shows the independent variables. All variables are defined as in Table A.1. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(5)	(6)	(7)	(8)
Constant	-1643.03**	-1643.64***	-1865.97**	-1867.29**
	(-2.93)	(-2.94)	(-2.98)	(-2.98)
Former CEO on	32.87*		36.63**	
board*joint tenure	(2.11)		(2.28)	
Former CEO is		33.15*		37.87**
chairman*joint tenure		(2.17)		(2.39)
Former CEO is ordinary		21.46		23.42
board member*joint tenure		(1.19)		(1.33)
Ln (number of executives)	-520.66***	-519.40***	-499.33***	-498.05***
	(-4.10)	(-4.11)	(-3.87)	(-3.88)
CEO tenure	5.99***	5.83***	6.33***	6.17***
	(4.69)	(4.22)	(5.87)	(5.44)
Stake executive board	1.30	1.34	-0.03	0.03
	(0.89)	(0.92)	(-0.02)	(0.03)
Stake supervisory board	4.56**	4.57**	3.22**	3.23*
	(2.72)	(2.71)	(2.27)	(2.24)
Stake largest shareholder	-3.43***	-3.42***		
	(-4.29)	(-4.37)		
Family > 50%			18.16	17.85
			(1.18)	(1.09)
Financials > 50%			-227.86***	-227.53***
			(-4.64)	(-4.68)
Industrials > 50%			-206.69*	-206.48*
			(-1.91)	(-1.90)
Others > 50%			-217.39*	-218.91*
			(-2.10)	(-2.15)
Checked	125.57**	121.85**	131.15**	126.99**
	(2.96)	(2.93)	(2.63)	(2.59)
Codetermination	-37.23	-45.90	-13.89	-24.86
	(-0.28)	(-0.36)	(-0.11)	(-0.21)
Bank representation	-231.96***	-230.85***	-206.26***	-204.77***
	(-6.21)	(-6.41)	(-5.74)	(-5.89)
Ln (market capitalization)	274.25***	274.63***	281.92***	282.44***
	(5.90)	(5.91)	(5.61)	(5.62)
Share price performance	-12.96	-12.74	-20.30	-19.97
	(-0.55)	(-0.53)	(-0.85)	(-0.83)
Tobin´s Q	-47.98	-48.15	-53.42	-53.62
	(-1.18)	(-1.19)	(-1.26)	(-1.27)
R^2 within	0.350	0.350	0.350	0.350
Observations	1,280	1,280	1,280	1,280

Table A.13: Determinants of executive compensation: Difference-in-differences – total assets & leverage

This table shows the results of fixed effects regressions using difference-in-differences methodology with per capita *executive compensation* as the dependent variable. The first column lists the independent variables. All variables are defined as in Table A.1. In columns 1 & 2 (3 & 4/5 & 6) the treatment group consists of all 41 firms whose former CEO transfers to the supervisory board (25 (16) firms where he becomes the chairman of the supervisory board (an ordinary supervisory board member)). The control group consists of 18 firms whose departing CEO did not become a member of the supervisory board. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Former CEO changes to the supervisory board		Former CEO becomes chairman of the board		Former CEO becomes ordinary board member	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-2820.43	-417.25	-2877.16	-3222.31*	-2351.28	821.03
	(-1.18)	(-0.46)	(-1.59)	(-2.05)	(0.76)	(0.74)
Post	-14.70	-40.42	15.66	3.59	-197.05	-206.21
	(-0.17)	(-0.55)	(0.21)	(0.06)	(-1.18)	(-1.39)
Post*treatment	143.02**	173.93***	259.57***	295.72***	106.52*	132.21**
	(2.85)	(2.95)	(2.96)	(3.02)	(1.83)	(2.26)
Ln (number of executives)	-654.11**	-632.53**	-557.57*	-552.50*	-661.89*	-682.28*
	(-2.13)	(-2.16)	(-2.00)	(-1.93)	(-2.02)	(-2.11)
CEO tenure	15.00***	14.25***	20.87***	21.77***	-6.03	-6.92
	(5.41)	(6.93)	(4.59)	(5.06)	(-0.63)	(-0.74)
Largest shareholder > 50%	382.21***	349.81***	379.53**	369.79***	307.66***	275.54***
	(3.39)	(3.06)	(2.90)	(2.94)	(4.50)	(3.54)
Checked	-20.76	0.15	-36.19	-24.62	88.43	116.20
	(-0.29)	(0.00)	(-0.46)	(-0.32)	(1.32)	(1.74)
Stake executive board	-2.69	-3.10	-2.51	-3.17	-6.61	-5.38
	(-0.54)	(-0.63)	(-0.37)	(-0.51)	(-1.20)	(-0.91)
Stake supervisory board	0.85	-1.46	-3.22	-3.27	-2.70	-3.20
	(0.21)	(0.39)	(-0.69)	(-0.73)	(-0.68)	(-0.83)
Codetermination	171.70	255.64	405.95	628.47	-347.74	-252.28
	(0.28)	(0.41)	(0.66)	(0.97)	(-0.35)	(-0.25)
Bank representation	-413.51***	-436.24***	-141.94**	-152.12**	-708.34***	-718.60***
	(-4.55)	(-5.73)	(-2.20)	(-2.73)	(-4.24)	(-4.35)
Ln (market capitalization)		90.08*		204.24**		100.74*
		(2.11)		(2.59)		(2.07)
Ln (total assets)	284.05		273.10**		335.68	73.06
	(1.63)		(2.15)		(1.69)	(1.29)
Share price performance	132.11**	106.43*	158.27**	141.47**	96.31	
	(2.33)	(2.03)	(2.47)	(2.45)	(1.63)	
Tobin´s Q	66.87	51.93	53.46	53.09	105.46	77.11
	(1.00)	(0.89)	(0.89)	(0.96)	(0.99)	(0.71)
Leverage		-555.77**		-565.50*		-473.66
		(-2.34)		(-1.80)		(-1.25)
R^2 within	0.374	0.372	0.428	0.432	0.348	0.346
Observations	413	413	301	301	238	238

Table A.14: Determinants of executive compensation: Difference-in-differences – largest shareholder > 25% & stake largest shareholder

This table shows the results of fixed effects regressions using difference-in-differences methodology with per capita *executive compensation* as the dependent variable. The first column lists the independent variables. All variables are defined as in Table A.1. In columns 1 & 2 (3 & 4/5 & 6) the treatment group consists of all 41 firms whose former CEO transfers to the supervisory board (25 (16) firms where he becomes the chairman of the supervisory board (an ordinary supervisory board member)). The control group consists of 18 firms whose departing CEO did not become a member of the supervisory board. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Former CEO changes to the supervisory board		Former CEO becomes chairman of the board		Former CEO becomes ordinary board member	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	204.97	215.41	-2003.25	-2139.86	1481.25	842.32
	(0.24)	(0.28)	(-1.13)	(-1.49)	(1.17)	(0.69)
Post	-129.86	-86.48	-96.18	-43.00	-294.58	-249.26*
	(-1.51)	(-1.15)	(-1.26)	(-0.66)	(-1.73)	(-1.78)
Post*treatment	221.27***	215.79**	304.88**	325.94**	282.73***	200.53**
	(2.94)	(2.89)	(2.58)	(2.73)	(5.16)	(2.78)
Ln (number of executives)	-638.11**	-635.60**	-601.77**	-587.55**	-635.73*	-655.92*
	(-2.31)	(-2.22)	(-2.25)	(-2.17)	(-2.00)	(-1.97)
CEO tenure	11.29***	13.80***	18.61***	20.86***	-7.12	-4.81
	(5.72)	(4.39)	(5.99)	(3.93)	(-0.69)	(-0.48)
Largest shareholder > 25%	162.98*		-12.90		464.59***	
	(1.84)		(-0.08)		(4.01)	
Stake largest shareholder		7.52***		6.77***		8.47**
		(3.92)		(4.06)		(2.86)
Checked	-10.20	135.68***	27.04	140.64***	26.07	192.12***
	(-0.23)	(4.81)	(0.37)	(3.24)	(0.52)	(3.69)
Stake executive board	-3.33	-3.86	-2.16	-3.93	-5.44	-5.49
	(-0.65)	(-0.79)	(-0.36)	(-0.62)	(-0.95)	(-0.99)
Stake supervisory board	-1.52	-1.31	-2.71	-3.47	-3.82	-2.75
	(-0.42)	(-0.35)	(-0.68)	(-0.78)	(-0.95)	(-0.74)
Codetermination	74.71	136.92	361.45	475.03	-229.12	-287.75
	(0.13)	(0.24)	(0.61)	(0.78)	(-0.26)	(-0.31)
Bank representation	-445.61***	-438.04***	-178.17*	-183.03**	-766.81***	-677.19***
	(-4.54)	(-4.88)	(-2.10)	(-2.41)	(-3.83)	(-3.99)
Ln (market capitalization)	66.20	62.67	164.14*	162.53**	48.63	75.60
	(1.55)	(1.61)	(1.88)	(2.19)	(0.88)	(1.49)
Share price performance	111.75*	104.87*	146.23**	141.76**	101.83	65.86
	(1.99)	(1.79)	(2.54)	(2.18)	(1.45)	(0.96)
Tobin´s Q	83.79	50.04	86.99	48.76	108.91	76.11
	(1.29)	(0.90)	(1.46)	(0.96)	(0.99)	(0.73)
R^2 within	0.347	0.364	0.398	0.416	0.341	0.349
Observations	413	413	301	301	238	238

Table A.15: Determinants of executive compensation: Difference-in-differences – identity largest shareholder

This table shows the results of fixed effects regressions using difference-in-differences methodology with per capita *executive compensation* as the dependent variable. The first column lists the independent variables. All variables are defined as in Table A.1. In columns 1 (2/3) the treatment group consists of all 41 firms whose former CEO transfers to the supervisory board (25 (16) firms where he becomes the chairman of the supervisory board (an ordinary supervisory board member)). The control group consists of 18 firms whose departing CEO did not become a member of the supervisory board. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Former CEO changes to the supervisory board	Former CEO becomes chairman of the board	Former CEO becomes ordinary board member
	(1)	(2)	(3)
Constant	376.88	-2116.84	1151.49
	(0.48)	(-1.32)	(1.00)
Post	-6.23	55.54	-200.60
	(-0.08)	(0.80)	(-1.28)
Post*treatment	166.63**	289.18**	122.79
	(2.48)	(2.45)	(1.39)
Ln (number of executives)	-625.60**	-541.40**	-713.54**
	(-2.48)	(-2.37)	(-2.28)
CEO tenure	16.98***	25.66***	-5.45
	(4.00)	(3.83)	(-0.50)
Family > 50%	313.76*	416.08**	264.49
	(1.90)	(2.36)	(1.61)
Financials > 50%	-332.13	-171.94	-340.63
	(-1.24)	(-0.64)	(-0.83)
Industrials > 50%	1693.38***	1714.31***	737.43***
	(4.10)	(3.99)	(9.06)
Others > 50%	172.39	135.98	344.96**
	(1.46)	(0.73)	(2.38)
Checked	102.46	80.97	150.49**
	(1.35)	(1.28)	(2.15)
Stake executive board	-4.75	-6.71	-6.10
	(-1.54)	(-1.55)	(-0.97)
Stake supervisory board	-1.58	-5.29	-1.89
	(-0.54)	(-1.53)	(-0.61)
Codetermination	103.15	421.53	-194.31
	(0.18)	(0.72)	(-0.21)
Bank representation	-497.56***	-236.94***	-805.01***
	(-5.63)	(-3.55)	(-4.19)
Ln (market capitalization)	64.45	167.12*	75.99
	(1.59)	(2.05)	(1.47)
Share price performance	65.04	102.66*	22.03
	(1.09)	(1.80)	(0.31)
Tobin´s Q	54.07	43.26	98.86
	(0.85)	(0.76)	(0.90)
R^2 within	0.389	0.468	0.350
Observations	413	301	238

Table A.16: Determinants of director compensation: tenure former CEO & total assets

This table shows the results of fixed effects regressions with per capita *director compensation* as the dependent variable. The first column shows the independent variables. All variables are defined as in Table A.1. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
Constant	-35.95**	-43.44**	-147.02**	-148.62**
	(-2.49)	(-2.45)	(-2.81)	(-2.74)
Former CEO on board*	0.22			
Former CEO tenure	(1.53)			
Former CEO is chairman*		0.76**		
Former CEO tenure		(2.63)		
Former CEO is ordinary		-0.69		
board member*f. CEO ten.		(-1.59)		
Former CEO on board			3.21	
			(1.47)	
Former CEO is chairman				7.55
				(1.79)
Former CEO is ordinary				-4.61
board member.				(-1.17)
Ln (number of directors)	1.33	1.64	-1.14	-0.64
	(0.19)	(0.23)	(-0.17)	(-0.09)
Largest shareholder > 50%	4.82	4.62	5.68	5.66
	(0.52)	(0.51)	(0.62)	(0.62)
Stake executive board	0.06	0.06	0.04	0.05
	(0.78)	(0.72)	(0.53)	(0.57)
Stake supervisory board	-0.08*	-0.08*	-0.10**	-0.11**
	(-2.00)	(-2.09)	(-2.74)	(-2.93)
Checked	-2.65	-2.69	-3.62	-3.81
	(-1.08)	(-1.03)	(-1.37)	(-1.32)
Codetermination	-35.63	-38.66	-35.15	-38.14
	(-1.62)	(-1.70)	(-1.62)	(-1.68)
Bank representation	-7.20***	-6.31**	-5.93***	-5.35**
	(-3.28)	(-2.81)	(-3.28)	(-3.11)
Board meetings	0.40*	0.41	0.25	0.24
	(1.85)	(1.73)	(1.01)	(0.98)
Ln (market capitalization)	7.31***	7.89***		
	(12.12)	(9.34)		
Ln (total assets)			14.81***	14.92***
			(4.10)	(4.03)
Share price performance	-0.18	-0.16	1.39	1.62
	(-0.11)	(-0.10)	(1.15)	(1.41)
Tobin´s Q	-1.44*	-1.40*	1.95**	2.08**
	(-2.04)	(-1.93)	(2.71)	(2.73)
R^2 within	0.071	0.077	0.077	0.080
Observations	1,195	1,195	1,203	1,203

Table A.17: Determinants of director compensation: leverage & largest shareholder > 25%

This table shows the results of fixed effects regressions with per capita *director compensation* as the dependent variable. The first column shows the independent variables. All variables are defined as in Table A.1. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
Constant	-68.51**	-75.14**	-35.81**	-43.77**
	(-2.78)	(-2.65)	(-2.47)	(-2.31)
Former CEO on board	3.34		3.75*	
	(1.57)		(1.92)	
Former CEO is chairman		8.00*		8.75*
		(2.00)		(2.20)
Former CEO is ordinary		-5.67		-5.92
board member		(-1.28)		(-1.26)
Ln (number of directors)	0.35	0.97	0.23	0.89
	(0.06)	(0.15)	(0.03)	(0.12)
Largest shareholder > 50%	6.55	6.47		
	(0.71)	(0.71)		
Largest shareholder > 25%			4.42	4.98
			(0.43)	(0.48)
Stake executive board	0.05	0.06	0.07	0.07
	(0.69)	(0.74)	(0.82)	(0.81)
Stake supervisory board	-0.11**	-0.12**	-0.09**	-0.10**
	(-2.57)	(-2.79)	(-2.31)	(-2.54)
Checked	-3.28	-3.44	0.18	0.06
	(-1.37)	(-1.29)	(0.08)	(0.02)
Codetermination	-33.24	-36.59	-34.51	-38.03
	(-1.60)	(-1.66)	(-1.53)	(-1.61)
Bank representation	-6.16**	-5.57*	-7.23***	-6.59**
	(-2.39)	(-2.18)	(-3.41)	(-3.10)
Board meetings	0.20	0.20	0.42*	0.41
	(0.75)	(0.74)	(1.91)	(1.72)
Ln (market capitalization)	8.90***	9.39***	7.32***	7.86***
	(6.30)	(5.68)	(11.45)	(8.74)
Share price performance			-0.37	-0.25
			(-0.22)	(-0.15)
Tobin´s Q	-0.13	-0.01	-1.34	-1.37
	(-0.07)	(-0.07)	(-1.59)	(-1.65)
Leverage	-1.44*	-1.46*		
	(-1.83)	(-1.86)		
R^2 within	0.078	0.081	0.069	0.072
Observations	1,195	1,195	1,195	1,195

Table A.18: Determinants of director compensation: stake largest shareholder & identity largest shareholder

This table shows the results of fixed effects regressions with per capita *director compensation* as the dependent variable. The first column shows the independent variables. All variables are defined as in Table A.1. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses) based on the Driscoll and Kraay (1998) estimator. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
Constant	-36.74**	-45.01*	-47.80**	-54.92**
	(-2.35)	(-2.21)	(-2.79)	(-2.61)
Former CEO on board	3.94		3.04	
	(1.71)		(1.34)	
Former CEO is chairman		9.04*		7.71*
		(1.94)		(1.88)
Former CEO is ordinary		-5.83		-5.99
board member		(-1.29)		(-1.42)
Ln (number of directors)	0.55	1.27	4.09	4.68
	(0.08)	(0.17)	(0.62)	(0.68)
Stake largest shareholder	0.07	0.09		
	(0.30)	(0.35)		
Family > 50%			18.63*	18.48*
			(2.21)	(2.21)
Financials > 50%			-17.73*	-17.50*
			(-2.04)	(-2.03)
Industrials > 50%			-17.94	-17.81
			(-1.63)	(-1.64)
Others > 50%			-0.34	-0.38
			(-0.05)	(-0.06)
Stake executive board	0.07	0.07	-0.03	-0.02
	(0.64)	(0.63)	(-0.41)	(-0.31)
Stake supervisory board	-0.09	-0.10*	-0.19***	-0.19***
	(-1.68)	(-1.84)	(-4.32)	(-4.59)
Checked	-1.15	-1.44	-4.58**	-4.74*
	(-1.02)	(-1.09)	(-2.34)	(-2.15)
Codetermination	-34.72	-38.29	-37.36	-40.67
	(-1.57)	(-1.65)	(-1.67)	(-1.74)
Bank representation	-6.91**	-6.22**	-3.64	-3.07
	(-3.15)	(-2.84)	(-1.73)	(-1.45)
Board meetings	0.37	0.35	0.31	0.31
	(1.26)	(1.03)	(1.51)	(1.47)
Ln (market capitalization)	7.34***	7.89***	7.85***	8.35***
	(11.51)	(8.57)	(9.79)	(8.00)
Share price performance	-0.30	-0.17	-0.86	-0.73
	(-0.18)	(-0.10)	(-0.56)	(-0.49)
Tobin´s Q	-1.37*	-1.41*	-1.56*	-1.58*
	(-2.00)	(-2.09)	(-2.18)	(-2.23)
R^2 within	0.068	0.073	0.085	0.089
Observations	1,194	1,194	1,195	1,195

Table A.19: Determinants of director compensation: Difference-in-differences – total assets & leverage

This table shows the results of fixed effects regressions using difference-in-differences methodology with per capita *director compensation* as the dependent variable. The first column lists the independent variables. All variables are defined as in Table A.1. In columns 1 & 2 (3 & 4/5 & 6) the treatment group consists of all 48 firms whose former CEO transfers to the supervisory board (29 (19) firms where he becomes the chairman of the supervisory board (an ordinary supervisory board member)). The control group consists of 12 firms whose departing CEO did not become a member of the supervisory board. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Former CEO changes to the supervisory board		Former CEO becomes chairman of the board		Former CEO becomes ordinary board member	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-274.42***	-128.14***	-312.64**	-248.62***	-49.16	-242.74***
	(-3.29)	(-3.54)	(-2.64)	(-5.03)	(-0.41)	(-3.43)
Post	3.56	3.28	7.09*	5.89	7.48	9.40
	(0.80)	(0.72)	(1.84)	(1.73)	(0.88)	(1.02)
Post*treatment	-0.21	0.02	3.15	2.92	-1.08	-3.48
	(-0.04)	(0.00)	(0.69)	(0.54)	(-0.12)	(-0.39)
Ln (number of directors)	-16.38	-12.04	-13.67	-10.00	-1.28	-3.63
	(-1.09)	(-0.81)	(-1.07)	(-0.82)	(-0.04)	(-0.13)
Largest shareholder > 50%	-9.91**	-10.96**	-6.85	-7.96*	-17.44***	-17.41***
	(-2.14)	(-2.46)	(-1.36)	(-1.84)	(-4.68)	(-6.11)
Checked	5.36	7.03	8.98***	10.06*	9.95*	11.91**
	(1.35)	(1.67)	(3.15)	(2.88)	(1.79)	(2.29)
Stake executive board	0.47**	0.36*	0.49**	0.42*	1.12***	0.98***
	(2.60)	(1.94)	(2.31)	(2.14)	(3.37)	(3.02)
Stake supervisory board	-0.03	-0.09	0.10	0.10	-0.13	-0.20
	(-0.34)	(-0.84)	(1.04)	(1.17)	(-1.13)	(-1.51)
Codetermination	-43.44**	-25.75*	-46.62**	-21.48	-51.78**	-31.32
	(-2.55)	(-1.85)	(-2.53)	(-1.27)	(-2.16)	(-1.13)
Bank representation	-13.18	-15.61**	-7.63	-10.06*	-11.97	-15.25
	(-1.70)	(-2.15)	(-1.28)	(-1.94)	(-0.83)	(-1.00)
Board meetings	0.83	2.00*	1.04	1.82	2.17	3.33*
	(0.73)	(1.83)	(0.70)	(1.16)	(1.14)	(1.95)
Ln (market capitalization)		15.33***		22.18***		12.57***
		(13.76)		(8.81)		(7.70)
Ln (total assets)	25.87***		28.45***		8.50	
	(3.76)		(3.69)		(0.91)	
Share price performance	-1.81	-4.38	-4.19	-6.09	-5.68	-7.51
	(-0.60)	(-1.09)	(-0.85)	(-1.02)	(-1.59)	(-1.64)
Tobin´s Q	-1.71	-2.51**	0.93	-0.90	1.08	-1.81
	(-1.25)	(-2.67)	(0.59)	(-0.77)	(0.23)	(-0.57)
Leverage		-11.93		-14.03		-16.61
		(-1.10)		(-1.03)		(-0.63)
R^2 within	0.277	0.293	0.445	0.466	0.217	0.241
Observations	385	385	287	287	217	217

Table A.20: Determinants of director compensation: Difference-in-differences – largest shareholder > 25% & stake largest shareholder

This table shows the results of fixed effects regressions using difference-in-differences methodology with per capita *director compensation* as the dependent variable. The first column lists the independent variables. All variables are defined as in Table A.1. In columns 1 & 2 (3 & 4/5 & 6) the treatment group consists of all 48 firms whose former CEO transfers to the supervisory board (29 (19) firms where he becomes the chairman of the supervisory board (an ordinary supervisory board member)). The control group consists of 12 firms whose departing CEO did not become a member of the supervisory board. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Former CEO changes to the supervisory board		Former CEO becomes chairman of the board		Former CEO becomes ordinary board member	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-131.90***	-132.36***	-341.72***	-347.02***	-192.25***	-181.34***
	(-3.89)	(-3.85)	(-6.19)	(-5.47)	(-3.44)	(-3.61)
Post	4.68	4.54	6.68	6.31	11.72	12.65
	(0.83)	(0.79)	(1.66)	(1.50)	(1.10)	(1.32)
Post*treatment	-1.49	-2.47	2.02	0.93	-5.30	-7.14
	(-0.21)	(-0.33)	(0.35)	(0.15)	(-0.51)	(-0.72)
Ln (number of directors)	-9.31	-8.85	-8.59	-7.33	2.04	-1.08
	(-0.63)	(-0.60)	(-0.68)	(-0.59)	(0.07)	(-0.04)
Largest shareholder > 25%	-3.53		-4.35		-3.27	
	(-0.73)		(-0.86)		(-0.55)	
Stake largest shareholder		-0.25*		-0.18*		-0.23*
		(-2.00)		(-2.11)		(-1.82)
Checked	2.60	2.83	3.84	6.66**	6.55	5.05
	(1.03)	(0.63)	(1.03)	(2.28)	(0.97)	(0.96)
Stake executive board	0.30*	0.34*	0.39*	0.39*	0.87***	0.93**
	(1.53)	(1.77)	(1.88)	(2.11)	(3.17)	(2.90)
Stake supervisory board	-0.11	-0.09	0.08	0.09	-0.26*	-0.24*
	(-1.16)	(-0.85)	(0.88)	(1.08)	(-1.98)	(-1.80)
Codetermination	-26.41*	-25.47*	-24.81	-23.14	-44.00	-42.95
	(-1.88)	(-1.78)	(-1.43)	(-1.22)	(-1.61)	(-1.73)
Bank representation	-15.15*	-16.05*	-9.00	-10.38*	-14.74	-13.87
	(-1.95)	(-2.04)	(-1.58)	(-1.86)	(-0.80)	(-0.96)
Board meetings	1.87	2.19*	1.63	1.85	2.99*	3.13*
	(1.60)	(1.82)	(0.94)	(1.14)	(1.91)	(1.92)
Ln (market capitalization)	14.96***	15.25***	21.28***	21.50***	12.34***	12.50***
	(12.15)	(11.75)	(10.15)	(9.01)	(7.32)	(7.53)
Share price performance	-4.07	-4.28	-5.71	-6.31	-6.12	-6.64*
	(-1.01)	(-1.18)	(-0.98)	(-1.08)	(-1.50)	(-1.86)
Tobin´s Q	-2.90	-2.02*	-1.12	-0.45	-1.71	-1.21
	(-3.10)	(-1.80)	(-1.04)	(-0.39)	(-0.53)	(-0.38)
R^2 within	0.287	0.292	0.458	0.464	0.226	0.228
Observations	385	385	287	287	217	217

Table A.21: Determinants of director compensation: Difference-in-differences – identity largest shareholder

This table shows the results of fixed effects regressions using difference-in-differences methodology with per capita *director compensation* as the dependent variable. The first column lists the independent variables. All variables are defined as in Table A.1. In columns 1 (2/3) the treatment group consists of all 48 firms whose former CEO transfers to the supervisory board (29 (19) firms where he becomes the chairman of the supervisory board (an ordinary supervisory board member)). The control group consists of 12 firms whose departing CEO did not become a member of the supervisory board. All regressions include year fixed effects. The coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Former CEO changes to the supervisory board	Former CEO becomes chairman of the board	Former CEO becomes ordinary board member
	(1)	(2)	(3)
Constant	-137.98***	-257.76***	-179.20***
	(-4.00)	(-5.05)	(-3.87)
Post	6.44	7.79*	14.27
	(1.13)	(1.79)	(1.41)
Post*treatment	-3.97	-0.67	-8.65
	(-0.69)	(-0.14)	(-1.03)
Ln (number of directors)	-9.39	-5.26	-4.78
	(-0.68)	(-0.43)	(-0.20)
Family > 50%	-8.61	-0.61	-16.15*
	(-0.93)	(-0.11)	(-1.99)
Financials > 50%	-40.46***	-33.75**	-43.32***
	(-3.45)	(-2.19)	(-3.25)
Industrials > 50%	-34.25**	-39.95***	
	(-2.43)	(-3.01)	
Others > 50%	-8.37	-6.73	-7.54
	(-1.30)	(-1.66)	(-0.91)
Checked	2.81	6.16*	6.30
	(0.48)	(1.78)	(0.93)
Stake executive board	0.34*	0.33*	0.99***
	(1.87)	(1.77)	(3.18)
Stake supervisory board	-0.07	0.05	-0.17
	(-0.55)	(0.50)	(-1.00)
Codetermination	-25.43*	-21.39	-41.15
	(-1.84)	(-1.16)	(-1.56)
Bank representation	-17.91**	-12.52**	-21.31
	(-2.49)	(-2.66)	(-1.33)
Board meetings	2.11*	1.89	3.17*
	(1.88)	(1.13)	(1.99)
Ln (market capitalization)	15.43***	21.89***	12.61***
	(12.07)	(8.64)	(7.72)
Share price performance	-4.41	-6.39	-7.29*
	(-1.08)	(-1.04)	(-1.76)
Tobin´s Q	-2.02	-0.53	-1.10
	(-1.72)	(-0.47)	(-0.35)
R^2 within	0.295	0.472	0.238
Observations	385	287	217

Chapter 3

Executive Attributes, Director Attributes, and Firm Performance

3.1 Introduction

Monitoring by the board of directors is of key importance for the protection of shareholders' interests. From the perspective of agency theory, a more effective monitoring of executives should lead to higher firm performance (Fama, 1980). Consequently, empirical studies related to the board of directors focus primarily on the monitoring function of the board of directors (Adams et al., 2010). In most studies the monitoring function is related to observable board characteristics like the size of the board or the proportion of outside directors on the board. In contrast to this, prior research neglected the impact of unobserved heterogeneity of managers[1] with monitoring tasks on firm performance. However, combining aspects of the agency and resource dependence theory (Pfeffer and Salancik, 1978) as done by Hillman and Dalziel (2003) implies that the effectiveness of monitoring should depend on both the incentives and the skills of the board. The skills of the board may be determined by unobservable and time invariant characteristics of individual directors (e.g. experience, expertise, reputation) that require the estimation of director fixed effects.

[1]The German Stock Corporation Act prescribes a two-tiered board structure with an executive board and a supervisory board. I use the term "executives" for the members of the executive board, the term "directors" for the members of the supervisory board and the term "managers" as generic term for executives and directors. Further details about the two-tiered board structure are given in Section 3.2.

What complicates the analysis of the relation between the individual impact of managers with monitoring tasks and firm performance, though, is the dual role of the board of directors in the one-tier-board system. As emphasized by Adams and Ferreira (2007) boards have a dual role as advisor and monitor of executives in the one-tier board system. Thus, relating firm performance to individual managers with monitoring tasks requires the assignment of these tasks to individual managers. An assignment of the monitoring and advisory tasks to individual managers would also allow assessing the importance of the monitoring task for firm performance relative to the leadership/advisory task.

In this paper, I distinguish between individual managers with different tasks by analyzing a data set of German firms – an economy with a two-tiered board system consisting of an executive and a supervisory board. For German firms, the tasks of running and monitoring the firm can be clearly assigned to the members of the executive and the supervisory board, respectively. My study is based on a comprehensive panel data set of 889 German listed firms for the period 1993-2011. In the empirical analysis, I use manager fixed effects which allows me to estimate the impact of individual managers on firm performance and to control for unobserved heterogeneity of managers. Manager fixed effects are estimated with the AKM method and are net of match effects as well as a wide array of board, firm and manager characteristics that have been identified as determinants of firm performance by the previous literature.

My results suggest that not only executive, but also director fixed effects explain a significant proportion of the variation in firm performance. Even though firm fixed effects explain an even higher proportion of the variation in firm performance on the manager-firm-year-level (47-50%), manager fixed effects (22-23%) are as important as observable board, manager and firm characteristics in explaining firm performance. Splitting the sample into executive- and director-firm-years shows that director fixed effects explain as much of the variation in firm performance as executive fixed effects. When manager fixed effects are estimated over a pre-period (1993-2002) and are used as proxy of skills for newly appointed managers in a post-period (2003-2011), I find a significant positive impact of manager fixed effects on firm performance suggesting an active impact of managers on firm performance. Using the manager fixed effects estimated by regressions on the manager-firm-level indicates that the aggregate sum of manager fixed effects has an impact on firm performance, but not the distribution of these fixed effects within or between the

executive and supervisory board. Furthermore the AKM method is applied to reinvestigate changes of CEOs[2] to the supervisory board of the same firm upon retirement on the level of individual persons. The results corroborates the finding in the study by Andres et al. (2013c) that transitions of former executives to the supervisory board are not a cause of concern for shareholders. Finally, the comparison of coefficient estimates between models with and without manager and match fixed effects reveals an omitted variable bias. For instance, the coefficient of free float changes by approximately 37% when manager or manager and match fixed effects are included.

The separation of managers with monitoring and advisory tasks would be much more complicated in the one-tier board system. Several factors in the one-tier board system complicate the separation of managers with different tasks: On the one hand, Coles and Li (2012) report that 33% of the five highest paid executives in ExecuComp firms are also members of the respective board of directors. For this proportion of managers, their leadership task due to their position as executive and their advisory/monitoring task due to their membership on the board of directors cannot be distinguished. Consequently, studies focusing on the differences between the leadership/advisory and the monitoring task would need to exclude the corresponding managers. A related problem refers to the assignment of these tasks to single board members. Due to their higher degree of independence from the CEO, outside directors are often considered to be better monitors (Fama and Jensen, 1983). On the other hand, inside directors usually possess better firm-specific information (Raheja, 2005; Ravina and Sapienza, 2010) qualifying them for the monitoring of executives.[3] Similarly, Faleye et al. (2011) provide evidence for an adverse effect of independent directors who primarily focus on their monitoring tasks. This implies that board effectiveness could be improved if independent directors allocate their time to both advising and monitoring responsibilities. Moreover, Coles et al. (2008) find that the advisory role of outside directors is more important for complex firms. For all these reasons, a separation of managers with monitoring and managers with advisory tasks is difficult for the one-tier board system.

[2]It may be incorrect to translate "chairman of the executive board" as "CEO". However, for expositional efficiency, I stick to the term CEO. For further details, see Footnote 1 of Chapter 2 (p. 10).

[3]See also Masulis and Mobbs (2011), who question the assumption of inside directors as a homogenous group and build upon the opposing views concerning the role of inside directors according to agency and optimal contracting theory.

In contrast to this, these two tasks are separated in the two-tiered board system, which can be found in Germany and several other European countries. The two-tiered board system formally assigns the advisory function to the members of the executive and the monitoring function to the members of the supervisory board. Thus, the two-tiered board system allows the cleanest separation (Adams and Ferreira, 2007) of the leadership/advisory and monitoring task and the assignment of these tasks to the individual members of the two boards.

This paper is related to a growing body of the literature that investigates the impact of individual managers on firm performance. Most of the studies consider the impact of executives and most importantly CEOs on firm performance. Studies using CEO deaths (e.g. Johnson et al., 1985; Fee et al. 2013) or CEO hospitalization events (Bennedsen et al., 2012) as exogenous shocks on CEO's actions, suggest a meaningful impact of individual CEOs on firm performance. Starting with the seminal paper by Bertrand and Schoar (2003), several studies draw on manager fixed effects to estimate an impact of individual executives on firm performance. Leadership style (Bertrand and Schoar, 2003) and reputation (Chemmanur and Paeglis, 2005) are just two of many examples for unobservable and time invariant characteristics that can be proxied by manager fixed effects and could explain the impact of individual executives on firm performance.

The impact of individual managers presumed to have monitoring functions (i.e. outside directors) received less attention by the prior literature. Analyzing the stock price reactions to first-time director appointments, Fich (2005) finds significantly positive cumulative abnormal returns for appointments of the CEOs of other companies as directors. Nguyen and Nielsen (2010) also draw on sudden deaths as an exogenous source of variation. They find a significant drop in firm value following the sudden deaths of independent directors. In further robustness tests they also consider director fixed effects and find that the adjusted R^2 of their regression model with the stock price reaction around sudden deaths of directors as dependent variable increases by about 50 percentage points. However, their identification of director fixed effects hinges on multiple directorships and variation in the degree of independence within individual director observations. This reduces their sample size to 30 directors and 74 directorships and thus only provides a first indication of the importance of unobserved director heterogeneity such as skills or ability. Moreover, all

papers alluded to above focus on either the impact of individual managers with leadership *or* monitoring tasks, but do not analyze their relative importance.

The paper further builds upon the progress in the adequate estimation of manager fixed effects. The relative importance of managers with leadership and monitoring tasks can be estimated by manager fixed effects. One important method for the estimation of manager fixed effects is the mover dummy variable (henceforth MDV) method by Bertrand and Schoar (2003). This method requires the change of a manager between firms in order to separately identify the manager and the firm fixed effect. Thus, by using this method, the sample size decreases dramatically and complicates the interpretation of the results. Recently, Graham et al. (2012) introduce the method by Abowd, Kramarz, and Margolis (henceforth AKM) (1999) to the corporate finance (specifically executive compensation) literature. This method allows the estimation of manager fixed effects based on a considerable larger sample of managers. The use of manager fixed effects allows to control for unobserved heterogeneity of managers and thereby to deal with one important source of endogeneity – the omitted variable bias. Omitted variable bias problems could also result from the non-consideration of match effects. Match effects allow controlling for the fit between an individual manager and the respective firm, which is a potentially important determinant in explaining firm performance. Woodcock (2011) derives a match effects model and shows that match effects explain a considerable proportion of wage dispersion in the US and allow a more precise estimation of manager fixed effects.

My study contributes to the literature in several important respects. First, and most importantly, to the best of my knowledge, this is the first study that focuses on the role of the unobserved heterogeneity of managers with monitoring tasks in explaining firm performance and the first study that simultaneously includes executive and director fixed effects.[4] This allows a separation of the fixed effects of individual managers with leadership/advisory and monitoring tasks as well as an evaluation of their relative importance in explaining firm performance. Since this study also controls for match effects, manager fixed effects can be estimated more precisely. According to Hermalin and Weisbach (2003) studies about the relation between board characteristics and firm

[4]Gantenbein and Volonte (2011) consider director fixed effects for listed firms in Switzerland. However, they do not examine executive fixed effects. Moreover, as they only consider cross-sectional observations for the year 2008, they cannot control for firm fixed effects.

performance implicitly assume a link between board characteristics and board actions. As my results suggest that director fixed effects are as important as executive fixed effects in explaining firm performance, director effects potentially explain a high proportion of the variance in certain board actions such as CEO turnover and executive compensation as well.

Second, the inclusion of director fixed effects allows the reexamination of the relation between board structure and firm performance. My results show that only a small part of the variance in firm performance is explained by observable board characteristics. Furthermore, the size and the significance of some board characteristics changes in regressions accounting for manager or manager and match fixed effects. Unobservable and time-invariant characteristics of individual directors (e.g. skills, motivation or reputation), i.e. director fixed effects, appear to be more important for the relation between board structure and firm performance than observable board characteristics.

Third, my results provide insights into the working of the two-tiered board system. The costs and benefits of changes from executives to the supervisory board upon retirement have been discussed controversially. Previous empirical studies have investigated this issue on the firm-level. When manager fixed effects are interpreted as proxy for skills the empirical setting of this study allows the reinvestigation of this issue on the level of individual managers. Furthermore, the AKM method enables the estimation of the fixed effects of all managers in firms with at least one mover, which allows the analysis of the impact of the skill mix (based on the most common interpretation of manager fixed effects) within and across the two boards on firm performance.

This paper proceeds as follows. Section 3.2 provides an overview of the institutional setting in Germany. In Section 3.3, different methods for the estimation of executive and director fixed effects are discussed. Section 3.4 presents the sample and descriptive statistics. The results on the manager-firm-level are discussed in Section 3.5. Section 3.6 contains the results of the analysis on the firm-level, and Section 3.7 concludes.

3.2 Institutional setting

This section briefly describes those aspects of the institutional environment of German firms which are particularly important for the empirical analysis.

The German Stock Corporation Act (*Aktiengesetz*, *AktG*) requires setting up an executive board (*Vorstand*) and a supervisory board (*Aufsichtsrat*). According to § 105 AktG a person cannot be a member of both boards simultaneously.

The main task of the executive board is to run the firm (§ 76 (1) AktG). Furthermore, the executive board represents the firm in judicial and extra-judicial matters (§ 78 (1) AktG). Even though running the firm is the joint responsibility of the entire executive board, the chief executive officer (CEO) takes a prominent position and coordinates the work of the executive board members (executives).[5]

The main task of the supervisory board is the monitoring of the executive board (§ 111 (1) AktG). In particular, the members of the supervisory board (directors) are responsible for the appointment, dismissal and compensation of executives. Moreover, the supervisory board is involved in decisions of fundamental importance.[6] According to the Codetermination Act *(Mitbestimmungsgesetz*, *MitbestG)*, the supervisory board has to elect a chairman (§ 27 MitbestG). The chairman of the supervisory board plays an important role as he is in most cases the chair of the compensation committee (section 5.2 of the German Corporate Governance Code) and is attributed a double-voting right in firms subject to parity codetermination. Codetermination is a peculiarity of the German corporate governance system and describes the allocation of control rights to employees through seats on the supervisory board. The fraction of employee representatives on the supervisory board depends on the number of employees. Firms with more than 500 (2,000) employees are subject to one-third (parity) codetermination.[7] The size of the supervisory board

[5]The election of a CEO is not mandated by law (§ 84 (2) AktG). However, the election of a CEO is intended in almost all articles of incorporation (see also section 4.2.1 of the German Corporate Governance Code. See the foreword of the code.

[6]See section 5.1.1 of the German Corporate Governance Code.

[7]Different regulations apply to firms in the coal and steel industry. At least half of the members of the supervisory boards of firms in these industries and with more than 1,000 employees must represent employees.

depends on the size of the firm. The maximal number of supervisory board members increases steadily with firm size.[8]

The personal qualifications for the election to the supervisory board are regulated in § 100 AktG. Members of the supervisory board must not hold more than 10 supervisory board seats, whereby positions as chairman of the supervisory board are double-counted. Supervisory board members are also not allowed to be a member of an executive board, where an executive - who is supposed to be monitored - sits on the supervisory board.

Many of the recent regulatory changes concerning the personal qualifications for a supervisory board seat are related to the efforts to improve the corporate governance of German firms and finally the appeal of Germany as a financial centre. In order to obtain this objective, Germany introduced the German Corporate Governance Code (hereafter "the code") in 2002. The code is revised regularly and contains recommendations and suggestions, inter alia, concerning the executive and supervisory board and the cooperation between the executive and the supervisory board. The compliance with the recommendations and suggestions is not binding, though. However, the code is based on the "comply-or-explain principle", whereby deviations from the recommendations need to be published in an annual declaration of conformity.

The recommendations concerning the supervisory board are mainly aimed at improving the effectiveness of the monitoring of the executive board. For instance, the legal limit of 10 simultaneous supervisory board seats is further restricted by section 5.4.5 of the code. According to this recommendation, directors should ensure to have sufficient time to perform their tasks as supervisory board members by not holding more than three simultaneous supervisory board seats. Moreover, transfers of CEOs of German corporations to the supervisory board of the same company upon retirement have been subjected to ongoing criticism. Opponents of this practice argue that former executives monitor their former colleagues leniently and hamper the criticism of managerial decisions during their own tenure (Andres et al., 2013c). In 2009, a "cooling-off period" has been introduced as another personal qualification of supervisory board members. According to the "cooling-off-period" the election of former executives to the supervisory board must be preceded by

[8]The supervisory board of firms with a share capital of up to 1,500,000 Euro can consist of up to 9, with a share capital of up to 10,000,000 Euro of up to 15 and with a share capital larger than 10,000,000 Euro of up to 21 members (§ 95 AktG).

two years following the retirement from the executive board; however, an exception from the ban allows the immediate change of former executives to the supervisory board. This exception requires a quorum of 25% of the shareholders' votes.[9]

These qualifications refer to information that is observable for the econometrician. In addition to that, the initial version of the code in 2002 has already contained a provision recommending that the supervisory board is composed in such a way, that their members "have the required knowledge, abilities and expert experience to properly complete their tasks and are sufficiently independent".[10] Knowledge, abilities and experience are examples for time-invariant unobservable factors that can be captured by director fixed effects.

3.3 Empirical methodology

My empirical analysis is based on the following regression model:

$$y_{ijt} = X_{ijt}ß + M_{ijt}\gamma + \rho_i + \theta_j + \tau_t + \varepsilon_{ijt} \quad (3.1)$$

The dependent variable is measured for firm i and manager j at year t. X_{ijt} denotes observable and time-variant firm and board characteristics and M_{ijt} observable and time-variant manager characteristics. ρ_i represents firm fixed effects, θ_j manager fixed effects and τ_t year fixed effects. In this model, θ_j is assumed to be constant over time and across all firms at which the respective manager has been employed. Since executives as well as directors potentially have an impact on firm performance, both are considered here. The main problem for the estimation of equation (3.1) refers to the perfect collinearity between θ_j and ρ_i for those managers, who have been employed in only one firm during the sample period ("stayers"). In the literature several methods are discussed to deal with this problem.

The MDV method is based on Bertrand and Schoar (2003). This method has been used by several other papers in the field of corporate finance (e.g. Fee et al., 2013; Graham et al.,

[9]This exception was introduced to serve the interests of family firms whose founders or other family members should be able to monitor executives after they step down as executive board members. The cooling-off-period concerning the transfer of former executives to the supervisory board upon retirement was preceded by a provision recommending that the former CEO or a former executive should not generally become the chairman of the supervisory board, which was added to the code in 2005. However, this recommendation had little practical effect (Andres et al., 2013c).

[10]For a detailed discussion on the tasks, the conditions for an effective work and current deficits of supervisory board members see Cahn (2011).

2012). Using this method, only those managers are considered who have been employed in at least two firms during the sample period ("movers"). Thus, θ_j and ρ_i can be disentangled for the group of movers. Equation (3.1) is then estimated only for the group of movers by the least square dummy variable (henceforth LSDV) method. Three problems are associated with this method: Depending on the degree of mobility, i.e. the frequency of managerial changes within the sample, the sample size could decrease considerably. On the other hand, this method could give rise to a sample selection bias, as movers are likely to be different from stayers (e.g. with respect to their skills or risk aversion) (Graham et al., 2012). A further disadvantage of the MDV method is that considerable computer memory is required which could make the application computationally infeasible in large data sets (Andrews et al., 2006).[11]

Several studies analyzing wage differences use the spell method (e.g. Abowd et al., 1999; Munch and Skaksen, 2008; Cornelissen and Hübler, 2011).[12] These studies try to control for unobserved heterogeneity on the firm- and manager-level that otherwise would result in an omitted variable bias. A spell S denotes a unique combination of manager j and firm i. Equation (3.2) can then be displayed as follows:

$$y_{ijt} = X_{ijt}ß + M_{ijt}\gamma + S_{ij} + \tau_t + \varepsilon_{ijt} \qquad (3.2)$$

where S_{ij} represents the manager-firm-combination ij. Since manager-firm-combinations can be generated for each manager-firm-year, the sample size is not affected by the spell method and a sample selection bias can be avoided. However, using the spell method, θ_j and ρ_i cannot be disentangled.

The AKM method based on Abowd et al. (1999) allows for a separate identification of θ_j and ρ_i without decreasing the sample size as much as under the MDV method. The authors use this method in order to investigate the role of unobserved heterogeneity of French employees in explaining wage differences. For the first time, Graham et al. (2012)

[11]In a model with N person years, K firms and J observable regressors, the storage of a matrix with dimension N*(K+J) is required. Assuming memory requirements of 8 byte for each matrix element, the memory requirements for this data set consisting of 95,477 manager-firm-years, 889 firms and 39 regressors already amounts to 0.78 GB (see Cornelissen, 2008).

[12]The spell method is also used by several studies in the field of corporate finance. For instance, Frank and Goyal (2010) consider manager fixed effects as determinant of capital structure, whereas Graham et al. (2012) study the role of manager fixed effects in executive compensation.

apply this method to an issue in the field of corporate finance.[13] As demonstrated by Abowd et al. (1999), using the LSDV method with the entire set of dummy variables and the following transformation and estimation of equation (3.1) are identical: First, the within transformation is applied to the level of each individual manager j:

$$y_{ijt} - \overline{y_j} = (X_{ijt} - \overline{X_j})ß + (M_{ijt} - \overline{M_j})\gamma + \sum_{i=1}^{N} \rho_i (F_{jt}^{i} - \overline{F_j^{i}}) + \varepsilon_{ijt} \quad (3.3)$$

The AKM method involves then the estimation of equation (3.3) by the LSDV method. The AKM method allows the identification of θ_j and ρ_i for all firms with at least one mover – i.e. the same firms as under the MDV method. However, in contrast to the MDV method, the fixed effects of not only the movers, but of all managers employed in these firms can be identified (Graham et al., 2012). Using the AKM method, the fixed effects of firms and managers can be compared within one "group". A group thereby consists of firms and managers connected by at least one mover.[14] Since the fixed effects within one group are only identified relative to a benchmark, ρ_i cannot be identified for the firms without any mover manager. In general, the comparison of θ_j and ρ_i is possible, albeit difficult, across groups by using a normalization procedure.[15] Since the application of the AKM method on the subset of movers and the MDV method are equivalent within one group, the restriction to the largest group allows me to apply the AKM method on the subset of movers as a robustness check. Hence, problems with the memory requirements as under the MDV method can be avoided.

The assumption that the manager fixed effect θ_j is constant across time and all firms, in which the manager has been employed during the sample period, is modified in my study as follows: First, I take into account that the same skills or attributes of one person could have a different impact on firm performance depending on whether the person is a member of

[13]Graham et al. (2012) investigate the impact of unobserved manager heterogeneity on the determinants of executive compensation. Further examples of papers that analyze the impact of individual executives on firm policy or performance include Frank and Goyal (2010) (capital structure) or Chevalier and Ellison (1999) (mutual fund performance). Hillier et al. (2013) investigate the role of unobservable time-invariant individual characteristics in explaining the performance of corporate insider trading. Coles and Li (2012) apply the AKM method to numerous issues in corporate finance (executive compensation, financial policy, payout policy, firm performance, corporate control, board structure and investment policy).

[14]See Abowd et al. (2002) for a detailed description of the underlying algorithm.

[15]The normalization procedure used by Cornelissen (2008) describes the fixed effects θ_j and ρ_i as deviations from their means. As pointed out by Graham et al. (2012), such normalization changes the relative level and variation of the fixed effects θ_j and ρ_i across the different groups; the MDV method leads to the same groups and for this reason to the same problems.

the executive or the supervisory board. Therefore, I add two fixed effects for each person who has been employed as executive and as director of at least one firm (not necessarily the same firm) in the sample. One fixed effect is added for all observations in the supervisory board and the other fixed effect refers to all observations in the executive board.

Furthermore, the model is modified such that the same manager (executive or director) could have a different impact in different firms on firm performance depending on the quality of the match between the manager and the firm (hereafter match quality). In this context, a better match quality should lead to a higher firm performance for a given manager with individual fixed effect θ_j. In equation (3.1), the match effect is absorbed into the error term. Leaving out match effects leads to upward biased coefficients (Woodcock, 2011). Based on the match effects model of Woodcock (2011), one match effect S_{ij} is added to each manager-firm-combination in equation (3.1); equation (3.1) can then be rewritten in the following way:

$$y_{ijt} = X_{ijt}ß + M_{ijt}\gamma + \rho_i + \theta_j + \tau_t + S_{ij} + \varepsilon_{ijt} \quad (3.4)$$

If equation (3.4) is expressed as deviations from match specific means, match effects, manager fixed effects and firm fixed effects can be eliminated (Baltagi, 2008). Ferreira (2009) shows that $\widehat{ß}$ can be estimated by means of this transformation. Assuming that match effects are orthogonal to manager fixed effects and firm fixed effects, the remaining parameters can be determined as follows: $\hat{\rho}_i$ and $\hat{\theta}_j$ can be estimated by equation (3.1) – i.e. the equation without match effects. The match effects S_{ij} equal the residuum from the following equation:

$$\hat{S}_{ij} = \left(\sum_{t=1}^{T_{ij}} \frac{y_{ijt} - x_{it}\widehat{ß}}{T_{ij}}\right) - \hat{\rho}_i - \hat{\theta}_j \quad (3.5)$$

In my analysis, models with match effects are considered in addition to the previously discussed models based on the AKM and MDV method.[16]

[16]Woodcock (2011) also considers other assumptions regarding the relation between manager fixed effects, firm fixed effects and match effects. However, these assumptions are based on random effects and therefore not applicable in this context.

3.4 Data and descriptive statistics

3.4.1 Sample selection

My study is based on a comprehensive data set consisting of all German firms listed at least once in "Amtlicher Handel" or "Geregelter Markt" during the sample period 1993-2011. Of these 1131 firms, all firm-years associated with a listing on at least one of the eight German stock exchanges are considered. Firm-years, where the firm is declared insolvent or bankrupt or firm-years with missing information concerning the executive and supervisory board composition, are excluded. This results in a sample of 13,059 firm-years and 134,731 manager-firm-years. Missing observations for firm characteristics further reduces the sample to 99,429 manager-firm-years. These manager-firm-years can be subdivided into 27,782 executive-firm-years and 71,647 director-firm-years and correspond to the observations under the spell method (hereafter full sample).[17] Table 3.1 presents the number of firms, managers (executives/directors) and manager-firm-years (executive-firm-years/director-firm-years) for each year of the sample period.

The composition of the executive and the supervisory board including the respective position of their members and information on the ownership structure were hand collected from the *Saling*/*Hoppenstedt Aktienführer*.[18] All other information was gathered from Datastream. The choice of manager, board and firm characteristics aims to control for a wide array of observable characteristics with a potential impact on firm performance and is based on prior literature and the institutional setting for German listed firms (e.g. Adams and Ferreira, 2009; Andres et al., 2013a; Dherment-Ferere et al., 2001; Fauver and Fuerst, 2006; Fich and Shivdasani, 2006). Overall, the set of control variables encompasses nine board characteristics (average tenure of the executive board, average tenure of the supervisory board, size of the supervisory board, ratio of the supervisory to the executive board size, codetermination, former CEO as chairman of the board, busy board, board with interlocking relations and women representation), five manager characteristics (tenure of a director, tenure of an executive, board position, busyness of a director and interlocking

[17] 23,467 (34%) of director-firm-years refer to employee representatives. In a robustness test (see Section 3.5.3), these observations are excluded.

[18] The *Saling*/*Hoppenstedt Aktienführer* is published on a yearly basis and additionally provides information about shareholdings, balance-sheet items and the profit and loss account on German listed firms.

relation) and seven firm characteristics (firm size, operating performance, firm age, ownership structure, capital structure, cash flow volatility and sales growth). The definition of the respective variables is provided in Table B.1 in the appendix of this chapter.

Table 3.1: Panel data observations

Year	Firms	Persons	Manager	Executives	Directors	Manager-firm-years	Executive-firm-years	Director-firm-years
1993	326	3,718	3,843	1,143	2,700	4,381	1,162	3,219
1994	388	4,244	4,388	1,283	3,105	5,003	1,310	3,693
1995	396	4,263	4,411	1,252	3,159	5,011	1,278	3,733
1996	385	4,078	4,220	1,181	3,039	4,771	1,204	3,567
1997	432	4,393	4,551	1,272	3,279	5,186	1,319	3,867
1998	446	4,592	4,762	1,340	3,422	5,397	1,385	4,012
1999	459	4,705	4,877	1,399	3,478	5,522	1,439	4,083
2000	460	4,678	4,838	1,395	3,443	5,470	1,444	4,026
2001	482	4,785	4,960	1,467	3,493	5,544	1,506	4,038
2002	536	5,052	5,217	1,623	3,594	5,744	1,653	4,091
2003	596	5,238	5,399	1,707	3,692	5,901	1,729	4,172
2004	598	5,088	5,237	1,665	3,572	5,728	1,689	4,039
2005	586	4,982	5,112	1,616	3,496	5,572	1,647	3,925
2006	574	4,900	5,024	1,589	3,435	5,454	1,611	3,843
2007	533	4,627	4,727	1,497	3,230	5,111	1,520	3,591
2008	532	4,640	4,750	1,522	3,228	5,126	1,546	3,580
2009	537	4,613	4,715	1,482	3,233	5,052	1,496	3,556
2010	527	4,519	4,618	1,469	3,149	4,939	1,485	3,454
2011	462	4,147	4,234	1,344	2,889	4,517	1,359	3,158
1993-2011 (Full)	990	18,203	19,666	6,432	13,234	99,429	27,782	71,647
1993-2011 (AKM)	889	17,285	18,684	6,071	12,613	95,477	26,379	69,098

This table shows the distribution of panel data observations for each year based on the full sample. For each year and the entire sample period, the number of firms, persons and managers is provided. Observations of the same individual person in the executive and supervisory board are treated as if they belong to two different managers. In addition, managers and manager-firm-years are subdivided into executives and directors as well as executive-firm-years and director-firm-years. For ease of comparison, this information is also provided for the AKM sample.

Panel A in Table 3.2 reports the distribution of movers and stayers within the full sample. 2,461 manager (12.51%) can be classified as movers.[19] Only about one third of all movers (33.40%) have worked for more than two firms. Dividing managers into executives and

[19]Due to this identification strategy, this data set suffers from the limitation to changes within the sample (as every other employee-employer data set). By including almost all listed German firms in the data set, I try to keep this limitation as low as possible.

directors, it is apparent that the share of movers among directors is considerably larger than among executives (14.55% vs. 8.32%). Panel B summarizes the groups which arise from the changes of managers between the sample firms, where "group 0" consists of those firms that have not employed any mover during the sample period and are thus not connected to other firms. Following the exact definition of a group, the 92 firms in "group 0" comprise 92 separate groups each consisting of just one firm (Cornelissen, 2008). The share of firms in "group 0" amounts to 9.29% and the share of the corresponding manager-firm-years to only 3.57%. Comprising 889 firms (i.e. 89.80% of all firms) and 96.00% of all manager-firm-years, group 1 is by far the largest group of the sample. By contrast, the remaining four groups with at least one mover account for only 0.90% of all firms and 0.40% of all manager-firm-years.[20] As mentioned in Section 3.3, the sample size decreases when the MDV or AKM method is used. Panel C presents the size of the sample for the different estimation methods. Using the AKM method, the data set corresponds exactly to group 1. It would be possible to also include groups 2 to 5 in the analysis. However, since fixed effects across groups can be compared only under restrictive assumptions and group 1 represents a very large share of the entire sample (93% of all firm-years and 96% of all manager-firm-years), I restrict the analysis to the largest group.[21] Using the MDV method, all manager-firm-years are also taken from group 1 and the firms are the same as under the AKM method. However, only manager-firm-years referring to movers are considered. Thereby, the amount of manager-firm-years decreased by 68.96% relative to the AKM method and corresponds to 29.80% of the full sample.

3.4.2 Representativeness and descriptive statistics

As the sample size decreases when the MDV or AKM method is applied, the representativeness of the MDV and AKM sample for the full sample is questionable.

[20]The share of the largest group relative to all groups with movers is considerable larger than in Graham et al. (2012) (65%). Graham et al. (2012) only consider the five highest paid executives per firm covered by ExecuComp for the sample period 1992-2006. One reason for the higher share of the largest group in this sample is the additional consideration of directors and thereby a larger number of managers per firm. On the other hand, my investigation partly falls within the period of the so called "Deutschland AG" that was characterized by a high amount of interrelations on a personal level by means of supervisory board seats.

[21]See Cornelissen (2008) for a discussion about the comparison of fixed effects across groups. He concludes "It is […] preferable to correlate only effects of the same group" (p. 185).

Table 3.2: Mobility, groups & samples

Panel A: Mobility

No. of firms the manager worked for	Number (%) of managers	Number (%) of executives	Number (%) of directors	Mover/stayer
1	17,205 (87.49%)	5,897 (91.68%)	11,308 (85.45%)	Stayer
2	1,639 (8.33%)	456 (7.09%)	1,183 (8.94%)	Mover
3	435 (2.21%)	64 (1.00%)	371 (2.80%)	Mover
4	168 (0.85%)	12 (0.19%)	156 (1.18%)	Mover
5	92 (0.47%)	2 (0.03%)	90 (0.68%)	Mover
6-15	127 (0.65%)	1 (0.02%)	126 (0.96%)	Mover
1-15	19,666	6,432	13,234	Mover/stayer

Panel B: Groups[22]

	Manager	Manager-firm-years	Executive-firm-years	Director-firm-years	Firms
"0"	889 (4.52%)	3,550 (3.57%)	1,277 (4.60%)	2,273 (3.17%)	92 (9.29%)
1	18,684 (95.00%)	95,477 (94.00%)	26,379 (94.95%)	69,098 (96.44%)	889 (89.80%)
2	23 (0.12%)	163 (0.16%)	55 (0.20%)	108 (0.15%)	2 (0.20%)
3	25 (0.13%)	65 (0.07%)	23 (0.08%)	42 (0.16%)	2 (0.20%)
4	35 (0.18%)	114 (0.11%)	27 (0.10%)	87 (0.12%)	3 (0.30%)
5	10 (0.05%)	60 (0.06%)	21 (0.08%)	39 (0.05%)	2 (0.20%)
0-5	19,666	99,429	27,782	71,647	990

Panel C: Samples[23]

	Groups	Manager-firm-years	Executives	Directors	Firm-years
AKM	1	95,477 (96.00%)	6,071 (94.39%)	12,613 (96.65%)	8,592 (92.80)
MDV	1	29,633 (29.80%)	531 (8.26%)	1,916 (14.47%)	8,592 (92.80)
Full	All	99,429	6,432	13,234	9,259

This table contains information about movers and stayers, the composition of groups and the AKM, MDV and full sample. Movers and stayers are defined as in Table B.1. The definition of a group is based on Abowd, Kramarz and Margolis (1999). Panel A shows the distribution of the number and percentage (in parentheses) of sample firms in which managers, executives and directors have been employed during the sample period. Based on the number of firms the manager, executive, director has worked for, he/she is categorized as mover or stayer. Panel B presents the number and percentage (in parentheses) of manager, manager-firm-years, executive-firm-years, director-firm-years, and firms in different groups. Panel C provides information about groups, manager-firm-years, executives, directors, and firm-years included in the AKM, MDV, and full sample.

To address this issue, I follow the methodology by Brav et al. (2005), which has also been used by Graham et al. (2012). In this approach, the means of the indicator variables and the quintiles of the continuous variables in the entire sample are compared with the

[22]According to the exact definition of a group, the firms in "group 0" can be categorized into 92 single groups (cf. Cornelissen, 2008).

[23]Using the AKM/MDV method, the fixed effects of all groups apart from "group 0" can be compared. However, comparing the fixed effects between different groups is not without problems. Therefore, only the largest group is considered here.

corresponding values in the AKM and MDV sample. For the continuous variables, the proportion of observations in the AKM and MDV sample within the quintiles of the full sample is considered. In case of a perfectly representative AKM and MDV sample, these proportions would equal 20%. For the indicator variables, the percentages of the values 0 and 1 are compared for the different samples.

Table 3.3 depicts the results of this procedure. The AKM sample is highly representative for most of the included board, manager and firm characteristics. This is particularly true for the firm characteristics. The proportion of none of the eight characteristics deviates by more than five percentage points from 20% within each quintile. As the AKM sample covers 96% of the manager-firm-years of the full sample, the deviations regarding the board and manager characteristics are also minor. Larger deviations only concern the size of the supervisory and executive board, which is higher for the AKM sample on average. In general, the deviations between the MDV and the full sample are larger than the deviations between the AKM and the full sample. For instance, the average size of the executive and the supervisory board is even higher for the MDV sample. The different board sizes follow naturally from the construction of the AKM and MDV sample. The larger the board size, the more likely a firm is to employ at least one mover ceteris paribus, which is the identifying assumption for a firm to be included in the AKM sample. Similarly, movers are more likely to acquire a board seat elsewhere, when more board seats are available, i.e. when the board size is larger. Furthermore, the average tenure of directors is higher and the average tenure of executives is lower for the MDV sample. Other deviations between the MDV and the full sample can also be traced back to the restriction to movers in the MDV sample. This concerns in particular interlocking relations[24], i.e. at least one executive and one director are joint members of another supervisory board (Hallock, 1997) – and busy directors, i.e. directors, who hold three or more directorships in German listed firms. Both interlocking relations and busy directors are more frequently found in the MDV sample. The proportion of women and employee representatives is also higher for the MDV than for the AKM and the entire sample.

[24]A more direct form of an interlocking relation – namely two persons serve on the supervisory boards on two different firms and monitor each other in his/her role as executive is prohibited according to § 100 (2) Nr. 3 AktG.

For the sake of brevity, only descriptive statistics of the AKM sample are presented in the following. The average tenure of an executive (a director) amounts to 4.6 (4.7) years. Based on the definition of Fich and Shivdasani (2006), 12.2% of all directors can be classified as busy directors. An interlocking relation exists for 6.2% of all executives and directors. 6.3% of all executives and directors are female.

The former CEO is the chairman of the supervisory board in 11.1% of all firm-years. The average (median) women representation equals 6% (3%) in both boards. On average, there are 1.00 interlocking relations between the executive and supervisory board. The average (median) supervisory board consists of 11.12 (12) members and is thereby substantially larger than the (average) median executive board consisting of 3.93 (3) members. The different board sizes are also reflected in the size of the supervisory board relative to the aggregate size of the executive and the supervisory board. The average (median) for this ratio amounts to 0.72 (0.75). The average proportion of employee representatives on the supervisory board - i.e. the average degree of codetermination – amounts to 33%. Based on the definition of Fich and Shivdasani (2006), only 2.0% of all supervisory boards can be classified as busy boards.

Tobin´s Q as measure for firm performance is on average 0.96.[25] The average (median) operative performance (measured as return on assets (ROA)) equals 4% (5%). The concentrated ownership structure of German firms (Franks and Mayer, 2001) is also reflected in this sample, as the average (median) share of free float (sum of shareholdings lower than 5%) amounts to only 37% (31%).

[25]Please note that the descriptive statistics are based on the manager-firm-level. For this reason firms with a large executive and/or supervisory board are overrepresented relative to firms with a small executive and/or supervisory board (which are smaller in terms of firm size as well). The mean value of Tobin's Q amounts to 1.10 when the firm-level is considered. This value is more in line with descriptive statistics of other studies for the German market (e.g. Andres et al., 2013c; Fauver and Fuerst, 2006).

Table 3.3: Descriptive statistics and sample representativeness of the AKM and MDV sample

Panel A: Continuous variables

Variable	Sample	Mean	Med.	Stdv.	1st Q	2nd Q	3rd Q	4th Q	5th Q
Supervisory board size	Full	10.85	11.00	6.03	6.00		12.00	18.00	25.00
	AKM	11.12	12.00	5.98	0.38		0.29	0.13	0.20
	MDV	11.83	12.00	6.18	0.34		0.27	0.13	0.25
Executive board size	Full	3.86	3.00	2.24	2.00	3.00	4.00	5.00	16.00
	AKM	3.93	3.00	2.25	0.31	0.21	0.17	0.11	0.20
	MDV	4.11	4.00	2.35	0.29	0.19	0.17	0.12	0.23
SB-/(SB+EB)-size-ratio	Full	0.72	0.75	0.11	0.63	0.71	0.75	0.80	0.95
	AKM	0.72	0.75	0.10	0.18	0.21	0.25	0.16	0.20
	MDV	0.73	0.75	0.10	0.16	0.20	0.25	0.18	0.20
Tenure supervisory board	Full	4.91	4.63	2.18	3.00	4.08	5.15	6.50	16.67
	AKM	4.89	4.60	2.16	0.21	0.19	0.21	0.20	0.20
	MDV	4.86	4.58	2.13	0.20	0.20	0.21	0.20	0.18
Tenure executive board	Full	4.59	4.00	2.41	2.60	3.67	4.75	6.29	19.00
	AKM	4.56	4.00	2.37	0.21	0.21	0.19	0.20	0.19
	MDV	4.46	4.00	2.28	0.21	0.21	0.20	0.20	0.18
Codetermination	Full	0.32	0.33	0.19	0.00	0.33	0.42	0.50	0.71
	AKM	0.33	0.33	0.19	0.21	0.30	0.07	0.39	0.02
	MDV	0.34	0.40	0.19	0.21	0.26	0.07	0.44	0.02
Interlocking board	Full	0.98	1.00	1.18	0.00		1.00	2.00	8.00
	AKM	1.00	1.00	1.19	0.43		0.31	0.15	0.11
	MDV	1.15	1.00	1.28	0.38		0.32	0.16	0.14
Women representation	Full	0.06	0.00	0.08	0.00		0.06	0.13	0.75
	AKM	0.06	0.03	0.08	0.49		0.12	0.22	0.17
	MDV	0.05	0.00	0.07	0.51		0.15	0.21	0.13
Tenure director	Full	4.70	4.00	3.38	2.00	3.00	5.00	7.00	21.00
	AKM	4.69	4.00	3.38	0.31	0.14	0.23	0.14	0.18
	MDV	4.96	4.00	3.50	0.28	0.14	0.23	0.15	0.20
Tenure executive	Full	4.59	4.00	3.28	2.00	3.00	5.00	7.00	20.00
	AKM	4.55	4.00	3.28	0.33	0.14	0.23	0.13	0.17
	MDV	4.07	3.00	3.05	0.39	0.15	0.22	0.12	0.13
Tobin's Q	Full	0.97	0.75	1.06	0.46	0.66	0.86	1.22	59.31
	AKM	0.96	0.75	1.03	0.20	0.21	0.20	0.19	0.20
	MDV	0.93	0.73	1.14	0.22	0.21	0.21	0.18	0.18
Firm size	Full	13.39	13.01	2.55	11.24	12.44	13.71	15.53	21.51
	AKM	13.50	13.13	2.53	0.18	0.20	0.21	0.21	0.21
	MDV	13.94	13.65	2.60	0.14	0.16	0.20	0.22	0.27

This table provides descriptive statistics for the variables in the full, AKM and MDV sample. All variables are defined as in Table B.1. Panel A contains descriptive statistics for the continuous variables. For each variable, it shows the mean, median, and standard deviation. The breakpoints of each quintile are reported for the full sample, and the percentage of observations that fall into each quintile is reported for the AKM and MDV sample. Panel B contains descriptive statistics for the indicator variables. For each variable, it shows the mean, median, and standard deviation.

Panel A (continued)

Variable	Sample	Mean	Med.	Stdv.	1st Q	2nd Q	3rd Q	4th Q	5th Q
Free float	Full	0.37	0.31	0.29	0.07	0.23	0.41	0.66	1.00
	AKM	0.39	0.31	0.29	0.20	0.19	0.20	0.20	0.20
	MDV	0.39	0.34	0.30	0.18	0.19	0.20	0.20	0.23
Capital structure	Full	0.20	0.15	0.19	0.01	0.09	0.21	0.36	1.00
	AKM	0.20	0.15	0.19	0.22	0.18	0.20	0.21	0.20
	MDV	0.19	0.14	0.19	0.21	0.19	0.21	0.20	0.19
Cash flow volatility	Full	0.11	0.09	0.09	0.06	0.08	0.10	0.14	10.27
	AKM	0.11	0.09	0.09	0.17	0.20	0.19	0.23	0.20
	MDV	0.11	0.09	0.09	0.16	0.21	0.20	0.24	0.19
ROA	Full	0.04	0.05	0.16	0.01	0.04	0.07	0.10	0.98
	AKM	0.04	0.05	0.15	0.23	0.18	0.23	0.16	0.20
	MDV	0.05	0.05	0.14	0.21	0.19	0.24	0.16	0.19
Sales growth	Full	0.26	0.03	8.99	-0.07	0.00	0.06	0.15	1,066.00
	AKM	0.25	0.03	9.02	0.20	0.18	0.21	0.20	0.20
	MDV	0.26	0.03	8.35	0.21	0.18	0.21	0.21	0.20
Firm age	Full	85.60	86.00	66.25	21.00	70.00	102.00	131.00	703.00
	AKM	86.69	87.00	64.93	0.20	0.19	0.21	0.20	0.20
	MDV	91.47	95.00	63.44	0.17	0.17	0.21	0.23	0.22

Panel B: Indicator variables

Variable	Sample	Mean	Med.	Stdv.	Variable	Sample	Mean	Med.	Stdv.
Chairman is	Full	0.110	0.000	0.313	CEO/Chairman	Full	0.167	0.000	0.373
former CEO	AKM	0.111	0.000	0.314		AKM	0.162	0.000	0.368
	MDV	0.122	0.000	0.327		MDV	0.211	0.000	0.410
Busy board	Full	0.019	0.000	0.137	Busy director	Full	0.118	0.000	0.323
	AKM	0.020	0.000	0.139		AKM	0.122	0.000	0.328
	MDV	0.040	0.000	0.196		MDV	0.332	0.000	0.471
Interlocking	Full	0.062	0.000	0.241	Mover	Full	0.300	0.000	0.458
manager	AKM	0.062	0.000	0.242		AKM	0.310	0.000	0.463
	MDV	0.081	0.000	0.273		MDV	1.000	1.000	0.000
Employee	Full	0.239	0.000	0.427	Female	Full	0.062	0.000	0.242
representative	AKM	0.246	0.000	0.430		AKM	0.063	0.000	0.243
	MDV	0.122	0.000	0.327		MDV	0.029	0.000	0.166

This table provides descriptive statistics for the variables in the full, AKM and MDV sample. All variables are defined as in Table B.1. Panel A contains descriptive statistics for the continuous variables. For each variable, it shows the mean, median, and standard deviation. The breakpoints of each quintile are reported for the full sample, and the percentage of observations that fall into each quintile is reported for the AKM and MDV sample. Panel B contains descriptive statistics for the indicator variables. For each variable, it shows the mean, median, and standard deviation.

3.5 Manager-level-analysis

The analysis on the manager-firm-year-level proceeds in four steps: First, I examine how the explanatory power of regressions model changes when manager fixed effects are considered (Section 3.5.1). Section 3.5.2 analyzes to what extent executive and director fixed effects contribute in explaining the variance in firm performance relative to other components. Subsequently, the robustness of the results with respect to different samples and different performance measures is tested (Section 3.5.3). Finally, based on the estimated manager fixed effects I analyze the relative importance of different types of executives and directors for firm performance in more detail in Section 3.5.4.

3.5.1 Explanatory power of regression models

To investigate the importance of executive and director fixed effects in explaining the variation in firm performance, equation (3.1) is estimated by using the manager, board and firm characteristics as described in Section 3.4.2. Unless otherwise stated, Tobin's Q is used as measure for firm performance in this section and the following sections.

Table 3.4 presents the results for the AKM sample.[26] I consider five regression models to examine the proportion of the variance in firm performance explained by unobserved manager fixed, firm fixed and match effects. The first four regression models are based on Graham et al. (2012). Column (1) neither includes firm fixed effects nor manager fixed effects. This model is estimated as pooled OLS (OLS model). In column (2), firm fixed effects are added to the OLS model (firm fixed model), whereas the model in column (3) includes executive and director fixed effects in addition to the OLS model (manager fixed model). The AKM method is used in column (4) and allows to separately identify and control for manager fixed and firm fixed effects (AKM model). In column (5), match effects are added to the AKM model (AKM + match effects model).

The model R-squared varies considerably depending on the regression model. The adjusted R-squared in column (1) amounts to 10.7%. Adding firm fixed effects in column (2)

[26]The robustness of these results to ROA as another measure of firm performance and the MDV sample is tested in Section 3.5.3.

increases R-squared by 52 percentage points to 62.7%, whereas including executive and director fixed effects leads to an increase in R-squared by 48.9 percentage points to 59.6%. When both firm fixed and manager fixed effects are added to the OLS model, the model R-squared increases by 66.3 percentage points to 77.0%. The finding for the model R-squared in column (4) is similar to the result in Coles and Li (2012), who find a model R-squared of 74%. However, they only consider the five highest paid executives per firm. The explanatory power of the firm fixed and manager fixed model in their study is closer to the explanatory power of the AKM model (they find values of 70% and 71%, respectively). Finally, including match effects in addition to firm and manager fixed effects leads to a further increase in the model R-squared by 3.3 percentage points to 80.3%. The different values for the adjusted R-squared in the models with firm and/or manager fixed effects indicate the importance of firm and manager fixed effects in explaining firm performance. On the other hand, the increase in the explanatory power is comparatively low, but not negligible, when match effects are considered in addition to firm fixed and manager fixed effects.

Table 3.4 also reports the estimated coefficients and significance levels. However, the coefficients for the board and firm characteristics are biased as board and firm characteristics of firms with a large supervisory and/or executive board are overrepresented. Therefore, I analyze the dependence of coefficients and significance levels on firm fixed, manager fixed and match effects on the firm-year-level in Section 3.6.

3.5.2 Relative importance of executive and director fixed effects

Based on the results presented so far, the relative economic importance of executive and director fixed effects compared to firm fixed effects and other observable manager, board and firm characteristics remains unanswered. To explore the relative importance of these components, I add match effects to the decomposition of the model R-squared used by Graham et al. (2012).

Table 3.4: Unobserved managerial heterogeneity and firm performance

	OLS	FE	IE	FE+IE	FE+IE+ME
	(1)	(2)	(3)	(4)	(5)
Tenure executive board	0.011	0.009	0.007	0.010*	0.008
	(1.11)	(1.24)	(1.12)	(1.67)	(1.36)
Tenure supervisory board	0.008	-0.006	0.008	-0.004	-0.005
	(0.63)	(-0.70)	(1.04)	(-0.70)	(-0.77)
Supervisory board size	0.008	-0.014	0.008	-0.011	-0.011
	(0.87)	(-1.08)	(0.92)	(-0.79)	(-0.69)
SB-/(SB+EB)-size-ratio	-0.300	-0.118	-0.228	-0.154	-0.017
	(-1.33)	(-0.53)	(-1.58)	(-0.88)	(-0.10)
Codetermination	-0.565**	0.247	-0.228	0.194	0.169
	(-2.22)	(0.89)	(-1.58)	(0.77)	(0.64)
Chairman is former CEO	0.114	0.043	0.054	0.023	0.018
	(0.97)	(1.32)	(1.64)	(0.79)	(0.59)
Busy board	0.277	-0.030	-0.177	-0.014	0.007
	(1.55)	(-0.40)	(-1.54)	(-0.26)	(0.15)
Interlocking board	0.001	-0.013	0.003	-0.008	-0.005
	(0.05)	(-1.20)	(0.42)	(-0.88)	(-0.55)
Women representation	1.027***	0.004	0.142	-0.206	-0.215
	(3.55)	(0.01)	(0.69)	(-0.90)	(-0.85)
Tenure director	-0.001	-0.000	0.001	0.004	0.006
	(-0.83)	(-0.19)	(0.19)	(1.08)	(0.71)
Tenure executive	0.001	-0.000	-0.002	0.003	0.005
	(0.75)	(-0.55)	(-0.27)	(0.68)	(0.55)
CEO/Chairman	0.006	0.011**	0.015	0.029*	0.025
	(0.41)	(2.43)	(0.67)	(1.95)	(0.97)
Busy director	0.030	-0.013*	-0.016	-0.001	-0.001
	(1.48)	(-1.77)	(-0.61)	(-0.05)	(-0.03)
Interlocking manager	-0.008	-0.003	-0.030	0.030	-0.003
	(-0.73)	(-0.45)	(-1.57)	(0.24)	(-0.18)
Firm size	-0.093***	-0.259***	-0.162***	-0.289***	-0.315***
	(-4.79)	(-6.57)	(-6.39)	(-5.95)	(-6.23)
ROA	0.772*	0.501***	0.433*	0.424**	0.436***
	(1.72)	(3.22)	(1.81)	(2.49)	(2.57)
Firm age	-0.053	-0.076	-0.001	-0.052	-0.033
	(-1.29)	(-0.77)	(-0.03)	(-0.53)	(-0.31)
Free float	-0.049	0.221***	-0.106*	-0.199***	-0.203***
	(-0.74)	(-2.82)	(-1.86)	(-3.00)	(-2.88)
Capital structure	-0.266**	0.366***	0.130	0.360***	0.339***
	(-1.97)	(4.28)	(1.47)	(4.10)	(3.71)
Cash flow volatility	0.273	1.267	0.670	1.222*	1.011
	(0.66)	(1.37)	(1.21)	(1.67)	(1.56)
Sales growth	0.003	0.000	-0.005	-0.005	-0.007
	(1.53)	(1.60)	(-0.65)	(-0.69)	(-0.73)
Constant	2.663***	4.760***	3.183***	5.077	5.272***
	(9.38)	(6.86)	(10.94)		(6.30)
Adj. R^2	0.107	0.627	0.596	0.770	0.803
Observations	95,477	95,477	95,477	95,477	95,477

This table shows the results of regressions at the manager-firm-year-level with Tobin´s Q as dependent variable, using the AKM sample. Tobin`s Q and all independent variables are defined as in Table B.1. (1) contains neither manager nor firm fixed effects and is estimated as pooled OLS, (2) uses firm fixed effects (FE), (3) uses manager fixed effects (IE), and (4) uses firm and manager fixed effects (FE+IE). (5) includes firm, manager, and match fixed effects (FE+IE+ME). The regression constant in (4) can be interpreted as descriptive statistic for the grand mean; its standard error is not computed. All regressions include year dummies. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

The adjusted R-squared can then be written as sum of the following components:

$$R^2 = \frac{\mathrm{Cov}((y_{it}),(\hat{y}_{it}))}{\mathrm{Var}(y_{it})} = \frac{\mathrm{Cov}((y_{it}),(X_{it}\hat{ß} + M_{ijt}\hat{\gamma} + \hat{\rho}_i + \hat{\theta}_j + \hat{S}_{ij} + \hat{\tau}_t))}{\mathrm{Var}(y_{it})}$$

$$= \frac{\mathrm{Cov}((y_{it}),(X_{it}\hat{ß}))}{\mathrm{Var}(y_{it})} + \frac{\mathrm{Cov}((y_{it}),(M_{ijt}\hat{\gamma}))}{\mathrm{Var}(y_{it})} + \frac{\mathrm{Cov}((y_{it}),(\hat{\rho}_i))}{\mathrm{Var}(y_{it})} + \frac{\mathrm{Cov}((y_{it}),(\hat{\theta}_j))}{\mathrm{Var}(y_{it})}$$

$$+ \frac{\mathrm{Cov}((y_{it}),(\hat{S}_{ij}))}{\mathrm{Var}(y_{it})} + \frac{\mathrm{Cov}((y_{it}),(\hat{\tau}_t))}{\mathrm{Var}(y_{it})} \qquad (3.6)$$

For models without match effects the fifth component on the right-hand side is equal to zero. The decomposition of the model R-squared allows interpreting the normalized covariances (i.e. the covariances of each component with Tobin's Q divided by the variance of Tobin's Q) as fractions of the model sum of squares attributable to the respective component (Graham et al., 2012).

Table 3.5 depicts the results of this decomposition. Column (1) presents the results for the decomposition of the model in column (4) of Table 3.4 (AKM model) and column (2) presents the results for the AKM + match effects model of column (5). The normalized covariances amounts to 0.190 (24.76%) for observable firm characteristics, 0.001 (0.07%) for observable board characteristics, 0.175 (22.78%) for manager fixed effects, 0.384 (49.83%) for firm fixed effects and 0.010 (1.32%) for year fixed effects. F tests indicate that manager fixed effects, firm fixed effects, year fixed effects and observable firm characteristics are significantly different from zero, whereas observable board and manager characteristics are not. Coles and Li (2012) report similar results for the normalized covariance relative to the explained variance of the model for observable manager characteristics (0.36%), and for firm fixed effects (43.74%), but a lower ratio for observable manager and board characteristics (altogether 5.22%) and a considerable higher ratio for manager fixed effects (48.24%).

The relative economic importance of executive and director fixed effects is examined by splitting the samples used in the AKM and AKM + match effects model into executive- and director-firm-years. Note that splitting the sample into executive-firm-years and director-firm-years reduces both the number of observations and the number of explanatory variables (due to a reduced number of manager fixed effects). Therefore the explanatory power of the manager fixed effects in the subsample could either increase or decrease

relative to the entire sample. This decomposition leads to very similar results for the various components. Overall, the comparison between the variance in firm performance explained by executive and director fixed effects indicates a very similar impact of these two types of managers on firm performance. The proportion of the variance explained is only slightly higher for executive (24.36%) than for director fixed effects (22.06%).

Controlling for match effects, the proportions of the variance explained by each component change only marginally. The fraction of the model R-squared attributable to match effects amounts to 4.25%. This fraction corresponds approximately to the decrease in the fraction of the variance explained by firm fixed effects (2.33%) and by manager fixed effects (0.83%). The model without match effects therefore overestimates the explanatory power of firm fixed effects and, to a smaller extent, of manager fixed effects. Decomposing the sample into executive- and director-firm-years shows that accounting for match effects is more important for director- than for executive-firm-years. Match effects account for 5.67% in explaining the variance in firm performance for director-firm-years, whereas this proportion amounts to only 1.01% for executive-firm-years.

3.5.3 Robustness tests

The results presented so far are based on Tobin's Q as a measure for firm performance. However, Tobin's Q is often criticized as measure of firm performance as it could also reflect growth opportunities and is based on cash-flow expectations rather than on realized operating efficiency (Dybvig and Warachka, 2012). Thus, I test the robustness of the results to return on assets (ROA) as an accounting based profitability measure. The results are very similar to the base model with Tobin's Q as performance measure. Using ROA as a measure of firm performance, the explanatory power increases considerably relative to model (3.1) when firm fixed effects or manager fixed effects are included (from 7.9% to 45.5% or 43.2%, respectively). In line with the results presented in Table 3.4 the explanatory power increases by a far larger extent when both firm fixed and manager fixed effects are considered (to 60.6%), whereas the additional inclusion of match effects

increases the explanatory power only slightly relative to the model with firm and manager fixed effects.[27]

Table 3.5: Relative importance of manager fixed effects in determining firm performance

Panel A: Manager

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.010	(1.24%)	0.008	(1.02%)
Observable time-variant manager characteristics	0.001	(0.07%)	0.001	(0.07%)
Observable time-variant firm characteristics	0.191	(24.76%)	0.202	(25.20%)
Firm fixed effects	0.384	(49.84%)	0.382	(47.51%)
Manager fixed effects	0.175	(22.78%)	0.176	(21.95%)
Match fixed effects			0.034	(4.25%)
Year effects	0.010	(1.32%)	0.000	(0.01%)
Residuals	0.230	(23.05%)	0.197	(19.66%)
Observations	95,477		95,477	

Panel B: Executives

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.009	(1.17%)	0.008	(0.96%)
Observable time-variant manager characteristics	0.001	(0.10%)	0.001	(0.10%)
Observable time-variant firm characteristics	0.181	(22.70%)	0.192	(23.82%)
Firm fixed effects	0.403	(50.35%)	0.401	(49.67%)
Manager fixed effects	0.195	(24.36%)	0.196	(24.32%)
Match fixed effects			0.008	(1.01%)
Year effects	0.011	(1.32%)	0.001	(0.12%)
Residuals	0.200	(20.04%)	0.192	(19.22%)
Observations	26,379		26,379	

Panel C: Directors

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.009	(1.24%)	0.008	(1.02%)
Observable time-variant manager characteristics	0.000	(0.06%)	0.000	(0.05%)
Observable time-variant firm characteristics	0.194	(25.62%)	0.206	(25.72%)
Firm fixed effects	0.376	(49.70%)	0.374	(46.65%)
Manager fixed effects	0.167	(22.06%)	0.168	(20.92%)
Match fixed effects			0.045	(5.67%)
Year effects	0.010	(1.32%)	0.000	(0.03%)
Residuals	0.244	(24.36%)	0.199	(19.86%)
Observations	69,098		69,098	

This table presents the results of the decomposition of the model R-squared in Table 3.4. The results in (1) are based on Table 3.4 (4) and the results in (2) are based on Table 3.4 (5). These components are observable time-variant board characteristics (first block in Table 3.4), observable time-variant manager characteristics (second block in Table 3.4) observable time-variant firm characteristics (third block in Table 3.4), firm fixed effects, manager/executive/director fixed effects, year effects and residuals. Additionally, (2) also contains match effects. For each of these components, the covariance with Tobin's Q (relative to the variance of Tobin's Q) and the percentage of the explained variance of Tobin´s Q (in parentheses) is computed. Panel A is based on all observations in Table 3.4 (4) and (5). Panel B is based on the subsample of executive-firm-years and Panel C is based on the subsample of director-firm-years.

[27]The results of this robustness check are given in Table B.2 in the appendix of this chapter.

The decomposition of the model R-squared leads to similar results with respect to the explanatory power of manager fixed effects. The proportion of the variance in ROA explained by manager fixed effects amounts to 24% and is also slightly higher for the subsample of executive-firm-years (28% compared to 22-23% for the subsample of director-firm-years).[28]

The previous results are based on the AKM sample. The following robustness checks alter the number and types of managers included. In general, these robustness checks reduce the number of manager-firm-years and potentially affect the relative explanatory power of each of the observable and unobservable components.

Using the AKM sample, the information for the identification of the fixed effects of non-movers is ultimately based upon the changes of movers between the sample firms. This could produce a biased estimation regarding the correlation between firm fixed effects and manager fixed effects – the so-called limited mobility bias (Abowd et al., 2004; Andrews et al., 2008). In a robustness check, I restrict the analysis to movers only and consider the MDV sample. In accordance with the results reported in Table 3.4, the explanatory power increases considerably relative to model (3.1) when firm fixed effects or manager fixed effects are included (from 11.0% to 55.0% or 38.8%, respectively). Confirming the results for the AKM sample, the explanatory power increases by a far larger extent when both firm fixed and manager fixed effects are considered (by 57.6 percentage points to 68.6%). However, in contrast to the AKM sample, the explanatory power increases significantly more relative to model (4) when match effects are included (by 8.9 percentage points).[29]

The greater importance of match effects for the MDV relative to the AKM sample can be attributed to the fact that every manager in the MDV sample has been employed in at least two sample firms. The higher importance of match effects is also reflected in the values for the normalized covariances (relative to the explained variance of the model). These values amount to 0.133 (11.60%) for managers, 0.088 (7.97%) for the subsamples of executives and 0.138 (12.02%) for the subsample of directors. Including match effects is accompanied by a decrease in the proportion of the variance explained by firm fixed effects (by 6.2

[28]The results of this robustness check are given in Table B.4 in the appendix of this chapter.

[29]The results of this robustness check are given in Table B.3 in the appendix of this chapter.

percentage points) and – to a lesser extent – by manager fixed effects (2.7 percentage points). The comparison between the AKM and MDV sample shows that director fixed effects account for a far higher proportion of the variance explained in firm performance than executive fixed effects. Whereas the proportion of variance explained is slightly higher for executive fixed effects in the AKM sample, the proportion of the variance explained by director fixed effects is considerably higher in the MDV sample (24-27% compared with 7-8% for executive fixed effects). As the AKM method might exaggerate the explanatory power of manager fixed effects (Graham et al., 2012), the high explanatory power of director fixed effects even in the MDV sample clearly indicates the importance of accounting for director fixed effects.[30]

Furthermore, the results could depend on the number of years a manager has worked for a firm. Following Bertrand and Schoar (2003), I assume that a manager has to have worked for at least three years for a firm to possibly affect firm performance and include only those managers in a further robustness test. This procedure results in a decrease of manager-firm-years to 87,122 and in an increase of the proportion of the variance explained by manager fixed effects to 25-26%. The decomposition in executive-firm-years and director-firm-years continues to indicate the importance of director fixed effects. Whereas the proportion of the variance explained by executive fixed effects amounts to 26%, director fixed effects accounts for an only slightly lower proportion (24%).[31]

Previous studies (e.g. Bertrand and Schoar, 2003; Graham et al., 2012) only consider the five highest paid executives per firm. In order to facilitate the comparison with these studies, I only include the five most important executives within a firm in a further robustness check. The classification of the importance of executives based on their compensation is not applicable in the German context as the law only requires the individualized disclosure of the compensation of the members of the executive board from 2006 onward. Initially, the following five executives are considered as most important executives: the CEO, his deputy and the three other executives with the longest tenure. In case of two or more executives with the same tenure, I consider the executive with the highest number of supervisory board seats in the respective year as most important. When both the tenure and the number of supervisory board seats of two or more executives are

[30]The results of this robustness check are given in Table B.5 in the appendix of this chapter.

[31]The results of this robustness check are given in Table B.6 in the appendix of this chapter.

identical, their importance is assigned randomly. Considering only the five most important executives per firm, the number of manager-firm-years decreases considerably to 24,515, whereas the proportion of the variance explained by executive fixed effects increases considerably to 58%.[32]

Alternatively, with respect to the importance of the supervisory board for the German corporate governance system, I include the CEO, his deputy, the chairman of the supervisory board as well as one additional executive and director based on the criteria above as the five most important managers per firm. Using this classification of the most important managers, the number of observations decreases to 37,647. The proportion of the variance explained by manager fixed effects increases and amounts to 38-39%; the higher proportion for the subsample of director-firm-years (40%) again corroborates the importance of including director fixed effects.[33]

As already mentioned in Section 3.2, the chairman of the supervisory board is attributed a double-voting right in firms subject to parity codetermination. For this reason employee representatives might have a limited impact on supervisory board decisions even in the case of a one-half codetermination. Therefore, I test the robustness of the results to the exclusion of employee representatives from the AKM sample. Excluding employee representatives from the sample reduces the sample size to 72,010 manager-firm-years. In accordance with the results in Table 3.6 and a limited impact of employee representatives on supervisory board decisions and thus on firm performance, the proportion of variance explained by manager (executive/director) fixed effects increases to 26-27% (26%/27-28%). This suggests that measuring the impact of manager fixed effects on firm performance by including all members of the executive and supervisory board underestimates the impact of shareholder representatives on the supervisory board.[34,35]

[32]The results of this robustness check are given in Table B.7 in the appendix of this chapter.

[33]The results of this robustness check are given in Table B.8 in the appendix of this chapter.

[34]The results of this robustness check are given in Table B.9 in the appendix of this chapter.

[35]For the robustness tests that vary the number and type of managers included, the relative increase in the explanatory power in models with firm fixed effects, manager fixed effects and match effects is very similar to the results in Table 3.4.

3.5.4 The importance of different types of executives & directors for firm performance

The results presented so far imply a high importance of executive and director fixed effects in explaining the variance in firm performance. These fixed effects have been modeled as unobservable and time-invariant characteristics. However, it remains unclear which characteristics are reflected in manager fixed effects. For instance, executive fixed effects could represent leadership style, assertiveness or reputation and director fixed effects could reflect intrinsic motivation, time management or expertise. However, according to the most prevalent interpretation, manager fixed effects proxy for skills (e.g. Abowd et al., 2002; Abowd et al., 2003; Ferreira, 2009; Graham et al., 2012; Iranzo et al., 2008). I follow the previous literature in interpreting the manager fixed effects as proxy for the skills of an individual executive or director, respectively.[36,37]

Figure 3.1 shows the distribution of the manager fixed effects estimated in Table 3.4 (5) (AKM + match model) as well as the distribution of the subsamples of executive and director fixed effects. Since fixed effects can only be estimated relative to a benchmark, the mean of the manager fixed effects is normalized to zero. The respective graphs indicate that manager as well as executive and director fixed effects are approximately normally distributed, but slightly skewed to the right.

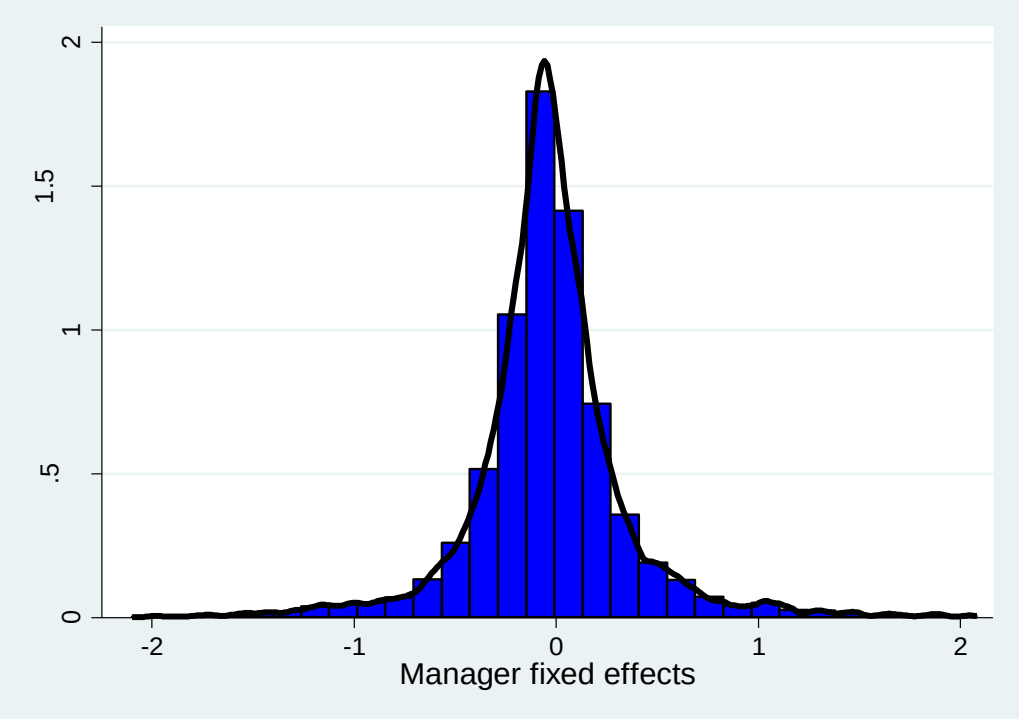
Panel A in Table 3.6 depicts descriptive statistics based on Figure 3.1. The standard deviation of manager fixed effects equals 0.706. This implies a considerable variation in the impact of managers on firm performance. Executive fixed effects are on average slightly higher than director fixed effects (0.006 vs. -0.003) and have a slightly higher standard deviation (0.805 vs. 0.654).

[36]Studies that analyze if manager fixed effects can be explained by observable personal characteristics such as education, gender or age usually find that these characteristics only explain a very small proportion of the model R-squared. However, Graham et al. (2012) also find that education which is commonly interpreted as proxy for skills is significantly and positively related to manager fixed effects in executive compensation. Due to sparse information regarding the educational background of executives and directors of German firms, I did not gather data on their educational background.

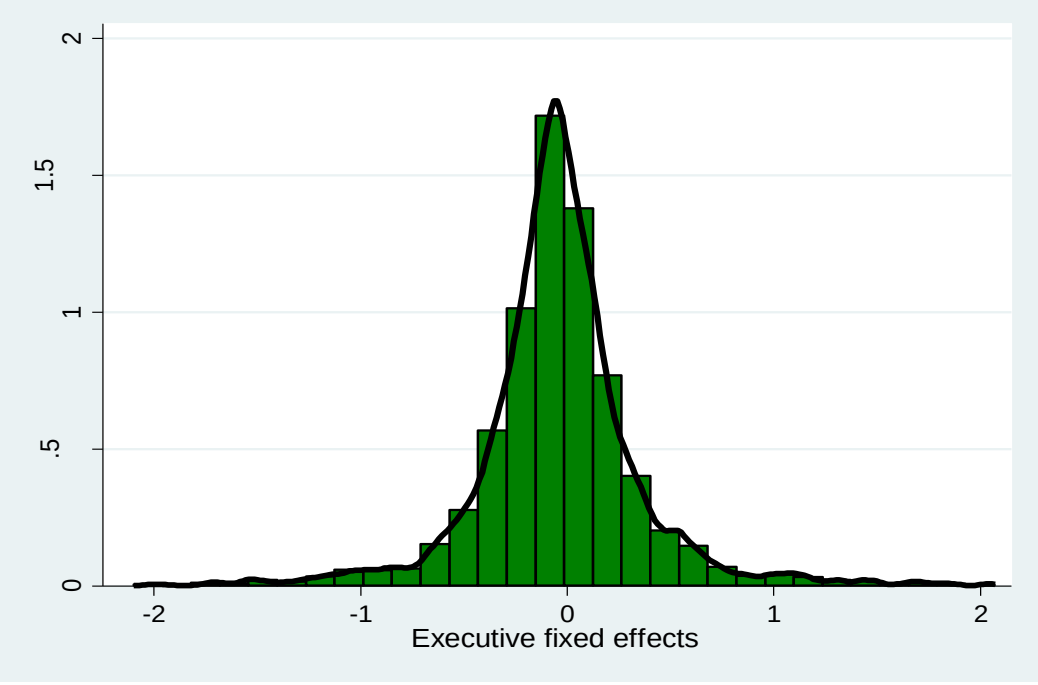
[37]Note that even if manager fixed effects do not represent skills they are still correlated with firm performance and therefore at least proxy for unobservable and time-invariant characteristics of managers with an impact on firm performance.

Figure 3.1: Distribution of manager fixed effects

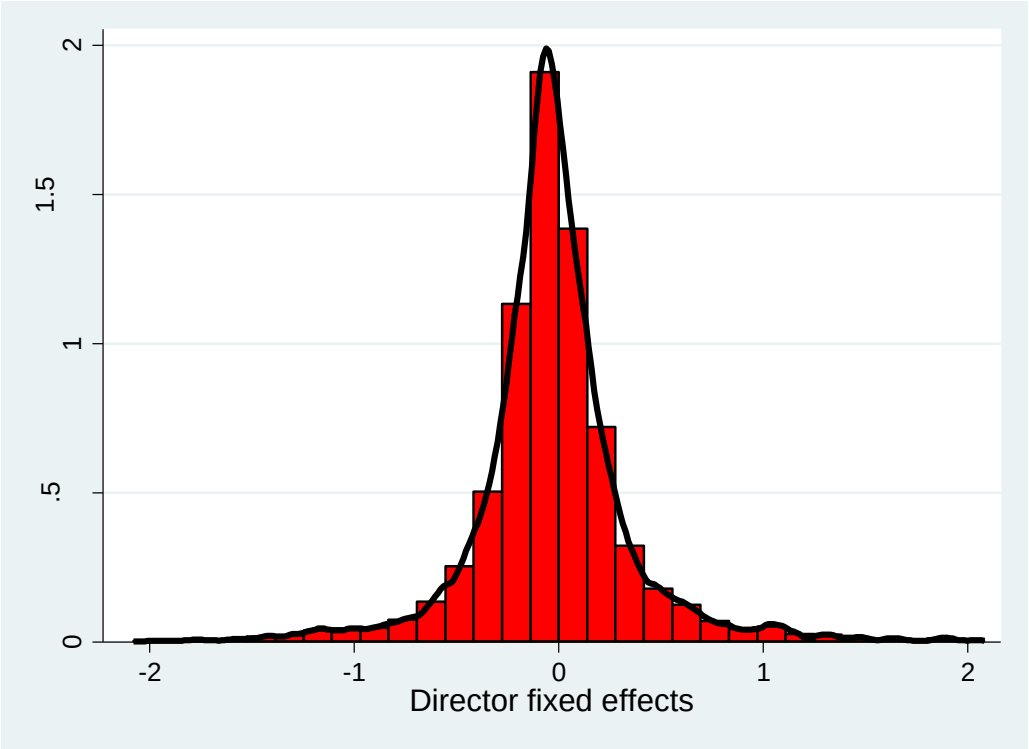
Panel A: Manager fixed effects



Panel B: Executive fixed effects



Panel C: Director fixed effects



This figure shows the distribution of manager, executive and director fixed effects. Manager, executive and director fixed effects are estimated based on the regression model in Table 3.4 (5) and are thus net of match effects. Manager, executive and director fixed effects are estimated relative to the benchmark of the average manager fixed effect of all managers included in the AKM sample, respectively. Panel A presents manager fixed effects, Panel B presents executive fixed effects and Panel C presents director fixed effects.

As stated before, the CEO and the chairman of the supervisory board are expected to have a larger impact on firm performance than ordinary executive or supervisory board members. Moreover, the double-voting right of the chairman of the supervisory board in firms with one-half codetermination suggests a limited influence of employee representatives on supervisory board decisions. Therefore, the standard deviations of the fixed effects of the CEO and the chairman of the supervisory board should be higher than the standard deviations of the fixed effects of the respective ordinary board members. Given their limited impact on supervisory board decisions, the standard deviation of the fixed effects of employee representatives should be closer to zero than the standard deviation of the fixed effects of shareholder representatives.

Panel B and C in Table 3.6 reports descriptive statistics for the individual fixed effects of different types of managers based on the estimation results in Table 3.4 (5) (AKM and AKM + match model). Since the position of an individual manager could change over time

(e.g. an ordinary member of the executive board is promoted to the CEO of the firm) these results are restricted to managers with only one type of position (chairpersons, CEO, chairman of the supervisory board (Panel B) and ordinary board members, executive board member, shareholder representative, employee representative (Panel C)) over time. In general, the results suggest a considerable larger impact of chairpersons than of ordinary board members. The respective standard deviation of the manager fixed effects of chairpersons (either the CEO or chairman of the supervisory board) is almost twice as high as the standard deviation of the manager fixed effects for ordinary board members (either an ordinary executive board member, shareholder representative or employee representative) (1.217 vs. 0.644). A closer analysis of the different positions on the executive and supervisory board reveals a higher impact of the CEO and the chairman of the supervisory board relative to ordinary executive and supervisory board members. Whereas the standard deviation of CEO fixed effects is almost twice as high as the standard deviation of ordinary executive board members, the standard deviation of the chairman of the supervisory board fixed effects is only slightly higher than the standard deviations of shareholder representative fixed effects (0.920 vs. 0.771). In accordance with a limited impact of employee representatives on board decisions, the standard deviation of the fixed effects of employee representatives is far lower (0.358) than for the other types of board positions. Even though the CEO seems to matter the most for firm performance, the standard deviation of shareholder representatives' fixed effects exceeds the standard deviations of ordinary executive board members fixed effects and corroborates the importance of director fixed effects.[38]

[38]Additional summary statistics based on the manager fixed effects estimated in the regression model in Table B.2 (4) and (5) with ROA as dependent variable are given in Table B.10 in the appendix of this chapter and lead to qualitatively similar results.

Table 3.6: Descriptive statistics on manager fixed effects

Panel A: Manager, executive and director fixed effects

	Manager fixed effects	Executive fixed effects	Director fixed effects
Mean	0.000	0.006	-0.003
25th percentile	-0.198	-0.217	-0.187
Median	-0.043	-0.047	-0.041
75th percentile	0.124	0.124	0.125
Std. dev.	0.706	0.805	0.654
Observations	18,684	6,071	12,613

Panel B: Manager fixed effects for chairpersons

	Chairperson fixed effects	CEO fixed effects	Chairman fixed effects
Mean	-0.014	0.027	-0.016
25th percentile	-0.287	-0.253	-0.311
Median	-0.050	-0.058	-0.055
75th percentile	0.158	0.143	0.174
Std. dev.	1.217	1.291	0.920
Observations	1,504	1,004	659

Panel C: Manager fixed effects for ordinary board members

	Ordinary board member fixed effects	Ordinary executive board member fixed effects	Ordinary shareholder representatives	Ordinary employee representatives
Mean	-0.002	-0.001	0.017	-0.028
25th percentile	-0.194	-0.208	-0.210	-0.166
Median	-0.038	-0.042	-0.033	-0.048
75th percentile	0.127	0.131	0.157	0.088
Std. dev.	0.644	0.659	0.771	0.358
Observations	13,841	4,302	6,070	4,223

This table presents descriptive statistics for manager fixed effects estimated in Table 3.4 (5). All variables are defined as in Table B.1. For each variable, it shows the number of observations, the mean, 25th percentile, median, 75th percentile, standard deviation and the number of observations. Panel A shows descriptive statistics on manager fixed effects, executive fixed effects and director fixed effects. Panel B describes manager fixed effects for chairpersons (CEO or chairman), CEOs and chairmen, and Panel C contains information about manager fixed effects for managers with ordinary board positions (ordinary executive board members, shareholder representatives, employee representatives). For Panel B and C, only individuals with the same type of board position (CEO, ordinary executive board member, chairman of the supervisory board, shareholder representative, employee representative) (not necessarily in the same firm) during the sample period are considered.

As mentioned in Section 3.3, the empirical analysis allows manager fixed effects to vary within one person across her/his executive and supervisory board positions. Focusing on those persons serving only on the executive and supervisory board within one firm allows the reinvestigation of changes from executives to the supervisory board of the same firm upon retirement. The costs and benefits of such transitions in terms of firm performance have been discussed controversially (Andres et al., 2013c; Bermig and Frick, 2010;

Grigoleit et al., 2011). The study by Andres et al. (2013c) indicates that the stock market considers the announcement of a CEO transition as good news.[39] In addition to that, Andres et al. (2013c) find largely insignificant effects on operating performance[40] and Grigoleit et al. (2011) find no significant relation between former executives on the supervisory board and different measures of firm performance. In contrast to this, the study by Bermig and Frick (2010) partially supports a negative effect. All these studies compare the performance of firms with and without former executives (or CEOs) on the supervisory board. However, they do not consider the characteristics of the corresponding executives in more detail. Interpreting the manager fixed effects as proxy for the skills of an individual former executive allows the investigation of this issue on a person-specific level.

To analyze the performance implications of transitions of former executives to the supervisory board, I compare the skills of former executives as supervisory board members with those of other supervisory board members. Panel A in Table 3.7 reports descriptive statistics for the director fixed effects of former executives, former CEOs and other board members. In order to distinguish the fixed effects of former executives from the fixed effects of executives serving on the supervisory board of at least one additional firm, only former executives serving on the supervisory board of the same, but of no other firm in the sample are considered. Since the position of an executive on the executive board could change over time, former executives are classified as former CEOs if they served as CEO for the last during their tenure on the executive board.[41]

In line with Andres et al. (2013c) the results suggest that former CEOs as monitors are not a cause of concern for shareholders. Their estimated average director fixed effect amounts to 0.129 (76th percentile). The difference between the average director fixed effects of former CEOs and other board member is positive and statistically significant at the 5% level, which indicates above average skills of former CEOs as monitors. On a more general level,

[39]See Table 2.2.

[40]See Table 2.4.

[41]In additional analyses, former executives are classified as former CEOs if they served for the majority of years on the executive board as CEO or if they served for all years on the executive board as CEO. Furthermore, I re-estimate Table 3.7 based on the manager fixed effects estimated in the regression model in Table B.2 (4) and (5) with ROA as dependent variable. These robustness checks lead to qualitatively similar results. If former CEOs are defined as executives serving as CEO for all years on the executive board the difference to the executive fixed effects of other executives is less evident. The results of these robustness checks are given in Table B.11, B.12 and B.13 in the appendix of this chapter, respectively.

the average director fixed effect of former executives (including former CEOs) is significantly higher compared to the average director fixed effect of other supervisory board members. The estimated value of 0.071 corresponds to the 68th percentile meaning that more than two thirds of other supervisory board members have a lower director fixed effect. In addition to that, Panel A in Table 3.7 also includes the executive fixed effects of former executives (CEOs) and of all other executives. The results indicate that the executive fixed effects of former executives are significantly higher (70th percentile) compared to other executive board members. This also holds true for the subgroup of former CEOs for which the estimated average executive fixed effect (75th percentile) and the difference to the executive fixed effects of other executives are even more pronounced. Overall, the results in Panel A in Table 3.7 indicate that only executives who performed well during their tenure are offered a seat on the supervisory board and that these executives perform well in their role as monitor, too.

However, the control group in Panel A in Table 3.7 includes all remaining executives and directors. Thereby the control group also consists of executives and directors without the dual experience as executive and director. In order to compare the monitoring skills of former executives of the same firm with executives serving on the supervisory board(s) of (a) different firm(s), the control group in Panel B in Table 3.7 includes director and executive fixed effects of executives serving on at least one supervisory board of another, but not the same firm. On a general level, the director fixed effects of directors with experience as executive at another firm are still above average, but not as high as the director fixed effects of former executives of the same firm. Furthermore their estimated average executive fixed effect is lower compared to the executive fixed effects of former executives of the same firm. This also holds true for the subgroup of CEOs.

In sum, the comparison of executive and director fixed effects of former executives with other managers with experience as executive and director and other executive and supervisory board members suggests that former executives of the same firm as monitors are not a cause of concern for shareholders. Their estimated skills as executive as well as director are on average higher compared to executives as monitors at other firms and other executives or directors. This corroborates the earlier finding that only executives who performed well during their tenure are offered a seat on the supervisory board and that these executives perform well in their role as monitor, too.

Table 3.7: Manager fixed effects of managers on the executive and supervisory board of the same and of different firms: Difference-in-differences

Panel A: Within firms

	Executives	CEOs	Other board members
Executive fixed effects	(1)	(2)	(3)
Mean	0.093*	0.130*	0.001
Median	-0.032	-0.052	-0.047
Std. dev.	1.004	1.069	0.794
Observations	287	127	5,784
Director fixed effects	(1)	(2)	(3)
Mean	0.071*	0.129**	-0.004
Median	-0.034	-0.000	-0.037
Std. dev.	0.724	0.814	0.756
Observations	287	127	12,326

Panel B: Within vs. between firms

	Within firms	Between firms	Difference
Executives on the supervisory board	(1)	(2)	(3)
Executive fixed effects	0.093	-0.017	0.110*
Director fixed effects	0.071	0.031	0.039
Difference	-0.022	0.048	0.071
Observations	287	866	1,153
CEOs on the supervisory board	(1)	(2)	(3)
Executive fixed effects	0.130	0.059	0.070
Director fixed effects	0.129	0.094	0.035
Difference	-0.007	0.035	-0.035
Observations	127	329	456

This table presents the levels and changes of manager fixed effects for those persons serving on the executive and the supervisory board of only one firm (within firms) or different firms, but not the same firm (between firms). Manager fixed effects are estimated based on the regression model in Table 3.4 (5). Panel A contains descriptive statistics for the executive and director fixed effects measured for those executives serving on the executive and the supervisory board of only one firm (within firms) and for a control group of other executive (supervisory) board members. CEOs refer to persons serving as CEO during the last year of their tenure on the executive board. For each group, it shows, the mean, median, standard deviation and the number of observations. The superscripts * and ** denote significance at the 10% and 5% level, respectively. Panel B shows the levels and changes of executive and director fixed effects for persons serving on (the) executive and supervisory board(s) using the difference-in-differences methodology. All executives (CEOs) serving on the executive and the supervisory board of only one firm (within firms) are defined as the treatment group, whereas executives (CEOs) serving on the executive and the supervisory board of different firms, but not of the same firm (between firms) are defined as the control group. The third row shows the difference in the director and executive fixed effect. The third column gives the differences between the treatment and control groups for the director and executive fixed effect and the difference between the differences in the director and executive fixed effect for the treatment and control groups. The mean is reported for each table cell. For the third row and third column, t-tests are used to test if the mean difference is significantly different from zero. The superscript * denote significance in differences at the 10% level.

3.6 Firm-level-analysis

In this section, the estimation results for executive and director fixed effects in Section 3.5 are used to construct measures for board quality and skill dispersion within and between the two boards (Section 3.6.1). Subsequently, I investigate the impact of these measures on firm performance (Section 3.6.2). Finally, Section 3.6.3 discusses the causal relation between manager fixed effects and firm performance.

3.6.1 Measures of board quality & skill dispersion

Apart from their aggregate amount, the dispersion of executive and director fixed effects within the firm could also have an impact on firm performance. One could assume that an executive board consisting of managers with low skills (e.g. caused by entrenchment) needs to be monitored more closely, which is likely to be performed by a supervisory board consisting of directors with relatively high skills. At the same time, monitoring by the supervisory board should be less important, if the executive board mainly consists of executives with high skills. A close monitoring of the executive board, especially an executive board consisting of executives with high skills, might even have a negative impact on firm performance as the monitoring imposes constraints on the executives' freedom to generate shareholder value (Brennan, 2006). Therefore, it may be expected that a higher dispersion between the quality of the executive and the supervisory board leads to a higher firm performance for a given aggregate quality of both boards. I measure the aggregate quality of the two boards and the quality of each board as the average fixed effect of their respective members. The dispersion between the qualities of the two boards is then calculated as the standard deviation between these estimated qualities.

The effectiveness of the executive and supervisory board could also depend on the distribution of skills within these boards. To the best of my knowledge, the relation between the distribution of the skills within these two boards and firm performance has not been previously tested. However, papers in the field of labor economics investigate a comparable issue, namely the relation between the skill mix of employees and firm performance (Iranzo et al., 2008). Depending on the business model of the firm, either high skills of a few workers ("dispersed skill distribution") or equally distributed skills of the

majority of workers ("concentrated skill distribution") are favorable (Milgrom and Roberts, 1990). Another strand of the literature related to the distribution of skills within the executive and supervisory board refers to the performance of teams. There is no consensus whether heterogeneous or homogeneous teams lead to higher firm performance. For instance, positive effects of heterogeneous teams could be attributed to workers with higher skills, who instruct lower skilled workers leading to higher productivity (Hamilton et al., 2003). However, Dess (1987) argues that homogeneous teams agree upon a common strategy more easily.[42] I measure the heterogeneity, i.e. skill dispersion, of the executive (supervisory) board as standard deviation of the corresponding executive (director) fixed effects estimated in Table 3.4 (AKM and AKM + match model).

Panel A in Table 3.8 contains descriptive statistics on the board quality, the quality of the executive and the supervisory board and the dispersion of skills within the executive and the supervisory board and between the two boards. As before, the mean of the individual manager fixed effects is normalized to zero. For the measures that do not control for match effects the quality of the executive and the supervisory board exhibit a positive mean (0.022 and 0.019, respectively) and a negative median (-0.024 and -0.023, respectively) indicating a positive skewness. The measures for the dispersion of skills within each board and between the two boards are also positively skewed. The dispersion of skills between is higher than within the executive and the supervisory board. The descriptive statistics are very similar for the measures based on estimation results controlling for match effects.

Panel B in Table 3.8 reports the correlation between the measures for the quality of the boards and the dispersion of skills within and between the executive and the supervisory board. As some of the measures are interrelated with each other, some of these correlations are quite high. The correlations between the average quality of all members in both boards and the quality of the executive and supervisory board are considerably high (between 0.88 and 0.97). Furthermore, the dispersion between the qualities of all managers in both boards is highly positively correlated with the dispersion of the quality between the executive and the supervisory board and the dispersion of skills within the supervisory board (0.89 and 0.92, respectively). All other measures are also, albeit to a lesser extent, positively

[42]For a comprehensive overview on studies about work group diversity, see Jackson et al. (2003). For a recent study that incorporates several dimensions of work group diversity and tests its impact on the performance for a large sample from the U.S. mutual fund industry, see Bär et al. (2007).

correlated (0.11-0.71). The correlations for the measures based on estimations controlling for match effects are very similar.[43]

Table 3.8: Descriptive statistics on board quality and skill dispersion

Panel A: Board quality and skill dispersion variables

	Board quality	EB quality	SB quality	Disp. EB-SB quality	Disp. manager skills	Disp. executive skills	Disp. director skills
No match effects							
Mean	0.021	0.022	0.019	0.059	0.163	0.101	0.156
25th percentile	-0.173	-0.182	-0.165	0.010	0.059	0.018	0.056
Median	-0.024	-0.024	-0.023	0.025	0.094	0.052	0.091
75th percentile	0.135	0.141	0.130	0.056	0.167	0.108	0.163
Std. dev.	0.731	0.806	0.703	0.183	0.303	0.206	0.281
Observations	8,591	8,591	8,591	8,591	8,591	8,591	8,591
Match effects							
Mean	0.022	0.024	0.021	0.059	0.162	0.101	0.156
25th percentile	-0.173	-0.185	-0.165	0.010	0.059	0.017	0.056
Median	-0.024	-0.022	-0.022	0.024	0.094	0.051	0.091
75th percentile	0.136	0.139	0.130	0.058	0.165	0.109	0.162
Std. dev.	0.735	0.811	0.706	0.185	0.304	0.208	0.282
Observations	8,591	8,591	8,591	8,591	8,591	8,591	8,591

Panel B: Correlation between measures of board quality and skill dispersion

	Board quality	EB quality	SB quality	Disp. EB-SB quality	Disp. manager skills	Disp. executive skills	Disp. director skills
Board quality	1.00/1.00						
EB quality	0.97/0.97	1.00/1.00					
SB quality	0.96/0.96	0.88/0.88	1.00/1.00				
Disp. EB-SB quality	0.49/0.50	0.52/0.53	0.42/0.43	1.00/1.00			
Disp. manager skills	0.51/0.51	0.50/0.50	0.49/0.49	0.89/0.89	1.00/1.00		
Disp. executive skills	0.13/0.13	0.11/0.12	0.14/0.14	0.25/0.25	0.44/0.44	1.00/1.00	
Disp. director skills	0.48/0.48	0.43/0.43	0.51/0.51	0.71/0.70	0.92/0.92	0.31/0.31	1.00/1.00

This table presents descriptive statistics for several measures of board quality and skill dispersion. All variables are defined as in Table B.1. For each variable, it shows the number of observations, the mean, 25th percentile, median, 75th percentile, standard deviation and the number of observations. The variables in Panel A are based on the estimation of manager fixed effects estimated in Table 3.4 (4) and (5). Panel B shows the correlation between the variables of Panel A.

[43]Additional summary statistics based on the manager fixed effects estimated in the regression model in Table B.2 (4) and (5) with ROA as dependent variable are given in Table B.14 in the appendix of this chapter and lead to qualitatively similar results.

3.6.2 Determinants of firm performance

The impact of the distribution of skills within the executive and the supervisory board and between the two boards on firm performance is analyzed using regression models on the firm-level. In addition to the board and firm characteristics described in Section 3.4.2, the dispersion of skills between and the dispersion within the executive and the supervisory board are included in three models. Moreover, these three models control for the aggregate quality of the executive and the supervisory board.[44] The coefficient estimates and the explanatory power are compared for overall five models. Model (1) does not include firm fixed effects or measures based on manager fixed effects (OLS model). In model (2), firm fixed effects (firm fixed model) and in model (3) measures based on manager fixed effects are added to the OLS model (manager fixed model). Models (4) and (5) include firm fixed effects and measures based on manager fixed effects. In contrast to model (4) (manager fixed + firm fixed model), model (5) controls for match effects (manager fixed + firm fixed + match model).

The results depicted in Table 3.9 show again that including firm fixed effects or measures based on manager fixed effects increases the explanatory power by more than 30 percentage points (in (2) by 42.4 and in (3) by 32.5 percentage points). However, the explanatory power increases significantly more when both firm fixed effects and measures based on manager fixed effects are included. In this case, the explanatory power increases by more than 70 percentage points (to 82.2%). The results regarding the dispersion of quality within the executive and supervisory board and between the two boards differ considerably depending on whether firm fixed effects are included. The results in (3) indicate a significantly positive impact of the dispersion within and between the executive and supervisory board on firm performance. However, these coefficient estimates are biased as the executive and director fixed effects in Table 3.4 (4) and (5) are estimated controlling for firm fixed effects. The results in models (4) and (5) suggest that the aggregate quality of both boards is the key factor in explaining the impact of manager fixed effects on firm performance. This effect is positive and significant on the 1% level, whereas

[44]The choice of these variables is driven by the high correlations between some of the measures of Panel B in Table 3.8.

the coefficients for the dispersion of skills within and between the two boards are insignificant in models (4) and (5).

The results regarding the board and firm characteristics also depend on whether executive and director fixed effects are included. For the sake of brevity, I only compare model (2) – the most commonly used model in the literature – with models (4) and (5). The coefficient estimates of the board characteristics in the models (2) and (4) are very similar. However, the significance levels differ for the average tenure of the executive, the size of the supervisory board, the dummy variable for a former CEO as chairman of the supervisory board and for women representation. The coefficients for the average tenure of the executive, the size of the supervisory board and women representation are not statistically significant at conventional levels for model (2) and significant on the 1%, 5% and 10% level for model (4), respectively. The coefficient estimate for the dummy variable for a former CEO as chairman of the supervisory board changes from significance on the 10% level in model (2) to insignificant in model (4). Concerning the firm characteristics, only the coefficient for the cash flow volatility turns from insignificant to significant (on the 1% level). For free float, the size of the coefficient changes by 37%. The differences and the directions in the changes of the coefficients suggest that highly skilled managers are more likely to work in firms with a more concentrated ownership structure.[45] Similar conclusions can be drawn for the comparison of models (2) and (5) (manager fixed + firm fixed + match model). In sum, the comparison between the results in model (2) and models (4) and (5) suggests an omitted variable bias in model (2) – the model that does not control for executive or director fixed effects.[46]

[45]Bertrand and Schoar (2003) also find a positive relation between manager fixed effects in performance and the fraction of shares held by large shareholders. They interpret this finding as evidence that firms with better corporate governance are more likely to select managers with performance-enhancing styles.

[46]As a robustness test, I re-estimate Table 3.9 based on the manager fixed effects estimated in the regression model in Table B.2 (4) and (5) with ROA as dependent variable. The results of this robustness check are given in Table B.15 in the appendix of this chapter. This robustness check leads to qualitatively similar results and lends further support to the notion of an omitted variable bias in model (2).

Table 3.9: Board quality, skill dispersion, and firm performance

	OLS	FE	IE'	FE+IE'	FE+IE'+ME'
	(1)	(2)	(3)	(4)	(5)
Board quality			0.340*	1.736***	1.720***
			(1.67)	(8.20)	(8.76)
Dispersion EB-SB quality			1.877***	-0.951	-0.908
			(4.08)	(-0.99)	(-0.98)
Dispersion executive skills			0.978***	0.360	0.406
			(5.09)	(1.41)	(1.48)
Dispersion director skills			0.872***	-0.209	-0.200
			(2.81)	(-0.58)	(-0.54)
Tenure executive board	0.009	0.013	0.024***	0.014***	0.013***
	(0.66)	(0.99)	(2.63)	(3.02)	(2.80)
Tenure supervisory board	0.005	-0.006	0.018	-0.002	-0.002
	(0.32)	(-0.59)	(1.43)	(-0.43)	(-0.35)
Supervisory board size	0.023*	-0.018	0.021**	-0.016**	-0.015**
	(1.72)	(-1.15)	(2.23)	(-2.06)	(-1.98)
SB-/(SB+EB)-size-ratio	-0.440*	-0.097	-0.196	0.115	0.229
	(-1.75)	(-0.33)	(-0.99)	(0.67)	(1.23)
Codetermination	-0.920***	0.099	-0.516***	0.103	0.092
	(-3.35)	(0.40)	(-3.00)	(0.78)	(0.70)
Chairman is former CEO	0.124	0.093*	0.088	0.018	0.010
	(1.11)	(1.67)	(1.28)	(1.22)	(0.67)
Busy board	0.277*	-0.020	0.170	0.016	0.027
	(1.68)	(-0.21)	(1.29)	(0.37)	(0.65)
Interlocking board	-0.002	-0.024	0.004	-0.006	-0.005
	(-0.15)	(-1.08)	(0.26)	(-0.78)	(-0.65)
Women representation	0.778***	-0.088	0.421*	-0.259*	-0.254*
	(2.89)	(-0.29)	(1.89)	(-1.66)	(-1.65)
Firm size	-0.126***	-0.325***	-0.099***	-0.344***	-0.352***
	(-4.13)	(-5.17)	(-4.29)	(-11.67)	(-11.94)
ROA	0.380	0.273	0.354	0.189	0.187
	(1.12)	(1.31)	(1.20)	(1.19)	(1.17)
Firm age	0.010	0.064	-0.036	0.039	0.062
	(0.26)	(0.38)	(-1.25)	(0.58)	(0.90)
Free float	-0.254***	-0.263**	-0.262***	-0.166***	-0.166***
	(-2.57)	(-2.36)	(-3.21)	(-4.05)	(-4.02)
Capital structure	-0.451***	0.283**	-0.096	0.294***	0.272***
	(-3.19)	(2.40)	(-0.96)	(4.14)	(3.81)
Cash flow volatility	0.280	1.950	-0.047	1.684***	1.509**
	(0.66)	(1.27)	(-0.29)	(2.60)	(2.42)
Sales growth	0.003	-0.000	-0.012	-0.012	-0.013
	(1.39)	(-0.40)	(-1.63)	(-1.20)	(-1.28)
Constant	3.072***	4.918***	2.232***	5.047***	4.992***
	(8.13)	(4.57)	(7.16)	(9.62)	(9.30)
Adj. R^2	0.086	0.510	0.411	0.822	0.822
Observations	8,591	8,591	8,591	8,591	8,591

This table shows the results of regressions at the firm-level with Tobin´s Q as dependent variable, using the AKM sample. Tobin`s Q and all independent variables are defined as in Table B.1. (1) contains neither manager nor firm fixed effects and is estimated as pooled OLS, (2) uses firm fixed effects (FE), (3) includes variables which are based on the manager fixed effects estimated in Table 3.4 (4) (IE'), (4) includes firm fixed effects and variables which are based on the manager fixed effects estimated in Table 3.4 (4) (FE+IE') and (5) uses firm fixed effects and variables which are based on the manager fixed effects (adjusted for match effects) estimated in Table 3.4 (5) (FE+IE'+ME'). All regressions include year dummies. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

3.6.3 Causality

The regression models presented in the previous sections are very useful in addressing one source of endogeneity – the omitted variable bias, that is the main endogeneity issue considered in this study. In this section, I examine the causality between manager fixed effects and firm performance to address a potential other source of endogeneity – reversed causality. The causality between manager fixed effects (as proxy for skills) and firm performance may go either way. On the one hand, highly-skilled managers could have an active and positive impact on firm performance. According to another interpretation, managers with high manager fixed effects sort into companies with high performance. The estimated high manager fixed effects could then be the result of a better human capital development of managers in firms with higher firm performance (Graham et al., 2009).

To investigate the causality between manager fixed effects and firm performance, I split the sample into the periods 1993-2002 and 2003-2011. Manager fixed effects are estimated for the period 1993-2002 as well as for the entire sample period. For the period 2003-2011 all firm-years are considered for which at least one manager fixed effect estimated over the period 1993-2002 can be assigned to a manager, who was newly appointed during the period 2003-2011. As the results of the regression models on the firm-year-level have shown, it is important to control for the aggregate quality of the executive and supervisory board. However, as this measure contains managers with the manager fixed effects estimated over the period 1993-2002, I exclude these managers for the calculation of a variable, which I refer to as net board quality. Net board quality is defined as the average fixed effects of all managers net of the manager fixed effects of newly appointed managers during the period 2003-2011 (with information about manager fixed effects estimated over the period 1993-2002). The variable net board quality is included in the regression models of Table 3.10 in order to adequately control for the aggregate board quality of the executive and supervisory board.[47]

Under the hypothesis of an active impact of managers on firm performance, one would expect a positive and significant impact of the manager fixed effects estimated over the period 1993-2002 on firm performance for the subsequent period (2003-2011). The impact

[47] All measures based on manager fixed effects in Table 3.10 are measured net of match effects.

of manager fixed effects on firm performance is captured in three different ways (resulting in the three models displayed in Table 3.10). The three regression models include the same set of observable board and firm characteristics as the regression models in the previous section and controls for net board quality and firm fixed effects. Model (1) includes the sum of manager fixed effects of newly appointed managers during the period 2003-2011 with information about manager fixed effects estimated over the period 1993-2002. In models (2) and (3) the respective manager fixed effects estimated over the period 1993-2002 are interacted with dummies variables for the board positions of the corresponding managers in the respective firm-year. Model (2) includes interactions with dummy variables for positions as chairperson (either CEO or chairman of the supervisory board) and ordinary board member (executive or supervisory board member), whereas model (3) includes interactions with dummy variables for any position on the executive or supervisory board. The coefficient for manager fixed effects is positive and significant (at the 5% level) in model (1). The results in models (2) and (3) indicate that the coefficient estimates are also significantly positive for the different types of positions on the executive or supervisory board in the respective firm-year. Overall, the results provide strong evidence in favor of an active impact of managers (executives and directors) on firm performance. [48]

[48]As a robustness test, manager fixed effects are estimated based on the regression model in Table B.2 (4) and (5) with ROA as dependent variable. The results of this robustness check are given in Table B.16 in the appendix of this chapter. In line with the results presented in Table 3.10 the coefficient of manager fixed effects has a positive sign in four out of five cases. However, the coefficient is only statistically significant for positions on the supervisory board in model (3). This corroborates the evidence in favor of the importance of director fixed effects.

Table 3.10: Causality between manager fixed effects and firm performance

	(1)	(2)	(3)
Manager fixed effects (1993-2002)	0.047**		
	(2.33)		
Chairpersons fixed effects (1993-2002)		0.088*	
		(1.92)	
Board member fixed effects (1993-2002)		0.047**	
		(2.29)	
Executive fixed effects (1993-2002)			0.088***
			(2.67)
Director fixed effects (1993-2002)			0.028**
			(2.10)
Net board quality	0.134***	0.133***	0.145***
	(4.24)	(4.17)	(3.86)
Tenure executive board	0.018**	0.018**	0.018**
	(2.30)	(2.33)	(2.34)
Tenure supervisory board	-0.001	-0.000	-0.001
	(-0.05)	(-0.00)	(-0.12)
Supervisory board size	0.027**	0.027**	0.026**
	(2.31)	(2.31)	(2.27)
SB-/(SB+EB)-size-ratio	-0.453*	-0.465*	-0.411*
	(-1.79)	(-1.81)	(-1.66)
Codetermination	-0.168	-0.172	-0.177
	(-1.08)	(-1.10)	(-1.14)
Chairman is former CEO	0.027	0.031	0.031
	(0.67)	(0.65)	(0.65)
Busy board	-0.230	-0.230	-0.226
	(-1.29)	(-1.28)	(-1.28)
Interlocking board	-0.016	-0.016	-0.017
	(-1.16)	(-1.15)	(-1.23)
Women representation	-0.110	-0.124	-0.101
	(-0.53)	(-0.60)	(-0.48)
Firm size	-0.546***	-0.546***	-0.546***
	(-3.66)	(-3.67)	(-3.68)
ROA	0.040	0.044	0.028
	(0.12)	(0.13)	(0.08)
Firm age	-0.166	-0.166	-0.160
	(-1.03)	(-1.03)	(-1.00)
Free float	-0.243***	-0.244***	-0.239***
	(-3.17)	(-3.21)	(-3.16)
Capital structure	0.599***	0.602***	0.597***
	(3.03)	(3.04)	(3.00)
Cash flow volatility	0.262	0.262	0.286
	(0.38)	(0.38)	(0.42)
Sales growth	-0.010	-0.010	-0.010
	(-0.53)	(-0.53)	(-0.52)
Constant	8.690***	8.683***	8.642***
	(4.02)	(4.04)	(4.04)
Adj. R^2	0.815	0.815	0.815
Observations	3,179	3,179	3,179

This table shows the results of regressions at the firm-level with Tobin´s Q as dependent variable for the period 2003-2011 with non-missing data about manager fixed effects (1993-2002). All variables are defined as in Table B.1. Manager fixed effects (1993-2002) are estimated for the period 1993-2002 and are based on the regression model in Table 3.4 (5). In models (2) and (3) manager fixed effects (1993-2002) are interacted with the position of the respective manager on the two boards. All regressions include year dummies. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

3.7 Conclusion

The impact of individual executives on firm performance has been investigated in many studies in the recent past and continues to gain in importance as research topic. Apart from individual executives, many studies also investigate the impact of the board of directors on firm performance. Previous studies related to the impact of the board of directors rely on observable board characteristics and do not consider director fixed effects.

By using a data set of German firms, the impact of individual managers with different tasks on firm performance can be distinguished. The two-tiered board in Germany allows the unambiguous assignment of the tasks of running and monitoring the firm to the members of the executive and the supervisory board. This study analyzes the absolute and relative importance of executive and director fixed effects compared to observable board, manager and firm characteristics as well as year and firm fixed effects. Using the AKM method allows to take into account a considerable larger number of managers as under the MDV method and to separately identify the manager and firm fixed effects as opposed to the spell method. In addition to that, I also include match effects allowing a more precise estimation of manager fixed effects.

I find that executive and director fixed effects are almost equally important in explaining the variance in firm performance. The proportion of the variance in firm performance explained amounts to 24% for executive fixed effects and 21-22% for director fixed effects, which is less than the corresponding proportion for firm fixed effects, but comparable to the proportion jointly explained by observable board, manager and firm characteristics (24-27%) when the AKM method is used. This proportion is even higher for director fixed effects under the MDV method. The results further suggest, that changes of former CEOs to the supervisory board of the same firm upon retirement do not seem to be a concern for shareholders as only executives who performed well during their tenure are offered a seat on the supervisory board and as these executives perform well in their role as monitor, too. Comparing the coefficient estimates of models with and without manager fixed effects suggests that models without manager fixed effects suffer from an omitted variables bias. The results also provide strong evidence in favor of an active impact of managers (executives and directors) on firm performance.

Using fixed effects in order to control for unobserved managerial heterogeneities does not answer the question of the source of these heterogeneities. When one follows the most common interpretation of manager fixed effects as a proxy for the skills of an individual manager, the analysis on the firm-level shows that the impact of manager fixed effects on firm performance can be attributed to the aggregate quality of the executive and the supervisory board, but not to the dispersion of skills within or between the two boards.

The high explanatory power of director fixed effects in explaining firm performance suggests at least two interesting areas for future research. Future research could focus more closely on the impact of specific types of directors such as former executives, bank representatives or employee representatives on firm performance. Prior studies have investigated these issues on the firm-level.[49] In contrast to this, the manager fixed dummy variable approach allows to reinvestigate these topics on the level of individual persons. As studies about the relation between board characteristics and firm performance implicitly assume a link between board characteristics and board actions (Hermalin and Weisbach, 2003), the investigation of the absolute and relative importance of director fixed effects in explaining certain board actions such as executive compensation and CEO turnover is another interesting field for future research.

[49]For studies about the impact of codetermination on firm performance, see among others, Fauver and Fuerst (2006) and Gorton and Schmid (2004). For a study about the impact of bank representatives on firm performance, see among others, Dittmann et al. (2010).

B Appendix to Chapter 3

Table B.1: Variable definitions to Chapter 3

This table presents the definitions of the variables used in Chapter 3. Board, manager characteristics and ownership structure are obtained or derived from the *Saling*/*Hoppenstedt Aktienführer*. All other firm characteristics are obtained from Datastream.

Variable	Definition
Board characteristics	
Board quality	Average fixed effects of all executive and supervisory board members.
Busy board	A dummy variable that equals one if at least 50% of the supervisory board members hold three or more directorships in German listed firms.
Chairman is former CEO	A dummy variable that equals one if the chairman of the supervisory board in the respective year was the CEO of the same company in at least one of the previous years.
Codetermination	Ratio of the number of employee representatives to *supervisory board size*.
Dispersion director skills	Standard deviation of the fixed effects of all supervisory board members.
Dispersion EB-SB quality	Standard deviation of *EB quality* and *SB quality*.
Dispersion executive skills	Standard deviation of the fixed effects of all executive board members.
Dispersion manager skills	Standard deviation of the fixed effects of all executive and supervisory board members.
EB quality	Average fixed effects of the executive board members.
Executive board size	Number of executive board members at the end of the fiscal year.
Interlocking board	A dummy variable that equals one if at least one executive and supervisory board are joint members of another supervisory board.
Net board quality	(Sum of the fixed effects of executive and supervisory board members – the sum of manager fixed effects (1993-2002))/(number of members on the executive and supervisory board – number of managers with non-missing manager fixed effects (1993-2002))
SB quality	Average fixed effects of the supervisory board members.
SB-/(SB+EB)-size-ratio	Ratio of *supervisory board size* to the sum of *supervisory board size* and *executive board size*.
Supervisory board size	Number of supervisory board members at the end of the fiscal year.

Board characteristics (continued)	
Tenure supervisory (executive) board	Average tenure of all supervisory (executive) board members. For an individual director (executive), tenure equals one plus the difference between the current year and the first year of the individual on the supervisory (executive) board during the listing period.
Women representation	Ratio of the number of women to (*supervisory board size + executive board size*).
Manager characteristics	
Busy director	A dummy variable that equals one if a director is classified as "busy", i.e. holds three or more directorships in German listed firms.
CEO/Chairman	A dummy variable that equals one if the individual is the CEO or the chairman of the supervisory board at the end of the fiscal year.
Chairman is former CEO	A dummy variable that equals one if the individual is the chairman of the supervisory board in the current year and was the CEO of the company in at least one of the previous years.
Employee representative	A dummy variable that equals one if the individual is a supervisory board member and employee representative at the end of the fiscal year.
Female	A dummy variable that equals one if a manager is female.
Interlocking manager	A dummy variable that equals one if an executive and a director are joint members of another supervisory board.
Mover	A dummy variable that equals one if a manager has worked for at least two firms of the sample during the sample period.
Stayer	A dummy variable that equals one if a manager has worked for only one firm of the sample during the sample period.
Tenure director	One plus the difference between the current year and the first year of the director on the supervisory board during the listing period.
Tenure executive	One plus the difference between the current year and the first year of the executive on the executive board during the listing period.
Firm characteristics	
Capital structure	Ratio of book value of total debt to book value of total assets.
Cash flow volatility	Standard deviation of share price returns in the previous 36 months.
Firm age	Natural logarithm of the difference between the current year and the year of the incorporation.
Firm size	Natural logarithm of the book value of total assets.
Free float	Fraction of voting equity held by shareholders with less than 5% of the voting equity.

Firm characteristics (continued)	
ROA	Ratio of earnings before interest and taxes to total assets.
Sales growth	Nominal growth rate of revenues over the last fiscal year.
Tobin's Q	(Market value of equity + book value of debt)/book value of total assets.

Table B.2: Unobserved managerial heterogeneity and firm performance – ROA

This table shows the results of regressions at the manager-firm-year-level with ROA as dependent variable, using the AKM sample. ROA and all independent variables are defined as in Table B.1. (1) contains neither manager nor firm fixed effects and is estimated as pooled OLS, (2) uses firm fixed effects (FE), (3) uses manager fixed effects (IE), and (4) uses firm and manager fixed effects (FE+IE). (5) includes firm, manager, and match fixed effects (FE+IE+ME). The regression constant in (4) can be interpreted as descriptive statistic for the grand mean; its standard error is not computed. All regressions include year dummies. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	OLS	FE	IE	FE+IE	FE+IE+ME
	(1)	(2)	(3)	(4)	(5)
Tenure executive board	0.004**	0.001	0.002***	0.001	0.001
	(2.53)	(0.89)	(2.81)	(0.92)	(0.90)
Tenure supervisory board	0.006***	-0.000	0.002*	-0.000	-0.000
	(4.83)	(-0.12)	(1.80)	(-0.10)	(-0.11)
Supervisory board size	-0.007***	-0.004***	-0.004***	-0.003***	-0.003***
	(-4.47)	(-3.01)	(-4.70)	(-2.92)	(-2.77)
SB-/(SB+EB)-size-ratio	0.098***	0.075**	0.007***	0.075**	0.073**
	(2.82)	(2.10)	(2.67)	(2.34)	(2.10)
Codetermination	0.048**	-0.020	0.002	-0.016	-0.099
	(2.31)	(-0.99)	(0.12)	(-0.85)	(-0.51)
Chairman is former CEO	-0.002	-0.009*	-0.002	-0.005	-0.004
	(-0.33)	(-1.85)	(-0.42)	(-1.00)	(-0.72)
Busy board	0.011	0.006	0.009	0.007	0.002
	(0.93)	(0.57)	(1.02)	(0.74)	(0.21)
Interlocking board	-0.006***	-0.003**	-0.004***	-0.003**	-0.003**
	(-2.77)	(-1.99)	(-3.26)	(-2.25)	(-2.13)
Women representation	0.055	0.006	0.022	0.002	-0.002
	(1.63)	(0.18)	(0.84)	(0.06)	(-0.07)
Tenure director	0.000	0.000	0.000	-0.000	0.001
	(0.57)	(0.66)	(1.40)	(-0.73)	(0.49)
Tenure executive	0.000***	-0.001	-0.000	-0.001*	0.000
	(2.77)	(-0.09)	(-0.24)	(-1.83)	(0.21)
CEO/Chairman	-0.001	0.002**	-0.002	-0.005	0.000
	(-0.96)	(1.99)	(-0.42)	(-1.00)	(0.08)
Busy director	-0.000	-0.002	0.009	-0.005	-0.004
	(-0.10)	(-1.23)	(1.02)	(-1.18)	(-0.76)
Interlocking manager	-0.002	-0.001	-0.004***	-0.003	-0.003
	(-1.06)	(-1.43)	(-3.26)	(-1.25)	(-0.84)
Firm size	0.017***	0.029***	0.015***	0.035***	0.036***
	(5.03)	(4.13)	(4.96)	(3.75)	(3.41)
Firm age	0.002	0.075***	0.010***	0.062***	0.065**
	(0.81)	(2.96)	(3.39)	(2.59)	(2.47)
Free float	-0.003	0.009	0.003	0.004	0.001
	(-0.31)	(0.77)	(0.34)	(0.43)	(0.11)
Capital structure	-0.085***	-0.193***	-0.154***	-0.222***	-0.218***
	(-4.51)	(-7.59)	(-7.57)	(-7.50)	(-7.03)
Cash flow volatility	-0.140	-0.058	-0.050	0.011	0.042
	(-1.49)	(-1.13)	(-1.38)	(0.22)	(0.72)
Sales growth	0.000	0.000***	0.000***	0.000***	0.000**
	(1.41)	(3.59)	(2.27)	(2.38)	(2.43)
Constant	-0.188***	-0.611***	-0.165***	-0.637	-0.657***
	(-3.76)	(-4.44)	(-3.88)		(-3.61)
Adj. R^2	0.079	0.455	0.432	0.606	0.626
Observations	95,554	95,554	95,554	95,554	95,554

Table B.3: Unobserved managerial heterogeneity and firm performance – MDV

This table shows the results of regressions at the manager-firm-year-level with Tobin´s Q as dependent variable, using the MDV sample. Tobin`s Q and all independent variables are defined as in Table B.1. (1) contains neither manager nor firm fixed effects and is estimated as pooled OLS, (2) uses firm fixed effects (FE), (3) uses manager fixed effects (IE), and (4) uses firm and manager fixed effects (FE+IE). (5) includes firm, manager, and match fixed effects (FE+IE+ME). The regression constant in (4) can be interpreted as descriptive statistic for the grand mean; its standard error is not computed. All regressions include year dummies. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	OLS	FE	IE	FE+IE	FE+IE+ME
	(1)	(2)	(3)	(4)	(5)
Tenure executive board	0.003	0.015	0.049	0.013	0.008
	(0.19)	(1.04)	(0.47)	(1.26)	(1.36)
Tenure supervisory board	0.027	-0.000	0.021	-0.007	-0.005
	(1.42)	(-0.03)	(1.70)	(-0.84)	(-0.77)
Supervisory board size	0.017*	-0.013	0.014*	-0.008	-0.011
	(1.65)	(-0.89)	(1.83)	(-0.66)	(-0.69)
SB-/(SB+EB)-size-ratio	-0.189	-0.423	-0.356**	-0.467**	-0.017
	(-0.72)	(-1.32)	(-1.99)	(-2.00)	(-0.10)
Codetermination	-0.721***	0.264	-0.500***	0.172	0.169
	(-2.72)	(1.02)	(-2.67)	(0.76)	(0.64)
Chairman is former CEO	0.114	0.057	0.083*	0.032	0.018
	(1.07)	(1.24)	(1.85)	(0.95)	(0.59)
Busy board	0.327*	0.010	0.245	0.001	0.007
	(1.65)	(0.12)	(1.64)	(0.01)	(0.15)
Interlocking board	0.011	-0.026	0.007	-0.018*	-0.006
	(0.74)	(-1.63)	(0.73)	(-1.84)	(-0.55)
Women representation	0.707***	0.058	0.495**	-0.085	-0.215
	(2.30)	(0.22)	(1.99)	(-0.41)	(-0.85)
Tenure director	0.001	0.002	0.005	0.008**	0.006
	(0.21)	(1.37)	(1.16)	(2.21)	(0.71)
Tenure executive	-0.011*	-0.005	0.001	0.001	0.005
	(-1.72)	(-1.43)	(0.09)	(0.10)	(0.55)
CEO/Chairman	0.002	0.009	0.027	0.041**	0.025
	(0.11)	(0.83)	(0.92)	(2.56)	(0.97)
Busy director	0.016	-0.019	-0.009	0.002	-0.000
	(0.74)	(-1.38)	(-0.35)	(0.10)	(-0.03)
Interlocking manager	-0.030	-0.005	-0.048*	0.006	-0.002
	(-1.25)	(-0.22)	(-1.70)	(0.38)	(-0.18)
Firm size	-0.124***	-0.288***	-0.154***	-0.278***	-0.314***
	(-4.85)	(-5.00)	(-6.13)	(-3.88)	(-6.23)
ROA	0.618	0.280	0.330	0.224	0.436***
	(1.22)	(0.91)	(0.80)	(0.81)	(2.57)
Firm age	-0.008	-0.071	0.008	-0.068	-0.033
	(-0.18)	(-0.56)	(0.29)	(-0.62)	(-0.31)
Free float	-0.083	-0.232**	-0.057	-0.192***	-0.203***
	(-1.05)	(-2.21)	(-0.09)	(-2.66)	(-2.88)
Capital structure	-0.224	0.315**	-0.036	0.261**	0.334***
	(-1.47)	(2.38)	(-0.33)	(2.00)	(3.71)
Cash flow volatility	0.861	3.036	0.715	2.366*	1.011
	(0.85)	(1.42)	(1.08)	(1.76)	(1.56)
Sales growth	0.005	-0.000	-0.006	-0.007	-0.007
	(1.55)	(-0.39)	(-0.64)	(-0.79)	(-0.73)
Constant	2.674***	5.261***	3.130***	5.195	5.271***
	(7.69)	(5.00)	(10.45)		(6.30)
Adj. R^2	0.110	0.551	0.388	0.686	0.769
Observations	29,633	29,633	29,633	29,633	29,633

Table B.4: Relative importance of manager fixed effects in determining firm performance – ROA

This table presents the results of the decomposition of the model R-squared in Table B.2. The results in (1) are based on Table B.2 (4) and the results in (2) are based on Table B.2 (5). These components are observable time-variant board characteristics (first block in Table B.2), observable time-variant manager characteristics (second block in Table B.2) observable time-variant firm characteristics (third block in Table B.2), firm fixed effects, manager/executive/director fixed effects, year effects and residuals. Additionally, (2) also contains match effects. For each of these components, the covariance with ROA (relative to the variance of ROA) and the percentage of the explained variance of ROA (in parentheses) is computed. Panel A is based on all observations in Table B.2 (4) and (5). Panel B is based on the subsample of executive-firm-years and Panel C is based on the subsample of director-firm-years.

Panel A: Manager

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	-0.005	(-0.86%)	-0.004	(-0.71%)
Observable time-variant manager characteristics	-0.001	(-0.14%)	0.001	(0.17%)
Observable time-variant firm characteristics	0.132	(21.68%)	0.133	(21.16%)
Firm fixed effects	0.325	(53.72%)	0.322	(51.35%)
Manager fixed effects	0.148	(24.44%)	0.148	(23.58%)
Match fixed effects			0.021	(3.34%)
Year effects	0.007	(1.16%)	0.007	(1.12%)
Residuals	0.394	(39.44%)	0.374	(37.36%)
Observations	95,554		95,554	

Panel B: Executives

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	-0.005	(-0.85%)	-0.005	(0.71%)
Observable time-variant manager characteristics	-0.001	(-0.22%)	0.001	(0.10%)
Observable time-variant firm characteristics	0.134	(21.35%)	0.135	(21.29%)
Firm fixed effects	0.315	(50.44%)	0.311	(49.08%)
Manager fixed effects	0.175	(28.10%)	0.175	(27.63%)
Match fixed effects			0.009	(1.41%)
Year effects	0.007	(1.18%)	0.008	(1.22%)
Residuals	0.376	(37.57%)	0.367	(36.69%)
Observations	26,393		26,393	

Panel C: Directors

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	-0.005	(-0.86%)	-0.004	(-0.70%)
Observable time-variant manager characteristics	-0.001	(-0.09%)	0.001	(0.19%)
Observable time-variant firm characteristics	0.131	(21.80%)	0.131	(21.04%)
Firm fixed effects	0.331	(55.50%)	0.327	(52.56%)
Manager fixed effects	0.134	(22.51%)	0.134	(21.51%)
Match fixed effects			0.027	(4.33%)
Year effects	0.007	(1.14%)	0.007	(1.06%)
Residuals	0.404	(40.39%)	0.377	(37.70%)
Observations	69,161		69,161	

Table B.5: Relative importance of manager fixed effects in determining firm performance – MDV

This table presents the results of the decomposition of the model R-squared in Table B.3. The results in (1) are based on Table B.3 (4) and the results in (2) are based on Table B.3 (5). These components are observable time-variant board characteristics (first block in Table B.3), observable time-variant manager characteristics (second block in Table B.3) observable time-variant firm characteristics (third block in Table B.3), firm fixed effects, manager/executive/director fixed effects, year effects and residuals. Additionally, (2) also contains match effects. For each of these components, the covariance with Tobin's Q (relative to the variance of Tobin's Q) and the percentage of the explained variance of Tobin´s Q (in parentheses) is computed. Panel A is based on all observations in Table B.3 (4) and (5). Panel B is based on the subsample of executive-firm-years and Panel C is based on the subsample of director-firm-years.

Panel A: Manager

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.009	(1.28%)	0.007	(0.86%)
Observable time-variant manager characteristics	0.001	(0.17%)	0.002	(0.20%)
Observable time-variant firm characteristics	0.193	(28.13%)	0.233	(30.11%)
Firm fixed effects	0.303	(44.20%)	0.298	(38.49%)
Manager fixed effects	0.171	(24.88%)	0.174	(22.42%)
Match fixed effects			0.091	(11.73%)
Year effects	0.009	(1.33%)	-0.030	(-3.82%)
Residuals	0.314	(31.44%)	0.225	(22.54%)
Observations	29,633		29,633	

Panel B: Executives

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.010	(1.39%)	0.008	(1.04%)
Observable time-variant manager characteristics	0.001	(0.13%)	0.002	(0.20%)
Observable time-variant firm characteristics	0.280	(38.07%)	0.345	(43.30%)
Firm fixed effects	0.374	(50.90%)	0.361	(45.29%)
Manager fixed effects	0.057	(7.79%)	0.059	(7.39%)
Match fixed effects			0.065	(8.12%)
Year effects	0.013	(1.71%)	-0.042	(-5.33%)
Residuals	0.265	(26.50%)	0.203	(20.32%)
Observations	4,284		4,284	

Panel C: Directors

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.009	(1.29%)	0.007	(0.85%)
Observable time-variant manager characteristics	0.001	(0.15%)	0.001	(0.18%)
Observable time-variant firm characteristics	0.184	(27.01%)	0.221	(28.67%)
Firm fixed effects	0.295	(43.34%)	0.291	(37.67%)
Manager fixed effects	0.183	(26.92%)	0.186	(24.13%)
Match fixed effects			0.094	(12.15%)
Year effects	0.009	(1.29%)	-0.028	(-3.65%)
Residuals	0.320	(31.98%)	0.228	(22.78%)
Observations	25,349		25,349	

Table B.6: Relative importance of manager fixed effects in determining firm performance – at least three years

This table presents the results of the decomposition of the model R-squared based on the regression model in Table 3.4. In contrast to the results presented in Table 3.4, this table does not include manager-firm-years of managers who have worked less than three years for a firm. The results in (1) are based on the regression model in Table 3.4 (4) and the results in (2) are based on the regression model in Table 3.4 (5). These components are observable time-variant board characteristics (first block in Table 3.4), observable time-variant manager characteristics (second block in Table 3.4) observable time-variant firm characteristics (third block in Table 3.4), firm fixed effects, manager/executive/director fixed effects, year effects and residuals. Additionally, (2) also contains match effects. For each of these components, the covariance with Tobin's Q (relative to the variance of Tobin's Q) and the percentage of the explained variance of Tobin´s Q (in parentheses) is computed. Panel A is based on all remaining observations in Table 3.4 (4) and (5). Panel B is based on the remaining subsample of executive-firm-years and Panel C is based on the remaining subsample of director-firm-years.

Panel A: Manager

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.011	(1.46%)	0.012	(1.51%)
Observable time-variant manager characteristics	0.001	(0.06%)	0.001	(0.08%)
Observable time-variant firm characteristics	0.203	(26.28%)	0.205	(26.24%)
Firm fixed effects	0.355	(45.99%)	0.355	(45.57%)
Manager fixed effects	0.191	(24.79%)	0.192	(24.57%)
Match fixed effects			0.008	(1.04%)
Year effects	0.011	(1.42%)	0.008	(1.00%)
Residuals	0.228	(22.82%)	0.220	(22.01%)
Observations	87,122		87,122	

Panel B: Executives

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.010	(1.32%)	0.011	(1.37%)
Observable time-variant manager characteristics	0.000	(0.06%)	0.001	(0.08%)
Observable time-variant firm characteristics	0.188	(23.81%)	0.189	(23.92%)
Firm fixed effects	0.375	(47.48%)	0.376	(47.59%)
Manager fixed effects	0.205	(25.90%)	0.205	(25.93%)
Match fixed effects			0.001	(0.08%)
Year effects	0.011	(1.43%)	0.008	(1.03%)
Residuals	0.210	(21.00%)	0.209	(20.94%)
Observations	23,702		23,702	

Panel C: Directors

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.011	(1.50%)	0.012	(1.55%)
Observable time-variant manager characteristics	0.000	(0.07%)	0.001	(0.08%)
Observable time-variant firm characteristics	0.209	(27.32%)	0.211	(27.21%)
Firm fixed effects	0.347	(45.38%)	0.347	(44.71%)
Manager fixed effects	0.186	(24.32%)	0.186	(24.00%)
Match fixed effects			0.011	(1.47%)
Year effects	0.011	(1.41%)	0.008	(0.98%)
Residuals	0.236	(23.64%)	0.225	(22.50%)
Observations	63,420		63,420	

Table B.7: Relative importance of manager fixed effects in determining firm performance – five most important executives

This table presents the results of the decomposition of the model R-squared based on the regression model in Table 3.4. In contrast to the results presented in Table 3.4, this table only includes manager-firm-years of the five most important executives: the CEO, his deputy and the three other executives with the longest tenure. In case of two or more executives with the same tenure, the executive with the highest number of supervisory board seats in the respective year is considered as most important. When both the tenure and the number of supervisory board seats of two or more executives are identical, their importance is assigned randomly. The results in (1) are based on the regression model in Table 3.4 (4) and the results in (2) are based on the regression model in Table 3.4 (5). These components are observable time-variant board characteristics (first block in Table 3.4), observable time-variant manager characteristics (second block in Table 3.4) observable time-variant firm characteristics (third block in Table 3.4), firm fixed effects, executive fixed effects, year effects and residuals. Additionally, (2) also contains match effects. For each of these components, the covariance with Tobin's Q (relative to the variance of Tobin's Q) and the percentage of the explained variance of Tobin´s Q (in parentheses) is computed.

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.006	(0.76%)	0.006	(0.81%)
Observable time-variant manager characteristics	0.000	(0.04%)	0.000	(0.05%)
Observable time-variant firm characteristics	0.146	(18.18%)	0.144	(17.83%)
Firm fixed effects	0.173	(21.47%)	0.174	(21.51%)
Manager fixed effects	0.468	(58.18%)	0.470	(58.20%)
Match fixed effects			0.002	(0.28%)
Year effects	0.011	(1.37%)	0.011	(1.33%)
Residuals	0.195	(19.52%)	0.193	(19.30%)
Observations	24,515		24,515	

Table B.8: Relative importance of manager fixed effects in determining firm performance – five most important managers

This table presents the results of the decomposition of the model R-squared based on the regression model in Table 3.4. In contrast to the results presented in Table 3.4, this table only includes manager-firm-years of the five most important managers: the CEO, his deputy, the chairman of the supervisory board as well as one additional executive and director with the longest tenure. In case of two or more executives or directors with the same tenure, the executive/director with the highest number of supervisory board seats in the respective year is considered as most important. When both the tenure and the number of supervisory board seats of two or more executives or directors are identical, their importance is assigned randomly. The results in (1) are based on the regression model in Table 3.4 (4) and the results in (2) are based on the regression model in Table 3.4 (5). These components are observable time-variant board characteristics (first block in Table 3.4), observable time-variant manager characteristics (second block in Table 3.4) observable time-variant firm characteristics (third block in Table 3.4), firm fixed effects, manager/executive/director fixed effects, year effects and residuals. Additionally, (2) also contains match effects. For each of these components, the covariance with Tobin's Q (relative to the variance of Tobin's Q) and the percentage of the explained variance of Tobin´s Q (in parentheses) is computed. Panel A is based on all remaining observations in Table 3.4 (4) and (5). Panel B is based on the remaining subsample of executive-firm-years and Panel C is based on the remaining subsample of director-firm-years.

Panel A: Manager

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.005	(0.59%)	0.004	(0.47%)
Observable time-variant manager characteristics	0.000	(0.01%)	0.000	(0.02%)
Observable time-variant firm characteristics	0.161	(19.10%)	0.146	(18.85%)
Firm fixed effects	0.307	(40.03%)	0.308	(39.66%)
Manager fixed effects	0.298	(38.93%)	0.299	(38.48%)
Match fixed effects			0.010	(1.30%)
Year effects	0.010	(1.36%)	0.010	(1.27%)
Residuals	0.234	(23.43%)	0.224	(22.43%)
Observations	37,647		37,647	

Panel B: Executives

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.005	(0.64%)	0.004	(0.48%)
Observable time-variant manager characteristics	0.000	(0.03%)	0.000	(0.01%)
Observable time-variant firm characteristics	0.170	(19.31%)	0.153	(19.04%)
Firm fixed effects	0.328	(41.24%)	0.329	(41.07%)
Manager fixed effects	0.297	(37.35%)	0.297	(37.08%)
Match fixed effects			0.008	(0.95%)
Year effects	0.011	(1.44%)	0.011	(1.38%)
Residuals	0.206	(20.56%)	0.198	(19.80%)
Observations	20,440		20,440	

Panel C: Directors

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.004	(0.54%)	0.003	(0.44%)
Observable time-variant manager characteristics	0.000	(0.03%)	0.000	(0.01%)
Observable time-variant firm characteristics	0.151	(18.60%)	0.138	(18.36%)
Firm fixed effects	0.290	(39.14%)	0.290	(38.57%)
Manager fixed effects	0.300	(40.49%)	0.300	(39.84%)
Match fixed effects			0.012	(1.63%)
Year effects	0.009	(1.27%)	0.009	(1.16%)
Residuals	0.260	(26.00%)	0.248	(24.79%)
Observations	17,207		17,207	

Table B.9: Relative importance of manager fixed effects in determining firm performance – excluding employee representatives

This table presents the results of the decomposition of the model R-squared based on the regression model in Table 3.4. In contrast to the results presented in Table 3.4, this table does not include manager-firm-years of employee representatives. The results in (1) are based on the regression model in Table 3.4 (4) and the results in (2) are based on the regression model in Table 3.4 (5). These components are observable time-variant board characteristics (first block in Table 3.4), observable time-variant manager characteristics (second block in Table 3.4) observable time-variant firm characteristics (third block in Table 3.4), firm fixed effects, manager/executive/director fixed effects, year effects and residuals. Additionally, (2) also contains match effects. For each of these components, the covariance with Tobin's Q (relative to the variance of Tobin's Q) and the percentage of the explained variance of Tobin´s Q (in parentheses) is computed. Panel A is based on all remaining observations in Table 3.4 (4) and (5). Panel B is based on the subsample of executive-firm-years and Panel C is based on the remaining subsample of director-firm-years.

Panel A: Manager

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.009	(1.17%)	0.008	(0.95%)
Observable time-variant manager characteristics	0.000	(0.06%)	0.000	(0.05%)
Observable time-variant firm characteristics	0.204	(23.83%)	0.197	(24.66%)
Firm fixed effects	0.357	(46.30%)	0.351	(43.90%)
Manager fixed effects	0.210	(27.30%)	0.210	(26.31%)
Match fixed effects			0.029	(3.67%)
Year effects	0.010	(1.35%)	0.004	(0.46%)
Residuals	0.229	(22.91%)	0.200	(20.00%)
Observations	72,010		72,010	

Panel B: Executives

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.010	(1.25%)	0.008	(1.01%)
Observable time-variant manager characteristics	0.001	(0.07%)	0.000	(0.03%)
Observable time-variant firm characteristics	0.210	(23.53%)	0.201	(24.83%)
Firm fixed effects	0.383	(47.83%)	0.379	(46.79%)
Manager fixed effects	0.207	(25.90%)	0.207	(25.62%)
Match fixed effects			0.009	(1.09%)
Year effects	0.011	(1.43%)	0.005	(0.62%)
Residuals	0.200	(19.96%)	0.191	(19.09%)
Observations	26,379		26,379	

Panel C: Directors

	(1) No match effects		(2) Match effects	
Observable time-variant board characteristics	0.008	(1.12%)	0.007	(0.92%)
Observable time-variant manager characteristics	0.000	(0.06%)	0.000	(0.05%)
Observable time-variant firm characteristics	0.200	(23.99%)	0.195	(24.55%)
Firm fixed effects	0.343	(45.43%)	0.337	(42.33%)
Manager fixed effects	0.212	(28.10%)	0.212	(26.68%)
Match fixed effects			0.040	(5.09%)
Year effects	0.010	(1.30%)	0.003	(0.36%)
Residuals	0.245	(24.51%)	0.205	(20.48%)
Observations	45,631		45,631	

Table B.10: Descriptive statistics on manager fixed effects – ROA

This table presents descriptive statistics for manager fixed effects estimated in Table B.2 (5). All variables are defined as in Table B.1. For each variable, it shows the number of observations, the mean, 25th percentile, median, 75th percentile, standard deviation and the number of observations. Panel A shows descriptive statistics on the manager fixed effects, executive fixed effects and director fixed effects. Panel B describes manager fixed effects for chairpersons (CEO or chairman), CEOs and chairmen, and Panel C contains information about manager fixed effects for managers with ordinary board positions (ordinary executive board members, shareholder representatives, employee representatives). For Panel B and C, only individuals with the same type of board position (CEO, ordinary executive board member, chairman of the supervisory board, shareholder representative, employee representative) (not necessarily in the same firm) during the sample period are considered.

Panel A: Manager, executive and director fixed effects

	Manager fixed effects	Executive fixed effects	Director fixed effects
Mean	-0.003	-0.004	-0.003
25th percentile	-0.025	-0.027	-0.025
Median	-0.002	-0.001	-0.003
75th percentile	0.026	0.028	0.025
Std. dev.	0.124	0.137	0.116
Observations	18,691	6,073	12,618

Panel B: Manager fixed effects for chairpersons

	Chairperson fixed effects	CEO fixed effects	Chairman fixed effects
Mean	-0.023	-0.003	-0.000
25th percentile	-0.037	-0.035	-0.038
Median	0.003	0.001	0.001
75th percentile	0.047	0.037	0.051
Std. dev.	0.185	0.168	0.192
Observations	1,504	1,002	659

Panel C: Manager fixed effects for ordinary board members

	Ordinary board member fixed effects	Ordinary executive board member fixed effects	Ordinary shareholder representatives	Ordinary employee representatives
Mean	-0.004	-0.006	-0.005	-0.004
25th percentile	-0.025	-0.027	-0.031	-0.022
Median	-0.002	-0.001	-0.002	-0.003
75th percentile	0.025	0.025	0.031	0.016
Std. dev.	0.121	0.135	0.138	0.067
Observations	13,848	4,304	6,074	4,225

Table B.11: Manager fixed effects of managers on the executive and supervisory board of the same and of different firms: Difference-in-differences – CEO for majority of years

This table presents the levels and changes of manager fixed effects for those persons serving on the executive and the supervisory board of only one firm (within firms) or different firms, but not the same firm (between firms). Manager fixed effects are estimated based on the regression model in Table 3.4 (5). Panel A contains descriptive statistics for the executive and director fixed effects measured for those executives serving on the executive and the supervisory board of only one firm (within firms) and for a control group of other executive (supervisory) board members. CEOs refer to persons serving as CEO during more than half of the years of their tenure on the executive board. For each group, it shows, the mean, median, standard deviation and the number of observations. The superscripts * and ** denote significance at the 10% and 5% level, respectively. Panel B shows the levels and changes of executive and director fixed effects for persons serving on (the) executive and supervisory board(s) using the difference-in-differences methodology. All executives (CEOs) serving on the executive and the supervisory board of only one firm (within firms) are defined as the treatment group, whereas executives (CEOs) serving on the executive and the supervisory board of different firms, but not of the same firm (between firms) are defined as the control group. The third row shows the difference in the director and executive fixed effect. The third column gives the differences between the treatment and control groups for the director and executive fixed effect and the difference between the differences in the director and executive fixed effect for the treatment and control groups. The mean is reported for each table cell. For the third row and third column, t-tests are used to test if the mean difference is significantly different from zero. The superscript * denote significance in differences at the 10% level.

Panel A: Within firms

	Executives	CEOs	Other board members
Executive fixed effects	(1)	(2)	(3)
Mean	0.093*	0.130*	0.001
Median	-0.032	-0.051	-0.047
Std. dev.	1.004	1.069	0.794
Observations	287	125	5,784
Director fixed effects	(1)	(2)	(3)
Mean	0.071*	0.127**	-0.004
Median	-0.034	-0.000	-0.037
Std. dev.	0.724	0.819	0.756
Observations	287	125	12,326

Panel B: Within vs. between firms

	Within firms	Between firms	Difference
Executives on the supervisory board	(1)	(2)	(3)
Executive fixed effects	0.093	-0.017	0.110*
Director fixed effects	0.071	0.031	0.039
Difference	-0.022	0.048	-0.071
Observations	287	866	1,153
CEOs on the supervisory board	(1)	(2)	(3)
Executive fixed effects	0.130	0.110	0.020
Director fixed effects	0.127	0.126	0.002
Difference	-0.003	0.016	0.018
Observations	125	235	360

Table B.12: Manager fixed effects of managers on the executive and supervisory board of the same and of different firms: Difference-in-differences – CEO for all years

This table presents the levels and changes of manager fixed effects for those persons serving on the executive and the supervisory board of only one firm (within firms) or different firms, but not the same firm (between firms). Manager fixed effects are estimated based on the regression model in Table 3.4 (5). Panel A contains descriptive statistics for the executive and director fixed effects measured for those executives serving on the executive and the supervisory board of only one firm (within firms) and for a control group of other executive (supervisory) board members. CEOs refer to persons serving as CEO during all years of their tenure on the executive board. For each group, it shows, the mean, median, standard deviation and the number of observations. The superscript * denote significance at the 10% level. Panel B shows the levels and changes of executive and director fixed effects for persons serving on (the) executive and supervisory board(s) using the difference-in-differences methodology. All executives (CEOs) serving on the executive and the supervisory board of only one firm (within firms) are defined as the treatment group, whereas executives (CEOs) serving on the executive and the supervisory board of different firms, but not of the same firm (between firms) are defined as the control group. The third row shows the difference in the director and executive fixed effect. The third column gives the differences between the treatment and control groups for the director and executive fixed effect and the difference between the differences in the director and executive fixed effect for the treatment and control groups. The mean is reported for each table cell. For the third row and third column, t-tests are used to test if the mean difference is significantly different from zero. The superscript * denote significance in differences at the 10% level.

Panel A: Within firms

	Executives	CEOs	Other board members
Executive fixed effects	(1)	(2)	(3)
Mean	0.093*	0.034	0.001
Median	-0.032	-0.070	-0.047
Std. dev.	1.004	0.816	0.794
Observations	287	99	5,784
Director fixed effects	(1)	(2)	(3)
Mean	0.071*	0.022	-0.004
Median	-0.034	-0.006	-0.037
Std. dev.	0.724	0.433	0.756
Observations	287	99	12,326

Panel B: Within vs. between firms

	Within firms	Between firms	Difference
Executives on the supervisory board	(1)	(2)	(3)
Executive fixed effects	0.093	-0.017	0.110*
Director fixed effects	0.071	0.031	0.039
Difference	-0.022	0.048	0.071
Observations	287	866	1,153
CEOs on the supervisory board	(1)	(2)	(3)
Executive fixed effects	0.034	0.156	-0.122
Director fixed effects	0.022	0.224	-0.203
Difference	-0.013	0.068	-0.081
Observations	99	159	258

Table B.13: Manager fixed effects of managers on the executive and supervisory board of the same and of different firms: Difference-in-differences – ROA

This table presents the levels and changes of manager fixed effects for those persons serving on the executive and the supervisory board of only one firm (within firms) or different firms, but not the same firm (between firms). Manager fixed effects are estimated based on the regression model in Table B.2 (5). Panel A contains descriptive statistics for the executive and director fixed effects measured for those executives serving on the executive and the supervisory board of only one firm (within firms) and for a control group of other executive (supervisory) board members. CEOs refer to persons serving as CEO during the last year of their tenure on the executive board. For each group, it shows, the mean, median, standard deviation and the number of observations. The superscript * and ** denote significance at the 10% and 5% level, respectively. Panel B shows the levels and changes of executive and director fixed effects for persons serving on (the) executive and supervisory board(s) using the difference-in-differences methodology. All executives (CEOs) serving on the executive and the supervisory board of only one firm (within firms) are defined as the treatment group, whereas executives (CEOs) serving on the executive and the supervisory board of different firms, but not of the same firm (between firms) are defined as the control group. The third row shows the difference in the director and executive fixed effect. The third column gives the differences between the treatment and control groups for the director and executive fixed effect and the difference between the differences in the director and executive fixed effect for the treatment and control groups. The mean is reported for each table cell. For the third row and third column, t-tests are used to test if the mean difference is significantly different from zero. The superscript * denote significance in differences at the 10% level.

Panel A: Within firms

	Executives	CEOs	Other board members
Executive fixed effects	(1)	(2)	(3)
Mean	0.110*	0.149*	0.019
Median	-0.017	-0.032	-0.026
Std. dev.	1.003	1.068	0.794
Observations	287	127	5,780
Director fixed effects	(1)	(2)	(3)
Mean	0.087*	0.146**	0.015
Median	-0.010	0.024**	-0.019
Std. dev.	0.725	0.815	0.652
Observations	287	127	12,319

Panel B: Within vs. between firms

	Within firms	Between firms	Difference
Executives on the supervisory board	(1)	(2)	(3)
Executive fixed effects	0.110	0.004	0.106*
Director fixed effects	0.087	0.053	0.035
Difference	-0.023	0.048	-0.071
Observations	287	865	1,152
CEOs on the supervisory board	(1)	(2)	(3)
Executive fixed effects	0.149	0.083	0.065
Director fixed effects	0.146	0.114	0.032
Difference	-0.003	0.031	-0.034
Observations	127	329	456

Table B.14: Descriptive statistics on board quality and skill dispersion – ROA

This table presents descriptive statistics for several measures of board quality and skill dispersion. All variables are defined as in Table B.1. For each variable, it shows the number of observations, the mean, 25th percentile, median, 75th percentile, standard deviation and the number of observations. The variables in Panel A are based on the estimation of manager fixed effects estimated in Table B.2 (4) and (5). Panel B shows the correlation between the variables of Panel A.

Panel A: Board quality and skill dispersion variables

	Board quality	EB quality	SB quality	Disp. EB-SB Quality	Disp. manager skills	Disp. executive skills	Disp. director skills
No match effects							
Mean	0.004	0.005	0.003	0.011	0.030	0.021	0.028
25th percentile	-0.021	-0.022	-0.020	0.002	0.010	0.002	0.009
Median	-0.000	0.002	-0.001	0.005	0.018	0.009	0.016
75th percentile	0.025	0.030	0.024	0.012	0.033	0.022	0.032
Std. dev.	0.113	0.120	0.112	0.022	0.042	0.043	0.043
Observations	8,596	8,596	8,596	8,596	8,596	8,596	8,596
Match effects							
Mean	0.004	0.005	0.003	0.011	0.030	0.020	0.028
25th percentile	-0.021	-0.022	-0.021	0.002	0.010	0.002	0.009
Median	-0.000	0.001	-0.002	0.005	0.018	0.009	0.017
75th percentile	0.026	0.031	0.025	0.011	0.033	0.022	0.031
Std. dev.	0.114	0.120	0.112	0.022	0.042	0.043	0.042
Observations	8,596	8,596	8,596	8,596	8,596	8,596	8,596

Panel B: Correlation between measures of board quality and skill dispersion

	Board quality	EB quality	SB quality	Disp. EB-SB quality	Disp. manager skills	Disp. executive skills	Disp. director skills
Board quality	1.00/1.00						
EB quality	0.98/0.98	1.00/1.00					
SB quality	0.98/0.98	0.91/0.92	1.00/1.00				
Disp. EB-SB quality	-0.09/-0.08	-0.11/-0.10	-0.07/-0.06	1.00/1.00			
Disp. manager skills	-0.11/-0.10	-0.13/-0.12	-0.09/-0.08	0.78/0.78	1.00/1.00		
Disp. executive skills	-0.10/-0.09	-0.12/-0.11	-0.07/-0.06	0.39/0.39	0.72/0.72	1.00/1.00	
Disp. director skills	-0.09/-0.08	-0.09/-0.08	-0.09/-0.08	0.58/0.58	0.92/0.92	0.56/0.56	1.00/1.00

Table B.15: Board quality, skill dispersion, and firm performance – ROA

This table shows the results of regressions at the firm-level with ROA as dependent variable, using the AKM sample. ROA and all independent variables are defined as in Table B.1. (1) contains neither manager nor firm fixed effects and is estimated as pooled OLS, (2) uses firm fixed effects (FE), (3) includes variables which are based on the manager fixed effects estimated in Table B.2 (4) (IE'), (4) includes firm fixed effects and variables which are based on the manager fixed effects estimated in Table B.2 (4) (FE+IE') and (5) uses firm fixed effects and variables which are based on the manager fixed effects (adjusted for match effects) estimated in Table B.2 (5) (FE+IE'+ME'). All regressions include year dummies. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	OLS	FE	IE'	FE+IE'	FE+IE'+ME'
	(1)	(2)	(3)	(4)	(5)
Board quality			0.413***	1.653***	1.662***
			(4.97)	(13.43)	(13.68)
Dispersion EB-SB quality			-1.128***	-0.056	-0.030
			(-4.39)	(-0.20)	(-0.11)
Dispersion executive skills			-0.219	0.239	0.246
			(-0.89)	(0.76)	(0.79)
Dispersion director skills			-1.111***	-0.343	-0.318
			(-4.38)	(-1.48)	(-1.36)
Tenure executive board	0.005***	0.000	0.003**	0.001	0.002***
	(3.74)	(0.27)	(2.05)	(1.17)	(2.61)
Tenure supervisory board	0.007***	0.001	0.040***	-0.000	0.001
	(4.88)	(0.43)	(2.72)	(-0.08)	(0.62)
Supervisory board size	-0.010***	-0.006***	-0.008***	-0.004***	-0.004***
	(-6.17)	(-3.51)	(-5.36)	(-3.95)	(-3.80)
SB-/(SB+EB)-size-ratio	0.102***	0.091*	0.063*	0.128***	0.127***
	(2.67)	(1.93)	(1.75)	(2.92)	(2.89)
Codetermination	0.043**	-0.038	0.017	-0.007	-0.003
	(2.06)	(-1.50)	(0.81)	(-0.52)	(-0.19)
Chairman is former CEO	-0.005	-0.014*	-0.006	0.000	0.000
	(-0.61)	(-1.78)	(-0.72)	(0.00)	(0.09)
Busy board	-0.001	0.002	0.016	0.002	-0.001
	(-0.05)	(0.07)	(0.92)	(0.11)	(-0.05)
Interlocking board	-0.010***	-0.004*	-0.009***	-0.004**	-0.004**
	(-2.98)	(-1.95)	(-2.76)	(-2.34)	(-2.30)
Women representation	0.085**	0.029	0.103***	0.005	0.002
	(2.48)	(0.62)	(3.18)	(0.24)	(0.10)
Firm size	0.027***	0.045***	0.018***	0.042***	0.043***
	(7.14)	(4.01)	(5.47)	(6.44)	(6.51)
Firm age	0.008**	0.120***	0.004	0.056***	0.058***
	(2.49)	(3.46)	(1.39)	(3.59)	(3.74)
Free float	-0.025**	-0.000	-0.022*	-0.002	-0.004
	(-2.04)	(-0.01)	(-1.93)	(-0.02)	(-0.40)
Capital structure	-0.098***	-0.217***	-0.100***	-0.232***	-0.232***
	(-5.52)	(-5.93)	(-6.43)	(-8.20)	(-8.18)
Cash flow volatility	-0.076	-0.000	-0.023	0.106**	0.122**
	(-1.12)	(-0.00)	(-0.95)	(1.96)	(2.22)
Sales growth	0.000	0.000***	0.000	0.000*	0.000*
	(1.14)	(2.75)	(0.95)	(1.90)	(1.91)
Constant	-0.304***	-0.925***	-0.112**	-0.700***	-0.712***
	(-5.54)	(-4.71)	(-2.38)	(-5.50)	(-5.60)
Adj. R^2	0.091	0.327	0.275	0.626	0.626
Observations	8,596	8,596	8,596	8,596	8,596

Table B.16: Causality between manager fixed effects and firm performance – ROA

This table shows the results of regressions at the firm-level with ROA as dependent variable for the period 2003-2011 with non-missing data about manager fixed effects (1993-2002). All variables are defined as in Table B.1. Manager fixed effects (1993-2002) are estimated for the period 1993-2002 and are based on the regression model in Table B.2 (5). In models (2) and (3) manager fixed effects (1993-2002) are interacted with the position of the respective manager on the two boards. All regressions include year dummies. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)
Manager fixed effects (1993-2002)	0.010		
	(1.33)		
Chairpersons fixed effects (1993-2002)		- 0.011	
		(-0.75)	
Board member fixed effects (1993-2002)		0.010	
		(1.37)	
Executive fixed effects (1993-2002)			0.005*
			(1.91)
Director fixed effects (1993-2002)			0.034
			(1.50)
Net board quality	0.007*	0.008*	0.018**
	(1.76)	(1.81)	(2.00)
Tenure executive board	0.003	0.029	0.003
	(1.20)	(1.20)	(1.25)
Tenure supervisory board	0.004	0.004	0.004
	(1.45)	(1.36)	(1.35)
Supervisory board size	0.000	-0.056	-0.000
	(0.05)	(-0.74)	(-0.02)
SB-/(SB+EB)-size-ratio	-0.061	-0.056	-0.049
	(-0.81)	(-0.74)	(-0.68)
Codetermination	-0.009	-0.007	-0.014
	(-0.28)	(-0.20)	(-0.39)
Chairman is former CEO	0.005	0.006	0.005
	(0.50)	(0.55)	(0.52)
Busy board	-0.053	-0.053	-0.051
	(-0.74)	(-0.74)	(-0.71)
Interlocking board	-0.002	-0.001	-0.001
	(-0.26)	(-0.26)	(-0.28)
Women representation	0.016	0.024	0.016
	(0.23)	(0.35)	(0.24)
Firm size	0.059*	0.059*	0.059*
	(1.72)	(1.70)	(1.70)
Firm age	0.056	0.056	0.058
	(1.28)	(1.27)	(1.32)
Free float	-0.042	-0.041	-0.049*
	(-1.64)	(-1.64)	(-1.68)
Capital structure	-0.218***	-0.220***	-0.216***
	(-3.99)	(-4.02)	(-3.93)
Cash flow volatility	0.303*	0.302*	0.305*
	(1.71)	(1.71)	(1.73)
Sales growth	0.003	0.003	0.003
	(1.06)	(1.05)	(1.06)
Constant	-0.988*	-0.981*	-0.990*
	(-1.74)	(-1.73)	(-1.74)
Adj. R^2	0.399	0.400	0.403
Observations	3,179	3,179	3,179

Chapter 4

Dividends, Stock Repurchases, and the Lintner Model: A Dynamic Panel Data Analysis of German Firms

4.1 Introduction

The question of how firms decide on the amount of cash to be disbursed to shareholders has attracted the attention of financial economists for decades. Lintner's (1956) partial adjustment model still is the workhorse of empirical investigations of corporate payout decisions.[1] He developed his model in a period when dividends were the dominant form of payouts. More recently, however, the volume of stock repurchases has caught up, and there have been years in which the volume of stock repurchases by listed U.S. firms has surpassed the volume of dividends (Grullon and Michaely, 2002). Skinner (2008, p. 608) concludes that his empirical evidence "suggests that repurchases have become the dominant form of payout".

In spite of this, however, in most empirical applications Lintner's (1956) partial adjustment model of payout policy is applied to dividend payouts rather than to total payouts. There are

[1]For recent applications see, among others, Andres et al. (2009), Chemmanur et al. (2010), and Skinner (2008). For a recent theoretical paper that builds on Lintner's model see Lambrecht and Myers (2012). There are also critical voices, though. DeAngelo et al. (2008) argue that the model has lost some of its descriptive ability, mostly because the number of firms that have a well-defined target payout ratio has decreased.

only very few exceptions in the literature. Grullon and Michaely (2002) estimate a traditional dividend-based Lintner model and then relate the resulting dividend errors (the difference between actual and predicted dividends) to the repurchase volume. The only paper we are aware of that estimates a Lintner model based on total payouts is Skinner (2008). He uses two restricted samples, one consisting of firms that repurchase and pay dividends in most years, and one consisting of firms that repurchase and never pay dividends. So far no paper estimates a Lintner model on full payouts for a comprehensive sample that permits to draw general conclusions on the choice between dividends and repurchases.

The correct specification depends on the economic reasons that drive the choice between dividends and stock repurchases. When both are good substitutes for each other (as argued by Miller and Modigliani, 1961, and as would be the case in a world of perfect capital markets) the model should be better at explaining total payouts rather than dividends. Tax-based explanations predict that firms choose the payout method that receives the more favorable tax treatment. In this case the correct model specification may depend on the tax regime. The financial flexibility hypothesis brought forward by Jagannathan et al. (2000) states that dividends are used to pay out permanent earnings while stock repurchases are used to pay out transitory earnings. In this case the estimation of a Lintner-type model requires the decomposition of earnings into a permanent and a transitory component.

In this paper we put the cart before the horse. We estimate different versions of Lintner-type partial adjustment models. The results then allow us to draw inferences on the motives underlying the choice between dividends and stock repurchases. Our sample is a large panel of German firms covering the period 1988-2008. This sample has two distinct advantages. First, stock repurchases were essentially prohibited until 1998. Therefore, we can analyze how the introduction of an alternative to dividends affects corporate payout decisions. Second, a major change in the tax system in 2001 affected the relative attractiveness of dividends and stock repurchases. This allows us to investigate the importance of tax considerations for corporate payout decisions in general, and the choice between dividends and stock repurchases in particular.

Our results can be summarized as follows. The introduction of repurchases in 1998 has materially affected the payout policy of German firms. This is inconsistent with the

substitutes hypothesis. We find no evidence that German firms have altered their payout policy in response to the 2001 tax reform. Our results imply that dividends are more sticky than total payouts. This is consistent with the prediction of the flexibility hypothesis that dividends are predominantly paid out of permanent earnings. We further document that, after the introduction of repurchases, the responsiveness of dividends to changes in transitory earnings is reduced substantially. This corroborates the evidence in favor of the flexibility hypothesis.

Our paper contributes to the literature in several ways. First, it is the first paper that uses a partial adjustment model to analyze how the introduction of stock repurchases affects the magnitude and determinants of dividend payouts. Second, we test whether a Lintner-type partial adjustment model is better suited to model dividend payouts or total payouts. Different from Skinner (2008), we do not restrict our sample to firms with a particular history of payout decisions. Third, we decompose earnings into a permanent and a temporary component. We then integrate both components in a partial adjustment model in order to test the hypothesis (brought forward by Jagannathan et al., 2000) that dividends are used to disburse permanent earnings while stock repurchases are used to pay out temporary earnings. To the best of our knowledge, this is the first paper that tests the flexibility hypothesis within a Lintner-type partial adjustment model. In our empirical analysis we use GMM-in-systems estimations, and we explicitly consider the role of special dividends (which, prior to the introduction of stock repurchases, might have been used to disburse temporary earnings).

The remainder of the paper is organized as follows. Section 4.2 describes the institutional setting in Germany. Section 4.3 develops our hypotheses. Section 4.4 presents the sample and descriptive statistics. In Section 4.5 we describe the econometric methodology and the results, Section 4.6 concludes.

4.2 Institutional setting

As pointed out above, the institutional framework in Germany provides an ideal environment to analyze our research questions. During the first half of our sample period (1988-1997) stock repurchases were effectively prohibited. In 1998 a new law came into

force which allowed stock repurchases. Besides this change in regulation there was also a major change in the taxation system. Until 2001 Germany operated a full imputation system that favored dividend payouts over repurchases for most investor types. After the 2001 tax reform the tax preference of most investors shifted towards repurchases.

In the following, we describe several aspects of the institutional environment of German firms as well as relevant changes over the sample period. These issues are dividends (Section 4.2.1), stock repurchases (4.2.2) and the tax treatment of dividends and stock repurchases (4.2.3).

4.2.1 Dividends

German firms pay annual (rather than quarterly) dividends. The payout decisions of German Stock Corporations (Aktiengesellschaften) are governed by § 58 of the Stock Corporation Act (*Aktiengesetz, AktG*).[2] The executive and the supervisory board can decide to retain up to 50% of the profits. The decision on whether to retain or to pay out the remaining amount is taken by the shareholders' meeting by simple majority vote. In practice it is almost always the case that the shareholders' meeting votes in favor of the proposal made by the executive board. The payment date is usually the business day following the day of the annual shareholders' meeting.[3]

Firms may pay special designated dividends (Sonderdividenden). They are of particular interest for our study because special designated dividends may be close substitutes for stock repurchases (DeAngelo et al., 2000).[4] This, in turn, is of particular importance because repurchases were essentially prohibited until 1998.

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[2]The following description relates to the standard case. The articles of incorporation may allow for deviations from this standard procedure. In addition, § 150 AktG prescribes that a firm has to retain at least 5% of its earnings as long as the total amount of retained earnings amounts to less than 10% of the dedicated capital (Grundkapital).

[3]Some firms have issued both common shares and non-voting preferred shares. The preferred shareholders are entitled to a cumulative minimum dividend (§ 139 AktG). These claims have priority over dividend payments to common shareholders. If the minimum preferred dividend is not paid in a given year, it is cumulated and has to be paid out in later years. If the dividend is not paid for two consecutive years, owners of preferred shares are entitled to a temporary voting right (§ 140 AktG), until the cumulated minimum dividend has been paid. In addition, non-voting shares are often entitled to an excess dividend, i.e. a dividend that is larger by a specified amount than the dividend paid to common shareholders.

[4]This view is supported by empirical results in Brickley (1983). For a sample of U.S. firms he finds higher dividend payouts in the year following a dividend increase than in the year following a special designated

4.2.2 Stock repurchases

Until 1998, stock repurchases were essentially prohibited in Germany.[5] In 1998, a new law came into force that allowed stock repurchases. Under this law firms are allowed to buy back up to 10% of their shares.[6] A firm wishing to buy back shares has to follow a standardized procedure. As a first step the shareholders' meeting (with simple majority) has to grant the managerial board the permission to buy back shares. This permission has to specify the maximum number of shares to be bought back (not more than 10% of shares outstanding), the minimum and maximum price to be paid per share, and the time of validity of the permission (initially not longer than 18 months; increased to 5 years in 2008).

This permission gives the managerial board the right, but not the obligation, to buy back shares.[7] Once the board decides to actually initiate a repurchase program the firm has to communicate this fact to the public. This is mandated by the German securities trading act (Wertpapierhandelsgesetz) which requires that listed firms immediately disclose information that is likely to materially affect security prices ("ad-hoc disclosure"). Empirical studies analyzing the impact of stock repurchase announcements on share prices typically use the date of the ad-hoc disclosure as the event date (e.g. Gerke et al., 2002; Schremper, 2003; Seifert and Stehle, 2003; Hackethal and Zdantchouk, 2006; Bessler et al., 2013).

Firms are required to treat all shareholders equally. This precludes negotiated repurchases from large shareholders. Open market repurchases, repurchase tender offers and transferrable put rights are admissible, though. Open market repurchases are the dominating form.

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dividend. This indicates that special designated dividends are weaker signals of higher future payouts than increases of regular dividends.

[5]Firms could acquire their own shares only under restrictive conditions (e.g. to prevent damage). Although there is some disagreement in the literature as to the actual number of repurchases in Germany prior to 1998 (see Seifert, 2006, for a discussion) it is safe to conclude that stock repurchases were not used as a means of disbursing cash to shareholders prior to 1998.

[6]The 10% threshold applies to an individual repurchase program, not to the total amount of repurchases during the life of the firm.

[7]Given permission through the annual meeting, the decision to initiate a repurchase program is taken by the executive board and approved by the supervisory board.

As is the case in the U.S., the announcement of a stock repurchase still does not require the managerial board to actually repurchase shares. The actual amount of repurchases is published in the firm's financial statement. This information thus allows us to identify the repurchase volume in a fiscal year.

Since 2004 new regulation adopted by the European Union imposes additional restrictions on stock repurchases. Individual transactions made as part of a repurchase program now have to be reported within seven trading days. Further, there are restrictions on the prices at which open market repurchases can be made (not higher than the price of the previous transaction) and on the maximum daily repurchase volume (not more than 25% of the average daily volume on the market on which the trade is made).

Finally, there are two ways in which the firm can handle the repurchased shares. First, it can treat them as an asset on the asset side of the balance sheet. They can then be used to cover outstanding convertible bonds or executive stock options. The maximum number of shares a firm can hold on its balance sheet is 10% of the shares outstanding. Alternatively, the firm can reduce the number of shares outstanding. In this case the firm's book equity is reduced by the repurchase volume.

4.2.3 Taxation of dividends and repurchases

The tax treatment of dividends and repurchases underwent a major change in 2001. Until 2001 Germany operated a full imputation system. Dividends paid to domestic investors were essentially taxed at the investor's personal tax rate.[8] Retained earnings were taxed at a corporate tax rate. Capital gains were tax exempt when the shares were held for more than six months (twelve months from 1999 onwards). Consequently, investors with a personal tax rate below the corporate rate on retained earnings favored dividends over repurchases while investors with a tax rate above the corporate rate favored repurchases. The latter group was usually small as the corporate tax rate on retained earnings was very close to the highest marginal tax rate on personal income. Corporate shareholders had a preference for dividends, as they received dividends tax free while capital gains were taxed at the

[8]Dividends were first taxed at the firm level. Domestic investors received the gross dividend plus a tax credit equal to the tax paid by the firm. The gross dividend was taxed at the investor's personal tax rate. The resulting tax liability was then offset against the tax credit.

corporate tax rate. Foreign investors did not receive the tax credit and may therefore have had a preference for repurchases.

Since 2001 dividends and retained earnings are taxed at the same rate at the corporate level. At the personal investor level, half of the net dividend is taxed at the investor's personal tax rate. Capital gains are not taxed when the shares are held for more than one year. When this condition is met individual investors should thus have a clear preference for repurchases over dividends. For corporate investors, dividend payments were essentially tax-free.[9] At the same time, capital gains from the sale of shares held in another company were also tax-exempt. Corporate investors were thus largely indifferent between dividends and repurchases.

In summary, while the preference for dividends versus repurchases depended on the status (domestic versus foreign) and the personal tax rate of the investor prior to 2001, there should be a clear preference for repurchases after 2001. We thus expect a shift from dividends to repurchases after the 2001 tax reform.

4.3 Hypotheses

Lintner's (1956) model is based on the presumption that firms have a target payout ratio. Therefore, changes in earnings translate into payout changes. The adjustment is not immediate, though. Rather, firms adjust their payout only partially towards the new target level. In its simplest form the model thus yields the adjustment process

$$\Delta D_{i,t} = \alpha_i + c_i \left(D^*_{i,t} - D_{i,t-1} \right) + u_{i,t} \tag{4.1}$$

$$D^*_{i,t} = r_i P_{i,t} \tag{4.2}$$

where $D_{i,t}$ denotes the dividend of firm i in period t, $P_{i,t}$ denotes profits, $D_{i,t}^*$ are the desired dividend payments, r_i is the target payout ratio for firm i and c_i is the speed-of-adjustment coefficient.

[9]Since 2004 5% of the received dividend had to be declared as revenue and was therefore subject to the corporate tax rate.

The model was developed at a time when stock repurchases were very rare. Therefore, it only considered dividend payouts. Despite the growing importance of repurchases most researchers have continued to use Lintner's framework to model dividend payouts only. Two notable exceptions are Grullon and Michaely (2002) and Skinner (2008). Whether it is appropriate to model total payouts rather than dividend payouts is an open question, though. It hinges on the motives why firms choose dividends or repurchases.

In a world without differential tax treatment of dividends and repurchases or other frictions, the two payout methods would be perfect substitutes.[10] Grullon and Michaely (2002) report empirical evidence that US firms increasingly use repurchases as substitutes for dividends. If indeed dividends and repurchases were close substitutes for each other it would be appropriate to apply the Lintner model to total payouts rather than to dividends only.

An implication of perfect substitutability is that a firm's total payout does not depend on the available menu of payout methods. Consequently, under perfect substitutability the introduction of repurchases should not affect the payout policy. This leads to our first hypothesis.

> *H4.1* (*substitutes*): *The introduction of repurchases in 1998 does not affect the parameters of a Lintner model of total payout.*

When the tax system treats dividends and repurchases differently, firms have an obvious reason to prefer one payout method over the other. As explained in Section 4.2, the German tax reform in 2001 has made repurchases more attractive. We thus have

> *H4.2* (*taxes*): *The 2001 tax reform results in a reduction of the* (*target*) *dividend payout ratio and a corresponding increase in the amount of repurchases.*

So far we have assumed that (absent differential tax treatment) dividends and repurchases are good substitutes. This need not be the case, though. The earnings of a firm may consist of a permanent component and a transitory component. Managers may be reluctant to increase dividends in response to high transitory earnings because the higher dividend level

[10]The assumption of a frictionless world is not a necessary condition for the substitute hypothesis to hold. The principal-agent models of Easterbrook (1984) and Jensen (1986) imply that managers pay dividends in order to disburse free cash flow and thus to reduce agency costs. A similar argument can be made in favor of repurchases. In signaling models of payout decisions (Bhattacharya, 1979; Miller and Rock, 1985) managers use dividends to signal information about future profitability. In a similar way, repurchases could be used as signals. Thus, both the principal-agent models and the signaling models are consistent with the substitute hypothesis.

may not be sustainable, and managers typically try to avoid dividend cuts.[11] Against this background, Jagannathan et al. (2000) have argued that firms use dividends to disburse permanent earnings but use repurchases to pay out transitory earnings. This is referred to as the flexibility hypothesis. The survey results reported in Brav et al. (2005) as well as the empirical evidence in Guay and Hartford (2000) support the flexibility hypothesis.

H4.3 (*flexibility* / *payout*): *Changes in dividend payouts are caused by changes in permanent earnings but unrelated to changes in transitory earnings.*

The flexibility hypothesis implies that repurchases track the more volatile transitory component of earnings. Consequently, we should expect that repurchases are adjusted quickly to changes in (transitory) earnings. This implies the following hypothesis.

H4.4 (*flexibility* / *speed of adjustment*): *The speed of adjustment coefficient will be larger in a Lintner model of total payout than in a Lintner model of dividends.*

As noted in Section 4.2, firms can use special designated dividends to disburse transitory cash flows. The flexibility hypothesis implies that firms used special dividends for that purpose prior to 1998 when repurchases were essentially prohibited. With the introduction of repurchases the importance of special dividends should decline. This should hold in particular after the 2001 tax reform which puts dividends at a disadvantage relative to repurchases.

H4.5 (*special dividends*): *Special designated dividends lose importance after 1998.*

We note that DeAngelo et al. (2000) reject the hypothesis that special dividends were displaced by repurchases. We believe, though, that the German setting, where repurchases were prohibited prior to 1998 warrants a reconsideration of this hypothesis.

Young firms tend to have volatile earnings and may therefore be reluctant to initiate dividend payments (Fama and French, 2001). They may, however, be willing to repurchase shares.[12] We therefore expect that the fraction of firms that do not distribute cash to shareholders (using either dividends or repurchases) decreases after 1998.

[11]Michaely et al. (1995) show that the negative market reaction after dividend cuts is stronger than the positive market reaction after dividend increases.

[12]Typically, special dividends are declared *in addition* to regular dividends. Therefore, special designated dividends are not an alternative for these firms.

H4.6 (*fraction of non-payers*): *The fraction of firms that do not pay out cash to shareholders decreases after 1998.*

4.4 Data and descriptive statistics

In this section, we describe the construction of our sample and present summary statistics. The descriptive analysis will already provide a first indication of the validity of some of our hypotheses.

4.4.1 Sample selection

Our sample covers all non-financial firms listed on the Frankfurt Stock Exchange that were among the largest 200 non-financial firms in Germany (as measured by total assets[13]) at any time during the 21-year period 1988-2008. This results in an initial sample of 424 firms. Our sample on average covers 67.2% of the aggregate market capitalization of all listed firms in Germany.

We drop firms-years in which a control agreement was in place.[14] The reason is that firms that are subject to a control agreement do not decide independently on their payout. We further restrict our sample to firms with at least two consecutive firm-year observations. The resulting data set is an unbalanced panel with 4,363 firm-year observations.

Until 1998 domestic firms had to prepare their accounts according to German accounting standards. Between 1998 and 2004 they were allowed (but not required) to apply international accounting standards (IAS/IFRS or US-GAAP) instead. Since 2005 application of IAS/IFRS is mandatory. A change in the accounting standards can affect reported earnings significantly. We therefore use dummy variables to control for the

[13]We measure total assets at year-end. If the fiscal year of a firm is not the calendar year, we estimate the year-end value of total assets as a time-weighted average of the total assets in the previous and following fiscal year.

[14]A control agreement implies that the firm is effectively controlled by a parent company. For a more detailed discussion see Andres et al. (2009).

accounting standards that were applied. In a robustness check, we exclude the first firm-year after a change in accounting standards.[15] The results are similar and are thus omitted.

Information on balance sheet items, items from the income statement and dividends were collected from *Saling*/*Hoppenstedt Aktienführer*. This is a yearly publication that provides detailed information (e.g., ownership structure, board composition, financial report information) on German listed firms. Values denominated in Deutsche Mark were converted to Euros at the official conversion rate.[16]

The dividend information we collect contains the nominal value and the tax credit (under the imputation system in effect until 2001) as well as any special designated dividend. We further obtain information on the number of shares outstanding. If a firm has several classes of shares (typically common shares and non-voting preferred shares) we calculate the total dividend payout. All values are adjusted for stock splits, stock dividends and changes in the dedicated capital (e.g. due to seasoned equity issues).

We further collect data on stock repurchases for the period 1998-2008. As outlined in Section 4.2, the initiation of a repurchase has to be publicly announced. Subsequently, the actual amount of repurchases has to be published in the annual report. We use this information to infer the amount of repurchases in each fiscal year.

German firms typically pay the annual dividend in the second quarter of the fiscal year. These dividends, however, are paid out of earnings of the previous year. Therefore, we link each dividend payment to the fiscal year preceding the year in which the dividend was paid. Thus, as an example, we link the dividend paid in 2004 to earnings in 2003.

Matters are more complicated for repurchases. For example, repurchases occurring early in 2004 are likely to be related to 2003 earnings, while repurchases later in the year may well be made in response to interim earnings figures for 2004. In our baseline specification we treat repurchases like dividends, i.e. repurchases made in 2004 are linked to earnings for 2003. As a robustness check, we implement an alternative specification. We link

[15]In the first year after a change in accounting standards, first-differenced earnings figures are calculated from two financial reports prepared according to different rules. The results of the robustness checks to Table 4.4, 4.5, 4.6, 4.7 and 4.8 are qualitatively and quantitatively similar. They are given in Table C.1, C.6, C.11, C.15 and C.21 in the appendix of this chapter, respectively.

[16]The official conversion rate of 1998 is 1.95583 Deutsche Mark per Euro.

repurchases to the earnings of the year in which the repurchase occurs (i.e. repurchases made in 2004 are linked to 2004 earnings).[17]

4.4.2 Descriptive statistics

Table 4.1 shows summary statistics for per-share earnings, total payouts and regular dividends. Total payout is the sum of regular dividends (including the tax credit until 2001), special dividends (also including the tax credit when applicable) and repurchases (from 1998 onwards).

On average, firms pay out about two thirds of their earnings. Regular dividends on average account for 51.8% of earnings. Total payouts are almost as volatile as earnings (coefficient of variation 4.86 as compared to 5.43). Regular dividends, on the other hand, are much less volatile. Their coefficient of variation is 2.77, about half the corresponding value for earnings. These results are consistent with the stylized fact that "regular dividends are what is smoothed, and not total payouts" (DeAngelo et al., 2008, p. 158). The finding that total payouts are much more volatile than dividends is inconsistent with the substitutes hypothesis. If dividends and repurchases were indeed close substitutes there would be no reason to smooth dividends but not total payouts.

Table 4.1: Summary statistics

	Earnings	Total payout	Dividends
Mean	15.35	10.13	7.95
Standard deviation	83.34	43.08	21.98
Coefficient of variation	5.43	4.86	2.77
Median	5.03	3.99	3.91
Maximum	2,278.00	1,566.00	399.42
Minimum	-1,078.43	0.00	0.00
Observations	4,363	4,342	4,363

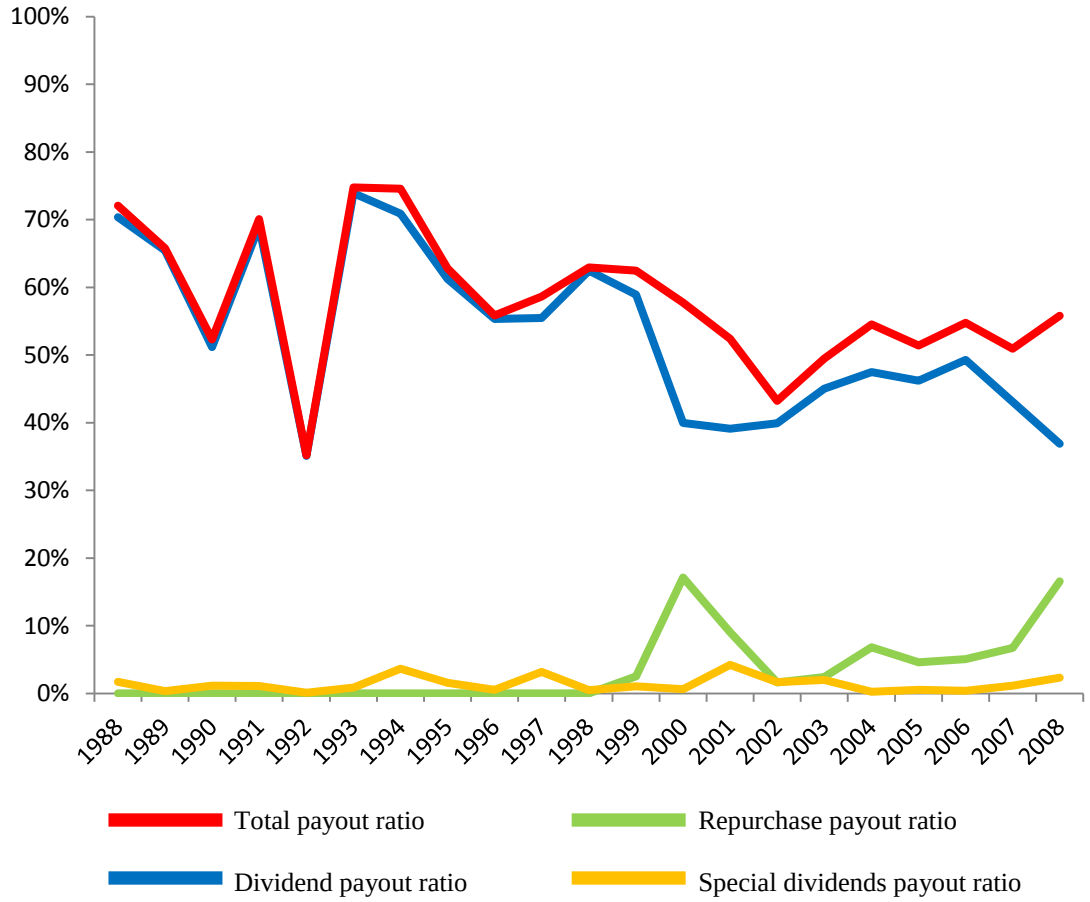
This table provides summary statistics for dividends, total payout and earnings in Euros per share. Total payout is defined as the sum of regular (gross) dividends, special dividends, and stock repurchases. The sample consists of 4,363 firm-year observations over the sample period from 1988 to 2008. Since we do not have information on special dividends for 21 firm-year observations, the number of observations for total payout is reduced accordingly.

[17]The results of the robustness checks to Table 4.4, 4.5 and 4.8 are qualitatively and quantitatively similar. They are given in Table C.2, C.7 and C.22 in the appendix of this chapter, respectively.

Table 4.2 shows the evolution of dividend payout ratios, special dividend payout ratios, repurchase ratios, and total payout ratios over time. The payout ratios are also displayed in Figure 4.1. Dividend ratios appear to decrease over time. In particular, the average ratio for the pre-repurchase period 1988-1997 is 56.4% while the corresponding value for the repurchase period 1998-2008 is only 44.2%. It is also noteworthy that (contrary to hypothesis H4.2) dividend payout ratios do not decrease after the 2001 tax reform.

The total payout ratios, on the other hand, change only slightly, from 57.7% to 53.7%. These shifts are consistent with dividends being substituted by repurchases. Interestingly, though, the special dividend ratio does not decrease but rather increases, from 1.3% to 1.5%. This is consistent with DeAngelo et al. (2000) but clearly inconsistent with our hypothesis H4.5.

Figure 4.1: Composition of total payout



This figure depicts the composition of total payout over the sample period from 1988-2008. All ratios are based on gross payouts relative to earnings.

Table 4.2: Aggregate payout ratios

Year	Observations	$\sum_i$DIV/ $\sum_i$EARN	$\sum_i$SPECIAL/ $\sum_i$EARN	$\sum_i$REP/ $\sum_i$EARN	$\sum_i$TP/ $\sum_i$EARN
1988	147	70.34%	1.73%	-	72.07%
1989	158	65.42%	0.36%	-	65.78%
1990	164	51.16%	1.15%	-	52.31%
1991	170	68.97%	1.11%	-	70.08%
1992	136	35.08%	0.12%	-	35.20%
1993	149	73.89%	0.87%	-	74.76%
1994	151	70.89%	3.66%	-	74.55%
1995	170	61.22%	1.57%	-	62.79%
1996	164	55.33%	0.51%	-	55.84%
1997	155	55.48%	3.16%	-	58.64%
1998	181	62.44%	0.50%	0.02%	62.96%
1999	193	58.91%	1.04%	2.51%	62.46%
2000	227	39.95%	0.63%	17.15%	57.73%
2001	224	39.09%	4.24%	9.05%	52.39%
2002	179	39.90%	1.69%	1.64%	43.24%
2003	169	45.04%	1.98%	2.43%	49.44%
2004	157	47.47%	0.26%	6.81%	54.53%
2005	182	46.21%	0.55%	4.62%	51.38%
2006	184	49.27%	0.41%	5.06%	54.74%
2007	192	43.06%	1.15%	6.71%	50.92%
2008	179	36.90%	2.33%	16.56%	55.79%
1988-1997	1,417	56.43%	1.31%	-	57.74%
1998-2008	2,067	44.24%	1.53%	7.90%	53.67%
1988-2008	3,484	47.12%	1.49%	6.16%	54.77%

This table provides annual information on payout ratios. The data consist of all firm-year observations with positive earnings (therefore, the number of observations is lower than in Table 4.1). Yearly payout ratios are obtained by relating aggregate payouts (dividends and/or repurchases) to aggregate earnings $\sum_i EARN$. $\sum_i DIV$ is the aggregate dividend payout per year expressed in millions of Euros. Accordingly, $\sum_i SPECIAL$ is defined as the aggregate payout of special dividends, $\sum_i REP$ is the aggregate repurchase volume, and $\sum_i TP$ is the sum of the three aforementioned items. We dropped two special dividends from the sample. Heidelberg Druckmaschinen AG paid a special dividend of 27.71 € in 1997. Altana AG paid a special dividend of 33.50 € in 2007. This corresponds to a special payout volume of 2,833 Mio. € and 4,732 Mio. €, corresponding to 77.54% and 61.98% of the pre-dividend market value of equity, respectively. We additionally report average payout ratios for the overall sample period (1988-2008), the period before the introduction of stock repurchases (1998-1997), and the period thereafter (1998-2008).

Stock repurchases are much less important in Germany than they are in the U.S. The highest repurchase ratio is 17.2%, observed in 2000. Repurchase ratios are much lower than dividend ratios in each single year. The low repurchase ratios might be explained by the fact that repurchases were prohibited before 1998 and firms only slowly adopted this additional method of payout. Note, though, that the fact that the largest repurchase ratio in our sample is observed already in 2000 casts doubt on that explanation. An alternative

explanation of the low repurchase ratios rests on the restrictive regulation which requires advance approval by the shareholders meeting and limits each individual repurchase program to no more than 10% of the shares outstanding.

Table 4.3 shows the fraction of firms that increased, decreased, or held constant their dividend and total payout, respectively. As the figures for dividends and total payouts are almost identical we concentrate on the former. Dividends are unchanged in more than 35% of the cases. We observe much more increases (about 40%) than decreases and omissions (together 28.3%). This pattern is consistent with managers being reluctant to cut dividends (and total payouts). A similar asymmetry between increases and decreases has also been reported for the U.S. (e.g. Jagannathan et al., 2000; Skinner, 2008) and for Germany (Andres et al., 2009).

As argued above, we expect the fraction of firms that do not distribute earnings to shareholders to decrease after the introduction of stock repurchases in 1998. We therefore divide our sample firms into two groups, those that pay dividends in a particular year and those that do not. The latter group is further decomposed into two subgroups, firms that pay no dividend in a particular year but have paid a dividend in earlier years, and firms that never paid a dividend. The fraction of sample firms in these four groups is depicted in Figure 4.2.

The fraction of dividend-paying firms decreased steadily until about 2003 and then started to rebound. It is noteworthy that the fraction of dividend-paying firms did not decrease in 1998 when repurchases were introduced; if anything, it *increased*. The fraction of non-paying firms is the complement of the fraction of paying firms and is thus not interesting in itself. What is interesting, though, is the decomposition into former payers and firms that never paid out dividends to shareholders. The fraction of the latter group has been close to zero until 1997. It started to increase in 1998 and then reached a plateau in 2001 where it stayed for several years. Since 2005 we observe a slight decline.

Table 4.3: Type of payout change

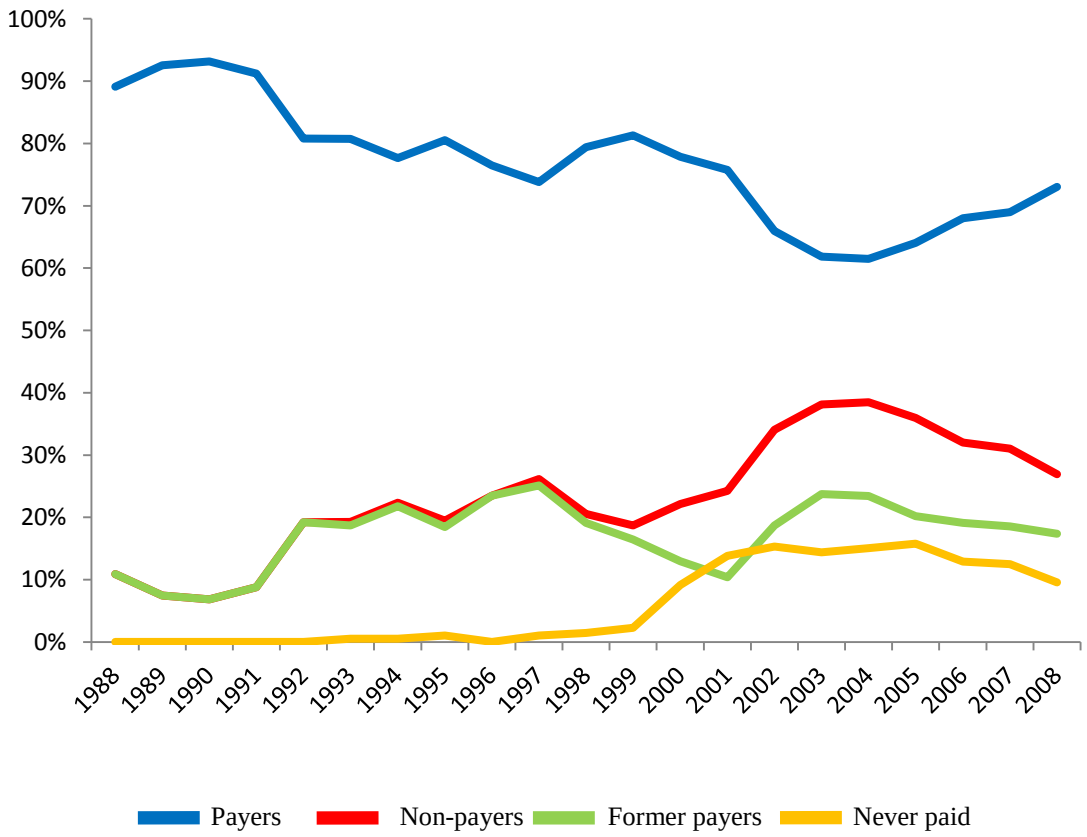
	Dividends				Total payout			
Year	Increase	Maintain	Decrease	Omit	Increase	Maintain	Decrease	Omit
1988	45	77	24	4	38	65	22	4
1989	65	72	19	3	67	70	19	3
1990	76	65	19	3	76	65	19	3
1991	72	58	40	10	76	58	36	10
1992	53	53	48	19	53	52	49	19
1993	40	71	39	11	42	70	38	11
1994	67	32	83	15	67	31	84	15
1995	87	63	35	5	83	62	40	5
1996	80	58	47	19	74	58	53	19
1997	72	61	52	16	73	60	52	14
1998	97	62	28	6	94	63	30	6
1999	82	82	39	6	81	79	43	6
2000	86	54	66	8	92	50	64	7
2001	130	48	61	8	124	47	68	7
2002	67	58	108	25	66	56	111	25
2003	61	113	55	23	62	108	59	23
2004	115	70	36	17	109	66	46	19
2005	86	73	58	8	90	67	60	9
2006	107	97	16	6	102	92	26	8
2007	100	98	23	11	106	82	33	10
2008	108	91	19	11	115	73	30	12
1988-1997	657 (39.3%)	610 (36.5%)	406 (24.3%)	105 (6.3%)	649 (39.3%)	591 (35.8%)	412 (24.9%)	103 (6.2%)
1998-2008	1,039 (43.4%)	846 (35.3%)	509 (21.3%)	129 (5.4%)	1,041 (43.5%)	783 (32.7%)	570 (23.8%)	132 (5.5%)
1988-2008	1,696 (41.7%)	1,456 (35.8%)	915 (22.5%)	234 (5.8%)	1,690 (41.8%)	1,374 (34.0%)	982 (24.3%)	235 (5.8%)

This table shows the type and number of payout changes for each year of our sample. A firm can *increase*, *decrease* or *maintain* its payout relative to the previous year. In case of a decrease, a firm can either reduce or *omit* payouts. Total payout is defined as the sum of regular (gross) dividends, special dividends, and stock repurchases.

The increase in the fraction of firms that never paid out dividends coincides with the introduction of repurchases in 1998 and with the hot IPO market at the end of the 1990s. Thus, the newly listed firms either use repurchases to disburse cash to their shareholders, or they do not disburse cash at all. We find that the latter is the dominant case. Most of the firms that never paid dividends (287 firm-year observations in the 1998-2008 period) do

not repurchase shares either. Our data set only contains 35 firm-year observations (12.2%) in which a firm that never paid a dividend repurchases shares.

Figure 4.2: Percentage of sample firms in different dividend groups



This figure depicts the distribution of the different dividend groups. A firm-year observation is defined as *'payer'* if a firm pays a regular dividend in the relevant year. Otherwise, the observation is defined as *'non-payer'*. For each non-payer we additionally track the whole history of dividend payments. If a company has never paid a regular dividend since its IPO, we define this firm-year observation as *'never paid'*. A *'former payer'* is defined as a firm that is currently not paying a regular dividend, but did so in at least one firm-year after going public.

4.5 Methodology and results

The descriptive statistics presented in the previous section already give some indication about the validity of our hypotheses. To draw further conclusions, we run a set of multivariate regressions that are derived from Lintner's (1956) model of dividend payouts. In the following, we explain in detail how the original model is adapted to test changes in the payout policy of our sample firms.

4.5.1 Model specifications

The starting point of our analysis is the Lintner (1956) model in its simplest form[18]

$$\Delta D_{i,t} = \alpha_i + c_i \left(D^*_{i,t} - D_{i,t-1} \right) + u_{i,t} \tag{4.1}$$

$$D^*_{i,t} = r_i P_{i,t} \tag{4.2}$$

where α_i is a constant, c_i is the speed of adjustment coefficient, $P_{i,t}$ are after-tax earnings, $D_{i,t}$ are dividend payments, $\Delta D_{i,t}$ is the change in dividend payments, $D_{i,t}^*$ are the desired dividend payments and r_i is the target payout ratio for firm i. Equation (4.1) models partial adjustment towards the desired level of dividends $D_{i,t}^*$, provided that $0 \leq c_i \leq 1$. The two polar cases correspond to complete adjustment (c_i=1) and no adjustment (c_i=0) towards the desired payout level.

Substitution of (4.2) into (4.1) yields

$$\Delta D_{i,t} = \alpha_i + b_i P_{i,t} + d_i D_{i,t-1} + u_{i,t} \tag{4.3}$$

where $b_i = c_i r_i$ and $d_i = \left(1 - c_i\right)$. It is common to assume that the target payout ratio and the speed of adjustment coefficient are constant across firms (Andres et al., 2009; Fama, 1974; Skinner, 2008). Adding year-fixed effects ($YEAR_t$)[19] and firm-fixed effects (η_i, to capture firm-specific heterogeneity) yields the baseline specification

$$D_{i,t} = bP_{i,t} + dD_{i,t-1} + YEAR_t + \eta_i + \upsilon_{i,t} \tag{4.4}$$

This specification considers (regular) dividends only. Denoting special dividends by $S_{i,t}$ and repurchases by $R_{i,t}$ we obtain a model based on total payouts

$$\left(D_{i,t} + S_{i,t} + R_{i,t} \right) = bP_{i,t} + d\left(D_{i,t-1} + S_{i,t-1} + R_{i,t-1} \right) + YEAR_t + \eta_i + \upsilon_{i,t} \tag{4.5}$$

Under the substitute hypothesis model (4.5) is a reasonable specification.

[18]We also estimate a model in which we additionally include lagged earnings as suggested by Fama and Babiak (1968). The results remain qualitatively unchanged. The results of the robustness checks to Table 4.4, 4.5, 4.6, 4.7 and 4.8 are given in Table C.3, C.8, C.13, C.16 and C.23 in the appendix of this chapter, respectively.

[19]We re-estimated all models without the year-fixed effects. The results remain qualitatively unchanged. The results of the robustness checks to Table 4.4, 4.5, 4.6, 4.7 and 4.8 are given in Table C.4, C.9, C.12, C.17 and C.24 in the appendix of this chapter, respectively.

Hypothesis 4.1 states that the introduction of repurchases in 1998 does not affect the parameters of a Lintner model of total payouts. To test this hypothesis we define a dummy variable which is set to 0 before 1998 and set to 1 from 1998 onwards. This dummy variable is interacted with the independent variables of the total payout model (4.5). The coefficient estimates allow us to test whether the target total payout ratio and/or the speed of adjustment changed after the introduction of repurchases in 1998.

Hypothesis 4.2 states that the 2001 tax reform should result in a reduction of dividend payout ratios. To test this hypothesis we augment our baseline model (the dividends-only model (4.4)) with a dummy variable which is set to 0 before the tax reform and set to 1 thereafter. The dummy variable is interacted with the independent variables. The coefficient estimates allow us to test whether the target dividend payout ratio and/or the speed of adjustment changed after the tax reform.

The flexibility hypothesis (our hypothesis 4.3) states that dividends are paid out of permanent earnings while repurchases (and special dividends) are paid out of transitory earnings. Model (4.5) is then an inappropriate specification because it does not differentiate between the two components of earnings.

Testing the flexibility hypothesis requires decomposing earnings into a permanent and a transitory component. We use the following simple procedure. We define permanent earnings $PermP_{i,t}$ to be the three-year moving average of earnings.[20] Transitory earnings $TransP_{i,t}$ is defined to be the deviation between total and permanent earnings.

As a robustness check we implement two alternative specifications. First, we use a five-year moving average instead of a three-year moving average.[21] Second, we estimate an AR(1)-model for each firm. The predicted values are then interpreted as the permanent

[20]Our choice of three-year moving averages is inspired by the definition of cash flow shocks in Guay and Hartford (2000). They consider shocks in cash-flows as the average of cash-flows in years t=0 and t=-1 and measure the permanence in cash flow shocks as the difference between a three-year post-shock cash-flows period (t=1, t=2 and t=3) and a three-year pre-shock cash-flows period (t=-4, t=-3 and t=-2).

[21]The results of the robustness checks to Table 4.7 and 4.8 are given in Table C.18 and C.25 in the appendix of this chapter, respectively.

component of earnings while the residual is interpreted as the transitory component.[22] The results for these alternative specifications are similar to those shown in Table 4.7 and 4.8.

We estimate the following model

$$D_{i,t} = bPermP_{i,t} + kTransP_{i,t} + dD_{i,t-1} + YEAR_t + \eta_i + \upsilon_{i,t} \qquad (4.6)$$

If dividend changes reflect changes in permanent earnings the coefficient k in equation (4.6) should, according to hypothesis 4.3, be zero. Moreover, firms could not use repurchases to disburse temporary earnings prior to 1998. Consequently, there may be a structural break in 1998. We address this issue by including a shift variable (and corresponding interaction terms) that measure differences between the period prior to 1998 and the period from 1998 onwards.

Under the flexibility hypothesis positive transitory earnings are expected to result in repurchases or special dividends. To test this hypothesis we define the variable $TransP^{+}_{i,t}$ which equals the transitory earnings as defined above when they are positive, and which equals zero when the transitory earnings are negative. We then estimate the following model based on repurchases and special dividends

$$\left(S_{i,t} + R_{i,t}\right) = bPermP_{i,t} + kTransP^{+}_{i,t} + d\left(S_{i,t-1} + R_{i,t-1}\right) + YEAR_t + \eta_i + \upsilon_{i,t} \qquad (4.7)$$

We expect k to be positive and b to be zero.

4.5.2 Estimation methods

The models we estimate are dynamic panel data models with a relatively short time series (T=21) and a relatively large number of firms (N=424).[23] It is well known that in this case the OLS estimator yields upward-biased estimates of the coefficient on the lagged dependent variable. The within-group estimator (WG) (which is obtained by subtracting the firm-specific mean from all observations), on the other hand, yields downward-biased

[22]The results of the robustness checks to Table 4.7 and 4.8 are given in Table C.19 and C.26 in the appendix of this chapter, respectively.

[23]T=21 is the maximum number of firm-years for an individual firm. As our dataset is an unbalanced panel, the average number of firm-years is much smaller and amounts to 11 years. Similarly, the average number of firm observations per year amounts to 208 and is thus smaller than the number of different firms in our sample.

estimates (e.g. Bond, 2002; Nickel, 1981). Consistent estimates can be obtained by GMM. We therefore implement the GMM-in-systems (GMM (SYS)) estimator (Blundell and Bond, 1998). It simultaneously estimates the equation in first differences with lagged levels as instruments and the equation in levels with lagged first differences as instruments.

When implementing the GMM (SYS) estimator we apply Roodman's (2009) rule of thumb. It states that the number of instruments should not exceed the number of cross-sectional units (firms in our case). We impose this restriction and then choose the instrument matrix with the highest p-value for the Hansen-test of overidentifying restrictions.

Besides the GMM estimator we also report the OLS and WG estimators. The coefficient on lagged payout obtained when using the GMM (SYS) estimator should lie in between the estimators obtained from the OLS and the WG estimators.

4.5.3 Results

For all model specifications, we report estimates based on OLS, alongside with within-group (WG) and GMM-in-systems (GMM (SYS)) estimators. We start the analysis by estimating Lintner's (1956) original specification as a benchmark model. Columns (1) to (3) of Table 4.4 contain the coefficient estimates of this baseline specification (equation 4.4). The coefficients on the lagged dependent variable vary between 0.67 (WG) and 0.80 (OLS), with a GMM (SYS) coefficient estimate (0.68) that is much closer to the within-groups estimator. These results confirm the prediction of an upward bias in OLS. The parameter estimates result in a speed of adjustment in the range of [0.20, 0.34], which is roughly in line with other studies on German data (Andres et al., 2009; Behm and Zimmermann, 1993). The estimated target payout ratio (b/(1-d)) varies between 0.23 (WG) and 0.48 (GMM (SYS)). Accordingly, estimates obtained via OLS and GMM (SYS) are very close to the average dividend payout ratio over the full sample period (46.6%, as documented in Table 4.2).

Not surprisingly, the estimates of the target payout ratio are higher for the full payout model (columns (4) – (6)). These estimates are based on model specification (4.5), where

(regular) dividends, special dividends and repurchases are added up to total payout. Again, the results of the GMM (SYS) estimation (52.5%) are very close to the average total payout ratio (55.8%). Compared to the estimates in columns (1) – (3), the target payout ratio is only slightly higher, though. This points to the importance of dividends as the main form of payout for German firms. When comparing the speed of adjustment, the total payout model yields substantially higher estimates than the dividends-only model. This finding is consistent with hypothesis 4.4 and indicates that (regular) dividends are indeed more sticky than total payouts.

Table 4.4: Classical Lintner model & total payout model

	Regular dividends			Total payout		
	OLS	WG	GMM (SYS)	OLS	WG	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.111	1.675*	-0.168*	2.937***	1.955	7.404
	(1.41)	(1.82)	(-0.17)	(2.54)	(1.05)	(1.60)
$D_{i,t-1}$	0.802***	0.666***	0.681***			
	(6.89)	(6.16)	(5.95)			
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$				0.252	0.139	0.183
				(1.33)	(0.96)	(1.32)
$P_{i,t}$	0.083**	0.078**	0.154***	0.339***	0.320**	0.429***
	(2.14)	(2.11)	(2.79)	(2.68)	(2.40)	(4.10)
m_1			-2.59			-1.98
m_2			-1.08			-1.30
Hansen (d.f)			334.22			339.90
			(316)			(313)
Observations	3,960	3,960	3,960	3,909	3,909	3,909
Target ratio	0.419	0.234	0.483	0.453	0.372	0.525
Speed of adjustment	0.198	0.334	0.319	0.748	0.861	0.817

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable (regression models 1-3). In addition we report the results with total payout as the dependent variable (regression models 4-6). The number of observations is slightly lower for models 4-6 because in some cases we were unable to identify whether a special dividend was paid in addition to the regular dividend. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively). The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment*.

The models discussed thus far implicitly assume that the target payout ratios and the speed of adjustment are constant throughout the sample period. However, with the introduction of stock repurchases, (regular) dividends may have lost in importance. Our descriptive results in Table 4.2 indeed show a decrease in the average dividend payout ratio from 56.4% to 44.1%.

Therefore we now turn to a model specification that allows for a structural break in 1998. The results are shown in Table 4.5. We first consider the dividends-only model (columns (1) – (3) in Table 4.5). As expected, we find a negative and highly significant (at the 5% level or better) change in the target dividend payout ratio. Before 1998, the estimated target payout ratio varies between 0.48 and 0.70 and drops significantly once stock repurchases became legal (range between [0.19, 0.47]). Estimates for the speed of adjustment are also lower for the period after 1997. This implies that dividend payouts became even more sticky once repurchases were allowed. A possible explanation for this finding is that firms, to a certain extent, used dividends to disburse transitory earnings prior to 1998 but ceased to do so once repurchases were allowed.

Columns (4) – (6) of Table 4.5 report the estimates for the total-payout model.[24] The results show a substantial decrease in the estimated target total payout ratio (from 0.79 to 0.49) and a strong increase in the speed of adjustment (from 0.51 to 0.89, all figures relate to the GMM (SYS) estimation) after 1997. These results are inconsistent with the substitutes hypothesis (H4.1). They rather imply that dividends and repurchases are not perfect substitutes. Stock repurchases (and potentially also special dividends) allow for a faster adjustment to temporary changes in earnings, which is reflected in the faster speed of adjustment during the second half of the sample period.

[24]There are 53 cases in which a firm announces that it repurchases shares in order to use the shares as a means of payment in future acquisitions ("acquisition currency"). When we eliminate the corresponding 53 firm-year observations we obtain results that are similar to those presented in Table 4.4-4.8. The results of the robustness checks to Table 4.4, 4.5, 4.6, 4.7 and 4.8 are given in Table C.5, C.10, C.14, C.20 and C.27 in the appendix of this chapter, respectively.

Table 4.5: The introduction of stock repurchases

	Regular dividends			Total payout		
	OLS	WG	GMM (SYS)	OLS	WG	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.102	1.048	0.423	1.276	-0.075	8.807***
	(1.50)	(0.96)	(0.42)	(1.02)	(-0.04)	(2.13)
$D_{i,t-1}$ (88-97)	0.669***	0.613***	0.608***			
	(16.77)	(27.30)	(47.44)			
$D_{i,t-1}$ (98-08)	0.886***,$^{++}$	0.735***	0.768***			
	(2.26)	(0.91)	(1.14)			
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (88-97)				0.577***	0.476***	0.494***
				(15.10)	(4.49)	(9.11)
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (98-08)				0.179^{++}	0.080^{++}	0.117^{+++}
				(-2.30)	(-2.25)	(-3.07)
$P_{i,t}$ (88-97)	0.196***	0.188***	0.274***	0.284***	0.274***	0.397***
	(3.23)	(2.93)	(25.65)	(3.24)	(3.05)	(43.90)
$P_{i,t}$ (98-08)	0.054**,$^{++}$	0.051**,$^{++}$	0.107***,$^{+++}$	0.346**	0.329**	0.431***
	(-2.56)	(-2.26)	(-4.04)	(0.38)	(0.33)	(0.28)
m_1			-2.74			-1.98
m_2			-0.37			-1.23
Hansen (d.f)			330.67			339.87
			(307)			(313)
Observations	3,960	3,960	3,960	3,909	3,909	3,909
Target ratio (88-97)	0.592	0.486	0.699	0.671	0.523	0.785
Target ratio (98-08)	0.474	0.192	0.461	0.421	0.358	0.488
Speed of adj. (88-97)	0.331	0.387	0.392	0.423	0.524	0.506
Speed of adj. (98-08)	0.114	0.265	0.232	0.821	0.920	0.883

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable (regression models 1-3). In addition we report the results with total payout as the dependent variable (regression models 4-6). The number of observations is slightly lower for models 4-6 because in some cases we were unable to identify whether a special dividend was paid in addition to the regular dividend. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts ** and *** denote significance at the 5% and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts ++, +++ denote significance at the 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as χ^2(k) under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively) in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

When comparing the dividends-only model (columns (1)-(3)) to the total payout model (columns (4)-(6)), we find that (as in Table 4.4) the total payout model yields higher estimates of the speed of adjustment as compared to the dividends-only model. This adds to the evidence in support of hypothesis 4.4. In sum, the findings in Table 4.5 indicate that dividends and repurchases are not considered as (perfect) substitutes by German firms.

As pointed out in Section 4.2 a change in taxation in 2001 made repurchases relatively more desirable for the vast majority of investors. We therefore expect that target dividend payout ratios decrease after 2001 (hypothesis 4.2). To test this hypothesis we extend the dividends-only model of Table 4.5 to allow for a tax-induced structural break in 2002 in addition to the structural break in 1998. The results are shown in Table 4.6. The coefficient estimates show substantial variation across sub-periods. We find payouts in later years to be much more rigid, as evidenced by a significantly lower speed of adjustment after 2001. The estimates of the target payout ratio are not within an economically meaningful range. The GMM-in-systems estimator implies a target payout ratio above 100%. Because the model specification with two structural breaks yields implausible results (possibly because the second sub-period is very short) we abstain from modeling two structural breaks in our further analysis and rather focus on the main structural break in 1998.

To gain further insight into the impact of the tax reform on payout decisions we re-estimate the model for the first sub-period (1988-97) and the last sub-period (2002-08) separately. The results are also shown in Table 4.6 (specification (4.4) and (4.5)). The target dividend payout ratio is 0.62 in 1988-97 and 0.72 in 2002-08. Thus both the joint estimation and the separate estimations for the sub-periods yield results which are inconsistent with H4.2. This hypothesis predicts *lower* target dividend payout ratios after the tax reform. Our results thus imply that tax considerations do not seem to be a (first order) determinant of the payout policy of German firms. This corroborates evidence reported in Andres et al. (2012).

Table 4.6: The tax reform

	Regular dividends				
	OLS	WG	GMM (SYS)	GMM (SYS)	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)
Constant	1.092	1.129	-0.550	0.221	-2.830***
	(1.49)	(1.03)	(-0.63)	(0.55)	(-2.60)
$D_{i,t-1}$ (88-97)	0.671***	0.580***	0.582***	0.538***	
	(16.52)	(28.81)	(43.20)	(30.20)	
$D_{i,t-1}$ (98-01)	0.484***	0.299**,$^{+}$	0.322***,$^{+}$		
	(-1.35)	(-1.90)	(-1.80)		
$D_{i,t-1}$ (02-08)	1.008***,$^{+++}$	0.859***,$^{++}$	0.941**,$^{+++}$		0.880***
	(3.73)	(2.88)	(3.43)		(7.78)
$P_{i,t}$ (88-97)	0.196***	0.180***	0.280***	0.288***	
	(3.23)	(2.85)	(31.47)	(44.30)	
$P_{i,t}$ (98-01)	0.041^{++}	0.033^{+++}	0.250***		
	(-2.49)	(-2.34)	(-0.37)		
$P_{i,t}$ (02-08)	0.048**,$^{++}$	0.044**,$^{++}$	0.078**,$^{+++}$		0.086**
	(-2.35)	(-2.01)	(-6.00)		(2.30)
m_1			-2.77	-1.67	-1.47
m_2			-1.02	-1.04	-0.93
Hansen (d.f)			308.57	105.87	118.73
			(232)	(90)	(77)
Observations	3,960	3,960	3,960	1,648	1,494
Target ratio (88-97)	0.596	0.429	0.607	0.623	
Target ratio (98-01)	0.079	0.047	0.381		
Target ratio (02-08)	-6.000	0.312	1.322		0.717
Speed of adj. (88-97)	0.329	0.420	0.418	0.462	
Speed of adj. (98-01)	0.516	0.701	0.678		
Speed of adj. (02-08)	-0.008	0.141	0.059		0.120

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. The first column shows the independent variables. $D_{i,t-1}$ represents dividends per share paid out in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5%, and 1% level, respectively. We introduce two structural breaks to account for the introduction of stock repurchases in 1998 and the tax reform in 2001. We report the coefficient for the period from 1998 to 2001 and the period from 2002 to 2008 which is the sum of the pre-break period (1988-1997) parameter and a shift term in both cases. We test if the sum of the 1988-1997-period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

The analysis thus far showed that the speed of adjustment is generally higher in a total payout model than in a dividends-only model. This is consistent with the flexibility hypothesis of Jagannathan et al. (2000). It predicts that changes in dividends are related to changes in permanent earnings but are unrelated to changes in temporary earnings. We now turn to a direct test of this hypothesis (our H4.3). As described above, we decompose earnings into a permanent and a transitory component (see model (4.6) above). The model is estimated for dividends only and allows for a structural break in 1998.

The results are shown in Table 4.7. During the first half of the sample period, the coefficients of both permanent and transitory earnings are positive and highly statistically significant. The estimated target payout ratios are only slightly lower for transitory earnings than for permanent earnings. This implies that, prior to the introduction of repurchases, firms used regular dividends to disburse transitory earnings.

With the introduction of stock repurchases this picture changes. We observe a statistically significant structural break for both earnings components. While the target payout ratio for permanent earnings decreases moderately and insignificantly (from 0.68 to 0.51 for the GMM (SYS) estimation), we observe a substantial and significant (at the1% level) decrease for temporary earnings, from 0.66 to 0.26 (GMM (SYS)). Thus, in the period after 1997, the reaction of dividend payouts to changes in transitory earnings is much weaker than in the pre-1998 period. In addition, the speed of adjustment decreases after 1997. Both results are consistent with the flexibility hypothesis (H4.3). Since the introduction of stock repurchases in 1998 firms are equipped with a more flexible method to disburse transitory earnings and thus do no longer use regular dividends for this purpose.

Table 4.7: Financial flexibility: Dividends

	Regular dividends		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	0.592	0.668	-0.041
	(1.17)	(0.83)	(-0.04)
$D_{i,t-1}$ (88-97)	0.643***	0.567***	0.589***
	(11.58)	(21.94)	(20.60)
$D_{i,t-1}$ (98-08)	0.793***	0.603***	0.673***
	(1.30)	(0.25)	(0.59)
$PermP_{i,t}$ (88-97)	0.206***	0.218***	0.279***
	(2.98)	(2.96)	(10.30)
$PermP_{i,t}$ (98-08)	0.112**,$^{+}$	0.131**	0.168***,$^{+++}$
	(-1.84)	(-1.55)	(-3.13)
$TransP_{i,t}$ (88-97)	0.194***	0.182***	0.273***
	(3.30)	(2.86)	(75.16)
$TransP_{i,t}$ (98-08)	0.013^{+++}	0.006^{+++}	0.085**,$^{+++}$
	(-2.67)	(-2.40)	(-5.07)
m_1			-2.99
m_2			-0.41
Hansen (d.f)			337.28
			(315)
Observations	3,581	3,581	3,581
Target ratio perm (88-97)	0.577	0.503	0.679
Target ratio perm (98-08)	0.541	0.330	0.514
Target ratio trans (88-97)	0.543	0.420	0.664
Target ratio trans (98-08)	0.063	0.015	0.260
Speed of adjustment (88-97)	0.357	0.433	0.411
Speed of adjustment (98-08)	0.207	0.397	0.327

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. The first column shows the independent variables. $D_{i,t-1}$ are dividends per share paid out in the previous year, $PermP_{i,t}$ represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2. $TransP_{i,t}$ is equal to the difference between after tax earnings per share and $PermP_{i,t}$. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period parameter and a shift term. We test if the sum of the pre-break period (1988-1997) parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, +++ denote significance at the 10% and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ ($TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

By definition, our measure of the transitory component of earnings can be negative. The flexibility hypothesis, however, implies that only positive deviations in earnings (i.e. positive transitory earnings) result in (temporary) payouts. We therefore run additional regressions in which only *positive* transitory earnings are considered to explain changes in special dividends and repurchases.

Table 4.8 contains the results of this specification (model (4.7)). As expected, we find the speed of adjustment to be very high. This lends further support to the notion that special dividends and repurchases are used as very flexible means of payouts. In fact, the estimated speed of adjustment further increases with the introduction of stock repurchases. Surprisingly, the permanent earnings component has a significant and positive impact on special dividends before 1998. The coefficient for positive transitory earnings is also positive (and partly significant), but consistently lower in magnitude. This implies that special dividends were partly used to pay out permanent earnings. For the second half of the sample period, though, special dividends and stock repurchases are not influenced by the permanent component of earnings. Accordingly, the estimated target payout ratio of permanent earnings falls to almost zero (for GMM (SYS)). On the other hand, the target payout ratio for the (positive) transitory component of earnings increases strongly and significantly (at the 10% level), from 0.09 to 0.61 (GMM (SYS)). This can again be interpreted as evidence in favor of the flexibility hypothesis.

Table 4.8: Financial flexibility: Special dividends & repurchases

	Special dividends + repurchases		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	-1.350**	-2.605**	2.740
	(-2.43)	(-2.36)	(0.52)
$S_{i,t-1}+R_{i,t-1}$ (88-97)	0.167**	0.074	0.157
	(2.43)	(0.66)	(2.11)
$S_{i,t-1}+R_{i,t-1}$ (98-08)	-0.034^{+++}	-0.083	-0.038^{+++}
	(-3.12)	(-1.47)	(-2.61)
$PermP_{i,t}$ (88-97)	0.140***	0.195***	0.142***
	(4.40)	(3.87)	(5.36)
$PermP_{i,t}$ (98-08)	0.124	0.143	0.009
	(-0.18)	(-0.58)	(-0.12)
Positive $TransP_{i,t}$ (88-97)	0.060**	0.060	0.073***
	(2.21)	(1.33)	(7.54)
Positive $TransP_{i,t}$ (98-08)	0.407	0.444	0.634*,$^{+}$
	(1.18)	(1.21)	(1.71)
m_1			-1.37
m_2			-1.63
Hansen (d.f)			296.22
			(177)
Observations	3,353	3,353	3,553
Target ratio perm (88-97)	0.168	0.211	0.168
Target ratio perm (98-08)	0.120	0.132	0.009
Target ratio trans (88-97)	0.072	0.065	0.087
Target ratio trans (98-08)	0.394	0.410	0.611
Speed of adjustment (88-97)	0.833	0.926	0.843
Speed of adjustment (98-08)	1.034	1.083	1.038

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with the sum of special dividends and stock repurchases per share as dependent variable. The first column shows the independent variables. $S_{i,t-1}$ are special dividends per share paid out in the previous year, $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $PermP_{i,t}$ represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2. Positive $TransP_{i,t}$ is equal to the maximum of the difference between after tax earnings per share and $PermP_{i,t}$ and zero. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, +++ denote significance at the 10% and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,,t}$ (Positive $TransP_{i,,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

4.6 Conclusion

The Lintner (1956) model, the workhorse of empirical research on corporate payout policy, is usually applied to dividend payouts. Against the background of the strong increase in repurchases this is not necessarily appropriate, though. We argue that a comparison of Lintner models of dividend payout and total payout can yield insights into the drivers of the payout decision. In particular it allows us to discriminate among alternative theories of corporate payout, namely, the substitutes hypothesis, tax-based explanations, and the flexibility hypothesis. These theories make specific predictions about the target payout ratios and speed of adjustment coefficients in Lintner models of dividend payout and total payout.

A distinguishing feature of our dataset is that it spans the introduction of stock repurchases in Germany in 1998 as well as a tax reform in 2001. This allows us to analyze how these events affected payout policy. We find that the introduction of repurchases in 1998 has materially affected the payout policy of German firms. In particular, both dividend and total target payout ratios decrease. The speed of adjustment for dividend payout decreases while the speed of adjustment for total payout increases. This is inconsistent with the substitutes hypothesis which predicts that the introduction of repurchases should not alter total payouts. Interestingly, special designated dividends do not lose importance after the introduction of repurchases.

We find no evidence that German firms have changed their payout policy in response to the 2001 tax reform. This finding, although surprising at first sight, is consistent with previous evidence. Andres et al. (2012) document that the tax preferences of the largest shareholder have no impact on the dividend payout ratios of German firms.

Our results provide clear support for Jagannathan et al.'s (2000) financial flexibility hypothesis. We find that dividends are more rigid than total payouts. This is consistent with the prediction of the flexibility hypothesis that dividends are predominantly paid out of permanent earnings. We further document that, after the introduction of repurchases, the responsiveness of dividends to changes in transitory earnings is reduced substantially. This finding is also supportive of the flexibility hypothesis.

C Appendix to Chapter 4

Table C.1: Classical Lintner model & total payout model – exclusion of years with a change in the accounting standards

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable (regression models 1-3). In addition we report the results with total payout as the dependent variable (regression models 4-6). The number of observations is slightly lower for models 4-6 because in some cases we were unable to identify whether a special dividend was paid in addition to the regular dividend. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively). The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment*.

	Regular dividends			Total payout		
	OLS	WG	GMM (SYS)	OLS	WG	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.195	1.738**	0.886	2.967***	2.017	8.480
	(1.06)	(1.88)	(0.85)	(2.57)	(1.06)	(1.59)
$D_{i,t-1}$	0.789***	0.663***	0.678***			
	(7.09)	(6.07)	(6.49)			
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$				0.247	0.136	0.149
				(1.32)	(0.95)	(1.19)
$P_{i,t}$	0.081***	0.076**	0.129**	0.339***	0.319**	0.412***
	(2.10)	(2.07)	(2.22)	(2.65)	(2.38)	(3.87)
m_1			-2.39			-1.88
m_2			-0.84			-1.32
Hansen (d.f)			340.77			341.01
			(314)			(314)
Observations	3,757	3,757	3,757	3,706	3,706	3,706
Target ratio	0.384	0.226	0.401	0.450	0.369	0.484
Speed of adjustment	0.211	0.337	0.322	0.753	0.864	0.851

Table C.2: Total payout model – allocation of repurchases to the earnings of the year in which the repurchase occurs

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with total payout as the dependent variable. In contrast to the baseline specification, repurchases are linked to the earnings of the year in which the repurchase occurs. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively). The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment*.

	Total payout model		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	1.887*	1.174	9.273
	(1.86)	(0.75)	(1.39)
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$	0.446***	0.346***	0.525***
	(3.27)	(2.78)	(6.44)
$P_{i,t}$	0.315**	0.317**	0.237***
	(2.36)	(2.08)	(3.48)
m_1			-3.04
m_2			-0.09
Hansen (d.f)			334.40
			(294)
Observations	3,548	3,548	3,548
Target ratio	0.569	0.485	0.499
Speed of adjustment	0.554	0.654	0.475

Table C.3: Classical Lintner model & total payout model – inclusion of earnings with lag

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable (regression models 1-3). In addition we report the results with total payout as the dependent variable (regression models 4-6). The number of observations is slightly lower for models 4-6 because in some cases we were unable to identify whether a special dividend was paid in addition to the regular dividend. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. $P_{i,t-1}$ corresponds to after-tax earnings per share in the previous year. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively). The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment*.

	Regular dividends			Total payout		
	OLS	WG	GMM (SYS)	OLS	WG	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.638	0.926	0.019	2.938***	1.946	7.332
	(1.21)	(1.49)	(0.03)	(2.58)	(1.05)	(1.57)
$D_{i,t-1}$	0.826***	0.687***	0.726***			
	(6.65)	(6.52)	(6.02)			
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$				0.215	0.098	0.175
				(1.26)	(0.74)	(1.30)
$P_{i,t}$	0.058**	0.055**	0.113***	0.329**	0.313**	0.426***
	(2.11)	(2.13)	(2.60)	(2.50)	(2.32)	(3.81)
$P_{i,t-1}$	0.006	0.010	-0.003	0.440	0.053*	0.012
	(0.58)	(1.08)	(-0.32)	(1.04)	(1.85)	(0.32)
m_1			-2.42			-2.01
m_2			-0.85			-1.36
Hansen (d.f)			337.72			339.49
			(313)			(312)
Observations	3,953	3,953	3,953	3,909	3,909	3,909
Target ratio	0.333	0.176	0.412	0.419	0.347	0.516
Speed of adjustment	0.174	0.313	0.274	0.785	0.902	0.817

Table C.4: Classical Lintner model & total payout model – exclusion of year dummies

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable (regression models 1-3). In addition we report the results with total payout as the dependent variable (regression models 4-6). The number of observations is slightly lower for models 4-6 because in some cases we were unable to identify whether a special dividend was paid in addition to the regular dividend. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively). The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment*.

	Regular dividends			Total payout		
	OLS	WG	GMM (SYS)	OLS	WG	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.852*	1.942***	0.737	3.233***	4.452***	3.262***
	(1.73)	(2.78)	(1.51)	(3.51)	(3.12)	(2.65)
$D_{i,t-1}$	0.799***	0.665***	0.717***			
	(6.87)	(6.03)	(5.81)			
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$				0.254	0.147	0.184
				(1.35)	(1.02)	(1.33)
$P_{i,t}$	0.084**	0.080**	0.134**	0.341***	0.325**	0.432***
	(2.17)	(2.18)	(2.38)	(2.69)	(2.43)	(4.07)
m_1			-2.58			-2.01
m_2			-1.03			-1.30
Hansen (d.f)			338.28			333.83
			(313)			(313)
Observations	3,960	3,960	3,960	3,909	3,909	3,909
Target ratio	0.201	0.239	0.283	0.457	0.381	0.529
Speed of adjustment	0.418	0.335	0.473	0.746	0.853	0.816

Table C.5: Classical Lintner model & total payout model – exclusion of repurchases as acquisition currency

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable (regression models 1-3). In addition we report the results with total payout as the dependent variable (regression models 4-6). Observations in which a firm announces that it repurchases shares in order to use the shares as a means of payment in future acquisitions ("acquisition currency") are not included. The number of observations is slightly lower for models 4-6 because in some cases we were unable to identify whether a special dividend was paid in addition to the regular dividend. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively). The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment*.

	Regular dividends			Total payout		
	OLS	WG	GMM (SYS)	OLS	WG	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.133	1.713*	0.392	2.963**	2.003	8.227
	(1.44)	(1.89)	(0.38)	(2.58)	(1.08)	(1.51)
$D_{i,t-1}$	0.798***	0.663***	0.716***			
	(6.88)	(6.17)	(5.80)			
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$				0.249	0.139	0.167
				(1.33)	(0.96)	(1.27)
$P_{i,t}$	0.083**	0.078**	0.132**	0.338***	0.320**	0.413***
	(2.14)	(2.11)	(2.34)	(2.68)	(2.40)	(4.14)
m_1			-2.58			-1.92
m_2			-1.11			-1.42
Hansen (d.f)			339.45			341.25
			(313)			(313)
Observations	3,913	3,913	3,913	3,862	3,862	3,862
Target ratio	0.411	0.231	0.465	0.450	0.372	0.496
Speed of adjustment	0.202	0.337	0.284	0.751	0.861	0.833

Table C.6: The introduction of stock repurchases – exclusion of years with a change in the accounting standards

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable (regression models 1-3). In addition we report the results with total payout as the dependent variable (regression models 4-6). The number of observations is slightly lower for models 4-6 because in some cases we were unable to identify whether a special dividend was paid in addition to the regular dividend. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts ++, +++ denote significance at the 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively) in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

	Regular dividends			Total payout		
	OLS	WG	GMM (SYS)	OLS	WG	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.101	1.132	1.392	1.276	0.029	10.827**
	(1.50)	(1.02)	(1.24)	(1.25)	(0.01)	(2.23)
$D_{i,t-1}$ (88-97)	0.669***	0.608***	0.608***			
	(16.76)	(25.85)	(47.64)			
$D_{i,t-1}$ (98-08)	0.868***,$^{++}$	0.735***	0.712***			
	(2.12)	(0.93)	(0.69)			
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (88-97)				0.578***	0.470***	0.496***
				(15.05)	(4.27)	(9.00)
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (98-08)				0.173^{++}	0.077^{++}	0.069^{+++}
				(-2.41)	(-2.18)	(-4.49)
$P_{i,t}$ (88-97)	0.196***	0.187***	0.275***	0.284***	0.273***	0.396***
	(3.23)	(2.90)	(25.73)	(3.54)	(3.01)	(45.94)
$P_{i,t}$ (98-08)	0.052**, $^{+++}$	0.049**, $^{++}$	0.109**, $^{+++}$	0.346**	0.330**	0.396***
	(-2.58)	(-2.27)	(-3.76)	(0.37)	(0.33)	(0.00)
m_1			-2.66			-1.82
m_2			-0.13			-1.22
Hansen (d.f)			341.01			340.60
			(314)			(314)
Observations	3,757	3,757	3,757	3,706	3,706	3,706
Target ratio (88-97)	0.592	0.477	0.702	0.673	0.515	0.786
Target ratio (98-08)	0.394	0.185	0.378	0.418	0.358	0.425
Speed of adj. (88-97)	0.331	0.392	0.392	0.422	0.530	0.504
Speed of adj. (98-08)	0.132	0.265	0.288	0.827	0.923	0.931

Table C.7: The introduction of stock repurchases – allocation of repurchases to the earnings of the year in which the repurchase occurs

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with total payout as the dependent variable. In contrast to the baseline specification, repurchases are linked to the earnings of the year in which the repurchase occurs. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscript ++ denote significance at the 5% level. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively) in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

	Total payout		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	1.266	0.043	9.919*
	(1.23)	(0.03)	(1.72)
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (88-97)	0.578***	0.513***	0.518***
	(14.52)	(7.01)	(11.65)
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (98-08)	0.325	0.201	0.438***
	(-1.19)	(-1.63)	(-0.53)
$P_{i,t}$ (88-97)	0.285***	0.282***	0.392***
	(3.55)	(3.24)	(37.68)
$P_{i,t}$ (98-08)	0.336*	0.340	0.228***,++
	(0.26)	(0.33)	(-2.26)
m_1			-3.35
m_2			-0.33
Hansen (d.f)			337.78
			(294)
Observations	3,548	3,548	3,548
Target ratio (88-97)	0.675	0.579	0.813
Target ratio (98-08)	0.498	0.426	0.406
Speed of adj. (88-97)	0.422	0.487	0.482
Speed of adj. (98-08)	0.675	0.799	0.562

Table C.8: The introduction of stock repurchases – inclusion of earnings with lag

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable (regression models 1-3). In addition we report the results with total payout as the dependent variable (regression models 4-6). The number of observations is slightly lower for models 4-6 because in some cases we were unable to identify whether a special dividend was paid in addition to the regular dividend. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. $P_{i,t-1}$ corresponds to after-tax earnings per share in the previous year. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively) in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

	Regular dividends			Total payout		
	OLS	WG	GMM (SYS)	OLS	WG	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.218	1.189	0.336	1.269	-0.021	8.806**
	(1.51)	(1.02)	(0.34)	(1.21)	(-0.01)	(2.15)
$D_{i,t-1}$ (88-97)	0.689***	0.627***	0.658***			
	(37.81)	(11.67)	(18.28)			
$D_{i,t-1}$ (98-08)	0.858***	0.696***	0.754***			
	(1.30)	(0.40)	(0.59)			
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (88-97)				0.581***	0.466***	0.516***
				(10.80)	(3.16)	(6.70)
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (98-08)				0.152^{+++}	0.050^{++}	0.119^{+++}
				(-2.87)	(-2.21)	(-3.21)
$P_{i,t}$ (88-97)	0.198***	0.190***	0.283***	0.284***	0.273***	0.398***
	(3.04)	(2.75)	(20.46)	(3.43)	(3.01)	(45.82)
$P_{i,t}$ (98-08)	$0.051^{**,++}$	$0.050^{**,++}$	$0.105^{**,+++}$	0.338**	0.323**	0.421***
	(-2.42)	(-2.14)	(-4.44)	(0.31)	(0.28)	(0.18)
$P_{i,t-1}$ (88-97)	-0.013	-0.007	-0.035*	-0.002	0.027	-0.019
	(-0.50)	(-0.26)	(-1.66)	(-0.06)	(0.82)	(-0.98)
$P_{i,t-1}$ (98-08)	0.018	0.024	0.010^{+}	0.037	0.041	-0.004
	(0.84)	(0.79)	(1.65)	(0.57)	(0.26)	(0.28)
m_1			-2.74			-1.97
m_2			-0.31			-1.26
Hansen (d.f)			330.98			338.12
			(305)			(305)
Observations	3,953	3,953	3,953	3,909	3,909	3,909
Target ratio (88-97)	0.637	0.509	0.827	0.678	0.493	0.822
Target ratio (98-08)	0.359	0.164	0.427	0.339	0.340	0.478
Speed of adj. (88-97)	0.311	0.373	0.342	0.419	0.554	0.484
Speed of adj. (98-08)	0.142	0.304	0.246	0.848	0.950	0.811

Table C.9: The introduction of stock repurchases – exclusion of year dummies

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable (regression models 1-3). In addition we report the results with total payout as the dependent variable (regression models 4-6). The number of observations is slightly lower for models 4-6 because in some cases we were unable to identify whether a special dividend was paid in addition to the regular dividend. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5% and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively) in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

	Regular dividends			Total payout		
	OLS	WG	GMM (SYS)	OLS	WG	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.761***	1.628***	0.284	2.508***	3.626**	2.347**
	(2.80)	(2.94)	(0.62)	(3.60)	(2.38)	(2.54)
$D_{i,t-1}$ (88-97)	0.672***	0.605***	0.612***			
	(14.52)	(21.75)	(42.73)			
$D_{i,t-1}$ (98-08)	0.880***,$^{++}$	0.740***	0.758***			
	(2.37)	(1.15)	(1.09)			
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (88-97)				0.556***	0.442***	0.476***
				(14.30)	(3.72)	(7.35)
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (98-08)				0.188^{++}	0.097^{+}	0.123^{+++}
				(-2.12)	(-1.83)	(-2.71)
$P_{i,t}$ (88-97)	0.195***	0.185***	0.272***	0.279***	0.265***	0.387***
	(3.21)	(2.89)	(19.98)	(3.44)	(2.88)	(28.70)
$P_{i,t}$ (98-08)	0.055**,$^{++}$	0.054**,$^{++}$	0.113**,$^{+++}$	0.350**	0.339**	0.438***
	(-2.52)	(-2.20)	(-3.83)	(0.43)	(0.44)	(0.43)
m_1			-2.75			-1.99
m_2			-0.41			-1.24
Hansen (d.f)			328.43			332.56
			(313)			(313)
Observations	3,960	3,960	3,960	3,909	3,909	3,909
Target ratio (88-97)	0.595	0.468	0.701	0.628	0.475	0.739
Target ratio (98-08)	0.458	0.208	0.467	0.431	0.375	0.499
Speed of adj. (88-97)	0.328	0.395	0.388	0.444	0.558	0.524
Speed of adj. (98-08)	0.120	0.260	0.242	0.812	0.903	0.877

Table C.10: The introduction of stock repurchases – exclusion of repurchases as acquisition currency

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable (regression models 1-3). In addition we report the results with total payout as the dependent variable (regression models 4-6). Observations in which a firm announces that it repurchases shares in order to use the shares as a means of payment in future acquisitions ("acquisition currency") are not included. The number of observations is slightly lower for models 4-6 because in some cases we were unable to identify whether a special dividend was paid in addition to the regular dividend. The first column shows the independent variables. $D_{i,t-1}$ and $S_{i,t-1}$ are dividends and special dividends per share paid out in the previous year, respectively. $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5% and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts ++, +++ denote significance at the 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ (or $D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$, respectively) in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

	Regular dividends			Total payout		
	OLS	WG	GMM (SYS)	OLS	WG	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.103	1.060	0.656	1.276	-0.039	10.040**
	(1.50)	(0.98)	(0.55)	(1.25)	(-0.02)	(2.00)
$D_{i,t-1}$ (88-97)	0.669***	0.614***	0.607***			
	(16.77)	(27.37)	(47.77)			
$D_{i,t-1}$ (98-08)	0.871***,$^{++}$	0.730***	0.750***			
	(2.17)	(0.87)	(0.98)			
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (88-97)				0.578***	0.477***	0.496***
				(15.12)	(4.54)	(9.32)
$D_{i,t-1}+S_{i,t-1}+R_{i,t-1}$ (98-08)				0.175^{++}	0.079^{++}	0.095^{+++}
				(-2.37)	(-2.28)	(-3.69)
$P_{i,t}$ (88-97)	0.196***	0.189***	0.274***	0.284***	0.274***	0.396***
	(3.23)	(2.93)	(25.56)	(3.54)	(3.06)	(45.85)
$P_{i,t}$ (98-08)	0.054**,$^{++}$	0.052**,$^{++}$	0.108**,$^{+++}$	0.344**	0.328**	0.407***
	(-2.55)	(-2.26)	(-3.98)	(0.37)	(0.32)	(0.10)
m_1			-2.75			-1.89
m_2			-0.42			-1.35
Hansen (d.f)			333.19			340.96
			(313)			(313)
Observations	3,913	3,913	3,913	3,862	3,862	3,862
Target ratio (88-97)	0.592	0.490	0.697	0.673	0.524	0.786
Target ratio (98-08)	0.419	0.193	0.432	0.417	0.356	0.450
Speed of adj. (88-97)	0.331	0.386	0.393	0.422	0.523	0.504
Speed of adj. (98-08)	0.129	0.270	0.250	0.825	0.921	0.905

Table C.11: The tax reform – exclusion of years with a change in the accounting standards

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. The first column shows the independent variables. $D_{i,t-1}$ represents dividends per share paid out in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce two structural breaks to account for the introduction of stock repurchases in 1998 and the tax reform in 2001. We report the coefficient for the period from 1998 to 2001 and the period from 2002 to 2008 which is the sum of the pre-break period (1988-1997) parameter and a shift term in both cases. We test if the sum of the 1988-1997-period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts ++, +++ denote significance at the 5% and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

	Regular dividends				
	OLS	WG	GMM (SYS)	GMM (SYS)	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)
Constant	1.091	1.217	-0.183	0.183	4.232
	(1.49)	(1.09)	(-0.20)	(0.30)	(1.06)
$D_{i,t-1}$ (88-97)	0.671***	0.573***	0.584***	0.537***	
	(16.52)	(26.57)	(44.27)	(30.54)	
$D_{i,t-1}$ (98-01)	0.475***	0.296**, $^{+}$	0.253*, $^{++}$		
	(-1.39)	(-1.83)	(-2.47)		
$D_{i,t-1}$ (02-08)	0.990***, $^{+++}$	0.868***, $^{+++}$	0.860***, $^{++}$		0.848***
	(3.53)	(3.07)	(2.13)		(6.88)
$P_{i,t}$ (88-97)	0.196***	0.180***	0.280***	0.289***	
	(3.23)	(2.84)	(31.33)	(41.27)	
$P_{i,t}$ (98-01)	0.040^{++}	0.034^{++}	0.248***		
	(-2.51)	(-2.31)	(-0.58)		
$P_{i,t}$ (02-08)	0.046**, $^{++}$	0.042**, $^{++}$	0.081**,$^{+++}$		0.074**
	(-2.39)	(-2.05)	(-5.39)		(2.12)
m_1			-2.68	-1.67	-1.81
m_2			-0.73	-1.06	-0.59
Hansen (d.f)			324.69	100.06	99.50
			(232)	(81)	(82)
Observations	3,757	3,757	3,757	1,648	1,334
Target ratio (88-97)	0.596	0.422	0.673	0.624	
Target ratio (98-01)	0.076	0.048	0.332		
Target ratio (02-08)	4.600	0.318	0.579		0.487
Speed of adj. (88-97)	0.329	0.427	0.416	0.463	
Speed of adj. (98-01)	0.525	0.704	0.747		
Speed of adj. (02-08)	0.010	0.132	0.140		0.152

Table C.12: The tax reform – exclusion of year dummies

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. The first column shows the independent variables. $D_{i,t-1}$ represents dividends per share paid out in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5% and 1% level, respectively. We introduce two structural breaks to account for the introduction of stock repurchases in 1998 and the tax reform in 2001. We report the coefficient for the period from 1998 to 2001 and the period from 2002 to 2008 which is the sum of the pre-break period (1988-1997) parameter and a shift term in both cases. We test if the sum of the 1988-1997-period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

	Regular dividends				
	OLS	WG	GMM (SYS)	GMM (SYS)	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)
Constant	1.152***	2.230***	0.328	0.643***	-0.332
	(5.41)	(5.13)	(0.89)	(2.89)	(-0.30)
$D_{i,t-1}$ (88-97)	0.666***	0.562***	0.578***	0.537***	
	(15.77)	(22.24)	(39.43)	(31.42)	
$D_{i,t-1}$ (98-01)	0.523***	0.357***	0.331***,$^{+}$		
	(-1.14)	(-1.45)	(-1.80)		
$D_{i,t-1}$ (02-08)	0.998***,$^{+++}$	0.860***,$^{+++}$	0.931**,$^{+++}$		0.870***
	(3.80)	(3.33)	(3.41)		(7.61)
$P_{i,t}$ (88-97)	0.194***	0.177***	0.279***	0.288***	
	(3.18)	(2.77)	(25.05)	(36.10)	
$P_{i,t}$ (98-01)	0.047***,$^{++}$	0.043**,$^{++}$	0.277***		
	(-2.32)	(-2.12)	(-0.03)		
$P_{i,t}$ (02-08)	0.047***,$^{++}$	0.045**,$^{+}$	0.078***,$^{+++}$		0.092**
	(-2.33)	(-1.95)	(-6.02)		(2.39)
m_1			-2.78	-1.67	-1.91
m_2			-1.03	-1.06	-1.28
Hansen (d.f)			262.89	92.96	101.37
			(232)	(90)	(88)
Observations	3,960	3,960	3,960	1,648	1,494
Target ratio (88-97)	0.581	0.404	0.661	0.622	
Target ratio (98-01)	0.099	0.067	0.414		
Target ratio (02-08)	23.500	0.329	1.130		0.708
Speed of adj. (88-97)	0.334	0.438	0.422	0.463	
Speed of adj. (98-01)	0.477	0.643	0.669		
Speed of adj. (02-08)	0.002	0.140	0.069		0.130

Table C.13: The tax reform – inclusion of earnings with lag

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. The first column shows the independent variables. $D_{i,t-1}$ represents dividends per share paid out in the previous year. $P_{i,t}$ represents after-tax earnings per share. $P_{i,t-1}$ corresponds to after-tax earnings per share in the previous year. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce two structural breaks to account for the introduction of stock repurchases in 1998 and the tax reform in 2001. We report the coefficient for the period from 1998 to 2001 and the period from 2002 to 2008 which is the sum of the pre-break period (1988-1997) parameter and a shift term in both cases. We test if the sum of the 1988-1997-period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

	Regular dividends				
	OLS	WG	GMM (SYS)	GMM (SYS)	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)
Constant	1.202	1.295	-0.424	0.083	0.884***
	(1.49)	(1.12)	(0.86)	(0.14)	(7.44)
$D_{i,t-1}$ (88-97)	0.692***	0.589***	0.636***	0.572***	
	(37.11)	(12.01)	(18.69)	(15.99)	
$D_{i,t-1}$ (98-01)	0.282*,++	0.118+++	0.264**,++		
	(-2.46)	(-2.79)	(-2.53)		
$D_{i,t-1}$ (02-08)	1.021***,+++	0.872***,++	0.957***,+++		0.884***
	(3.37)	(2.34)	(2.75)		(7.44)
$P_{i,t}$ (88-97)	0.197***	0.182***	0.288***	0.294***	
	(3.03)	(2.72)	(25.28)	(35.77)	
$P_{i,t}$ (98-01)	0.031++	0.028++	0.237***		
	(-2.60)	(-2.39)	(0.87)		
$P_{i,t}$ (02-08)	0.046**,++	0.045**,+	0.079+++		0.084**
	(-2.24)	(-1.94)	(-6.06)		(2.31)
$P_{i,t-1}$ (88-97)	-0.013	-0.005	-0.035**	-0.024*	
	(-0.49)	(0.18)	(-1.97)	(-1.82)	
$P_{i,t-1}$ (98-01)	0.159***,+++	0.149***,++	0.054***,+++		
	(2.77)	(2.54)	(2.80)		
$P_{i,t-1}$ (02-08)	-0.005	0.000	-0.009		0.000
	(0.79)	(0.18)	(1.21)		(0.03)
m_1			-2.75	-1.66	-1.98
m_2			-1.07	-1.04	-1.59
Hansen (d.f)			310.96	96.94	100.02
			(229)	(80)	(80)
Observations	3,953	3,953	3,953	1,641	1,494
Target ratio (88-97)	0.640	0.433	0.791	0.687	
Target ratio (98-01)	0.043	0.032	0.322		
Target ratio (02-08)	-2.190	0.352	1.837		0.724
Speed of adj. (88-97)	0.308	0.411	0.364	0.428	
Speed of adj. (98-01)	0.718	0.882	0.736		
Speed of adj. (02-08)	-0.021	0.128	0.043		0.116

Table C.14: The tax reform – exclusion of repurchases as acquisition currency

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. Observations in which a firm announces that it repurchases shares in order to use the shares as a means of payment in future acquisitions ("acquisition currency") are not included. The first column shows the independent variables. $D_{i,t-1}$ represents dividends per share paid out in the previous year. $P_{i,t}$ represents after-tax earnings per share. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5% and 1% level, respectively. We introduce two structural breaks to account for the introduction of stock repurchases in 1998 and the tax reform in 2001. We report the coefficient for the period from 1998 to 2001 and the period from 2002 to 2008 which is the sum of the pre-break period (1988-1997) parameter and a shift term in both cases. We test if the sum of the 1988-1997-period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio* equals the coefficient for $P_{i,t}$ divided by the *speed of adjustment* in the respective period.

	Regular dividends				
	OLS	WG	GMM (SYS)	GMM (SYS)	GMM (SYS)
	(1)	(2)	(3)	(4)	(5)
Constant	1.092	1.149	-0.400	0.221	-0.146
	(1.49)	(1.04)	(-0.39)	(0.55)	(-0.12)
$D_{i,t-1}$ (88-97)	0.671***	0.581***	0.583***	0.538***	
	(16.52)	(29.03)	(43.61)	(30.20)	
$D_{i,t-1}$ (98-01)	0.483***	0.299***,+	0.322***,+		
	(-1.36)	(-1.91)	(-1.81)		
$D_{i,t-1}$ (02-08)	1.004***,+++	0.857***,+++	0.923**,+++		0.862***
	(3.60)	(2.81)	(3.06)		(7.31)
$P_{i,t}$ (88-97)	0.196***	0.181***	0.280***	0.288***	
	(3.23)	(2.86)	(31.60)	(44.30)	
$P_{i,t}$ (98-01)	0.040***,++	0.034***,++	0.258***		
	(-2.49)	(-2.34)	(-0.38)		
$P_{i,t}$ (02-08)	0.048***,++	0.045**,++	0.076***,+++		0.091**
	(-2.35)	(-2.01)	(-5.96)		(2.36)
m_1			-2.79	-1.67	-1.91
m_2			-1.01	-1.14	-1.22
Hansen (d.f)			297.15	105.87	132.96
			(232)	(90)	(88)
Observations	3,913	3,913	3,913	1,648	1,460
Target ratio (88-97)	0.596	0.432	0.671	0.623	
Target ratio (98-01)	0.077	0.049	0.381		
Target ratio (02-08)	-12.000	0.315	0.987		0.659
Speed of adj. (88-97)	0.329	0.419	0.417	0.462	
Speed of adj. (98-01)	0.517	0.701	0.678		
Speed of adj. (02-08)	-0.004	0.143	0.077		0.138

Table C.15: Financial flexibility: Dividends – exclusion of years with a change in the accounting standards

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. The first column shows the independent variables. $D_{i,t-1}$ are dividends per share paid out in the previous year, $PermP_{it}$ represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2. $TransP_{it}$ is equal to the difference between after tax earnings per share and $PermP_{it}$. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5% and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period parameter and a shift term. We test if the sum of the pre-break period (1988-1997) parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ ($TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Regular dividends		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	0.603	0.778	0.370
	(1.20)	(0.94)	(0.34)
$D_{i,t-1}$ (88-97)	0.640***	0.561***	0.575***
	(11.32)	(21.92)	(20.40)
$D_{i,t-1}$ (98-08)	0.763***	0.599***	0.551***
	(1.10)	(0.25)	(-0.15)
$PermP_{i,t}$ (88-97)	0.208***	0.218***	0.286***
	(2.97)	(2.92)	(10.68)
$PermP_{i,t}$ (98-08)	0.118**,$^{+}$	0.134***	0.205***,$^{++}$
	(-0.02)	(-1.48)	(-2.12)
$TransP_{i,t}$ (88-97)	0.194***	0.181***	0.273***
	(3.31)	(2.83)	(107.56)
$TransP_{i,t}$ (98-08)	0.008^{+++}	0.002^{++}	0.110***, $^{+++}$
	(-2.74)	(-2.42)	(-3.98)
m_1			-2.97
m_2			-0.15
Hansen (d.f)			264.57
			(178)
Observations	3,381	3,381	3,381
Target ratio perm (88-97)	0.578	0.497	0.673
Target ratio perm (98-08)	0.498	0.334	0.457
Target ratio trans (88-97)	0.539	0.412	0.642
Target ratio trans (98-08)	0.034	0.005	0.245
Speed of adjustment (88-97)	0.360	0.439	0.425
Speed of adjustment (98-08)	0.237	0.401	0.449

Table C.16: Financial flexibility: Dividends – inclusion of earnings with lag

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. The first column shows the independent variables. $D_{i,t-1}$ are dividends per share paid out in the previous year, $PermP_{i,t}$ ($PermP_{i,t-1}$) represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2 (t-1, t-2, t-3). $TransP_{i,t}$ ($TransP_{i,t-1}$) is equal to the difference between after tax earnings per share (in the previous year) and $PermP_{i,t}$ ($PermP_{i,t-1}$). For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5% and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period parameter and a shift term. We test if the sum of the pre-break period (1988-1997) parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ ($TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Regular dividends		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	0.512	0.130	1.091
	(0.56)	(0.08)	(1.21)
$D_{i,t-1}$ (88-97)	0.559***	0.498***	0.511***
	(5.89)	(9.29)	(11.46)
$D_{i,t-1}$ (98-08)	0.835***,$^{++}$	0.608***	0.667***
	(2.11)	(0.81)	(0.99)
$PermP_{i,t}$ (88-97)	0.176**	0.172***	0.323***
	(2.51)	(4.75)	(3.04)
$PermP_{i,t}$ (98-08)	0.176**	0.154**	0.238**,$^{+}$
	(0.00)	(-0.27)	(-1.88)
$PermP_{i,t-1}$ (88-97)	0.109	0.148	0.055
	(1.33)	(1.45)	(0.90)
$PermP_{i,t-1}$ (98-08)	-0.088^{+++}	-0.026^{+++}	-0.092^{+++}
	(-2.82)	(-2.21)	(-2.71)
$TransP_{i,t}$ (88-97)	0.227***	0.231***	0.302***
	(4.94)	(4.10)	(11.84)
$TransP_{i,t}$ (98-08)	-0.017^{+++}	-0.004^{+++}	0.038^{+++}
	(-3.44)	(-2.98)	(-6.29)
$TransP_{i,t-1}$ (88-97)	-0.029	-0.024	-0.075
	(-0.68)	(-0.60)	(-1.49)
$TransP_{i,t-1}$ (98-08)	-0.039	-0.034	-0.021
	(-0.25)	(-0.28)	(0.57)
m_1			-3.10
m_2			1.77
Hansen (d.f)			317.40
			(254)
Observations	3,224	3,224	3,224
Target ratio perm (88-97)	0.385	0.342	0.659
Target ratio perm (98-08)	1.067	0.391	0.714
Target ratio trans (88-97)	0.514	0.461	0.617
Target ratio trans (98-08)	-0.101	-0.010	0.113
Speed of adjustment (88-97)	0.441	0.502	0.489
Speed of adjustment (98-08)	0.165	0.392	0.333

Table C.17: Financial flexibility: Dividends – exclusion of year dummies

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. The first column shows the independent variables. $D_{i,t-1}$ are dividends per share paid out in the previous year, $PermP_{i,t}$ represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2. $TransP_{i,t}$ is equal to the difference between after tax earnings per share and $PermP_{i,t}$. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period parameter and a shift term. We test if the sum of the pre-break period (1988-1997) parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ ($TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Regular dividends		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	0.771***	1.667***	0.282
	(2.59)	(2.92)	(0.53)
$D_{i,t-1}$ (88-97)	0.652***	0.565***	0.597***
	(10.53)	(17.71)	(18.46)
$D_{i,t-1}$ (98-08)	0.784***	0.602***	0.661***
	(1.23)	(0.27)	(0.47)
$PermP_{i,t}$ (88-97)	0.201***	0.211***	0.273***
	(2.90)	(2.84)	(9.44)
$PermP_{i,t}$ (98-08)	0.115**,$^{+}$	0.136**	0.171***,$^{+++}$
	(-1.69)	(-1.34)	(-2.89)
$TransP_{i,t}$ (88-97)	0.196***	0.182***	0.273***
	(3.32)	(2.87)	(46.87)
$TransP_{i,t}$ (98-08)	0.014^{+++}	0.007^{++}	0.087**,$^{+++}$
	(-2.68)	(-2.40)	(-4.99)
m_1			-3.01
m_2			-0.37
Hansen (d.f)			320.82
			(315)
Observations	3,581	3,581	3,581
Target ratio perm (88-97)	0.578	0.485	0.677
Target ratio perm (98-08)	0.532	0.342	0.504
Target ratio trans (88-97)	0.563	0.418	0.677
Target ratio trans (98-08)	0.065	0.018	0.260
Speed of adjustment (88-97)	0.348	0.435	0.403
Speed of adjustment (98-08)	0.216	0.398	0.257

Table C.18: Financial flexibility: Dividends – calculation of permanent earnings based on a five year moving average

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. The first column shows the independent variables. $D_{i,t-1}$ are dividends per share paid out in the previous year, $PermP_{i,t}$ represents the five year moving average of after-tax earnings per share based on the years t, t-1, t-2, t-3 and t-4. $TransP_{i,t}$ is equal to the difference between after tax earnings per share and $PermP_{i,t}$. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5% and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period parameter and a shift term. We test if the sum of the pre-break period (1988-1997) parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +++ denote significance at the 1% level. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ ($TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Regular dividends		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	0.161	-0.253	0.633
	(0.19)	(-0.16)	(0.61)
$D_{i,t-1}$ (88-97)	0.660***	0.594***	0.612***
	(8.33)	(14.16)	(10.21)
$D_{i,t-1}$ (98-08)	0.789***	0.486***	0.513***,$^{+++}$
	(1.04)	(-0.78)	(-2.57)
$PermP_{i,t}$ (88-97)	0.257**	0.311***	0.353***
	(2.19)	(2.29)	(4.37)
$PermP_{i,t}$ (98-08)	0.153**	0.205**	0.171***,$^{+++}$
	(1.04)	(-0.90)	(-2.57)
$TransP_{i,t}$ (88-97)	0.218***	0.209***	0.266***
	(3.12)	(2.77)	(17.51)
$TransP_{i,t}$ (98-08)	0.014^{+++}	-0.002^{+++}	0.058*,$^{+++}$
	(-2.78)	(-2.58)	(-6.74)
m_1			-2.79
m_2			-0.90
Hansen (d.f)			325.27
			(297)
Observations	2,871	2,871	2,871
Target ratio perm (88-97)	0.756	0.776	0.910
Target ratio perm (98-08)	0.725	0.399	0.725
Target ratio trans (88-97)	0.641	0.515	0.686
Target ratio trans (98-08)	0.066	-0.004	0.119
Speed of adjustment (88-97)	0.340	0.406	0.388
Speed of adjustment (98-08)	0.211	0.514	0.487

Table C.19: Financial flexibility: Dividends – calculation of permanent earnings based on an AR (1) – model

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. The first column shows the independent variables. $D_{i,t-1}$ are dividends per share paid out in the previous year. Permanent and transitory earnings are calculated based on an AR(1)-model for each firm. The predicted values of this model are then defined as $PermP_{i,t}$ while the residual corresponds to $TransP_{i,t}$. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period parameter and a shift term. We test if the sum of the pre-break period (1988-1997) parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ ($TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Regular dividends		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	1.177*	0.357	0.692
	(1.69)	(0.36)	(0.71)
$D_{i,t-1}$ (88-97)	0.641***	0.564***	0.627***
	(23.24)	(13.58)	(24.13)
$D_{i,t-1}$ (98-08)	0.708***	0.520***	0.653***
	(0.50)	(-0.26)	(0.16)
$PermP_{i,t}$ (88-97)	0.216***	0.302***	0.245***
	(4.78)	(5.45)	(10.39)
$PermP_{i,t}$ (98-08)	0.147***,$^{+}$	0.195***,$^{+++}$	0.168***,$^{+}$
	(-1.66)	(-2.68)	(-1.66)
$TransP_{i,t}$ (88-97)	0.193***	0.184***	0.269***
	(3.00)	(2.67)	(11.50)
$TransP_{i,t}$ (98-08)	0.024**,$^{+++}$	0.027**,$^{++}$	0.022^{+++}
	(-2.73)	(-2.33)	(-10.78)
m_1			-2.73
m_2			-0.32
Hansen (d.f)			338.16
			(326)
Observations	3,953	3,953	3,953
Target ratio perm (88-97)	0.602	0.692	0.657
Target ratio perm (98-08)	0.503	0.406	0.484
Target ratio trans (88-97)	0.538	0.422	0.721
Target ratio trans (98-08)	0.082	0.056	0.063
Speed of adjustment (88-97)	0.359	0.436	0.373
Speed of adjustment (98-08)	0.292	0.480	0.347

Table C.20: Financial flexibility: Dividends – exclusion of repurchases as acquisition currency

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with dividends per share as dependent variable. Observations in which a firm announces that it repurchases shares in order to use the shares as a means of payment in future acquisitions ("acquisition currency") are not included. The first column shows the independent variables. $D_{i,t-1}$ are dividends per share paid out in the previous year, $PermP_{i,t}$ represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2. $TransP_{i,t}$ is equal to the difference between after tax earnings per share and $PermP_{i,t}$. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5% and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period parameter and a shift term. We test if the sum of the pre-break period (1988-1997) parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ ($TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Regular dividends		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	0.594	0.686	0.178
	(1.18)	(0.86)	(0.17)
$D_{i,t-1}$ (88-97)	0.642***	0.566***	0.587***
	(11.56)	(21.87)	(20.70)
$D_{i,t-1}$ (98-08)	0.785***	0.596***	0.650***
	(1.22)	(0.21)	(0.42)
$PermP_{i,t}$ (88-97)	0.206***	0.218***	0.279***
	(2.98)	(2.97)	(10.33)
$PermP_{i,t}$ (98-08)	0.113**,$^{+}$	0.131**	0.169***,$^{+++}$
	(-1.82)	(-1.54)	(-3.10)
$TransP_{i,t}$ (88-97)	0.194***	0.182***	0.272***
	(3.30)	(2.86)	(75.75)
$TransP_{i,t}$ (98-08)	0.013^{+++}	0.006^{++}	0.082**,$^{++}$
	(-2.68)	(-2.40)	(-5.27)
m_1			-2.99
m_2			-0.41
Hansen (d.f)			328.27
			(315)
Observations	3,539	3,539	3,539
Target ratio perm (88-97)	0.575	0.502	0.676
Target ratio perm (98-08)	0.526	0.324	0.483
Target ratio trans (88-97)	0.542	0.419	0.659
Target ratio trans (98-08)	0.060	0.015	0.234
Speed of adjustment (88-97)	0.358	0.434	0.413
Speed of adjustment (98-08)	0.215	0.404	0.350

Table C.21: Financial flexibility: Special dividends & repurchases – exclusion of years with a change in the accounting standards

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with the sum of special dividends and stock repurchases per share as dependent variable. The first column shows the independent variables. $S_{i,t-1}$ are special dividends per share paid out in the previous year, $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $PermP_{i,t}$ represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2. Positive $TransP_{i,t}$ is equal to the maximum of the difference between after tax earnings per share and $PermP_{i,t}$ and zero. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, +++ denote significance at the 10% and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ ($TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Special dividends + repurchases		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	-1.351**	-2.645**	2.371
	(-2.43)	(-2.29)	(0.43)
$S_{i,t-1}+R_{i,t-1}$ (88-97)	0.167**	0.072	0.156**
	(2.42)	(0.63)	(2.08)
$S_{i,t-1}+R_{i,t-1}$ (98-08)	-0.035^{+++}	-0.087***	-0.042^{+++}
	(-3.13)	(-1.46)	(-2.61)
$PermP_{i,t}$ (88-97)	0.140***	0.198***	0.143***
	(4.40)	(3.75)	(5.46)
$PermP_{i,t}$ (98-08)	0.127	0.150	0.122
	(-0.15)	(0.15)	(-0.16)
Positive $TransP_{i,t}$ (88-97)	0.060**	0.062	0.073***
	(2.21)	(1.32)	(7.44)
Positive $TransP_{i,t}$ (98-08)	0.418	0.444	0.666**,$^{+}$
	(1.17)	(1.20)	(1.79)
m_1			-1.35
m_2			-1.66
Hansen (d.f)			305.43
			(178)
Observations	3,353	3,353	3,353
Target ratio perm (88-97)	0.168	0.213	0.169
Target ratio perm (98-08)	0.123	0.138	0.117
Target ratio trans (88-97)	0.072	0.067	0.086
Target ratio trans (98-08)	0.404	0.048	0.639
Speed of adjustment (88-97)	0.833	0.928	0.844
Speed of adjustment (98-08)	1.035	1.087	1.042

Table C.22: Financial flexibility: Special dividends & repurchases – allocation of repurchases to the earnings of the year in which the repurchase occurs

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with the sum of special dividends and stock repurchases per share as dependent variable. In contrast to the baseline specification, repurchases are linked to the earnings of the year in which the repurchase occurs. The first column shows the independent variables. $S_{i,t-1}$ are special dividends per share paid out in the previous year, $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $PermP_{i,t}$ represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2. Positive $TransP_{i,t}$ is equal to the maximum of the difference between after tax earnings per share and $PermP_{i,t}$ and zero. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5% and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, +++ denote significance at the 10% and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ (Positive $TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Special dividends + repurchases		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	-1.376**	-2.403***	9.852
	(-2.46)	(-2.64)	(1.45)
$S_{i,t-1}+R_{i,t-1}$ (88-97)	0.164**	0.105	0.169**
	(2.39)	(1.13)	(2.41)
$S_{i,t-1}+R_{i,t-1}$ (98-08)	-0.075^{+++}	-0.082**,$^{+}$	-0.028^{+++}
	(-2.68)	(-1.85)	(-2.80)
$PermP_{i,t}$ (88-97)	0.143***	0.211***	0.142***
	(4.48)	(3.66)	(5.33)
$PermP_{i,t}$ (98-08)	0.118	0.141	0.085^{+}
	(-0.25)	(-0.66)	(-1.06)
Positive $TransP_{i,t}$ (88-97)	0.060**	0.074	0.077***
	(2.20)	(1.64)	(8.07)
Positive $TransP_{i,t}$ (98-08)	0.533	0.704	0.025
	(1.04)	(1.19)	(-0.61)
m_1			-2.22
m_2			-1.56
Hansen (d.f)			273.59
			(167)
Observations	3,207	3,207	3,207
Target ratio perm (88-97)	0.171	0.236	0.171
Target ratio perm (98-08)	0.083	0.130	0.110
Target ratio trans (88-97)	0.093	0.084	0.072
Target ratio trans (98-08)	0.024	0.651	0.496
Speed of adjustment (88-97)	0.831	0.895	0.836
Speed of adjustment (98-08)	1.075	1.082	1.028

Table C.23: Financial flexibility: Special dividends & repurchases – inclusion of earnings with lag

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with the sum of special dividends and stock repurchases per share as dependent variable. The first column shows the independent variables. $S_{i,t-1}$ are special dividends per share paid out in the previous year, $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $PermP_{i,t}$ ($PermP_{i,t-1}$) represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2 (t-1, t-2, t-3). Positive $TransP_{i,t}$ ($TransP_{i,t-1}$) is equal to the maximum of the difference between after tax earnings per share (in the previous year) and $PermP_{i,t}$ ($PermP_{i,t-1}$) and zero. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++ denote significance at the 10% and 5% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals $PermP_{i,t}$ (Positive $TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Special dividends + repurchases		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	0.779	-0.139	4.300
	(0.53)	(-0.08)	(0.84)
$S_{i,t-1}+R_{i,t-1}$ (88-97)	0.163***	0.050	0.148**
	(2.59)	(-0.47)	(2.27)
$S_{i,t-1}+R_{i,t-1}$ (98-08)	0.035	-0.020	0.086**
	(-1.54)	(-0.62)	(-0.66)
$PermP_{i,t}$ (88-97)	0.292***	0.360***	0.370***
	(3.57)	(4.43)	(5.54)
$PermP_{i,t}$ (98-08)	0.207*	0.255**	0.312**
	(-0.88)	(-1.06)	(-0.66)
$PermP_{i,t-1}$ (88-97)	-0.158***	-0.172***	-0.227***
	(-2.92)	(-5.22)	(-4.11)
$PermP_{i,t-1}$ (98-08)	-0.070	-0.065**	-0.183**
	(1.09)	(1.50)	(0.61)
Positive $TransP_{i,t}$ (88-97)	0.020	-0.001	0.015
	(0.62)	(-0.01)	(0.81)
Positive $TransP_{i,t}$ (98-08)	0.446	0.436	0.648**,++
	(1.30)	(1.34)	(2.26)
Positive $TransP_{i,t-1}$ (88-97)	-0.300	-0.051*	-0.058***
	(-1.17)	(-1.87)	(-3.20)
Positive $TransP_{i,t-1}$ (98-08)	-0.201	-0.213**,+	-0.345**,+
	(1.32)	(-1.75)	(-1.75)
m_1			-1.48
m_2			-1.71
Hansen (d.f)			283.86 (170)
Observations	3,198	3,198	3,198
Target ratio perm (88-97)	0.349	0.379	0.434
Target ratio perm (98-08)	0.215	0.250	0.312
Target ratio trans (88-97)	0.024	-0.001	0.018
Target ratio trans (98-08)	0.462	0.427	0.709
Speed of adjustment (88-97)	0.837	0.950	0.852
Speed of adjustment (98-08)	0.965	1.020	0.914

Table C.24: Financial flexibility: Special dividends & repurchases – exclusion of year dummies

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with the sum of special dividends and stock repurchases per share as dependent variable. The first column shows the independent variables. $S_{i,t-1}$ are special dividends per share paid out in the previous year, $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $PermP_{i,t}$ represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2. Positive $TransP_{i,t}$ is equal to the maximum of the difference between after tax earnings per share and $PermP_{i,t}$ and zero. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, ++, +++ denote significance at the 10%, 5%, and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ (Positive $TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Special dividends + repurchases		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	-1.190	-1.732	-0.724
	(-1.04)	(-0.82)	(-0.55)
$S_{i,t-1}+R_{i,t-1}$ (88-97)	0.157**	0.066	0.140*
	(2.21)	(0.59)	(1.79)
$S_{i,t-1}+R_{i,t-1}$ (98-08)	-0.032**,$^{+++}$	-0.081	-0.038**,$^{++}$
	(-2.90)	(-1.36)	(-2.37)
$PermP_{i,t}$ (88-97)	0.147***	0.210***	0.152***
	(4.48)	(3.38)	(5.53)
$PermP_{i,t}$ (98-08)	0.128	0.150	0.131
	(-0.25)	(-0.64)	(-0.21)
Positive $TransP_{i,t}$ (88-97)	0.058**	0.058	0.070***
	(2.31)	(1.29)	(6.19)
Positive $TransP_{i,t}$ (98-08)	0.406	0.442	0.637**,$^{+}$
	(1.19)	(1.22)	(1.76)
m_1			-1.53
m_2			-1.59
Hansen (d.f)			250.82
			(177)
Observations	3,353	3,353	3,353
Target ratio perm (88-97)	0.174	0.225	0.177
Target ratio perm (98-08)	0.124	0.139	0.126
Target ratio trans (88-97)	0.069	0.062	0.081
Target ratio trans (98-08)	0.393	0.409	0.614
Speed of adjustment (88-97)	0.843	0.934	0.860
Speed of adjustment (98-08)	1.032	1.081	1.038

Table C.25: Financial flexibility: Special dividends & repurchases – calculation of permanent earnings based on a five year moving average

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with the sum of special dividends and stock repurchases per share as dependent variable. The first column shows the independent variables. $S_{i,t-1}$ are special dividends per share paid out in the previous year, $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $PermP_{i,t}$ represents the five year moving average of after-tax earnings per share based on the years t, t-1, t-2, t-3 and t-4. Positive $TransP_{i,t}$ is equal to the maximum of the difference between after tax earnings per share and $PermP_{i,t}$ and zero. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts **, *** denote significance at the 5% and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts ++, +++ denote significance at the 5% and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ (Positive $TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Special dividends + repurchases		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	1.848	1.048	3.235
	(1.63)	(0.75)	(0.66)
$S_{i,t-1}+R_{i,t-1}$ (88-97)	0.378**	0.310	0.463***
	(2.49)	(1.52)	(3.27)
$S_{i,t-1}+R_{i,t-1}$ (98-08)	-0.035^{+++}	-0.091^{++}	-0.036^{+++}
	(-2.79)	(-2.05)	(-3.54)
$PermP_{i,t}$ (88-97)	-0.037	0.001	-0.135
	(-0.36)	(0.01)	(-1.21)
$PermP_{i,t}$ (98-08)	0.118	0.157	0.090
	(1.36)	(1.32)	(1.64)
Positive $TransP_{i,t}$ (88-97)	0.027	0.024	0.045
	(0.83)	(0.77)	(1.31)
Positive $TransP_{i,t}$ (98-08)	0.459	0.480	0.663**,$^{++}$
	(1.42)	(1.39)	(2.19)
m_1			-1.45
m_2			-1.49
Hansen (d.f)			291.78
			(183)
Observations	3,353	3,353	3,553
Target ratio perm (88-97)	-0.037	0.001	-0.251
Target ratio perm (98-08)	0.114	0.144	0.087
Target ratio trans (88-97)	0.043	0.035	0.084
Target ratio trans (98-08)	0.443	0.440	0.640
Speed of adjustment (88-97)	0.622	0.690	0.537
Speed of adjustment (98-08)	1.035	1.091	1.036

Table C.26: Financial flexibility: Special dividends & repurchases – calculation of permanent earnings based on an AR (1) – model

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with the sum of special dividends and stock repurchases per share as dependent variable. The first column shows the independent variables. $S_{i,t-1}$ are special dividends per share paid out in the previous year, $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. Permanent and transitory earnings are calculated based on an AR(1)-model for each firm. The predicted values of this model are then defined as $PermP_{i,t}$ while Positive $TransP_{i,t}$ corresponds to the maximum of the residual and zero. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts ++, +++ denote significance at the 5% and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ (Positive $TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Special dividends + repurchases		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	-1.436**	-1.359	9.528*
	(-2.50)	(-0.78)	(1.79)
$S_{i,t-1}+R_{i,t-1}$ (88-97)	0.275***	0.270*	0.253***
	(3.06)	(1.85)	(2.66)
$S_{i,t-1}+R_{i,t-1}$ (98-08)	-0.003^{+++}	-0.054**,$^{++}$	-0.008^{+++}
	(-3.17)	(-2.31)	(-2.85)
$PermP_{i,t}$ (88-97)	0.094***	-0.028	0.114***
	(3.30)	(-0.23)	(4.49)
$PermP_{i,t}$ (98-08)	0.014	0.023	0.025
	(-1.36)	(-0.05)	(-1.57)
Positive $TransP_{i,t}$ (88-97)	0.089***	0.096***	0.076***
	(3.40)	(2.83)	(7.36)
Positive $TransP_{i,t}$ (98-08)	0.461	0.506	0.313
	(1.17)	(1.20)	(0.74)
m_1			-1.26
m_2			-1.38
Hansen (d.f)			308.39
			(179)
Observations	3,553	3,553	3,553
Target ratio perm (88-97)	0.130	-0.038	0.153
Target ratio perm (98-08)	0.140	0.022	0.025
Target ratio trans (88-97)	0.123	0.032	0.102
Target ratio trans (98-08)	0.460	0.480	0.311
Speed of adjustment (88-97)	0.725	0.730	0.747
Speed of adjustment (98-08)	1.003	1.054	1.008

Table C.27: Financial flexibility: Special dividends & repurchases – exclusion of repurchases as acquisition currency

This table shows the results of OLS, within-groups (WG), and GMM-in-systems (GMM (SYS)) regressions with the sum of special dividends and stock repurchases per share as dependent variable. Observations in which a firm announces that it repurchases shares in order to use the shares as a means of payment in future acquisitions ("acquisition currency") are not included. The first column shows the independent variables. $S_{i,t-1}$ are special dividends per share paid out in the previous year, $R_{i,t-1}$ corresponds to the repurchase volume per share in the previous year. $PermP_{i,t}$ represents the three year moving average of after-tax earnings per share based on the years t, t-1 and t-2. Positive $TransP_{i,t}$ is equal to the maximum of the difference between after tax earnings per share and $PermP_{i,t}$ and zero. For the fixed-effects models the coefficient for *constant* is the average value of the fixed effects as obtained from Stata 12. Each cell shows the estimated coefficient and t-value (in parentheses). The superscripts *, **, *** denote significance at the 10%, 5%, and 1% level, respectively. We introduce a structural break to account for the introduction of stock repurchases in 1998. We report the coefficient for the period from 1998 onwards which is the sum of the pre-break period (1988-1997) parameter and a shift term. We test if the sum of the pre-break period parameter and the shift term is statistically different from zero. We also report the standard t-test for the shift parameter and the t-value (in parentheses; please note that the coefficient is the sum of the pre-break coefficient and the shift parameter while the t-statistic is for the shift parameter. There can thus be cases where the parameter is positive while the t-statistic is negative). The superscripts +, +++ denote significance at the 10% and 1% level, respectively. The statistics m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with k degrees of freedom reported in parentheses. All regressions include year dummies and a dummy indicating a change in the accounting standards. The *speed of adjustment* is calculated as one minus the coefficient for $D_{i,t-1}$ in the respective period. The *target ratio perm* (*trans*) equals the coefficient for $PermP_{i,t}$ (Positive $TransP_{i,t}$) in the respective period divided by the *speed of adjustment* in the respective period.

	Special dividends + repurchases		
	OLS	WG	GMM (SYS)
	(1)	(2)	(3)
Constant	-1.350**	-2.637**	2.542
	(-2.43)	(-2.34)	(0.48)
$S_{i,t-1}+R_{i,t-1}$ (88-97)	0.167**	0.073	0.157**
	(2.44)	(0.64)	(2.11)
$S_{i,t-1}+R_{i,t-1}$ (98-08)	-0.034^{+++}	-0.084	-0.038^{+++}
	(-3.12)	(-1.45)	(-2.63)
$PermP_{i,t}$ (88-97)	0.140***	0.195***	0.142***
	(4.40)	(3.86)	(5.36)
$PermP_{i,t}$ (98-08)	0.124	0.145	0.124
	(-0.19)	(-0.56)	(-0.15)
Positive $TransP_{i,t}$ (88-97)	0.060**	0.060	0.073***
	(2.21)	(1.33)	(7.53)
Positive $TransP_{i,t}$ (98-08)	0.407	0.443	0.632*,$^{+}$
	(1.18)	(1.21)	(1.68)
m_1			-1.36
m_2			-1.71
Hansen (d.f)			292.69
			(177)
Observations	3,511	3,511	3,511
Target ratio perm (88-97)	0.168	0.210	0.168
Target ratio perm (98-08)	0.120	0.134	0.119
Target ratio trans (88-97)	0.072	0.065	0.087
Target ratio trans (98-08)	0.394	0.409	0.609
Speed of adjustment (88-97)	0.833	0.927	0.843
Speed of adjustment (98-08)	1.034	1.084	1.038

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Lebenslauf

Seit Sep. 2009	**Universität Mannheim** Lehrstuhl für ABWL und Finanzierung Wissenschaftlicher Mitarbeiter
Feb. 2009 – Aug. 2009	**Rheinische Friedrich-Wilhelms-Universität Bonn** Lehrstuhl für Finanzwirtschaft Wissenschaftlicher Mitarbeiter
Apr. 2006 – Sep. 2008	**Rheinische Friedrich-Wilhelms-Universität Bonn** Hauptstudium der Volkswirtschaftslehre Abschluss: Diplom-Volkswirt
Sep. 2007 – Apr. 2008	**Universitat Pompeu Fabra** **Barcelona, Spanien** Auslandsstudium
Okt. 2004 – März 2006	**Rheinische Friedrich-Wilhelms-Universität Bonn** Grundstudium der Volkswirtschaftslehre
Juni 2004	Abitur, Görres-Gymnasium, Düsseldorf