



Corporate Governance and Internal Capital Markets

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Abstract

We exploit an exogenous shock to corporate ownership structures created by a recent tax reform in Germany to explore the link between corporate governance and internal capital markets. We find that firms with more concentrated ownership are less diversified and have more efficient internal capital markets. Our findings provide direct evidence in support of Scharfstein and Stein's (2000) model, which suggests that internal capital misallocations are partly a result of poor corporate governance. We also provide evidence of a channel through which the benefits of ownership concentration outweigh its costs.

Corporate governance and internal capital markets are two of the topics that have received most attention from corporate finance scholars over the past 10 to 15 years (see Shleifer and Vishny (1997), Becht, Bolton, and Röell (2004), and Stein (2004) for reviews). The two topics are in fact closely intertwined in theoretical research; agency problems—which corporate governance mechanisms seek to mitigate in a variety of ways—are at the heart of every theory of inefficient internal capital markets. Surprisingly, very few empirical studies have looked into the actual link between corporate governance and internal capital markets. This paper seeks to fill the gap by examining the impact of corporate ownership on corporate diversification and on the efficiency of firms' internal capital markets.

The few studies that have explored the link between the two topics suggest that this can be a fruitful avenue for research. For instance, Lins and Servaes (1999), who find a significant diversification discount in Japan and in the U.K. but not in Germany, also find that concentrated ownership in the hands of insiders enhances the value effect of diversification in Germany but not elsewhere—suggesting that international differences in corporate governance affect the impact of diversification on shareholder wealth. Anderson, Bates, Bizjak, and Lemmon (2000) show that firms that are more diversified provide less incentive-based compensation to their CEOs but have more outsiders on the board. Durnev, Morck, and Yeung (2004) find a positive association between the informativeness of a firm's stock prices and the efficiency of its capital budgeting, and attribute the relation to the mediating role of corporate governance. Ozbas and Scharfstein (2010) show that the investment behavior of conglomerates is more inefficient if management has small ownership stakes. Relatedly, Datta, D'Mello, and Iskandar-Datta (2009)

show that equity-based compensation (but not stock options) is associated with more efficient internal capital markets.

These studies show that explicit tests of the impact of corporate governance on internal capital markets can contribute significantly to our understanding of both topics. However, none of these studies are exempt from at least one of the problems that have undermined much of the empirical literature on both topics: endogeneity and measurement error in Tobin's Q. Demsetz and Villalonga (2001) show that, after correcting for the endogeneity of corporate ownership, its alleged effect on firm value disappears. Campa and Kedia (2002) and Villalonga (2004a) show that, after correcting for endogeneity or self-selection biases in corporate diversification, the diversification discount disappears or even turns into a premium. Whited (2001) and Colak and Whited (2007) show that the evidence of internal capital markets' inefficiency is largely an artifact of measurement error in Tobin's Q

In this paper, we take advantage of a unique opportunity for a natural experiment provided by a recent tax change in Germany to explore the link between corporate governance and internal capital markets. In 2002, the prevailing 52% corporate tax on capital gains from investments in other corporations was repealed, thus eliminating a significant barrier to changes in ownership structures. The tax repeal affected most large shareholders in German corporations since, in addition to companies, banks, and other financial institutions that are commonly organized in corporate form, most wealthy individual and family shareholders in Germany hold their shares through intermediate corporations (La Porta, López de Silanes, and Shleifer (1999); Franks and Meyer (2001); Faccio and Lang (2002)). Indeed, the tax change gave rise to a significant reshuffling of corporate ownership structures. This exogenous shock allows us to

overcome or at least mitigate concerns about the endogeneity of ownership in estimating its effect on internal capital markets.

Other studies have exploited changes in law as exogenous events to overcome the endogeneity of corporate governance variables. Such papers include Bertrand and Mullainathan (2003) who study changes in anti-takeover laws, and Chhaochharia and Grinstein (2007) as well as Hochberg, Sapienza, and Vissing-Jorgensen (2009), who exploit the Sarbanes-Oxley Act as a quasi-natural experiment. The closest to our paper is Giannetti and Laeven (2009), who use a pension reform in Sweden to identify the effects of institutional ownership on performance.

The significant change in ownership structures that resulted from the German tax reform offers an additional advantage from an econometric point of view: It creates a longitudinal variation that is unusual in ownership studies and which, combined with the already-large cross-sectional variation in German ownership structures, allows us to identify the effects of ownership changes and structure with much greater statistical power than what could be obtained from U.S. data (see Zhou (2001) for a related criticism of the literature).

Moreover, because German corporations disclosed segment information during our sample period, we are able to compute measures of diversification and internal capital market efficiency similar to those used by other researchers on U.S. data.

We find that firms with more concentrated ownership are less diversified and have more efficient internal capital markets. These findings are consistent with the theoretical arguments in Bolton and Scharfstein (1998) and Scharfstein and Stein (2000), which suggest that capital misallocations are partly a result of poor corporate governance. Our paper thus contributes to the

internal capital markets literature by providing direct evidence of the effect of governance structures on how these markets work.

In addition, our paper also contributes to the corporate governance literature by providing new evidence about the benefits and costs of ownership concentration. Ownership concentration as a governance mechanism can be a double-edged sword, since it can mitigate the agency problem between minority shareholders and managers (due to large shareholders' greater incentives to monitor the managers) but it can bring about another agency problem, between large and small shareholders. (Burkart, Panunzi, and Shleifer (2003) provide a formal model of this tradeoff). Because corporate diversification also has benefits and costs, our finding that firms with more concentrated ownership are less diversified can be interpreted in one of two ways. If diversification is overall value-destroying and internal capital markets are inefficient, corporate diversification can be seen as the outcome of an agency problem where either managers or controlling shareholders lead their companies to diversify to make up for their lack of personal diversification or extract other private benefits at the expense of minority shareholders, who only bear the costs. Under this view of diversification, our results would thus suggest that the agency benefits of ownership concentration outweigh its agency costs, since large shareholders are not only able to successfully prevent self-interested managers from diversifying the company's business; their large equity stakes act as a commitment device for them not to engage in value-destroying diversification themselves. On the other hand, if diversification is value-enhancing, our results would suggest that the net benefits of ownership concentration are negative.

Given Lins and Servaes (1999) finding of no diversification discount in Germany, our results imply that the benefits and costs of ownership concentration just offset each other.

However, our own finding that more concentrated ownership leads to more efficient allocation of internal resources suggests that the net benefits of ownership concentration may in fact be positive.

Our findings have significant policy implications. To the extent that the German tax reform was meant to reduce ownership concentration and to improve minority investor protection in the country, our results suggest that the reform may have in fact been counterproductive. The broader policy implication is that lawmakers and regulators should be cautious when trying to harmonize corporate governance systems across countries with different institutional contexts and different governance mechanisms in play.

The rest of the paper is organized as follows. In Section I, we derive a set of hypotheses on the link between corporate governance and internal capital markets. Section II provides background information about governance structures in Germany, the tax change we exploit, and segment reporting in Germany. The data set, sample characteristics, and variable definitions are provided in Section III. Section IV discusses the empirical results. Section V concludes.

I. Main Hypotheses

We test two related pairs of hypotheses concerning the link between corporate governance and internal capital markets. We start by looking at a measure of diversification which proxies for the complexity and scope of a firm's internal capital market: the number of operating segments. We then study the efficiency of firms' internal capital markets. In both cases, the null hypothesis posits that corporate governance structures play no role for diversification and the efficiency of internal capital markets.

Of all possible governance measures, we focus on ownership concentration as our key independent variable, for two reasons. First, from a theoretical standpoint, ownership concentration is a particularly interesting governance mechanism because it is at the heart of what Burkart, Panunzi, and Shleifer refer to as “the twin conflicts essential to understanding corporate governance: that between the manager and the outside shareholders, and that between the large shareholder and the minority shareholders” (2003, p. 2170). Unlike many other governance mechanisms which protect minority investors from the abuses of either managers or large shareholders (e.g. an active market for corporate control, cumulative voting, etc.), concentrated ownership offers the benefit of mitigating the former conflict at the cost of exacerbating the latter. We therefore do not take a stance about whether concentrated ownership structures are a “better” or “worse” governance mechanism than widely held structures, and instead leave it to the data to tell us. Second, from an empirical standpoint, ownership measures are the most directly affected by the German corporate capital gains tax repeal of 2002, which we use as a largely exogenous shock to infer causality from the relations we observe between corporate governance and internal capital markets.

A. Corporate Governance and Diversification

We begin our analysis by looking at the relation between a firm’s ownership structure and the extent of its industrial diversification. There are theoretical arguments to justify either a positive or a negative relation, depending on which of the two agency problems is assumed to matter most, and on whether diversification is assumed to be good or bad, which is a much-debated question (see Villalonga (2003) for a review of the debate). Figure 1 summarizes the four possible scenarios.

If diversification is assumed to be “good,” i.e., value-creating for all shareholders (because of efficient internal capital markets as in Gertner, Scharfstein, and Stein (1994) or Stein’s (1997) models, economies of scope, or other reasons), a positive relation between ownership concentration and a firm’s number of segments will be a direct reflection of which agency problem dominates. If the conflict between owners and managers is more costly, ownership concentration will mitigate the problem (i.e., be “good”), and will be positively associated to value-creating diversification (Scenario 1). If the more costly conflict is the one between large and minority shareholders, ownership concentration will only exacerbate it (and hence be “bad”) and NPV-positive diversification projects will not be undertaken (Scenario 2).

On the other hand, if diversification is assumed to be “bad,” i.e., value-destroying for the firm as a whole (because of information or agency problems), managers or controlling shareholders may still be able to derive private benefits from it—because of empire-building preferences (Jensen (1986); Stulz (1990)), risk reduction (Amihud and Lev (1981)), or other reasons. The predicted relations between ownership concentration and number of segments will then reverse. If the conflict between owners and managers is the most worrisome, ownership concentration will help curb managers’ penchant for costly diversification (i.e. be “good”), and will hence be negatively associated to it (Scenario 3). If large shareholders are the primary beneficiaries of diversification at the expense of minority shareholders (“bad”), we will see a positive association (Scenario 4).

The two scenarios in the diagonal of the matrix shown in Figure 1 (scenarios 1 and 4) yield a common prediction:

Hypothesis 1a: Firms with more concentrated ownership structures are more diversified.

The two off-diagonal scenarios in Figure 1 (scenarios 2 and 3) yield the opposite prediction:

Hypothesis 1b: Firms with more concentrated ownership structures are less diversified.

B. Corporate Governance and Internal Capital Market Efficiency

Our second pair of hypotheses relates to the link between corporate ownership structures and the overall efficiency of a firm's internal capital reallocations. An internal capital market is defined as being efficient if it allocates funds across the firm so as to maximize shareholder wealth (Shin and Stulz (1998)). This implies that units with better investment opportunities have priority in the allocation of funds and should receive funds from less promising units. It is important to examine this link in addition to the relation between corporate governance and diversification because of the potential "dark side" of these markets (Scharfstein and Stein (2000)).

Our first hypothesis about this link posits that firms with more concentrated ownership structures operate better capital allocation processes and hence have more efficient internal capital markets. This hypothesis is a direct implication of the agency model by Scharfstein and Stein (2000). Their analysis suggests that capital misallocations are at least in part due to agency problems at the top of the organization. Inefficiencies arise if ineffective governance structures allow the CEO to misallocate corporate resources to enjoy private benefits, e.g. by over-investing in segments with pet projects, or to satisfy rent-seeking divisional managers, instead of allocating them to the best investment opportunities (Rajan, Servaes, and Zingales (2000); Scharfstein and Stein (2000); Wulf (2009)).

Hypothesis 2a: Firms with more concentrated ownership structures have more efficient internal capital markets.

Alternatively, one can also formulate the hypothesis that firms with less concentrated ownership (and hence more powerful managers) have better internal capital markets. As suggested in Stein (2003), internal capital markets are likely to add value in situations where investor protection is low due to weaknesses in governance structures.

Hypothesis 2b: Firms with more concentrated ownership structures have less efficient internal capital markets.

In the remainder of the paper, we empirically test these two pairs of hypotheses.

II. Background Information

A. Corporate Governance in Germany

Germany offers a unique environment in which to analyze issues related to internal capital markets and corporate ownership and allows conclusions to be drawn that go well beyond the German financial system. In addition to being one of the largest economies in the world, with major industrial conglomerates, the German corporate governance system provides a very rich set of different and time-varying ownership structures (see Krahnert and Schmidt (2004), Fohlin (2005), or Enriques and Volpin (2007) for a broader overview than that provided here).

Compared with the rather dispersed ownership structures prevailing in the United States and United Kingdom, German companies exhibit relatively high levels of ownership concentration, with important ownership stakes being held by other corporations, banks, insurance, families, and the government (see La Porta, López de Silanes, and Shleifer (1999), Franks and Mayer (2001), and Faccio and Lang (2002)). Most interestingly, as we will describe

later, ownership structures of German firms vary not only a great deal in the cross-section but also over time within firms. This time-series variation, which allows us to identify the effects of changes in ownership structures, is usually not observed for U.S. firms (Zhou (2001)). Furthermore, the large heterogeneity in ownership structures provides us with the opportunity to study the effects of different types of owner on the functioning of internal capital markets.

Banks and insurance companies have traditionally exercised significant control over German companies, both directly and indirectly. For instance, German banks, in addition to being large providers of corporate debt, also hold ownership stakes in a wide range of corporations. Many of these holdings date back to equity received in lieu of cash payments from financially-constrained industrial firms following World War II, but the holdings have remained relatively stable over the last decades (Edwards, Lang, Maydew, and Shackelford (2004)). Moreover, through the process of proxy voting on behalf of their retail customers, banks' actual voting power is frequently much greater than what their direct holdings would grant them (see e.g., Franks and Mayer (2001)). Next to banks and insurance firms, holdings by other corporations also play an important role in Germany and are often associated with inter-corporate equity holdings and interlocking directorships.

B. The Change in the Tax Law

Effective January 1st, 2002, Germany introduced a new corporate tax law which fully exempted capital gains on shareholdings in other German firms from corporate taxation if the shares had been held for more than one year. (Holdings in foreign firms had been exempted from tax already prior to the reform). Until then, the tax rate on corporate capital gains had been 52%, so the new law had a substantial impact on all corporate shareholders. Because wealthy German

families usually hold their ownership stakes through corporate investment vehicles (*Beteiligungsgesellschaften*), their holdings were also affected by the change.

Many commentators considered the change in law a revolutionary step towards breaking up the so-called *Deutschland AG*, or “Germany, Inc.” (e.g., Steinborn (2001), Keen (2002)). Before the tax reform, about 13% of Germany’s market capitalization was tied in a web of inter-corporate equity holdings. Because many of these holdings dated back to World War II and German equity prices have greatly increased since then, the cost of divesting those holdings prior to the tax reform would have been prohibitive for most owners.

The change in the corporate tax rate was part of a wider fundamental tax reform within the Tax Reduction Act of 2000, which also included changes in personal income taxation. (A summary of the tax system before and after the reform can be found in Edwards, Lang, Maydew, and Shackelford (2004)). The plan of the tax exemption was first announced by the German government on December 22nd, 1999 and was made effective on January 1st, 2002.

The corporate capital gains tax repeal indeed caused a significant and largely exogenous reshuffling in the ownership structures of German companies, as we will show later in this paper. The tax law change affected the trade-off between the benefits and costs of holding blocks in corporations. For a given level of benefits, the tax change increased the opportunity cost of holding a block in a firm and increased the likelihood that a blockholder relinquish control (Helwege, Pirinsky and Stulz (2007)). This opportunity cost can be particularly high if a block has been held for a long time and accordingly has a low tax base, as was often the case in Germany. These considerations would imply a reduction in ownership concentration after the tax change. However, the tax exemption also applied to newly acquired holdings, thus increasing the

incentives for new blockholdings to be formed (Enriques and Volpin (2007)). It was therefore unclear ex-ante whether the tax exemption would lead to an overall increase or decrease in ownership concentration, even though the latter is what the government presumably intended (Edwards et al. (2004)). In Italy, for example, a similar tax break was followed by an increase in corporate cross-holdings (Bianchi and Bianco (2006)). Overall, the tax change implied a “resetting” of ownership structures and the elimination of a barrier in the process towards “optimal” corporate ownership.

The large impact of a tax reform like the German one on corporate ownership structures has precedents elsewhere in the world. Notably, Morck (2005) shows that pyramidal business groups, which Berle and Means (1932) showed were prevalent in the United States prior to the 1930s, largely disappeared from the U.S. corporate landscape as a result of inter-corporate dividend taxation and other tax reforms that rendered them too costly to maintain.

III. Sample and Data

A. Sample Construction

We constructed our sample by starting with the 790 firms that were included in the German stock market index CDAX in 2000. The CDAX is comparable to the S&P 500 in the United States and covers all German firms whose shares were admitted to the Prime Standard and General Standard segments of the German Stock Exchange. From this sample we excluded all financial and real estate firms with SIC codes between 6000 and 6999. We then collected business segment data and ownership information for all remaining firms during the period 2000-2006, and dropped those firm-year observations for which ownership or segment data was

unavailable. Our final sample includes 1,169 firm-year observations from 286 different diversified firms.

Table I defines all the variables used in this paper. Table II reports descriptive statistics for the sample firms. Due to a significant amount of missing data about firms' cash and marketable securities, the liquidity variable is only available for 844 of the 1,169 firm-years, which reduces the number of observations in our multivariate regressions. We also estimate our models assuming that cash and marketable securities, when missing, is equal to zero. The results are very similar to those reported in the paper.

B. Corporate Ownership Data and Measures

Just like in the United States, companies in Germany are required to report the holdings of all shareholders who own more than 5%. We hand-collected this information from annual reports and, if available, from the U.S. Securities and Exchange Commission (SEC) 20-F Forms, which need to be filed by all German companies that are cross-listed in the United States.

Based on this information, we construct three widely used ownership measures. First, *block ownership* is the sum of the shareholdings of all owners who own more than 5% of a firm. Second, *ownership concentration* is the Herfindahl index of the individual ownership stakes. It is calculated as the sum of the squared ownership stakes of all shareholders who own more than 5% of a firm. Third, *top blockholder* represents the stake of the firm's largest shareholder (if the shareholder owns more than 5%). For comparison with other studies, e.g. La Porta, López de Silanes, and Shleifer (1999), we also report the fraction of firms that are widely held, *WH20* and *WH10*. According to this definition, a firm is widely held if there is no controlling shareholder who owns more than 20% (10%) of the shares of a firm.

Whenever there was a difference between voting rights and cash-flow rights, we used voting rights for the calculation of our ownership measures. Thus, “ownership” in this paper refers to vote ownership, not to share ownership or to voting control.¹

We also use our hand-collected ownership data to trace the exact identity of all shareholders that hold more than 5%. Based on this information, we group all shareholders into one of the following categories: bank, insurance, corporation, institutional investor, insider, government, and others (e.g. non-profit foundations). Institutional investors include pension funds, mutual funds, hedge funds or private equity firms. Insiders include executives of the firm, family members of the founders of the firm, and in a small number of cases private individuals. We cannot differentiate between executives and founding family members because often only the sum of the two was reported (especially in small firms).

Table III presents summary statistics for the ownership variables. According to all measures, ownership is relatively concentrated. The mean (median) *block ownership*, for example, is 40.5% (43.1%) per firm-year, and only 21% (37%) of the firms can be considered widely-held according to the *WH10* (*WH20*) measure. Figure 2 shows the distribution of *block ownership*. A separation of *block ownership* into different owner types reveals that German firms are owned mainly by insiders (mean ownership of 22.5%), other corporations (9.9%), and institutional investors (4.8%). However, financial institutions also have significant stakes in

¹ As Villalonga and Amit (2009) note, voting control—the fraction of votes controlled by a given shareholder—can exceed vote ownership due to pyramids or voting agreements, both of which exist in Germany. In addition, voting control in Germany can exceed vote ownership through two other mechanisms: proxy voting by banks on behalf of their clients, and veto rights associated to “blocking minority” (25%) stakes (Franks and Mayer (2001)). Because information about voting agreements and proxy voting rights is not always available, we choose to focus on vote ownership instead of voting control to ensure that our corporate governance measures are accurate and consistent across all the different owner types in our sample.

some German corporations, with the top 5% of firm-years showing a bank (insurance) ownership percentage above 8.4% (8.0%).

Table IV contains information on the evolution of the different ownership measures around the capital gains tax reform, which became effective in 2002. Panel A documents that the reform lead to an overall decrease in ownership, with median *block ownership* declining from 47.9% in 2001 to 41.5% in 2006.² However, it is important to note that the changes in ownership were far from uniform and implied a significant reshuffling in owner types. Panel B shows that while some owner types decreased their holdings, others increased them. The increases in ownership are mainly due to increased holdings by institutional investors and corporations. Institutional investors increased their average stockholdings by 27% (from 4.1% in 2001 to 5.2% in 2006), and corporations by 11% (from 10.1% in 2001 to 11.2% in 2006). Most strikingly, banks cut their holdings in half (from 1.6% to 1%) and insurance firms reduced them to a third of what they had (from 1.5% to 0.44%). These substantial reductions in bank and insurance ownership mainly took place immediately after the 2002 tax reform, which is consistent with the evidence in Dittmann, Maug, and Schneider (2010). Overall, the divergence in the evolution of equity holdings across owner types after the tax reform is consistent with Enriques and Volpin's prediction (2007) that the tax change in Germany would not necessarily lead to an overall reduction in ownership.

C. Segment Data in Germany

² Some ownership changes took already place before the tax reform, i.e. in the years 2000 and 2001. Our results in the subsequent analysis do not change if we exclude the 2000-2001 period from our analysis. Our regression results also do not change if we exclude the year 2006 from the analysis (the last year in our sample, which exhibits a slight reversal in the ownership variables trend).

Since 1998, German firms are required to disclose accounting information at the segment level, which allows researchers to construct measures of diversification and internal capital market efficiency (see Beer, Deffner, and Fink (2007) and Langguth and Brunschön (2006)). Because large German corporations typically report according to the international accounting standards IFRS and U.S. GAAP (around 99% of all large corporations), our sample firms mostly follow the segment reporting rules of IAS 14 and SFAS 131. The remaining firms use the German Accounting Standard, whose segment reporting rules are qualitatively similar to the international ones. There is no appreciable difference between the two standards in the quality of the data reported.

Overall, segment disclosure rules in Germany are hence qualitatively identical to the requirements for U.S. firms. Firms have to report the number of segments they have and, for each segment, a business description as well as its total sales, operating income, total assets, capital expenditures, and depreciation. Segment data have to be reported for all segments whose sales or assets represent more than 10% of the firm's total sales or assets.

Like any study that uses business segment data, we have to deal with some potential weaknesses of these data (see, e.g., Villalonga (2004b)). First, we observe, as do Beer, Deffner, and Fink (2007), that the quality of segment reporting in Germany increases with firm size. Some small firms, for example, do not fully report all mandatory segment variables. Since our internal capital market efficiency measure requires the availability of a wide range of variables, large firms are therefore somewhat overrepresented in our analysis. Second, a close inspection of our segment data and company annual reports shows some segment reorganizations and name changes that took place during our sample period. Thus, it is difficult to track a specific segment

over time. Following Rajan, Servaes, and Zingales (2000), we address this problem by ensuring that no data item is calculated using data that are spread over multiple years. Third, there have been some changes in accounting and segment reporting regimes over our sample period. To account for those, we added year fixed effects to our regressions. We also analyze the annual reports of our sample firms to verify whether changes in accounting rules led to reorganizations of the segments being disclosed. However, this turned out never to be the case.

D. Measures of Diversification and Internal Capital Market Efficiency

We start our analysis by looking at a measure of diversification that proxies for the complexity and scope of a firm's internal capital market: the number of operating segments. By using this measure, we follow Lang and Stulz (1994), Berger and Ofek (1995), and others, and assume that firms with more segments are more diversified and usually operate larger and more complex internal capital markets. Table V shows that the median firm reports three business segments, of which two are true operating segments (as opposed to holding entities or accounting segments constructed, for instance, to reflect consolidation adjustments). Because corporate diversification is reduced if a firm operates different segments in similar industries, we also calculate the number of a firm's segments which operate in different 2-digit SIC code industries. The median firm in our sample has two unrelated segments.

Our measure of internal capital market efficiency follows Rajan, Servaes, and Zingales (2000), which we refer to as RSZ hereafter. As a first step, we calculate for each segment whether it is a net provider or a net receiver of funds. Cross-subsidies (across a firm's segments) are calculated as the difference between a segment's investment rate and the average investment rate of single-segment firms in the same industry (i.e., we compute the industry-adjusted

investment rate of a segment). We then follow RSZ and further adjust this investment rate by subtracting the industry-adjusted investment rate averaged across the firm's segments, to account for the fact that diversified firms might have more overall funds available than single-segment firms. Finally, we establish that a segment receives a subsidy (makes a transfer) if this adjusted investment rate is larger (smaller) than zero, and measure the size of a firm's internal reallocations as the sum of the absolute values of the subsidies and transfers across all segments.

As a second step, to assess the efficiency of internal reallocations, we multiply the measure of a segment's subsidy or transfer by the difference between the segment's ROA and the average ROA of the remaining segments in the firm. We then add the weighted subsidies and transfers across all segments of a firm in a given year and standardize the sum by total firm assets.

Finally, we define a dummy variable which measures the overall internal capital market efficiency (*ICM Efficiency*) and which takes the value zero if the continuous measure is negative (i.e., if the internal capital market is inefficient) and the value one if the continuous measure is greater than or equal to zero (i.e., if the internal capital market is efficient or at least neutral). A more detailed description of the *ICM Efficiency* variable construction is provided in the Appendix. Descriptive statistics are provided in Table V. The table shows that in 87% of firm-years, the internal resource allocation is average considered efficient according to our measure.

IV. Empirical Results

A. Univariate Analyses

In this section, we analyze the univariate relations between corporate ownership and internal capital markets. Table V reports means and medians for the diversification and ICM

efficiency measures for firms with high and low block ownership, where block ownership is considered high (low) if it is above (below) the median value in the sample (which is 43.1%).

Consistent with Hypothesis 1b, we find that firms with higher block ownership are less diversified, i.e. have fewer segments. This result is in line with the notion that ownership concentration prevents CEOs from engaging in value-destroying diversification to satisfy their private objectives (Scenario 3 in Figure 1). However, it is also consistent with the notion that large shareholders fail to engage in value-creating diversification (Scenario 2). If, as the results of Lins and Servaes (1999) suggest, diversification in Germany on average has no significant impact on value, the implication is that the benefits and costs of ownership concentration offset each other in the aggregate.

We also find some preliminary support for Hypothesis 2a in that efficient internal capital markets are more frequent among firms with high block ownership. Specifically, 93% of the firm-years with high block ownership operate an internal capital market that can be categorized as efficient based on the RSZ measure; this compares to only 81% if block ownership is low. These univariate results are in line with models such as Scharfstein and Stein's (2000), which suggests that capital misallocations are in part due to agency problems at the headquarters level.

B. Multivariate Analysis of Ownership Structure and Diversification

We proceed to test our first pair of hypotheses (1a and 1b) using multivariate analysis, by regressing the number of operating segments on our ownership measures and a set of control variables which include firm size, leverage, liquidity, and profitability. Because our measures of diversification are counts of a firm's number of segments, we use Poisson regressions to estimate our models. To control for any year-specific effects (e.g., to account for changes in accounting

rules or segment reporting), we estimate our regressions with year fixed effects. We also include industry fixed effects to control for industry-specific factors. The standard errors are corrected for heteroskedasticity and clustered at the firm level to adjust for intra-firm autocorrelation. In the regressions shown in Table VI, we do not use firm fixed effects because our dependent variables and several of the independent variables often do not vary over time. However, we later re-estimate the models using first differences.

Our multivariate estimates in Table VI confirm the previous univariate results. More specifically, they indicate that firms with more concentrated ownership (by any of our measures) have less segments, as predicted by Hypothesis 1b. Firms with more segments also seem to be larger and more leveraged, and to have higher cash holdings. For robustness, we also use, as alternative dependent variables, our other diversification measures: the number of unrelated segments (in column (4)), and the number of reported segments (in column (5)). The results are very similar to those based on the number of operating segments. Our results are also robust to using lagged ownership values.

C. Multivariate Analysis of Ownership Structure and Internal Capital Markets Efficiency

We also use multivariate regressions to test our second pair of hypotheses (2a and 2b), which relate to the link between ownership structure and internal capital market efficiency. Since our measure of ICM efficiency is a dummy variable, we estimate logit regressions of the probability that a firm runs an efficient internal capital market. The independent variables are the same as before, i.e., our different ownership measures and the same set of controls used in the Poisson regressions of Table VI.

Table VII shows that ownership concentration, regardless of how we measure it, appears to positively affect the efficiency of a firm's internal capital market. The estimates in column (8) show that our results are robust to controlling for the number of operating segments in a firm and that firms with less segments generally have more efficient internal capital markets.

Overall, the results are consistent with Hypothesis 2a. If ownership is concentrated in the hands of large blockholders, multisegment firms seem to be more likely to prioritize segments that show promising investment opportunities and reallocate corporate resources accordingly. Hence, large owners seem to play an important monitoring role in preventing CEOs from misallocating corporate resources to enjoy private benefits, as suggested by the theoretical models of Scharfstein and Stein (2000), Rajan, Servaes, and Zingales (2000), and Wulf (2009). Our results are in line with previous studies suggesting that large shareholders have stronger incentives to monitor and are more active in governance (e.g. Shleifer and Vishny (1986), and Franks and Mayer (2001) for Germany). They also confirm the evidence in Lins and Servaes (1999) that, in Germany, the diversification discount is smaller for firms with high insider ownership.

In Table VIII, we further trace the mechanism behind the efficiency-increasing effect of large blockholders. We decompose *block ownership* into its constituent owner types to investigate whether certain types of owners are particularly effective in increasing the efficiency of capital allocations. Most interestingly, we find some evidence that an increase in ownership by other corporations, government, and/or by insiders appears to positively affect the allocative efficiency of multisegment firms. Our results are again robust to using lagged values.

Given that the tax reform led to decreases in bank and insider ownership yet corporate ownership increased, the implication is that the tax reform's indirect impact on the efficiency of internal capital markets was mixed. The broader implication is that governments should exercise caution when implementing reforms that seek convergence in international governance structures. Our results suggest that, at least with regard to the internal allocation of resources, German corporations and their minority shareholders have benefited from the demise of the banks' corporate control and the improved incentives for industrial corporations to invest in one another. Yet the decrease in insider (including founding family) ownership has had a negative impact.

D. Robustness Checks

Table IX reports results from several robustness checks. First, to ensure that our results are not driven by the variation in ownership before the 2002 tax change, we re-estimate the regressions from Tables VI through VIII including only observations from the sub-period 2002–2006. Columns (1) and (2) of Table IX show the results of re-estimating the main models of Tables VI and VII, respectively. Columns (3) and (4) show the results of re-estimating the models of Table VIII (where block ownership is broken down by owner type). All four columns indicate that the results of Tables VI through VIII are robust to the exclusion of the years prior to the tax reform.

As a second set of robustness checks, we recompute the ICM efficiency measure with imputed segment Tobin's Q instead of Return on Assets. The fifth and sixth columns in Table IX show that this alternative measure yields very similar results to the previous one.

E. Changes in Ownership and Firm Characteristics: Selection versus Influence

In order to identify a largely causal effect of the changes in ownership on internal capital markets, we need to mitigate concerns that the ownership changes were mainly due to expected future changes in the internal organization (i.e., diversification and efficiency of the internal capital markets) and not to the tax change.

It is worth noting that, while selection arguments are a severe concern in studies relating corporate governance to firm performance (Demsetz and Lehn (1985); Demsetz and Villalonga (2001); Giannetti and Laeven (2009)), they are of much less concern when relating governance to firms' internal capital markets, as we do in this study. Even though investors might increase ownership in anticipation of a higher firm value, they are unlikely to adjust their holdings in anticipation of changes in the internal capital market. In line with this argument, Stein (2003) writes that it is hard to see why (management) ownership should be spuriously correlated with measures of internal capital allocation.

Nevertheless, we take the view that some investors might believe that changes in the internal capital markets will necessarily lead to changes in firm performance and will therefore adjust their holdings in anticipation of such changes. We address this potential concern in two different ways. First, we test whether blockholders seemed to expect a particularly low future performance in firms where substantial ownership reductions were observed. To that end, we compare firms that experienced large reductions in ownership with firms that only saw small reductions. We follow Helwege, Pirinsky, and Stulz (2007) in defining a decrease in block ownership as large if the reduction in block ownership at a given firm and in a given year was at least 5%. Table X compares firm characteristics between the two groups of firms. Most

importantly, the table shows that both profitability (EBIT/Total Assets), which is a measure of current or past performance, and Tobin's Q, which is a measure of expected future performance, do not significantly differ between firms experiencing large and small declines in ownership. Furthermore, the reduction in ownership does not seem to be related to other observable firm characteristics either, namely market capitalization, leverage, or liquidity (cash holdings).

The second way in which we seek to mitigate possible selection concerns is by running our regressions in first differences, i.e., by regressing one-year changes in diversification and internal capital market efficiency on one-year changes in ownership structure. We specifically focus on changes in *block ownership*, i.e. the change in the sum of the shareholdings of all owners who own more than 5% of a firm's equity.

The results are reported in Table XI. In columns 1 and 3, the change in block ownership is calculated in relative terms (*block ownership* in year t minus *block ownership* in year $t - 1$, divided by *block ownership* in year $t - 1$) while in columns 2 and 4 the change is calculated in absolute terms (*block ownership* in year t minus *block ownership* in year $t - 1$). Consistent with our previous findings, the first-differences regressions show that an increase in block ownership is associated with a decrease in diversification and with an increase in the efficiency of internal capital allocation. The ICM efficiency results are robust to controlling for changes in firms' number of operating segments.

V. Conclusion

This paper shows that corporate governance has a significant impact on internal capital markets. Specifically, ownership concentration reduces the extent of corporate diversification, but increases the probability that internal capital markets are efficient.

Our paper contributes to the literature in several ways. First, despite a rich theoretical literature about the relation between corporate governance and internal capital markets, our study is one of the first to empirically test this relation and, to the best of our knowledge, the first one to control for the endogeneity of corporate governance, which we do by taking advantage of a natural experiment facilitated by a change in German tax law. By doing so, we are able to test theories of internal capital markets and provide evidence of a causal link between ownership structure and corporate diversification as well as internal capital market efficiency.

Second, our paper contributes to the corporate governance literature by providing new evidence about the benefits and costs of ownership concentration. Specifically, our findings suggest that the agency benefits of ownership concentration outweigh its agency costs, since large shareholders successfully prevent self-interested managers from engaging in value-destroying diversification and ensure that internal resource allocation is based on the attractiveness of investment opportunities and not on agency motives or informational distortions.

Third, because we use the recent tax reform in Germany as a natural experiment for our study, we are also able to evaluate the impact of the reform on the welfare of minority investors, which the reform sought to protect. In this sense, our findings suggest that the reform may have been partially counterproductive. The broader policy implication is that caution should be exercised when implementing tax or other legal reforms that seek convergence in international corporate governance systems, since there is no “one size fits all” solution to governance problems.

Appendix: Measurement of Internal Capital Market Efficiency

To construct a measure of the efficiency of a firm's internal capital market, we use the method from Rajan, Servaes, and Zingales (2000) or RSZ. We first look at the difference between the investment rate of a segment that is part of a diversified or multi-segment firm and the investment it would make had it been a stand-alone or single segment (*ss*) firm in the same industry. Namely, we calculate: $I_j / TA_j - I_{ss} / TA_{ss}$, where I_{ss} / TA_{ss} is the average investment rate of single-segment same-industry firms. For this analysis, we include all operating segments of diversified firms.

We also follow RSZ in adjusting this investment rate for the possibility that diversified firms might have more funds available than stand-alone firms. If we measure transfers and subsidies by the difference between the investment rate of a segment and that of a single-segment firm in the same industry, we might otherwise treat these additional funds as resources exchanged rather than as additional funds to all segments. We therefore calculate the following adjusted investment rate:

$$I_j / TA_j - I_{ss} / TA_{ss} - \sum_j w_j (I_j / TA_j - I_{ss} / TA_{ss}),$$

where I is the investment of segment j , ss means single segment firm, and w is segment j 's share of total firm assets (TA). We then stipulate that a segment receives a subsidy or makes a transfer if the following conditions hold:

$$Subsidy_j = I_j / TA_j - I_{ss} / TA_{ss} - \sum_j w_j (I_j / TA_j - I_{ss} / TA_{ss}) \text{ if Value} > 0$$

$$Transfer_j = I_j / TA_j - I_{ss} / TA_{ss} - \sum_j w_j (I_j / TA_j - I_{ss} / TA_{ss}) \text{ if Value} < 0$$

The size of the internal resource reallocations of firm i at time t is then the sum of the *absolute* values of transfers and subsidies across all segments of firm i in year t , i.e.,

$$\sum Subsidy_j + \sum |Transfer_j|$$

We weight the measure of a subsidy to or transfer from a segment by the difference between the segment's Return on Assets (ROA), ROA_j and the average ROA of all remaining segments in the firm, \overline{ROA}_{-j} . We only include non-financial segments, since a comparison between financial and non-financial segments using ROA would be misleading. Finally, we add the weighted subsidies and transfers across all segments of firm i in year t and standardize it by total assets:

$$\frac{\sum_j TA_j (ROA_j - \overline{ROA}_{-j}) (I_j / TA_j - I_{ss} / TA_{ss}) - \sum_j w_j (I_j / TA_j - I_{ss} / TA_{ss})}{TA_i}$$

We then define a dummy variable which measures whether the internal capital market is efficient or not (*ICM Efficiency*). The dummy variable takes a value of zero if the continuous measure is negative (i.e., if the internal capital market is inefficient), and a value of one if the continuous measure is positive (i.e., if the internal capital market is efficient) or zero (i.e., if the internal capital market is neutral).³ For robustness, we also use imputed segment Tobin's Q instead of ROA for the construction of the ICM efficiency measure and find similar results (see Table IX).

³ The formula underlying the efficiency measure can also be zero if a firm has a non-operating segment and two operating segments whereby one of these two segments is a financial operating segment. The measure of the efficiency of the internal capital market measures is zero in that case (as the efficiency measure is based only on operating non-financial segments).

Whenever our segment-level variables are based on a comparison with single-segment firms operating in the same industry (e.g., imputed Q, or an industry investment rate), we construct them by matching the segment to all CDAX firms whose primary SIC code is in the same two-digit SIC group. However, our results do not change if we do the matching at the three-digit SIC code level instead. Finally, all variables in the formulas above are equal-weighted. In robustness checks, we use also use asset weights and obtain similar results.

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		Ownership Concentration	
		Good	Bad
Diversification	Good	Scenario 1 (+)	Scenario 2 (-)
	Bad	Scenario 3 (-)	Scenario 4 (+)

Figure 1. Assumptions underlying the hypothesized relation between ownership concentration and corporate diversification

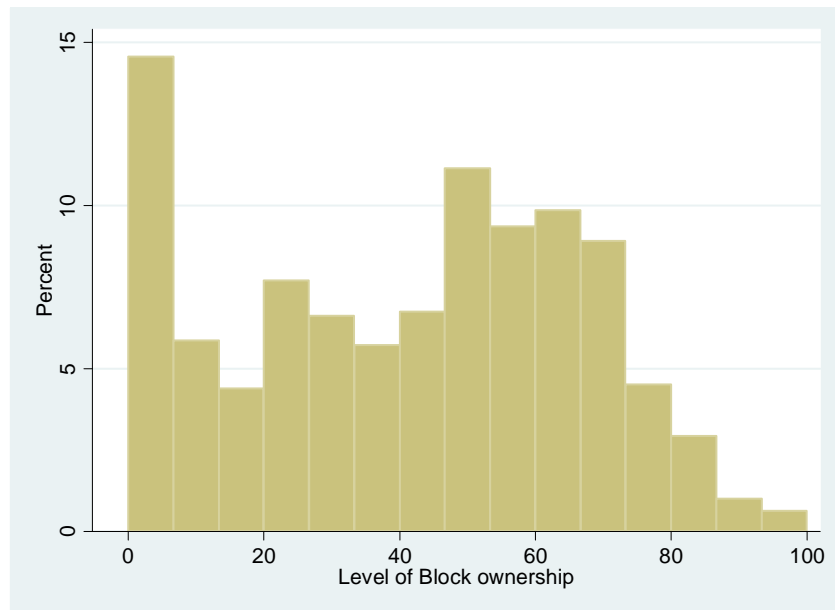


Figure 2. Distribution of Block Ownership. Distribution of *Block ownership* in our sample. *Block ownership* is the sum of the shareholdings of all owners that own more than 5% of a firm. The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample.

Table I
Variable Definitions

Variable	Definition	Source
<i>Firm Data</i>		
Market capitalization	Market value of the firm's equity (Worldscope code WC08001).	Worldscope
Firm size	Book value of total assets (WC02999).	Worldscope
Leverage	Total debt (WC 03255) divided by total assets.	Worldscope
Liquidity	Value of cash and marketable securities (WC02001) divided by total assets.	Worldscope
Profitability	Earnings before interest and taxes (EBIT) (WC18191) divided by total assets.	Worldscope
Tobin's Q	Market value of assets divided by book value of assets. mMarket value of assets equals book value of assets plus market value of equity less book value of equity.	Worldscope
<i>Ownership Data</i>		
Block ownership	Sum of the shareholdings of all owners who own more than 5% of a firm.	Hand-collected from Annual Reports/20-F
Ownership concentration	Herfindahl index of ownership concentration, calculated as the sum of the squared ownership stakes of all shareholders who own more than 5% of a firm	Hand-collected from Annual Reports/20-F
Top blockholder	Size of the stake of the firm's largest shareholder (if the shareholder owns more than 5%).	Hand-collected from Annual Reports/20-F
WH10	Fraction of firms that are widely held. A firm is widely held if there is no controlling shareholder who owns more than 10% of the shares of a firm.	Hand-collected from Annual Reports/20-F
WH20	Fraction of firms that are widely held. A firm is widely held if there is no controlling shareholder who owns more than 20% of the shares of a firm.	Hand-collected from Annual Reports/20-F
<i>Internal Capital Market Data</i>		
# Reported segments	Number of segments of a firm.	Worldscope
# Unrelated segments	Number of segments in different 2-digit SIC code industries.	Worldscope
# Operating segments	Number of segments that are not consolidation or holding segments.	Worldscope
ICM Efficiency	Dummy variable which measures the internal capital market efficiency of a firm and takes the value 0 if a firm's internal capital market is considered inefficient according to the measure by Rajan, Servaes and Zingales (2000), and the value one if the internal capital market is considered efficient or neutral. See the Appendix for details.	Worldscope

Table II
Descriptive Statistics

Summary statistics for the financial characteristics of the firms in our sample. *Market capitalization* is the market value of equity of a firm (Worldscope code WC08001). *Firm size* is the book value of total assets (WC02999). *Leverage* is total debt (WC 03255) divided by total assets. This variable is winsorized at 1% and 99%. *Liquidity* is the value of cash and marketable securities (WC02001) divided by total assets (also winsorized at 1% and 99%). *Profitability* is earnings before interest and taxes (EBIT) (WC18191) divided by total assets (winsorized at 1% and 99%). *Tobin's Q* is the market value of assets divided by the book value of assets. The market value of assets equals the book value of assets plus the market value of equity less the book value of equity. The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample.

Variable	Mean	Median	STD	Percentiles		Obs.
				5%	95%	
Market cap. (€ million)	2,530	103	8,394	7	16,000	1166
Firm size (€million)	6,715	136	25,500	14	35,600	1169
Leverage	0.55	0.58	0.24	0.14	0.91	1149
Liquidity	0.14	0.08	0.18	0.01	0.45	844
Profitability	0.03	0.06	0.19	-0.28	0.25	1112
Tobin's Q	1.55	1.20	1.33	0.70	3.51	1146

Table III
Ownership Characteristics: Descriptive Statistics

Summary statistics of ownership variables of the firms in our sample. *Block ownership* is the sum of the shareholdings of all owners who own more than 5% of a firm. *Ownership concentration* is the Herfindahl index of ownership concentration, calculated as the sum of the squared ownership stakes of all shareholders who own more than 5% of a firm. *Top blockholder* represents the stake of the firm's largest shareholder (if the shareholder owns more than 5%). WH20 (WH10) represents the fraction of firms that are widely held. A firm is widely held if there is no controlling shareholder who owns more than 20% (10%) of the shares of a firm. The table also contains ownership information on the different types of blockholders of a firm. The underlying ownership measure is *block ownership*. Our data is hand-collected from annual reports and forms 20-F. The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample.

Variable	Mean	Median	STD	Percentiles	
				5%	95%
<i>Ownership Variables</i>					
Block ownership	40.45	43.10	25.88	0.00	78.60
Ownership concentration	0.16	0.10	0.17	0.00	0.52
Top blockholder	30.80	26.08	22.79	0.00	72.30
WH20	0.37	0.00	0.48	0.00	1.00
WH10	0.21	0.00	0.41	0.00	1.00
<i>Block Ownership by Owner Types</i>					
Bank	1.26	0.00	6.00	0.00	8.45
Insurance	0.88	0.00	3.78	0.00	8.02
Institutional Investor	4.81	0.00	13.58	0.00	32.00
Corporation	9.91	0.00	19.58	0.00	60.50
Government	0.96	0.00	5.75	0.00	0.00
Insider	22.51	13.00	24.66	0.00	70.00
Others	0.05	0.00	0.65	0.00	0.00

Table IV
Evolution of Ownership Structures over Time

Evolution of different corporate ownership measures in Germany during the period 2000–2006. *Block ownership* is the sum of the shareholdings of all owners who own more than 5% of a firm. *Ownership concentration* is the Herfindahl index of ownership concentration, calculated as the sum of the squared ownership stakes of all shareholders who own more than 5% of a firm. *Top blockholder* represents the stake of the firm's largest shareholder (if the shareholder owns more than 5%). *WH20* and *WH10* represent the fraction of firms that are widely held. A firm is widely held if there is no controlling shareholder who owns more than 20%/10% of the shares of a firm. The data is hand-collected from annual reports and forms 20-F. The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample.

<i>Panel A: Ownership Measures over Time</i>											
Years	Block Ownership		Ownership Concentration		Top Blockholder		WH20		WH10		
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	
2000	42.86	50.02	0.1737	0.1447	33.32	33.96	0.31	0.00	0.19	0.00	
2001	41.86	47.90	0.1627	0.1119	31.82	29.60	0.32	0.00	0.19	0.00	
2002	42.02	47.28	0.1563	0.1119	30.34	27.00	0.37	0.00	0.22	0.00	
2003	42.26	46.53	0.1659	0.1093	31.41	27.00	0.35	0.00	0.22	0.00	
2004	40.77	42.70	0.1630	0.1037	30.63	26.50	0.38	0.00	0.23	0.00	
2005	38.51	38.64	0.1519	0.0855	29.26	25.20	0.42	0.00	0.26	0.00	
2006	39.25	41.46	0.1643	0.0903	31.00	25.95	0.39	0.00	0.21	0.00	
<i>Change</i>											
(00-06)	-8%	-17%	-5%	-38%	-7%	-24%	26%	0%	11%	0%	
(01-06)	-6%	-13%	1%	-19%	-3%	-12%	22%	0%	11%	0%	

<i>Panel B: Different Owner Types over Time</i>												
Years	Bank		Insurance		Institutional Investor		Corporation		Government		Insiders	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
2000	2.23	0.00	1.25	0.00	3.25	0.00	8.59	0.00	1.14	0.00	25.01	19.00
2001	1.57	0.00	1.52	0.00	4.12	0.00	10.06	0.00	1.14	0.00	23.34	17.70
2002	1.91	0.00	1.74	0.00	4.83	0.00	8.40	0.00	1.28	0.00	24.04	18.72
2003	1.41	0.00	0.79	0.00	5.18	0.00	9.26	0.00	1.09	0.00	24.79	20.00
2004	0.80	0.00	0.69	0.00	5.49	0.00	10.47	0.00	0.97	0.00	21.61	10.65
2005	0.72	0.00	0.48	0.00	5.08	0.00	10.61	0.00	0.77	0.00	19.66	6.95
2006	1.03	0.00	0.44	0.00	5.24	0.00	11.17	0.00	0.68	0.00	20.00	7.35
<i>Change</i>												
(00-06)	-54%	0%	-65%	0%	61%	0%	30%	0%	-40%	0%	-20%	-61%
(01-06)	-34%	0%	-71%	0%	27%	0%	11%	0%	-40%	0%	-14%	-58%

Table V
Ownership Structures, Diversification and Efficiency of Internal Capital Markets:
Univariate Results

This table contains information on the diversification and efficiency of the internal capital market of firms with high and low block ownership. *Block ownership* is the sum of the shareholdings of all owners that own more than 5% of a firm and is considered high (low) if it is above (below) the median value in the sample. The data sources include annual reports and forms 20-F (for the ownership measures) and Worldscope (for the diversification and ICM efficiency measures). The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample.

	All Firms		Firms with Low Block Ownership		Firms with High Block Ownership		<i>p</i> -value from <i>t</i> -test of difference in means	<i>p</i> -value from non-parametric Wilcoxon test of difference in medians
	Mean	Median	Mean	Median	Mean	Median		
# Operating segments	3.05	3.00	2.03	2.00	1.62	1.00	0.0000	0.0000
# Unrelated segments	2.14	2.00	2.35	2.00	1.92	2.00	0.0000	0.0000
# Reported segments	1.83	2.00	3.30	3.00	2.80	3.00	0.0000	0.0000
ICM Efficiency	0.87	1.00	0.81	1.00	0.93	1.00	0.0000	0.0000

Table VI
Ownership Structure and Corporate Diversification

Poisson regressions (count data model) in which the dependent variable is the number of segments of a firm, which is used as a measure of corporate diversification. In columns (1) through (3) we use # *Operating segments*, i.e. the number of segments that are not consolidation or holding segments. In column (5), we use # *Unrelated segments*, defined as the number of segments in different 2-digit SIC code industries. Column (6) uses # *Reported segments*, defined as the number of segments of a firm that are reported in Worldscope. *Block ownership* is the sum of the shareholdings of all owners who own more than 5% of a firm. *Ownership concentration* is the Herfindahl index of ownership concentration, calculated as the sum of the squared ownership stakes of all shareholders who own more than 5% of a firm. *Top blockholder* represents the stake of the firm's largest shareholder (if the shareholder owns more than 5%). *Firm size* is the book value of total assets. *Leverage* is total debt divided by total assets. *Liquidity* is the value of cash and marketable securities divided by total assets. *Profitability* is earnings before interest and taxes divided by total assets. All regressions include industry and year fixed effects. Heteroskedasticity-robust *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level to account for within-firm correlation. The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	# Operating Segments			# Unrelated Segments (4)	# Reported Segments (5)
	(1)	(2)	(3)		
Block ownership	-0.003** (-2.49)			-0.003** (-2.32)	-0.002* (-1.65)
Top blockholder		-0.003** (-2.49)			
Ownership concentration			-0.554*** (-3.14)		
Firm Size	0.076*** (2.94)	0.077*** (2.99)	0.076*** (2.93)	0.075*** (3.07)	0.094*** (4.37)
Leverage	0.316* (1.95)	0.309* (1.94)	0.319** (2.01)	0.360** (2.28)	0.482*** (2.91)
Liquidity	0.219 (1.63)	0.238* (1.76)	0.247* (1.85)	0.110 (0.76)	0.093 (0.56)
Profitability	-0.045 (-0.34)	-0.025 (-0.18)	-0.012 (-0.09)	0.082 (0.57)	0.011 (0.06)
Observations	824	824	824	750	787
Pseudo <i>R</i> -squared	0.066	0.066	0.067	0.064	0.068

Table VII
Ownership Structure and Internal Capital Market Efficiency

Logit regressions in which the dependent variable is *ICM Efficiency*, which is a dummy variable that measures the internal capital market efficiency of a firm and takes the value 0 if a firm's internal capital market is considered inefficient according to the measure by Rajan, Servaes and Zingales (2000), and the value one if the internal capital market is considered efficient or neutral. See Appendix III for details. *Block ownership* is the sum of the shareholdings of all owners that own more than 5% of a firm. *Ownership concentration* is the Herfindahl index of ownership concentration, calculated as the sum of the squared ownership stakes of all shareholders who own more than 5% of a firm. *Top blockholder* represents the stake of the firm's largest shareholder (if the shareholder owns more than 5%). All regressions include industry and year fixed effects. Heteroskedasticity-robust *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level to account for within-firm correlation. Constants were included in the regressions but are not reported. The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Block ownership	0.017*** (3.68)				0.016*** (3.30)			0.012*** (2.59)
Top blockholder		0.019*** (3.30)				0.017*** (2.77)		
Ownership concentration			2.895*** (3.05)				2.924*** (2.95)	
Firm Size				-0.177** (-2.41)	-0.123* (-1.71)	-0.138* (-1.87)	-0.131* (-1.80)	0.015 (0.18)
Leverage				-0.178 (-0.27)	-0.418 (-0.61)	-0.342 (-0.51)	-0.380 (-0.56)	0.068 (0.10)
Liquidity				1.319 (1.41)	1.309 (1.33)	1.236 (1.27)	1.212 (1.25)	2.303* (1.84)
Profitability				0.495 (0.51)	0.231 (0.23)	0.185 (0.18)	0.128 (0.12)	0.275 (0.24)
# Operating segments								-0.683*** (-3.81)
Observations	1132	1132	1132	816	816	816	816	816
Pseudo <i>R</i> -squared	0.109	0.105	0.106	0.095	0.118	0.113	0.118	0.186

Table VIII
Efficiency of the Internal Capital Market and Different Types of Owner

Logit regressions in which the dependent variable is *ICM Efficiency*, a dummy variable that measures the internal capital market efficiency of a firm and takes the value 0 if a firm's internal capital market is considered inefficient according to the measure by Rajan, Servaes and Zingales (2000), and the value one if the internal capital market is considered efficient or neutral. See Appendix for details. The different regressions include the block ownership of different owner types. The efficiency measures are calculated based on all operating non-financial segments of the firms in the sample. All regressions include industry and year fixed effects. Heteroskedasticity-robust *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level to account for within-firm correlation. Constants were included in the regressions but are not reported. The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank	0.024 (0.92)						0.026 (1.09)	0.021 (0.76)
Corporation		0.012 (1.57)					0.020** (2.33)	0.013* (1.85)
Insider			0.012** (2.00)				0.017*** (2.74)	0.015** (2.39)
Institutional				-0.007 (-0.89)			0.002 (0.20)	-0.002 (-0.24)
Government					0.033* (1.84)		0.037** (1.96)	0.025 (1.18)
Insurance						-0.008 (-0.47)	0.005 (0.31)	0.014 (0.61)
Firm size	-0.180** (-2.45)	-0.164** (-2.23)	-0.143* (-1.88)	-0.186** (-2.48)	-0.222*** (-3.01)	-0.172** (-2.28)	-0.161** (-2.02)	-0.018 (-0.18)
Leverage	-0.226 (-0.35)	-0.269 (-0.40)	-0.068 (-0.11)	-0.108 (-0.16)	-0.270 (-0.41)	-0.183 (-0.28)	-0.343 (-0.51)	0.229 (0.34)
Liquidity	1.329 (1.43)	1.462 (1.50)	1.125 (1.22)	1.294 (1.39)	1.307 (1.37)	1.306 (1.40)	1.266 (1.28)	2.206* (1.80)
Profitability	0.524 (0.54)	0.495 (0.50)	0.152 (0.16)	0.429 (0.45)	0.637 (0.68)	0.498 (0.51)	0.165 (0.17)	0.123 (0.11)
# Operating segments								-0.682*** (-3.60)
Observations	816	816	816	816	816	816	816	816
Pseudo <i>R</i> -squared	0.097	0.102	0.104	0.097	0.102	0.096	0.127	0.192

Table IX
Robustness Checks

This table provides robustness checks of the regressions shown in Tables VI and VIII. In the Poisson regressions in column (1) and (2), the dependent variable is the number of operating segments of a firm which is used as a measure of corporate diversification. In the logit regressions in column (3) to (6), the dependent variable is *ICM Efficiency* which is a dummy variable that measures the internal capital market efficiency of a firm and takes the value 0 if a firm's internal capital market is considered inefficient according to the measure by Rajan, Servaes and Zingales (2000), and the value one if the internal capital market is considered efficient or neutral. The analysis in Column (1) complements Table VI and provides results for different owner types. Column (2) complements Table VII and provides results for the period 2002-2006 only. Columns (3) and (4) complement Tables VI and VIII and provide results for the period 2002-2006 only. Columns (5) and (6) complement Tables VII and VIII. In these columns, *ICM Efficiency* is calculated not using ROA but rather imputed Tobin's Q as a measure of segment profitability (see Appendix). All regressions include industry and year fixed effects. Heteroskedasticity-robust *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level to account for within-firm correlation. Constants were included in the regressions but are not reported. The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Sample period: 2002-2006				ICM Measure using Tobin's Q instead of ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
	# Operating segments	ICM Efficiency	# Operating segments	ICM Efficiency	Pooled Block Owners	Owner Types
Block ownership	-0.003** (-2.36)	0.015*** (2.88)			0.011** (2.13)	
Bank			0.003 (0.46)	0.029 (1.19)		-0.050** (-2.21)
Corporation			-0.004** (-2.23)	0.020** (2.38)		0.025*** (2.84)
Insider			-0.002* (-1.65)	0.016** (2.33)		0.013** (1.97)
Institutional			-0.002 (-1.38)	0.001 (0.15)		-0.009 (-0.93)
Government			-0.007 (-1.29)	0.039 (1.50)		0.064** (2.47)
Insurance			0.004 (0.65)	-0.017 (-0.83)		-0.044* (-1.94)
Firm Size	0.066** (2.38)	-0.130 (-1.57)	0.067** (2.13)	-0.160* (-1.81)	-0.216** (-2.40)	-0.258*** (-2.64)
Leverage	0.365** (2.16)	-0.379 (-0.51)	0.375** (2.28)	-0.357 (-0.48)	-0.350 (-0.38)	-0.186 (-0.19)
Liquidity	0.476** (2.21)	0.943 (0.75)	0.472** (2.30)	0.881 (0.68)	0.073 (0.08)	0.013 (0.01)
Profitability	-0.131 (-0.70)	0.586 (0.46)	-0.141 (-0.74)	0.534 (0.44)	0.207 (0.31)	0.120 (0.18)
Observations	660	654	660	654	816	816
Pseudo <i>R</i> -squared	0.059	0.107	0.060	0.120	0.144	0.194

Table X
Comparison of Firm Characteristics between Firms with Large Ownership Reductions and Other Firms

This table compares the characteristics of firms that experienced a large decrease in *block ownership* and those that did not experience a large decrease in *block ownership*. A decrease in *block ownership* is considered large if the reduction in *block ownership* at a given firm and in a given year was at least 5% (see Helwege, Pirinsky and Stulz (2007)). *Block ownership* is the sum of the shareholdings of all owners who own more than 5% of a firm. The data sources include annual reports and forms 20-F (for the ownership measures) and Worldscope (for the diversification and ICM efficiency measures). The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample.

	Firms with Small Block Ownership Decrease (<5% Drop)		Firms with Large Block Ownership Decrease (>5% Drop)		<i>p</i> -value from <i>t</i> -test of difference in means	<i>p</i> -value from non-parametric Wilcoxon test of difference in medians
	Mean	Median	Mean	Median		
Market cap. (€ million)	2,585	100	2,029	105	0.3924	0.9633
Firm size (€ million)	6,614	143	7,566	137	0.6414	0.5297
Leverage	0.563	0.583	0.556	0.581	0.6984	0.6167
Liquidity	0.128	0.084	0.129	0.080	0.9068	0.9086
Profitability	0.041	0.061	0.046	0.065	0.6717	0.6969
Tobin's Q	1.448	1.188	1.381	1.218	0.3764	0.4963

Table XI
First-Differences Regressions

Regressions using one-year changes in the dependent and independent variables. Columns (1) and (2) analyze the changes in corporate diversification (i.e., number of operating segments) while columns (3) through (6) analyze changes in *ICM Efficiency*, i.e., changes in the efficiency of the internal capital market of a firm. We measure the change in ownership by looking at the changes in *Block ownership*, i.e. the change in the sum of the shareholdings of all owners who own more than 5% of a firm. In columns 1 and 3, the change in block ownership is calculated in relative terms (*Block ownership* in year t minus *Block ownership* year $t - 1$, divided by *Block ownership* in year $t - 1$). In columns 2 and 4, the change is calculated in absolute terms (*Block ownership* in year t minus *Block ownership* year $t - 1$). All regressions include industry and year fixed effects. Heteroskedasticity-robust t -statistics are reported in parentheses. Standard errors are clustered at the firm level to account for within-firm correlation. Constants were included in the regressions but are not reported. The sample consists of 1,169 firm-year observations from the 286 firms that were listed in the German stock market index CDAX in 2000 and for which we had segment and ownership data in at least one year during the period 2000–2006. Financial and real estate firms are excluded from the sample. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Change in # Operating segments			Change in ICM Efficiency		
	(1)	(2)	(3)	(4)	(5)	(6)
Relative change in block ownership	-0.437** (-2.08)		0.867** (2.10)		0.891** (2.15)	
Absolute change in block ownership		-0.021*** (-2.88)		0.016* (1.89)		0.017* (1.92)
Change in Firm Size	-0.026 (-0.05)	0.008 (0.02)	0.395 (0.67)	0.431 (0.78)	0.332 (0.56)	0.413 (0.75)
Change in Leverage	-0.314 (-0.34)	-0.214 (-0.24)	-1.333 (-1.13)	-1.173 (-1.08)	-1.352 (-1.15)	-1.178 (-1.08)
Change in Liquidity	0.512 (0.87)	0.418 (0.74)	-1.540 (-1.55)	-1.313 (-1.46)	-1.624 (-1.59)	-1.352 (-1.49)
Change in Profitability	0.500 (0.72)	0.672 (1.03)	-0.785 (-0.67)	-0.505 (-0.48)	-0.822 (-0.72)	-0.525 (-0.51)
Change in # Operating segments					0.350 (1.45)	0.165 (0.82)
Observations	613	705	538	621	538	621
Pseudo R -squared	0.022	0.021	0.104	0.083	0.110	0.085