# Business groups, investment, and firm value

van der Molen, R.M.

# Chapter 4

# Capital allocation

## 4.1 Introduction

With imperfect external capital markets, the creation of an internal capital market may improve the allocation of capital across investment projects (Williamson, 1985, Stein, 1997). Based on this idea, and on the observation that business groups are especially common in developing and transition economies, some authors have argued that these confederations of firms can be seen as efficient responses to capital market imperfections (see, e.g., Khanna and Palepu, 1997). This view is not undisputed, however. Recently, a number of authors have argued that business groups provide a way for the controlling shareholder to expropriate minority shareholders. By tunneling funds out of group affiliates in which his ownership stake is small into firms in which he has a large ownership stake, the controlling shareholder can enrich himself at the expense of minority shareholders (see Johnson et al., 2000).

Although these two views of business groups may appear to be opposites, in fact they share an important common thread. Both views consider the within-group reallocation of capital as a distinctive feature of business groups. Although they predict the outcomes to be different, the within-group reallocation of capital is the mechanism through which business groups create (or destroy) value. Hence, analyzing the within-group reallocation of capital may enable us to distinguish between the two views and may improve our understanding of the functioning of business groups. This is what we do in

This chapter is based on Van der Molen (2005).

this chapter.

A necessary condition for both views to hold is the existence of an internal capital market in business groups. Therefore, we start with an assessment of the claim that internal capital markets are typical for diversified business groups. We analyze the role of internal capital markets using data on Indian business groups. Based on both direct and indirect measures of reallocation, we find that within-group allocation of capital is substantial. Second, the two views of business groups have different predictions about the allocation of funds that the internal capital market will bring about. The intermediation view implicitly assumes that the internal capital market is efficient, and predicts that it will realize a better allocation of capital than the external capital market.[1] The tunneling view, on the other hand, claims that the internal capital market serves to benefit the controlling shareholder, and hence predicts that the final allocation of capital will be mainly determined by ownership variables. The different predictions imply that we can test the two views by analyzing the functioning of the internal capital market.

The reason why the allocation of capital may have real economic effects, is that it influences the investment behavior of companies. Hence, if an internal capital market is a distinctive feature of business groups, it will lead to differences between the capital expenditure of group affiliates and that of comparable stand-alone companies. Moreover, the observed differences in investment behavior indicate whether business groups improve the allocation of capital. That is, an efficient internal capital market should lead to higher investment by group affiliates with relatively good investment opportunities, and lower investment by affiliates whose investment opportunities are relatively poor. Therefore, we use the investment behavior of group affiliates *vis-a-vis* stand-alone companies to analyze the impact and efficiency of internal capital markets.

While internal capital markets in multi-division firms have been studied extensively, very few papers have analyzed the allocation of capital in business groups. In this respect, business groups have the advantage that they are composed of legally distinct companies, implying that better data is available on the constituent parts of the internal capital market in terms of availability,

[1] Of course, the efficiency of internal capital markets is not undisputed. See Stein (2003) for a survey of theories that stress the dark side of internal capital markets.

measurement and definition.[2] Moreover, it allows for some additional tests on how ownership structure affects ICM efficiency, and the effect of internal capital markets on firm value.

Some evidence on the role of internal capital markets in business groups exists. For example, Khanna and Palepu (2000), Shin and Park (1999) and Hoshi et al. (1991) analyze business groups' internal capital markets by investigating the sensitivity of an affiliate's investment to the group's internal funds. Note that this is an indirect test, in the sense that it assumes the existence of an internal capital market. Moreover, this methodology only analyzes the impact on investment behavior, and does not distinguish between efficient and inefficient reallocation of capital. With respect to tunneling, some recent evidence has been found by Bertrand et al. (2002) and Bae et al. (2002). Bertrand et al. (2002) examine the reallocation of funds in Indian business groups, and find evidence consistent with the tunneling hypothesis. Although the authors explicitly recognize the possibility that the observed reallocation is brought about by an internal capital market, they do not investigate it in detail.

The current paper extends the literature in a number of ways. First, we propose a more direct test of how the reallocation of capital within a business group affects the investment behavior of its affiliates. By comparing the investment behavior of group affiliates and stand-alone companies in the same industry, we construct a direct measure of the effect of group affiliation on capital expenditure. Second, by comparing this effect for different companies within the same group, we construct a measure of the efficiency of the group's reallocation. Besides an improved understanding of the workings of internal capital markets in Indian business groups, analyzing the determinants of ICM efficiency also helps me to distinguish between the intermediation and tunneling view. Third, having constructed an efficiency measure, we can investigate the effect of internal capital markets on firm value.

Our findings suggest that reallocation of capital within business groups is substantial. However, reallocation is generally not efficient, i.e., firms with relatively good investment opportunities do not have the highest investment

[2]For instance, in multi-division firms, it may be difficult to determine the value of assets and investment for each division separately if some assets are used by more than one division.

rates. The empirical findings suggest that both intermediation and tunneling play a role in the reallocation of capital in Indian business groups. But we also find that intermediation does not always lead to value creation, and that tunneling does not always destroy value. More specifically, the efficiency of the internal capital market decreases with the diversity of the investment opportunities, whereas the controlling shareholder's incentives to engage in tunneling may lead to a more efficient allocation of capital.

The rest of the paper is organized as follows. Section 4.2 describes the sample and the variables that we use. Section 4.3 provides evidence of inter-firm investment, borrowing and lending, and contains the results of our regressions. Section 4.4 deals with some robustness issues. Conclusions follow.

## 4.2 Sample and variable construction

### 4.2.1 Sample of firms

We use data from Prowess, a publicly available dataset maintained by the Center for Monitoring the Indian Economy. Besides financial statements and share prices, Prowess also contains information about the group affiliation of each firm, i.e., whether or not a firm is a group affiliate and the name of the group to which it is affiliated. Because share-price information is only available as of 1996, the sample period is from 1997 to 2002.[3] We select all private manufacturing companies which are domestically owned. Moreover, we restrict the sample to observations with positive sales and assets. Observations for which information on profits or share prices is lacking are also excluded. Since my analysis is based on comparing group affiliates and stand-alone companies in the same industry, we can only use firms for which this comparison is reliable, i.e., for industries with sufficient observations available.[4] The final sample contains 20,975 firm-year observations on 4,176 companies. We use the data on stand-alone companies (12,614 firm-years on 2,649 companies) to construct imputed values for the group affiliates. The analysis of the efficiency of internal capital markets is based on the subsam-

[3] Since we use beginning-of-period share prices, the first year for which we can perform the analysis is 1997.

[4] See below for further details about the industry classification on which the comparisons are based.

ple of group affiliates, which consists of 8,361 firm-year observations on 1,527 group affiliated companies.

An important part of the analysis is based on comparing group affiliates with stand-alone companies in the same industry. We calculate imputed values for group companies using stand-alone industry peers. Hence, the quality of these imputed values crucially depends on the definition of an industry. On the one hand, a more detailed industry classification will result in better imputed values. In general, data on other firms in the same 5-digit SIC code are more informative than data on other firms in the same 2-digit SIC code. On the other hand, the imputed values will be more reliable when they are based on a large number of stand-alone companies. Therefore, the assignment of firms to industry categories is done as follows. For all firms in the sample, Prowess reports an industry code, based on the National Industrial Classification (NIC). These codes range from 2 to 5-digit NIC codes, which are comparable to 2 to 5-digit SIC codes. In principle, all firms are assigned the industry category that is reported in Prowess. Only if the number of stand-alone companies in a certain industry category is less than five, we use a less detailed categorization. In such a case, all firms in this industry category are assigned the industry category one level of precision lower.[5] So, if we have only four stand-alone companies in a 5-digit NIC code, these companies are assigned the 4-digit NIC code of which the 5-digit NIC code is a subset. We continue this procedure until as many companies as possible have been assigned a NIC code. This procedure results in a total number of 52 different industry categories, with 8 categories based on 5-digit NIC codes, 10 categories based on 4-digit NIC codes, 16 categories based on 3-digit NIC codes, and 18 categories based on 2-digit NIC codes.

### 4.2.2 Ownership variables

A test of tunneling requires information on the ownership stake of the controlling shareholder. Obtaining this information can be difficult, since the controlling shareholder's holdings may be both direct and indirect, i.e., via a controlling share in other companies.

However, the disclosure requirements in India are such that publicly listed

[5] More precisely, we require an industry category to contain at least 5 stand-alone companies for which the necessary data are available for the whole sample period.

companies must classify reported equity holdings as either promoter's or non-promoter's share. A promoter is 'a person or persons who are in control of the company, or (...) a relative of the promoter' (SEBI Regulations, 1997). Moreover, if a promoter (either a corporate body or an individual) has a controlling share in another company, this company's ownership stake counts as part of the promoter's share. Thus, the definition of a promoter captures both direct ownership, i.e., through owning shares in a company, and indirect ownership, i.e., through owning (a fraction of) another corporate body, which has an ownership stake in the company.[6]

### 4.2.3 Variable construction

We construct several variables to measure the magnitude and efficiency of the reallocation of capital within a business group. First, to measure the effect of any reallocation, we calculate excess investment as the difference between a group affiliate's capital expenditure and that of its stand-alone industry peers. Second, we construct several measures of internal capital market (ICM) efficiency, based on the idea that excess investment should be increasing in investment opportunities. Table 4.1 reports descriptive statistics for these and other variables that we use in the regressions.

**Excess investment**

We calculate the effect of group affiliation on a firm's investment rate as the difference between its actual investment rate and the imputed investment rate, which is our best guess of a company's investment rate if it were a stand-alone company. This proxy is calculated as the asset-weighted average investment rate of stand-alone companies in the same industry, where each stand-alone company's investment rate is weighted by the book value of its total assets. So, for industry $k$, we calculate

$$\bar{I}_{kt} = \frac{\sum_{i \in S \cap K} I_{it}}{\sum_{i \in S \cap K} BA_{it}}, \tag{4.1}$$

[6] In fact, this is an important advantage compared to the analysis of Bertrand et al. (2002), who ignore indirect holdings due to lack of data. Bertrand et al. (2002) use an older version of Prowess, where holdings by 'directors and relatives' are available but this does not include holdings by subsidiaries and other corporate bodies on which promoters have control. In the second release of Prowess (which we use), ownership data includes 'persons acting in concert', which in turn includes holdings by corporate bodies acting in concert, many of which are subsidiaries.

where $S$ is the set of all stand-alone firms, $K$ is the set of all firms in industry $k$, $I_{it}$ is firm $i$'s capital expenditure in year $t$, and $BA_{it}$ is the book value of firm $i$'s total assets at the beginning of year $t$. Excess investment for group firm $i$ is then measured as the difference between its actual investment rate and the proxy based on stand-alone peers' investment rates:

$$\text{EXINVEST}_{it} = \frac{I_{it}}{BA_{it}} - \bar{I}_{kt} \tag{4.2}$$

where $i \in K$.[7] A positive excess investment implies that a group affiliate invests more than its stand-alone industry peers, whereas a negative excess investment implies that a group firm's investment is lower than that of comparable stand-alone companies.

To analyze the within-group allocation of funds, we have to compare a group company's investment rate to that of other members of the same group. Hence, we construct a second measure of excess investment. It compares a group affiliate's actual investment ratio with the asset-weighted group average investment ratio, the latter ebing defined as:

$$\bar{I}_{jt} = \frac{\sum_{i \in J} I_{it}}{\sum_{i \in J} BA_{it}}, \tag{4.3}$$

where $J$ is the set of all affiliates of group $j$. For firm $i$ which is a member of group $j$, excess investment is calculated as follows:

$$\text{EXINVEST1}_{it} = \frac{I_{it}}{BA_{it}} - \bar{I}_{jt} \tag{4.4}$$

A positive value of this measure means that a company invests more than the average investment rate in the group.[8]

**ICM efficiency**

To analyze the reallocation of capital, we construct a proxy for a firm's

[7] By using this measure of excess investment, we do not correct for the possibility that the investment of group affiliates is on average higher than that of stand-alone companies. Put differently, we do not distinguish between a group's role in generating and allocating capital. See Rajan et al. (2000) for more on this issue.

[8] Another measure of excess investment has been used by Billet and Mauer (2003). They construct a measure of transfers and subsidies by comparing a segment's after tax cash flow and its capital expenditure. This measure cannot be used in the current setting, since group companies may have other sources of capital besides the business group.

investment opportunities. A natural candidate would be Tobin's $q$ or the market-to-book value of a firm's total assets. However, we cannot use these measures for group affiliates, since they will be partly determined by the reallocation of capital within a business group. The reallocation of capital within a group may lower the cost of capital for some of the group affiliates, which will affect the market value of these companies. Thus, measuring investment opportunities by a group affiliate's market-to-book value suffers from an endogeneity problem.

Instead, we use the industry-average market-to-book ratio, measured over all stand-alone companies in the same industry, as a proxy for investment opportunities. First, this measure is not subject to the endogeneity problem described above. Second, to the extent that investment opportunities are determined by technology, they are likely to be industry specific. Wernerfelt and Montgomery (1988) find that industry effects explain a large part of the variation in Tobin's $q$. This implies that the industry average Tobin's $q$ is a good proxy for the Tobin's $q$ of firms in that industry. We define Tobin's $q$ as the ratio of market value to book value of total assets. The market value is computed as the market value of common equity plus the book value of preferred equity plus the book value of debt. A group affiliate's imputed investment opportunities are calculated as the asset-weighted average market-to-book value of total assets of stand-alone firms in the same industry.[9] That is, for group affiliate $i \in K$, $\bar{q}_{it} \equiv \bar{q}_{kt}$, where

$$\bar{q}_{kt} = \frac{\sum_{n \in S \cap K} q_{nt} \cdot BA_{nt}}{\sum_{n \in S \cap K} BA_{nt}}. \tag{4.5}$$

One may criticize the use of this proxy for group affiliates' investment opportunities by arguing that group affiliation may affect a firm's investment opportunities, apart from the effects of the reallocation of capital. For example, one may argue that group affiliates operate more efficiently, and therefore have better investment opportunities than stand-alone peers. This may indeed be the case, but it does not necessarily affect the validity of the proxy. A 'technical' characteristic that improves the investment opportunities of group affiliates will only invalidate the analysis if the effect on investment opportunities varies sufficiently for different affiliates to change

[9] Using the industry median market-to-book value instead of the asset-weighted average does not lead to qualitatively different results.

**Table 4.1. Descriptive statistics: group companies**
Table contains descriptive statistics for all group affiliates. $BA_{it}/BA_{jt}$ measures the size of a company relative to the size of the group to which it is affiliated. Market-to-book is the ratio of market value of total assets to book value of total assets. Excess value is the difference between a firm's market-to-book value and the asset-weighted average market-to-book values of stand-alone companies in the same industry. Investment is measured as the first difference of gross fixed assets. EXINVEST is industry-adjusted investment, and EXINVEST1 measures group-adjusted investment. $N$ is the number of firm-year observations.

| | mean | median | std.dev. | max | min | N |
|---|---|---|---|---|---|---|
| total assets | 291.1 | 74.7 | 1,173 | 53,975 | 0.02 | 8,361 |
| sales | 239.3 | 70.41 | 1,001 | 57,120 | 0.01 | 8,361 |
| $BA_{it}/BA_{jt}$ | 0.365 | 0.213 | 0.366 | 1 | 0.000 | 7,126 |
| market-to-book | 0.901 | 0.659 | 1.611 | 50.454 | 0.011 | 3,896 |
| excess value | 0.281 | 0.286 | 1.462 | 36.278 | -13.717 | 3,825 |
| investment | 0.060 | 0.028 | 0.131 | 1 | -0.958 | 7,445 |
| EXINVEST | -0.002 | -0.021 | 0.132 | 0.962 | -0.992 | 5,932 |
| EXINVEST1 | -0.004 | 0 | 0.110 | 0.909 | -1.087 | 6,217 |

the ranking of investment opportunities. So, as long as group affiliation does not alter the ranking of the affiliates' investment opportunities, the current proxy is appropriate.

Reallocation is value-enhancing, i.e., it will increase the value of the group as a whole, if it transfers funds from group affiliates with below group-average investment opportunities to group affiliates with above group-average investment opportunities. Group $j$'s average investment opportunities, $\bar{q}_{jt}$ is computed as the asset-weighted average imputed investment opportunities of all firms belonging to group $j$. So,

$$\bar{q}_{jt} = \sum_{i \in J} \bar{q}_{it} \cdot BA_{it} / \sum_{i \in J} BA_{it} \tag{4.6}$$

We construct two measures of ICM efficiency based on the difference between a firm's imputed market-to-book ratio and the group-average of these ratios. Based on Rajan et al. (2000), we calculate the relative value added by reallocation (RVA) as the asset-weighted average of the amount of

**Table 4.2. Descriptive statistics: business groups**
Table contains descriptive statistics for all business groups with more than two different industries. Excess value is the difference between a firm's market-to-book ratio and the asset-weighted average market-to-book ratio of stand-alone companies in the same industry. (1/Herfindahl) measures the size of an ICM, and is calculated as the inverse of the asset-based Herfindahl index. Diversity is calculated as the coefficient of variation in the imputed investment opportunities of all firms in a certain group. Excess investment is industry-adjusted investment. Average promoter's share is the asset-weighted average promoter's ownership stake in the members of a certain group, and the variation of promoter's share is calculated as the coefficient of variation in the promoter's share in all firms in a certain group. The sample contains 1,294 group-year observations

| | mean | median | std.dev. | max | min |
|---|---|---|---|---|---|
| group sales | 1,153.2 | 366.335 | 3,540.7 | 66,109.9 | 2.750 |
| # of affiliates | 4.158 | 3 | 3.591 | 42 | 2 |
| # of industries | 3.160 | 2 | 1.945 | 19 | 2 |
| (1/Herfindahl) | 2.159 | 1.868 | 1.080 | 9.723 | 1.002 |
| diversity | 0.380 | 0.285 | 0.382 | 2.608 | 0 |
| excess investment | -0.008 | -0.022 | 0.264 | 1.144 | -1.732 |
| high $\bar{q}_{it}$, high ownership | -0.003 | 0 | 0.165 | 0.959 | -0.911 |
| high $\bar{q}_{it}$, low ownership | -0.002 | 0 | 0.080 | 0.882 | -0.790 |
| low $\bar{q}_{it}$, high ownership | 0.000 | 0 | 0.154 | 1.064 | -0.994 |
| low $\bar{q}_{it}$, low ownership | -0.003 | 0 | 0.088 | 0.732 | -0.554 |
| excess value | 0.657 | 0.425 | 1.994 | 21.975 | -23.924 |
| high $\bar{q}_{it}$, high ownership | 0.110 | 0 | 1.509 | 18.150 | -20.741 |
| high $\bar{q}_{it}$, low ownership | 0.074 | 0 | 0.716 | 11.407 | -10.207 |
| low $\bar{q}_{it}$, high ownership | 0.295 | 0 | 0.678 | 9.486 | -0.225 |
| low $\bar{q}_{it}$, low ownership | 0.178 | 0 | 0.463 | 6.066 | -0.508 |
| RVA | -0.002 | -0.000 | 0.031 | 0.366 | -0.552 |
| QS | -0.000 | 0 | 0.026 | 0.427 | -0.391 |
| promoter | 40.132 | 40.034 | 17.136 | 96.857 | 0 |
| variation(promoter) | 0.948 | 0.989 | 0.454 | 2.256 | 0.002 |

excess investment multiplied by the excess market-to-book value, or

$$\text{RVA}_{jt} = \sum_{i \in J} \frac{BA_{it}}{BA_{jt}} \cdot (\bar{q}_{it} - \bar{q}_{jt}) \cdot \text{EXINVEST}_{it} \tag{4.7}$$

where $BA_{it}$ is the book value of assets of firm $i$ at the beginning of year $t$, $BA_{jt}$ is the sum of the book values of assets of all firms that belong to group

$j$, measured at the beginning of year $t$. A business group that efficiently reallocates funds will enable affiliates with above group-average investment opportunities (i.e., $\bar{q}_{it} > \bar{q}_{jt}$) to invest more than its stand-alone industry peers (i.e., $\text{EXINVEST}_{it} > 0$), whereas the affiliates with relatively poor investment opportunities will have negative excess investment. Therefore, an efficient internal capital market implies a positive RVA.

Another measure of the efficiency of allocation is the $q$-sensitivity of investment (QS), introduced by Peyer and Shivdasani (2001). We compute it as

$$\text{QS}_{jt} = \sum_{i \in J} \frac{BA_{it}}{BA_{jt}} \cdot (\bar{q}_{it} - \bar{q}_{jt}) \cdot \text{EXINVEST1}_{it} \tag{4.8}$$

where $I_{jt}$ is the sum of capital expenditure in year $t$ of all affiliates of group $j$. Hence, $I_{jt}/BA_{jt}$ is the asset-weighted average investment rate of group $j$. The $q$-sensitivity of investment is positive if firms with above-group-average investment opportunities (i.e., $\bar{q}_{it} > \bar{q}_{jt}$) have above-group-average investment ratios (i.e., $\text{EXINVEST1}_{it} > 0$), and if firms with imputed investment opportunities below the group's average have below-group-average investment rates. Therefore, the $q$-sensitivity of investment indicates whether, within a business group, high $q$ firms invest relatively more and low $q$ firms invest relatively less. Compared to the RVA measure of efficiency, the $q$-sensitivity only looks at the allocation of funds within the group, and does not compare it to stand-alone companies.

## 4.3 Results

### 4.3.1 Direct evidence of inter-firm capital flows

To give an impression of the importance of the reallocation of funds within groups, we report some figures about intra-group investment, lending and borrowing. These figures are taken from group affiliates' annual reports (as reported in the Prowess dataset).

Looking at inter-firm lending and borrowing, we find that 736 out of 8,361 observations borrow from other group members. Although this number is not very large, the amount that these firms borrow from other group affiliates is substantial. On average, they borrow 32 percent of their total borrowings from group members (the median value is 17 percent). Albeit for a modest

number of firms, intra-group borrowing may be a substantial source of funds for these companies. More firms are engaged in intra-group lending: 2,037 out of 8,361. The average amount they lend out to other group members is 3.4 percent of their total assets. Since it is most likely that the large group companies lend to the smaller ones, the amount that is lend out by group affiliates will probably make up a larger fraction of the receiving companies' total assets.

Additional information is obtained by looking at inter-firm investment within groups, or cross-shareholding, we find that 4,675 out of 8,361 firm-year observations have positive investments in other group members. Moreover, the average amount that these firms invest in other group members is 6.5 percent of total assets. Comparing this number to these companies capital expenditure, we find that the average amount these companies invest in their own capital stock is 6.1 percent of total assets. Thus, the amount invested in another group member is comparable to group affiliates' capital expenditure, on average. This suggests that the magnitude of inter-firm investments is large enough to have a substantial impact on an affiliate's capital expenditure. The relative importance of inter-firm investment within business groups becomes even more clear when we compare it to inter-firm investments by stand-alone companies. We find that 2,428 out of 12,614 observations do invest in other companies. So, the fraction of stand-alone companies that invest in other firms is much lower than the fraction of group affiliates that do so, and this difference is significant at the one percent level. For these 2,428 firm-year observations, the average amount they invest in other firms is 4.8 percent (the median is 2.0 percent). The difference in both the mean and the median amount of inter-firm investment are significant at the one percent level. Thus, inter-firm investment is more prominent in group affiliates, indicating that the internal reallocation of funds is an important characteristic of business groups.

The accounting variables give some information about the extent to which reallocation of capital takes place within business groups, yet they are not sufficiently informative to analyse the efficiency of the reallocation. Moreover, transfers of funds may take place through other channels than those readily observable in a company's annual report. After all, tunneling is about hiding money from the public. Therefore, we will use an indirect measure of

reallocation, excess investment. We interpret excess investment as the result of the reallocation of funds within a business group. This suggests that internal capital markets do exist in business groups, and that they reallocate a substantial amount of funds.

### 4.3.2 Excess investment

In table 4.3, we compare firms with positive and negative excess investment. In panel A, excess investment is defined with respect to stand-alone industry peers (EXINVEST), whereas in panel B excess investment is defined relative to the other companies in the same group (EXINVEST1). Although the two measures of excess investment are positively correlated, there are some remarkable differences between the two panels. We find that firms with positive excess investment are on average larger in absolute terms. However, when size is measured relative to other group members, we find that large companies invest more than their stand-alone industry peers, but not more than their fellow group members. More importantly, we find that firms with above group-average investment also have relatively good investment opportunities, on average, as measured by $(\bar{q}_{it} - \bar{q}_{jt})$. This is consistent with business groups allocating capital efficiently across different investment projects. Note that this is only true when excess investment is measured relative to that of other group members, and not when we use stand-alone companies as a benchmark. This implies that, on average, a given amount of capital is allocated efficiently within business groups.[10]

Panels A and B also differ with respect to the ownership variables. In panel A, we find that the promoter's ownership stake is larger in firms with positive excess investment, at least for the mean promoter's share. Note also that the public's share is larger for firms that invest less than their stand-alone peers, on average. So, the ownership structure is different for firms with positive and negative excess investment, and firms in which the controlling shareholder has a larger ownership stake get to invest more. Panel B reports that firms with above group-average investment rates do not significantly differ from below group-average investment companies with respect to the absolute size of the promoter's share. They do, however, have a significantly

[10] Here, an efficient allocation does not mean that the ICM achieves the best allocation possible. It means that the allocation is such that the ICM adds value.

**Table 4.3. Descriptive statistics of excess investment**
EXINVEST is calculated as the difference between a firm's investment rate and the asset-weighted average investment rate of stand-alone companies in the same industry. EXINVEST1 is calculated as the difference between a firm's investment rate and the asset-weighted average investment rate of other companies in the same group. $N$ is the number of firm-year observations. Statistical significance refers to the differences between the subsamples (i.e., positive and negative excess investment). Statistical significance at the ten-, five-, and one-percent level is indicated by $^{\dagger}$, $^{*}$, and $^{**}$, respectively.

**Panel A: Industry-adjusted investment**

| | EXINVEST $\leq 0$ | | | EXINVEST $> 0$ | | |
|---|---|---|---|---|---|---|
| | mean | median | N | mean | median | N |
| sales | 190.58 | 55.36 | 3,764 | 279.15** | 84.04** | 4,597 |
| $BA_{it}/BA_{jt}$ | 0.352 | 0.186 | 3,764 | 0.381** | 0.236** | 3,362 |
| investment | 0.004 | 0.010 | 3,764 | 0.117** | 0.075** | 3,681 |
| EXINVEST | -0.063 | -0.044 | 3,764 | 0.103** | 0.051** | 2,168 |
| EXINVEST1 | -0.033 | -0.008 | 3,764 | 0.042** | 0.008** | 2,453 |
| $(\bar{q}_{it} - \bar{q}_{jt})$ | 0.076 | 0* | 3,764 | 0.057 | 0 | 3,270 |
| promoter | 46.31 | 46.85 | 2,584 | 47.62* | 48.84** | 3,268 |
| public | 28.14** | 27.16** | 2,584 | 26.58 | 25.51 | 3,268 |
| expromoter | 5.339 | 0.733 | 2,563 | 5.423 | 0.995 | 2,353 |

**Panel B: Group-adjusted investment**

| | EXINVEST1 $\leq 0$ | | | EXINVEST1 $> 0$ | | |
|---|---|---|---|---|---|---|
| | mean | median | N | mean | median | N |
| sales | 236.93 | 65.38 | 3,810 | 241.25 | 74.06** | 4,551 |
| $BA_{it}/BA_{jt}$ | 0.384** | 0.202 | 3,810 | 0.344 | 0.220 | 3,316 |
| investment | 0.019 | 0.012 | 3,810 | 0.103** | 0.059** | 3,635 |
| EXINVEST | -0.039 | -0.035 | 3,629 | 0.056** | 0.016** | 2,303 |
| EXINVEST1 | -0.047 | -0.020 | 3,810 | 0.064** | 0.023** | 2,407 |
| $(\bar{q}_{it} - \bar{q}_{jt})$ | 0.030 | 0 | 3,759 | 0.111** | 0 | 3,275 |
| promoter | 46.69 | 47.35 | 2,675 | 47.34 | 48.80 | 3,177 |
| public | 27.49 | 26.08 | 2,675 | 27.09 | 25.99 | 3,177 |
| expromoter | 4.85 | 0 | 2,644 | 6.00* | 2.01** | 2,272 |

larger promoter's share relative to other firms in the same group. If the reallocation of capital within a business group is mainly driven by expropriation motives of the controlling shareholder, we would expect a relatively high promoter's share for firms that invest more than the average group company.

**Table 4.4. Determinants of excess investment**
The dependent variable is excess investment, measured by industry-adjusted investment (EXINVEST) in column (I) and (II), and by group-adjusted investment (EXINVEST1) in column (III) and (IV). Firm size is measured as the natural log of sales. $(\bar{q}_{it} - \bar{q}_{jt})$ measures a firm's investment opportunities relative to the group average. The excess ownership shares are measured relative to the group average. $N$ is the number of firm-year observations. Models include firm and calendar-year fixed effects. Statistical significance at the ten-, five-, and one-percent level is indicated by $^{\dagger}$, $^{*}$, and $^{**}$, respectively.

| **Variable** | **Coefficient** (Std. Err.) | | | |
|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) |
| (assets/group assets) | -0.011 | 0.001 | -0.028$^{\dagger}$ | -0.012 |
| | (0.020) | (0.020) | (0.016) | (0.016) |
| firm size | -0.029$^{**}$ | -0.030$^{**}$ | -0.015$^{**}$ | -0.015$^{**}$ |
| | (0.004) | (0.004) | (0.003) | (0.003) |
| $(\bar{q}_{it} - \bar{q}_{jt})$ | -0.005 | -0.005 | -0.003 | -0.004 |
| | (0.004) | (0.004) | (0.003) | (0.003) |
| excess promoter's share | 0.000 | | -0.001$^{*}$ | |
| | (0.001) | | (0.000) | |
| excess public's share | | 0.001 | | 0.000 |
| | | (0.001) | | (0.001) |
| N | 4164 | 4175 | 4325 | 4336 |
| $R^2$ | 0.031 | 0.032 | 0.043 | 0.047 |

In other words, we would expect to find a higher excess promoter's share for positive excess investment firms in panel B. The results of panel B are therefore consistent with expropriation motives playing a role in the reallocation of capital within business groups.

To further analyze the determinants of excess investment, we estimate a multivariate model. We regress the amount of excess investment on a firm's relative investment opportunities $(\bar{q}_{it} - \bar{q}_{jt})$, ownership variables, and a number of control variables (firm size and firm- and calendar-year dummies). The results are reported in table 4.4. In columns I and II, we use industry-adjusted investment as a measure of excess investment. We find that the amount of excess investment is decreasing in firm size. Moreover, we find

no significant effect of investment opportunities and ownership variables. When we use group-adjusted investment as the measure of excess investment (columns III and IV) we find comparable results. The only exception is a significantly negative effect of the promoter's share on excess investment. The coefficient estimate of -0.001 implies that a one standard deviation increase in excess promoter's share leads to a 0.14 standard deviation decrease in excess investment, which is at odds with the tunneling hypothesis. In sum, the evidence suggests that the amount of excess investment for a group affiliate is not affected by its relative investment opportunities nor by the ownership stake of its promoter.

### 4.3.3 The efficiency of the internal capital market

Even if business groups are not efficiently reallocating capital in general, it may still be the case that some business groups have an efficient internal capital market, and that other groups mainly use their internal capital market to expropriate minority shareholders. In this section, we will analyze the determinants of ICM efficiency.

The value-creating potential of an internal capital market depends on a number of characteristics. In theory, an internal capital market may create more value when the number of affiliates is large (see Stein, 1997). The more firms a group consists of, the more it will be able to alleviate financial constraints, other things equal. To measure a group's internal capital market size, we use a group's Herfindahl index rather than a simple count of the number of affiliates. The Herfindahl index is a better measure of the group's value creating potential, because it takes into account the relative size of the affiliates. The importance of the relative size of the affiliates can be illustrated by a limiting case in which one affiliate makes up 100 percent of the group's capital needs, and the size of the other affiliates is negligible. In this case, the internal capital market cannot create any value compared to the external capital market. Thus, the value-creating potential of the internal capital market depends on the relative size of the affiliates. In the regressions, we use the inverse of the Herfindahl index based on firm assets. A higher value of this variable implies that a group has either more affiliates or affiliates of more equal size. Thus, efficient-ICM theory predicts a positive relation between the inverse of the Herfindahl index and the value of the

internal capital market.

A second important determinant of the value-creating potential of an internal capital market is the degree to which the outcomes of the different projects are related. Other things equal, the value that can be created by an internal capital market increases as the project outcomes become more negatively related. In terms of business groups, the more the affiliated firms differ in terms of investment opportunities, the greater is the value that the business group's reallocation of capital may create.[11] We use the coefficient of variation of the affiliates' investment opportunities as a proxy for the diversity of a group's internal capital market. It is defined as the standard deviation of the imputed investment opportunities of all affiliates in the same group, divided by the group's average imputed investment opportunities. Efficient-ICM theory predicts a higher internal capital market value for groups with greater diversity.

To test the expropriation view of business groups, we also analyze the effect of ownership variables on ICM efficiency. Note that a controlling shareholder has an incentive to depart from the optimal allocation of capital only if his ownership stake differs between group members. Tunneling will only affect ICM efficiency in a situation where the controlling shareholder has a large ownership stake in some firms, and a small stake in others. Therefore, tunneling is most likely to occur in groups where the variation of the promoter's ownership stake is large. So, the larger the variation in the promoter's share, the larger is the controlling shareholder's incentive to tilt the allocation of capital toward the firms in which he has a large ownership stake. With respect to the efficiency of a group's internal capital market, this implies that, other things equal, ICM efficiency is decreasing in the variation of the promoter's share. We measure the variation in the promoter's share (public's share) as the coefficient of variation of the asset-weighted promoter's share.[12]

In addition to the variation in the promoter's share, we are also interested

[11] See also Matsusaka and Nanda (2002), who show that the possibility of reallocating capital in an internal capital market is a real option that increases in value with the mean and variance of the investment opportunities of the projects. See also Peyer (2002).

[12] We use asset-weighted ownership shares instead of the equally weighted ownership shares, because we measure the effects of within-group reallocation using the affiliated firms' investment ratio, which has a firm's assets as the numerator.

in the effect of the level of the promoter's share. The larger the ownership stake of the controlling shareholder, the less ownership and control are separated. This may lead to less agency problems, improving the efficiency of the within-group allocation. Moreover, an important difference between an internal capital market in a business group and in a diversified company is that the controlling shareholder in a group will to some extent be constrained by the interests of the non-controlling shareholders. Hence, the larger the fraction that is owned by the controlling shareholder, the greater his ability to do as he pleases. Note that what the controlling shareholder wants is not necessarily optimal for the group as a whole. The average promoter's share is calculated as the asset-weighted average promoter's share (or public's share).

In table 4.5, we compare groups with efficient and inefficient internal capital markets. If the sum of the relative value added by allocation (RVA) for a business group $j$ over the sample period is positive, the business group (or its ICM) is classified as efficient. Otherwise, a group is termed inefficient. This implies that a group's classification as either efficient or inefficient is constant over the sample period.[13] We find that inefficient-ICM groups are significantly larger than efficient-ICM groups. This is true irrespective of whether we use group sales or the number of affiliates as a measure of group size. This suggests that internal capital markets only create value in relatively small groups. Moreover, the size of inefficient internal capital markets, as measured by the inverse of the Herfindahl index, is larger than that of efficient internal capital markets, and inefficient internal capital markets are significantly more diversified. This appears to be at odds with efficient-ICM theory, which predicts the value creating potential of an internal capital market to be positively related to ICM diversity and ICM size.

To investigate the determinants of internal capital markets efficiency, we estimate a regression model. As the dependent variable, we use both efficiency measures, RVA and the $q$-sensitivity. Based on the differences between the subsamples of efficient and inefficient ICM groups, we include a measure of group size as an explanatory variable. We measure group size by the natural logarithm of a group's total sales. Moreover, we include ICM

[13] We also used a classification based on whether or not a group's RVA is positive in one year. This way, a group's classification can change from one year to another. This measure of efficiency leads to qualitatively similar results.

**Table 4.5. Descriptive statistics of ICM efficiency**
Table reports descriptive statistics for groups with inefficient and efficient internal capital markets. A group's ICM is classified as efficient if the sum of the RVA for a group over the sample period is greater than zero. (1/Herfindahl) is the inverse of the asset based Herfindahl index of a group, diversity is defined as the coefficient of variation of the investment opportunities of all firms in a group, PROMOTER is the average ownership stake of the controlling shareholder in the affiliated companies, $\sigma$(PROMOTER) is the variation in the controlling shareholder's ownership stake, and $N$ is the number of group-year observations. Statistical significance refers to the differences between the two subsamples. Statistical significance at the ten-, five-, and one-percent level is indicated by $^{\dagger}$, $^{*}$, and $^{**}$, respectively.

| | mean | median | std.dev. | max | min | N |
|---|---|---|---|---|---|---|
| **Inefficient ICM groups** | | | | | | |
| relative value added | -0.006 | -0.000 | 0.038 | 0.094 | -0.552 | 700 |
| $q$-sensitivity | -0.003 | -0.000 | 0.030 | 0.204 | -0.391 | 700 |
| group sales | 1,418.8$^{**}$ | 455.740$^{**}$ | 4,641.7 | 66,109.9 | 2.750 | 700 |
| no. of affiliates | 4.387$^{**}$ | 3$^{*}$ | 4.187 | 42 | 2 | 700 |
| no. of industries | 3.350$^{**}$ | 3$^{**}$ | 2.213 | 19 | 2 | 700 |
| (1/Herfindahl) | 2.226$^{*}$ | 1.948$^{**}$ | 1.076 | 6.420 | 1.002 | 700 |
| diversity | 0.386 | 0.310$^{**}$ | 0.366 | 2.595 | 0 | 700 |
| PROMOTER | 40.336 | 40.312 | 16.737 | 76.856 | 0 | 646 |
| $\sigma$(PROMOTER) | 0.933 | 0.949 | 0.474 | 2.195 | 0.002 | 535 |
| **Efficient ICM groups** | | | | | | |
| relative value added | 0.003$^{**}$ | 0.000$^{**}$ | 0.018 | 0.366 | -0.057 | 594 |
| $q$-sensitivity | 0.003$^{**}$ | 0.000$^{**}$ | 0.020 | 0.427 | -0.032 | 594 |
| group sales | 840.235 | 289.975 | 1,325.3 | 9,117.9 | 3.030 | 594 |
| no. of affiliates | 3.889 | 3 | 2.704 | 21 | 2 | 594 |
| no. of industries | 2.936 | 2 | 1.545 | 10 | 2 | 594 |
| (1/Herfindahl) | 2.080 | 1.761 | 1.080 | 9.723 | 1.004 | 594 |
| diversity | 0.373 | 0.260 | 0.402 | 2.608 | 0 | 585 |
| PROMOTER | 39.899 | 39.626 | 17.592 | 96.857 | 0 | 568 |
| $\sigma$(PROMOTER) | 0.964 | 1.046$^{**}$ | 0.432 | 2.256 | 0.005 | 489 |

size (measured by the inverse of the Herfindahl index) and ICM diversity (proxied by the coefficient of variation in $\bar{q}_{it}$) as explanatory variables. The variation of the promoter's share is included to control for the controlling shareholder's incentive to use the internal capital market to maximize his own welfare, which may conflict with an efficient allocation of capital. We

**Table 4.6. Efficiency of capital allocation**
Dependent variable is the value created by the internal capital market, measured by either Relative Value Added (columns I to III) or the Q-sensitivity of investment (columns IV to VI). (1/Herfindahl) is the inverse of the asset based Herfindahl index of a group, diversity is defined as the coefficient of variation of the investment opportunities of all firms in a group, PROMOTER is the average ownership stake of the controlling shareholder in the affiliated companies, $\sigma$(PROMOTER) is the variation in the controlling shareholder's ownership stake, and $N$ is the number of group-year observations. The models include group-specific and year-specific effects. Statistical significance at the ten-, five-, and one-percent level is indicated by $^{\dagger}$, $^{*}$, and $^{**}$, respectively.

| **Variable** | **Coefficient** (Std. Err.) | | | | | |
|---|---|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) | (V) | (VI) |
| | Relative Value Added | | | Q-sensitivity | | |
| group sales | 0.001 | 0.000 | 0.001 | 0.000 | 0.000 | 0.001 |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| (1/Herfindahl) | -0.003 | | -0.007 | -0.001 | | -0.003 |
| | (0.003) | | (0.008) | (0.003) | | (0.007) |
| diversity | -0.021$^{**}$ | -0.021$^{**}$ | -0.021$^{**}$ | -0.010$^{*}$ | -0.010$^{*}$ | -0.010$^{*}$ |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) |
| PROMOTER | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| $\sigma$(PROMOTER) | 0.015$^{*}$ | 0.018$^{**}$ | 0.012$^{\dagger}$ | 0.012$^{\dagger}$ | 0.013$^{*}$ | 0.012$^{\dagger}$ |
| | (0.008) | (0.007) | (0.008) | (0.007) | (0.006) | (0.007) |
| (1/Herfindahl)$^2$ | | | 0.001 | | | 0.000 |
| | | | (0.001) | | | (0.001) |
| N | 1015 | 1015 | 1015 | 1015 | 1015 | 1015 |
| adjusted $R^2$ | 0.039 | 0.038 | 0.039 | 0.026 | 0.026 | 0.027 |

also include the average promoter's share. The model specification also includes group dummies and calendar-year dummies. The inclusion of group dummies ensures that unobserved group-specific variables that may act upon the efficiency of its internal capital market are controlled for. The results are presented in table 4.6.

Columns (I) and (IV) present the results from the initial specification of the model. Group size has no effect on the value created by the ICM, irrespective of which measure of efficiency we use. This result does not change when we use another proxy of group size (such as the group's total assets or the number of affiliates). One explanation for this insignificance could be that group size is relatively constant over time, which would imply that a large part of the impact of group size on ICM value would be captured by the group-specific effect. We find a negative coefficient for ICM size, measured by the inverse of the Herfindahl index, but this effect is small and not statistically significant. The diversity of the internal capital market has a large and significantly negative effect on ICM value. The coefficient estimates of ICM diversity imply that a one standard deviation increase in diversity leads to a 0.26 standard deviation decrease in relative value added, and a 0.13 standard deviation decrease in q-sensitivity. Hence, the negative effect of diversity is also economically significant. Note that these findings are at odds with efficient ICM theory.[14]

We find no effect of the average promoter's share on ICM efficiency. However, the variation in the promoter's ownership stake across different group members has a positive effect on ICM value. This means that an increase in the controlling shareholder's incentive to tunnel capital from high ownership stake companies to low ownership stake companies increases the efficiency of the ICM. Relative value added increases by 0.22 standard deviation and $q$-sensitivity increases by 0.18 standard deviation as a result of a one standard deviation increase in the variation of the promoter's share. This evidence can only be reconciled with the expropriation view if controlling shareholders have large ownership fractions in firms with relatively good investment opportunities. We will investigate this possibility in more detail below.

One could argue that group size, ICM size and ICM diversity are essentially measuring the same effect. In this case, multicollinearity may render

[14] One may argue that in our model both the dependent variable, $\text{RVA}_{jt}$ (and $\text{QS}_{jt}$, as well as one of the independent variables, ICM diversity, are a function of $\bar{q}_{it}$, which may explain our result. However, we cannot see how this dependence would explain our result. ICM diversity, which is calculated as the coefficient of variation of the $\bar{q}_{it}$'s for all firms in group $j$, is increasing in $\bar{q}_{it}$ for $\bar{q}_{it} > \bar{q}_{jt}$ and decreasing in $\bar{q}_{it}$ for $\bar{q}_{it} < \bar{q}_{jt}$. The sign of the derivative of $\text{RVA}_{jt}$ (and $\text{QS}_{jt}$) with respect to $\bar{q}_{it}$ can be positive or negative, depending on excess investment in firm $i$. Hence, we find no *a priori* reason why their dependence on $\bar{q}_{it}$ would account for the negative relationship between ICM value and ICM diversity.

the coefficient estimates inconsistent. However, because the pairwise correlations between the different variables are rather low (they are all between -0.2 and 0.2), multicollinearity is unlikely to be a problem here. To check that the results are robust to changes in the specification of the model, we estimated several other models, one of which is reported in columns (II) and (V), respectively. Here, we dropped ICM size as an explanatory variable. Note that the coefficient estimates of the remaining variables remain alomst unchanged. It could also be argued that the effect of ICM size on ICM value initially is positive, but becomes negative if the group becomes too large. We allow for this possibility by including squared ICM size as an additional explanatory variable. The results are reported in columns (III) and (VI) of table 4.6. We find no evidence for a non-linear relationship between ICM size and the efficiency of the internal capital market.[15]

To investigate how ownership variables affect the allocation of capital, we perform an additional test. If the allocation of capital across group affiliates is driven by expropriation motives, we would expect positive excess investment for firms with a relatively high promoter's share. But if the allocation is mainly driven by investment opportunities, high-$q$ companies should have positive excess investment. To distinguish between these two views, we construct the following measures of excess investment. All group affiliates are sorted into one of four categories: companies with (1) high $q_{it}$ and high promoter's share, (2) high $q_{it}$ and low promoter's share, (3) low $q_{it}$ and high promoter's share, and (4) low $q_{it}$ and low promoter's share. High and low in this classification mean high and low with respect to the group-average. For each group, we calculate the total amount of excess investment for every category as the sum of excess investment for all affiliates of this group in that category. We regress the four measures of excess investment on ICM characteristics and ownership variables. The results are reported in table (4.7). The four columns refer to the four categories: the dependent variable in each column is the total amount of excess investment in firms in the appropriate category.[16] With respect to the variation in promoter's share,

[15] We also tested for a non-linear effect of group size on ICM efficiency. We found no significant effects.

[16] If, for a business group, the number of affiliates in a category is zero (e.g. because the number of affiliates is too small), we set the amount of excess investment in that category equal to zero. Setting them to missing instead does not change the results.

**Table 4.7. Excess investment in different types of firms**
Dependent variable is, for each year, the sum of excess investment in all firms that belong to the same group and fall into the appropriate category. The models also include group and calendar-year dummies. $N$ is the number of group-year observations. Statistical significance at the ten-, five-, and one-percent level is indicated by $^{\dagger}$, $^{*}$, and $^{**}$, respectively.

| **Variable** | **Coefficient** (Std. Err.) | | | |
|---|---|---|---|---|
| | I | II | III | IV |
| | Excess investment in firms with | | | |
| | high $q$, high promoter | high $q$, low promoter | low $q$, high promoter | low $q$, low promoter |
| diversity | -0.052$^{*}$ | 0.002 | -0.037$^{\dagger}$ | -0.013 |
| | (0.024) | (0.013) | (0.021) | (0.014) |
| $\sigma$(PROMOTER) | 0.017 | 0.011 | -0.028 | 0.036$^{\dagger}$ |
| | (0.038) | (0.019) | (0.033) | (0.022) |
| group size | 0.007 | -0.009 | -0.012 | -0.014 |
| | (0.018) | (0.009) | (0.016) | (0.011) |
| N | 1015 | 1015 | 1015 | 1015 |
| adjusted $R^2$ | 0.014 | 0.004 | 0.025 | 0.015 |

we expect to find a positive effect of the promoter's incentive to tunnel on the excess investment of companies in which the promoter has a high stake. This would imply a positive coefficient for the variation in the promoter's share in columns (I) and (III). We find no evidence of a significantly positive effect, however. As a matter of fact, the only effect that is significant at a reasonable level is the coefficient in column (IV), which suggests that an increase in the promoter's incentive to tunnel leads to an increase in the excess investment of low $q_{it}$, low ownership stake companies. If tunneling lies at the heart of the reallocation of capital in business groups, it is unclear why the controlling shareholder would tilt the allocation toward poor investment projects in which his ownership stake is small.

Moreover, columns (I) and (III) of table 4.7 report a significantly negative coefficient for diversity, whereas this coefficient is insignificant in columns (II) and (IV). This implies that the negative effect of ICM diversity on the

overall efficiency of the internal capital market (as reported in table 4.6) is largely due to firms with a relatively high promoter's share. Although this may suggest that a high promoter's share somehow distorts the efficient allocation of capital, it is not consistent with tunneling. If anything, we would expect a controlling shareholder to exploit every possibility to increase the value of his shareholdings, and thus to exploit ICM diversity to the benefit of the firms in which he owns a large stake. The results in tables 4.6 and 4.7 are therefore not consistent with the tunneling view.

In sum, we find that the reallocation of capital within business groups is not in line with efficient ICM theory. The efficiency of the internal capital market is negatively related to the diversity of the internal capital market. This finding is consistent with the results of Rajan et al. (2002), who find that the efficiency of internal capital markets in diversified companies in the US decreases with the diversity of the investment opportunities. This suggests that the reallocation of capital is more efficient in less diversified business groups. Moreover, although ownership variables seem to affect the allocation of capital, we find no evidence for the tunneling hypothesis, i.e. that the reallocation of funds is mainly driven by the controlling shareholder's incentive to expropriate minority shareholders.

### 4.3.4 Reallocation's effect on firm value

Of course, the main reason why we are interested in within-group capital allocation is that it may create or destroy value. To assess the importance of intra-group capital markets, we analyze the effect of ICM efficiency on (excess) value. Moreover, an analysis of the determinants of (excess) firm value can help to distinguish between the intermediation and expropriation view.

We start with an analysis of excess value measured at the group level. We calculate the dependent variable, excess group value, as the sum of excess firm value for all firms in the same group, where excess firm value is measured as the difference between a firm's actual market-to-book ratio and its imputed market-to-book ratio, $\bar{q}_{it}$ (i.e., the weighted average market-to-book ratio for stand-alone companies in the same industry).[17] We regress excess group

[17]Since share price data are more scarce than accounting information, analyzing the

**Table 4.8. Reallocation and group value**
Dependent variable is group excess value, measured as the sum of the excess value of all firms that belong to a certain group-year. Group and calendar-year dummies are included. $N$ is the number of group-year observations. Statistical significance at the ten-, five-, and one-percent level is indicated by $^{\dagger}$, $^{*}$, and $^{**}$, respectively.

| **Variable** | **Coefficient** (Std. Err.) | |
|---|---|---|
| relative value added | $4.525^{*}$ | |
| | (1.756) | |
| $q$-sensitivity | | $8.170^{**}$ |
| | | (1.940) |
| group size | $0.229^{\dagger}$ | $0.226^{\dagger}$ |
| | (0.124) | (0.124) |
| N | 1294 | 1294 |
| adjusted $R^2$ | 0.127 | 0.112 |

value on a measure of ICM efficiency, group size, and dummies for each group and each calendar year. The results are reported in table 4.8.

We find that ICM efficiency has a significantly positive effect on a group's excess value, irrespective of whether we use relative value added or $q$-sensitivity as a measure of ICM efficiency. The coefficient estimates imply that a one standard deviation increase in relative value added leads to a 0.07 standard deviation increase in group excess value, and that a one standard deviation increase in $q$-sensitivity increases group excess value by 0.11 standard deviation. This suggests that the reallocation of capital is an important characteristic of business groups in India, and confirms our earlier findings about the relevance of internal capital markets. Moreover, these results imply that investors are to some extent informed about the efficiency of a business group's internal capital market, and adjust their valuation accordingly.

A more detailed picture of the valuation effects of ICM efficiency can be obtained by analyzing the value consequences for different types of group

effect of business group's reallocation of capital on the value of the affiliates considerably reduces sample size. Instead of 7,034 firm-year observations on group affiliates, we only have information on share price for 3,896 firm-years. For this reason, we also perform a firm-level analysis as a robustness check.

affiliates. As before, we use the classification into the four categories based on the relative investment opportunities and the relative promoter's share for each company (see subsection 4.3.3). For each group-year and each of the four categories, we construct excess value as the sum of the industry-adjusted market-to-book value for all affiliates in the category of interest. For example, excess value for high $q$, high promoter's share companies measures for each group the sum of the excess value of its affiliates that have above group-average investment opportunities and above group-average promoter's share. We use these measures of excess value as the dependent variables in our models. The explanatory variables are ICM efficiency, group size, group dummies and calendar-year dummies, as before. Panels A and B of table 4.9 summarize the results.

In panel A, where we use relative value added as a measure of ICM efficiency, we find that the valuation effect of ICM efficiency is positive for companies with above group-average investment opportunities, and almost zero for firms with relatively poor investment opportunities. Although not surprising - ICM efficiency implies that capital is transfered from low-$q$ to high-$q$ companies -, this result demonstrates that the measure of ICM efficiency makes sense, i.e., it is related to real market values. More interestingly, the difference between the estimated coefficients in columns I and II suggests that, of the high-$q$ companies, the ones in which the promoter owns a relatively large stake benefit most from the internal capital market. This is confirmed by the results reported in panel B, where we use $q$-sensitivity as a measure of ICM efficiency. Again, we find that high-$q$ companies with a relatively large promoter's share benefit more from the efficiency of the internal capital market than firms with a small promoter's share. This suggests that the allocation of capital within a business group is tilted toward those companies where excess investments are especially valuable for the controlling shareholder.

Instead of examining the valuation effect of our measures of ICM efficiency, we can also directly analyze how the determinants of ICM efficiency affect excess value. More specifically, we analyze the valuation effect of ICM diversity, ICM size and the variation in the promoter's share. The results are reported in panel C of table 4.9. We find a negative coefficient estimate on diversity in column I, implying that the excess value of firms with relatively good invest-

**Table 4.9. Reallocation and group value**
Dependent variable is, for each year, the sum of excess value of all firms that belong to the same group and fall into the appropriate category. The models also include group and calendar-year specific effects. $N$ is the number of group-year observations. Statistical significance at the ten-, five-, and one-percent level is indicated by $^{\dagger}$, $^{*}$, and $^{**}$, respectively.

| **Variable** | **Coefficient** (Std. Err.) | | | |
|---|---|---|---|---|
| | I | II | III | IV |
| | high $q$, high promoter | high $q$, low promoter | low $q$, high promoter | low $q$, low promoter |
| **Measure of efficiency: RVA** | | | | |
| relative value added | 0.762** | 0.202 | 0.002 | 0.016 |
| | (0.259) | (0.240) | (0.144) | (0.138) |
| group size | 0.035† | 0.036* | 0.019† | -0.008 |
| | (0.018) | (0.017) | (0.010) | (0.010) |
| N | 1294 | 1294 | 1294 | 1294 |
| adjusted $R^2$ | 0.039 | 0.019 | 0.046 | 0.008 |
| **Measure of efficiency: QS** | | | | |
| $q$-sensitivity | 0.676* | 0.133 | 0.142 | -0.106 |
| | (0.288) | (0.266) | (0.160) | (0.153) |
| group size | 0.035† | 0.036* | 0.019† | -0.008 |
| | (0.018) | (0.017) | (0.010) | (0.010) |
| N | 1294 | 1294 | 1294 | 1294 |
| adjusted $R^2$ | 0.023 | 0.017 | 0.046 | 0.008 |
| **Direct effect of variables** | | | | |
| diversity | -0.073* | 0.017 | 0.026 | -0.019 |
| | (0.036) | (0.034) | (0.017) | (0.020) |
| (1/Herfindahl) | -0.038 | -0.070** | 0.008 | -0.018 |
| | (0.025) | (0.024) | (0.012) | (0.014) |
| $\sigma$(PROMOTER) | -0.032 | -0.200** | 0.059* | -0.026 |
| | (0.060) | (0.058) | (0.028) | (0.033) |
| group size | 0.077** | 0.094** | 0.028* | -0.013 |
| | (0.028) | (0.027) | (0.013) | (0.015) |
| N | 1015 | 1015 | 1015 | 1015 |
| adjusted $R^2$ | 0.043 | 0.031 | 0.062 | 0.016 |

ment opportunities and a relatively high promoter's share decreases as the diversity of investment opportunities increases. This is consistent with the large valuation effect of ICM efficiency for this type of companies (see panel A and B) and the negative relation between diversity and ICM efficiency.

Furthermore, the coefficient estimate on the variation of the promoter's share is significantly negative in column II and significantly positive in column III. This implies that an increase in the controlling shareholder's incentive to tilt the allocation toward high promoter's share companies results in a decrease in the excess value for firms with good investment opportunities but low promoter's share, and an increase in the excess value for firms with relatively poor investment opportunities, but high promoter's share. This suggests that a controlling shareholder destroys value for high-$q$ companies in which his ownership stake is small, and creates value for low-$q$ companies in which his ownership stake is large. Note, however, that we do not find a positive coefficient on the variation in promoter's share in column I.

In sum, we find that the efficiency of the reallocation of capital within a business group has a substantial and significant effect on how investors value the affiliates of this group compared to stand-alone peers. The excess value of a group affiliate is positively affected by the difference between its investment opportunities and the group average investment opportunities, but only if the group's internal capital market is efficient. Groups that reallocate their funds inefficiently will find that affiliates with relatively poor investment opportunities are valued higher by investors than firms with relatively good investment opportunities. This suggests that investors recognize the effect that the reallocation of capital within a business group may have on a firm's capital expenditure, and that they adjust their valuation of these firms accordingly.

## 4.4 Robustness tests

The analysis of reallocation is based on the proxy for a group affiliate's investment opportunities. For a group member, we take the average market-to-book value of stand-alone companies as a measure of its investment opportunities. However, one may argue that market imperfections render stand-alone companies' market values an imperfect measure of a group company's invest-

ment opportunities. After all, one of the main hypotheses is that business groups are a response to market imperfections. This would imply that the market values of stand-alone companies are more distorted by market imperfections than the market values of group affiliates. For several reasons, we believe that this argument does not invalidate our analysis.

First, the distorted market values are only problematic if the market imperfections affect the market value of firms in different industries in different ways. That is, if for some industries the difference between the actual market value and their 'intrinsic' value is larger than for other industries, the proxy will be biased. Hence, the mere fact that market imperfections lead to 'incorrect' market values does not necessarily cause the proxy to be incorrect. Moreover, since the proxy is based on a weighted average of all stand-alone companies in the same industry, many firm-specific effects are likely to cancel out.

Second, suppose that the market value of group affiliates would be a better indicator of investment opportunities than the market value of stand-alones because group affiliates have a lower cost of capital, i.e., they are less financially constrained. If the reduction in the cost of capital is the same for all affiliates of a certain group, the proxy of investment opportunities based on stand-alone companies is still correct, in the sense of sorting the group affiliates with respect to investment opportunities.

Third, suppose that the market value of stand-alone companies is not a good proxy for 'intrinsic' investment opportunities. This would imply that low-$q$ companies (as measured by the proxy) either are in industries with poor investment opportunities (i.e., the proxy is correct) or are in industries where stand-alone companies face severe market imperfections (i.e., the proxy is incorrect). So, finding higher excess investment for low-$q$ companies may either be a sign of inefficient reallocation (if the proxy is correct), or it may indicate the (efficiently) lower cost of capital for group affiliates. In the latter case, we would expect the excess value for these companies to be high. This suggests a formal test of what the market value of stand-alone companies actually measures. If $q$ is indeed a measure of 'intrinsic' investment opportunities, we would expect higher investments to be especially valuable for high-$q$ companies. On the other hand, if $q$ does not measure investment opportunities because of market imperfections, the relationship between $q$

**Table 4.10. Robustness test**
Dependent variable is excess value, measured as a firm's actual market-to-book value minus the weighted average market-to-book value of stand-alone peers. $\bar{q}_{it}$ measures a group affiliate's imputed investment opportunities, and $\bar{q}_{jt}$ measures the average investment opportunities of the group. The models include firm and calendar-year dummies. Statistical significance at the ten-, five-, and one-percent level is indicated by $^{\dagger}$, $^{*}$, and $^{**}$, respectively.

| **Variable** | **Coefficient** (Std. Err.) | | |
|---|---|---|---|
| | all firms | $\bar{q}_{it} > \bar{q}_{jt}$ | $\bar{q}_{it} \leq \bar{q}_{jt}$ |
| EXINVEST | -0.048 | 0.663$^{*}$ | 0.101 |
| | (0.169) | (0.303) | (0.082) |
| $q$ * EXINVEST | 0.599$^{**}$ | | |
| | (0.139) | | |
| N | 2465 | 1274 | 1191 |
| adjusted $R^2$ | 0.184 | 0.048 | 0.064 |

and a group affiliate's market value becomes unclear. If $q$ is more related to the degree of market imperfections than to investment opportunities, higher investment could even be most valuable for low-$q$ companies, i.e., companies that would have suffered most from market imperfections if they were stand-alones.

We test the competing views by regressing excess value on excess investment and the interaction of excess investment and $q$. The interaction term measures how the valuation effect of higher investment depends on $q$. Moreover, we include calendar-year dummies and firm-specific effects as explanatory variables. The result are reported in table 4.10. We find a significantly positive coefficient for the interaction term, implying that higher investments are especially value enhancing for high-$q$ companies. This is consistent with $q$ being a good proxy for investment opportunities. As an additional test, we also analyze how the valuation effect of excess investment depends on $q$ by splitting the sample into high-$q$ and low-$q$ companies, where high and low are defined relative to the group-average $q$. As reported in the last two columns of table 4.10, the effect of excess investment on firm excess value is high and significant for high-$q$ group affiliates, whereas it is insignificant for

low-$q$ companies. Again, these results are consistent with $q$ being a proxy for investment opportunities. We therefore conclude that the assertion that $q$ might measure the degree of market imperfections instead of investment opportunities is not supported by the data.

## 4.5 Conclusion

In this chapter, we have analyzed the reallocation of capital within business groups by comparing the capital expenditure of group affiliates and stand-alone peers in India. We find that group affiliation has a significant effect on the investment behavior of a firm. With respect to the efficiency of the internal capital markets in business groups, we find that reallocation is inefficient, on average. We find that there is no relationship between excess investment and the relative investment opportunities, $(\bar{q}_{it} - \bar{q}_{jt})$, of a group affiliate. This is at odds with efficiency, which requires firms with better investment opportunities to have higher excess investment. Moreover, we find that groups do not invest more in high-$q$ companies.

Although reallocation within groups is not efficient in general, it is efficient for some groups. We find that the efficiency of reallocation is decreasing in the diversity of a group. Moreover, we find that the efficiency of a group's internal capital market has a profound impact on the value of its affiliates. This suggests that the reallocation of capital is indeed an important characteristic of business groups, and that whether or not group affiliation is value enhancing depends at least partly on the efficiency of its internal capital market.

With respect to ownership variables, we find that these variables do explain some of the variation in ICM efficiency. However, contrary to what the tunneling view would predict, we find ICM efficiency to increase with the variation in the promoter's share. We do find evidence that the controlling shareholder's incentives affect the amount of excess investment. Firms in which the controlling shareholder owns a large stake are found to have higher excess investment. Moreover, the valuation effect of group affiliation is partly determined by ownership variables. First, firms with a high promoter's share benefit more from the efficiency of the internal capital market. Second, an increase in the promoter's incentive to tunnel leads to a decrease in excess

value for firms with good investment opportunities and a low promoter's share, whereas it increases the excess value of firms with poor investment opportunities and a high promoter's share.

The evidence suggests that both intermediation and tunneling play a role in Indian business groups. Some groups create value by reallocating capital from firms with poor investment opportunities to firms with good investment opportunities. This is mainly true for less diversified groups: as groups become more diversified, the efficiency of the reallocation of capital decreases. The reallocation of capital is also driven by the controlling shareholder's interests to tilt the allocation towards companies in which his ownership stake is large. Note, however, that this is not always value-destroying. We find that ICM efficiency increases with the controlling shareholder's incentive to tunnel, which suggests that tunneling may very well lead to efficient transfers of capital. It may be the case that some efficient transfers of capital are not feasible in a 'normal' internal capital market, but become feasible through a combination of the controlling shareholder's incentives and his ability to exercise control.

Moreover, firms with relatively poor investment opportunities may benefit from tunneling if a large fraction of their shares is owned by the controlling shareholder. This may be part of the solution to an important empirical puzzle: why would minority shareholders invest in a company if they know that the controlling shareholder will only act in his own interest? Our results suggests that, since the controlling shareholder's interests are sometimes aligned with that of minority shareholders, minority shareholders may benefit from tunneling.