

Discussion Paper No. 11-014

**Do Residential Property  
Companies Systematically Adjust  
Their Capital Structure?  
The Case of Germany**

Björn-Martin Kurzrock, Frieder Mokinski,  
Felix Schindler, and Peter Westerheide

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Centre for European  
Economic Research

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## **Non-technical Summary**

Our paper analyzes the corporate financing behavior of German residential property companies. The German residential property industry is characterized by a predominance of non-listed companies with different legal forms and a large variety of company sizes. Not much is known about the considerations driving the choice of the capital structure of these smaller, non-listed companies, since previous research has almost exclusively focused on listed companies.

We test whether adjustments in the financing structure of residential property companies can be explained by one or both of the dominating principles of corporate capital structuring: the pecking order theory and the trade-off theory. The pecking order theory argues that, due to information asymmetries in external finance, internal financing out of the cash flow is the preferred source of corporate finance. If internal financing is not available, the first resort is debt, while equity is only issued if the other forms are unavailable or only available at unreasonable cost.

The trade-off theory suggests that a firm's optimal level of debt balances the benefits and costs of debt. The benefits of debt are mainly seen in tax savings and disciplining effects on managers, thereby mitigating conflicts between managers and owners of a firm. Countervailing costs of increasing debt are a growing risk of bankruptcy and rising costs of financial distress.

We find that capital structure adjustment behavior differs largely among property companies of different legal form. In general, we find support for pecking order considerations in capital structuring decisions of German residential property companies. The strongest effects are observed for housing cooperatives. This is the only category of firms in which we can observe capital structure targeting behavior as explained by the trade-off theory of capital choice. The fact that the strongest effects in the pecking order theory regressions and the trade-off theory regressions are observable for housing cooperatives reflects both the strong propensity of these organizations for targeting a conservative financing structure and the limited flexibility in adjusting their equity basis. As a consequence, housing cooperatives must finance additional investments first through debt and can only successively raise new equity.

Independent from the legal form, we find an indication for a size effect in that larger companies – other things being equal – rely less on debt financing than smaller ones, which is in accordance with the pecking order theory.

## Das Wichtigste in Kürze

In der vorliegenden Untersuchung wird das Finanzierungsverhalten deutscher Wohnungsunternehmen analysiert. In dieser Branche sind in Deutschland Unternehmen verschiedener Rechtsformen und Größenordnungen tätig, die in der Regel nicht börsennotiert sind. Bisher ist wenig über das Finanzierungsverhalten kleiner und mittlerer nicht-börsennotierter Wohnungsunternehmen bekannt. Frühere Untersuchungen haben sich nahezu ausschließlich mit börsennotierten Unternehmen befasst.

Wir fragen, ob Anpassungen in der Kapitalstruktur von Wohnungsunternehmen durch die dominierenden Prinzipien der Kapitalstrukturwahl erklärt werden können: die Pecking-Order-Theorie und die Trade-off-Theorie. Nach der Pecking-Order-Theorie folgen die Firmen in ihrem Finanzierungsverhalten einer sogenannten „Hackordnung“: Wegen Informationsasymmetrien an den Finanzmärkten bevorzugen sie zunächst die interne Finanzierung aus dem Cash Flow, erst danach wählen sie die Kreditfinanzierung. Zur externen Eigenkapitalfinanzierung greifen sie nur als letztem Mittel. Die Trade-off-Theorie betont dagegen die Steuervorteile und den Effekt der Disziplinierung von Managern durch den Einsatz von Fremdkapital, denen allerdings steigende Insolvenzrisiken und Risikoprämien gegenüberstehen.

Unsere Ergebnisse zeigen deutliche Unterschiede zwischen verschiedenen Rechtsformen. Im Allgemeinen finden wir Anhaltspunkte für ein Pecking-Order-Verhalten der deutschen Wohnungsunternehmen. Die stärksten Effekte sind für die Wohnungsgenossenschaften zu beobachten. Die Unternehmen dieser Rechtsform sind auch die einzigen, die zugleich ein Verhalten gemäß der Trade-off-Theorie erkennen lassen. Die vergleichsweise deutlichen Effekte bei den Genossenschaften lassen sich mit der ausgeprägten Neigung dieser Unternehmen zu einem konservativen Finanzierungsverhalten bei gleichzeitig beschränkter Flexibilität zur Aufnahme neuen Eigenkapitals erklären: Genossenschaften müssen neue Investitionen daher zunächst mit Fremdkapital finanzieren und können erst sukzessive neues Eigenkapital aufbauen.

Unabhängig von der Rechtsform finden wir auch einen Unternehmensgrößeneffekt: Demnach nehmen große Unternehmen weniger Fremdkapital als kleinere auf. Auch dies lässt sich mit Aussagen der Pecking-Order-Theorie erklären.

# Do Residential Property Companies Systematically Adjust Their Capital Structure? The Case of Germany

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## Abstract

This paper analyzes whether predominantly non-listed corporations in the residential property industry systematically adjust their capital structure to changing financing requirements. Since previous research almost exclusively focused on listed companies, little is known about the considerations that drive the choice of capital structure of non-listed companies. We therefore adopt established testing approaches for the pecking order theory and the trade-off theory from the finance literature, which we then apply to a sample of 1,300 German residential property companies. These companies are characterized by various legal forms and large differences in size. We find that capital structure adjustment behavior differs largely among property companies of different legal forms. While housing cooperatives behave in line with the trade-off theory, the behavior of stock companies and corporations with limited liability is more in line with the pecking order theory.

**Keywords:** Financial Leverage, Capital Structure, Property Companies, Real Estate Finance

**JEL Classifications:** G32, C20, L85

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## 1 Motivation and outline

Capital structure is one of the key topics in corporate finance.<sup>1</sup> Still – in this respect – little is known about non-listed residential property companies (RPCs). These companies differ from listed RPCs with respect to attainable sources of financing, typical investors, and taxation rules. Furthermore, some companies, e.g. housing cooperatives, typically pursue not only economic, but also social goals. Naturally, the question arises how these differences feed back into capital structure adjustments: do we observe similar behavior for non-listed and for listed RPCs?

We adopt testing approaches originally developed by Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) to our research framework and apply these to a unique sample of 1,300 German residential property companies (GRPCs). The sample period spans from 1996 to 2009. The sample accounts for the major legal forms of GRPCs; it can be regarded as representative of the German residential property sector, which is dominated by small and medium-sized non-stock corporations.

We find that non-stock corporate enterprises resemble stock corporations in their financing behavior. Similar to Shyam-Sunder and Myers (1999), our empirical results show that property companies behave in line with the pecking order theory (POT) rather than the trade-off theory (TOT) and do not – with the notable exception of housing cooperatives – pursue a target capital structure. We argue that their particular characteristics of housing cooperatives give rise to this financing behavior.

The outline of this paper is as follows: first we give a brief overview of the POT and the TOT and comment on the explanatory power of the two (Section 2). We then review the recent empirical literature on the capital structure choice of RPCs (Section 3), and briefly describe the German residential real estate sector (Section 4). Thereafter we describe the data set and the empirical approach of our study (Section 5). The empirical results are presented and discussed in Section 6. A conclusion is given in Section 7.

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<sup>1</sup> Myers (2001) *inter alia* provides a comprehensive overview of the literature. See also Bharath et al. (2010), p. 3212.

## **2 Theories of capital structure**

### **2.1 Pecking order theory (POT)**

The POT builds upon the basic assumption of asymmetric information on capital markets. The costs of different forms of financing depend on their exposure to asymmetric information. Outside investors realize that exposure to private information of insiders is large for some forms of financing, such as equity, while it is smaller for other forms, such as debt: equity is compensated with (risky) residual profits, while debt providers receive a contractually fixed payment subject to the single risk that the company fails. Therefore, outside investors, who presume that the company management acts in the interest of existing shareholders, will demand higher compensation for equity than for debt. Accordingly, the POT predicts a hierarchy of forms of financing (Myers 1984; Myers and Majluf 1984): internal financing is the superior choice since it can be accessed without the need to overcome information asymmetries. If internal financing is not available, the first resort is debt, while equity is only issued if the other forms are unavailable or only available at unreasonable cost. These cost-related arguments for a financial pecking order are matched by independency considerations. Other things being equal, managers likely prefer financing instruments involving as little intrusion into their business by external capital providers as possible (see inter alia Cosh and Hughes 1994; Jordan et al. 1998; Hamilton and Fox 1998; Swinnen et al. 2005).

### **2.2 Trade-off theory (TOT)**

The TOT suggests that a firm's optimal level of debt balances the (marginal) benefits and costs of debt.<sup>2</sup> The most important motive for issuing debt or for demanding bank credit according to the TOT is its function as a tax shield, i.e. the possibility to deduct interest from corporate income taxes. Moreover, it mitigates agency conflicts between managers and owners of a firm (Grossman and Hart 1982; Jensen 1986; Stulz 1990). Higher debt limits the volume of free cash flow at the disposal of managers and forces them to regularly pay their debt obligations. Costs of increasing debt are a growing risk of bankruptcy and rising costs of fi-

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<sup>2</sup> A simple static trade-off model was already introduced by Kraus and Litzenberger (1973). They mention that “[t]he optimization of the firm's financial structure involves a trade-off between the tax advantage of debt and bankruptcy penalties” (p. 915). Therefore, the designation as TOT might be ascribed to this paper, albeit earlier contributions by Robichek and Myers (1965) and Hirshleifer (1966) already analyzed this matter. The term “trade-off theory” to our knowledge was introduced by Myers (1984, p. 577).

nancial distress. Costs of financial distress comprise in a general definition “the legal and administrative costs of bankruptcy, as well as the subtler agency, moral hazard, monitoring and contracting costs which can erode firm value even if formal default is avoided” (Myers 1984, p. 584). Moreover, debt exerts not only disciplining effects but it also incurs agency problems: in particular, debt gives incentives for asset substitution, i.e. for undertaking projects with high potential for profits for shareholders but also with high risk to be carried mainly by lenders if shareholders have limited liability (Jensen and Meckling 1976).

This implies on the one hand that firms with a higher risk of bankruptcy have a lower borrowing capacity than those with valuable and marketable assets in place. On the other hand, it basically entails a positive relationship between profitability and leverage: the higher the taxable profits of a company, the higher the value of debt as a tax shield.

One immediate consequence of these considerations is that firms target a certain debt ratio depending on their profitability and structural characteristics which determine their debt capacity, expected bankruptcy risks, and costs of financial distress.

### **2.3 Academic debate about the relevance of the POT and the TOT**

A recent seminal paper by Lemmons et al. (2008) challenged the long tradition of explaining corporate capital structure by pecking order or trade-off considerations. They point to dominant company-specific effects governing capital structure choice. According to their findings, high- and low-leverage companies tend to stay on their respective levels of debt for long periods of the company history. This has not yet been explained by any of the usually applied factors, such as industry characteristics, ownership structure, size, profitability, collateral, or growth opportunities.

In a similar fashion, Fama and French (2005, p. 580-581) conclude that "it is probably time to stop running empirical horse races between [the POT and the TOT] as stand-alone stories for capital structure. Perhaps it is best to regard the two models as stable mates with each having elements of truth that help explain some aspects of financing decisions." Byoun (2008) addresses this issue as he combines the basic intuition of the POT with the observation that capital structure adjustments follow financial deficits or surpluses.

As we have no long-term panel data at our disposal we are not in the position to apply long-term fixed effects regressions as in Byoun (2008) or Lemmons et al. (2008). However, we do account for the critique by Lemmons et al. (2008) to traditional capital structure analyses, referring to company-specific adjustment processes instead of attempting to explain the debt



level. In other words, we do not primarily focus on explaining capital structures themselves but on adjustments back to company-specific patterns in capital structure adjustments. Put differently, our question is whether GRPCs do systematically adjust towards their company-specific capital structure.

Uniform expectations for the amount of leverage in RPCs – compared to other industries – can only be derived for the effect of collateral and tangibility of assets. Given the fact that most assets of property companies are tangible and can therefore serve as collateral we expect higher average leverage ratios than in other industries. With respect to other potentially impacting factors such as size, profitability, and growth opportunities, expectations are ambiguous since expected coefficients are contrary for the TOT and the POT.

If time-varying parameters and adjustment costs or asymmetries in taxation are prevalent, it can be shown that the process of targeting debt ratios resembles pecking order behavior in many respects. In a process of mean reversion, the typical negative correlation between profitability and leverage can show up in dynamic trade-off models as well. The same is true if we assume that retained cash flow is taxed less than distributed cash flow (see Frank and Goyal (2007, p. 12) for an overview of dynamic the TOT models; a recent example is presented in Strebulaev (2007)).

Baker and Wurgler (2002) argue that the time-varying relative costs of debt and equity will also have an impact on capital structure decisions. Firms tend to issue equity in times when equity prices are high and costs of equity are low compared to interest on debt. This behavior can have long-lasting effects on the capital structure of companies and can blur the influence of the POT and the TOT, which can nonetheless be regarded as guiding principles of capital structure adjustments.

### **3 Review of the empirical literature on real estate firms**

Previous research on the (optimal) capital structure of real estate firms such as property companies, particularly on Real Estate Investment Trusts (REITs), relates to the POT and the TOT with a primary focus on the US and UK markets. To our knowledge, GRPCs have not been investigated to date. Results from previous research with respect to real estate firms are ambiguous, although usually in line with one of the theories depending on firm type, firm size, and region. Recent studies yield the following results: On the one hand, Bond and Scott (2006) find from a regression analysis of 18 UK listed property companies that real estate firms face information asymmetries which, all else equal, force upon them a pecking order of

financial choice, i.e. a preference of internal over external finance, and of debt over equity. To avoid adverse signaling effects of external financing and of equity in particular, smaller real estate firms tend towards the POT, indicating a size effect.

On the other hand, Ooi (2000) finds empirical evidence from regressions on 83 UK listed property companies that suggests the existence of target debt-to-equity levels determining debt-equity decisions in property companies. Large firms tend to issue more public debt while smaller property firms rely more on equity issues. Furthermore, *large* security issues are more likely to be debt issues. Brounen and Eichholtz (2001) investigate stock price reactions to the announcements of 139 security offerings by listed European property companies. They document a modest non-negative price reaction to debt offerings and a significantly negative reaction to equity issues. In line with the TOT they also find that higher corporate tax brackets correspond with stronger negative announcement reactions to equity issues.

In a regression analysis of 37 REITs and 60 property companies, Morri and Christianziani (2009) find that REITs are significantly less leveraged than other real estate firms in Europe. They point out that this may be due to the tax-exempt status of REITs (akin Boudry et al. 2010), although regular debt issuances can also be found for REITs (Feng et al. 2007; Morri and Beretta 2008). Ertugrul et al. (2008) find a positive significant relation between the use of derivatives and financial leverage in the REIT industry, indicating managerial risk aversion and the financial distress costs as a motive for using derivatives in the REIT industry. In a panel analysis of 308 UK property companies, Westgaard et al. (2008) find that profitability, tangibility, and size are positively related to leverage while asset turnover and income variability show a negative relationship. This would again point towards the TOT.

The impact of corporate ownership on capital structure decisions in particular has been subject to a wide range of general corporate finance literature. In a regression analysis of 243 US REITs, Dolde and Knopf (2010) find that institutional ownership is significantly negatively related to leverage ratios based on book and market values and conclude that incentives are aligned between insiders and institutional owners of REITs at high levels of insider ownership. Size (+), profitability (+), earnings volatility (-), recent price history (-), and dividend payout ratio (+) are significantly related to one or both of the two leverage ratios. As may be expected, the business model of a property company is also relevant for capital structure decisions. Ooi (1999) shows in a panel analysis of 83 UK property companies that asset structure, business orientation, and the level of involvement in property development are significant determinants of the corporate debt policy. Financial distress consideration has a significant

influence as well. While these results again relate to the TOT, the analysis also shows that property investment managers take into account the prevailing market sentiment and borrowing costs (market timing) when making capital structure decisions. Corporate performance and tax burden, however, do not appear to have any significant effect on capital structure decisions, at least in the short run, as in Ooi (1999). Investigating 143 US REITs, Ooi et al. (2010) also conclude that TOT behavior plays a secondary role compared to market timing behavior in financing decisions.

By contrast, in another recent regression study of 186 US REITs, Ertugrul and Giambona (2010) argue that the POT and the TOT may be limited in explaining the capital structure of REITs due to the strongly regulated and competitive setting in which REITs operate. They find that leverage ratios of REITs depend on the median leverage ratio and the volatility of operational performance in their segment, consistent with the competitive equilibrium model of Maksimovic and Zechner (1991).

While a large portion of previous research relates to REITs and listed property companies, offering miscellaneous results depending on time, region, and research approach, the case of non-listed RPCs may be notably different as Brav (2009), amongst others, finds with a large sample of listed and non-listed UK firms.<sup>3</sup> In our research, we are the first to focus on GRPCs which are usually not listed. Thereby, we introduce regression models set forth in previous corporate finance studies to specifically test for the POT and the TOT and – specific in our models – also distinguish all major legal forms of GRPCs which are described in Section 5.3. Characteristics such as liability, taxation, and ownership structure, among others, differ substantially between companies of different legal forms and, thus, the legal form may influence capital structure decisions.

## **4 Characteristics of the German residential real estate sector**

### **4.1 General characteristics**

GRPCs and the underlying direct real estate market differ in several ways from other industries and non-RPCs. While the first two arguments outlined in the following are valid for real estate markets in general, the latter three characterize the German residential real estate mar-

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<sup>3</sup> In particular, Brav (2009, p. 265) finds that listed firms are more likely to raise or retire equity than non-listed firms characterized by only few shareholders. Moreover, applying a target adjustment model as in Shyam-Sunder and Myers (1999), he shows that debt ratios of non-listed firms exhibit higher persistence and revert to the mean more slowly.

ket in particular.

First, the assets of RPCs consist for a major part of market-tradable real estate. Therefore, company values are mainly determined by the assessed market values of their properties. From a theoretical point of view, the sum of all property values should be equal to the company value (equity) plus the present value of overhead costs and debt. For this reason, the net asset value of a real estate firm is often used as an alternative valuation approach to market valuation on stock markets, although most listed property companies in Germany are traded at significant discounts.

Second, real estate firms, and GRPCs in particular, are characterized by a stable cash flow. For investors, this means that the return volatility might be lower and the forecast of future cash flows is more reliable compared to other industries.

Third, most GRPCs are small and medium-sized, often owning less than 5,000 residential units, as in our sample, and are not publicly listed. German REITs are not allowed to hold residential real estate built before 2007 and located in Germany in their portfolios under German REIT legislation.<sup>4</sup> This may have several implications. First of all, GRPCs are less dependent on stock and corporate bond markets. As a consequence, they have to rely mainly on bank credit as an external source of financing. Furthermore, due to missing capital market control and lack of coverage by analysts, asymmetric information and its consequences may be more prevalent for this sector.

Fourth, the German residential real estate market is characterized by low homeownership rates and a low concentration on the supply side of rental markets. Beside private owners, the legal forms of GRPCs are manifold, which results in specific characteristics and tax issues (see Section 4.2). Furthermore and mainly due to the German social housing legislation of the 1950s and 1960s, municipal authorities form a substantial part in the ownership structure of GRPCs. As determined by the market structure, GRPCs differ substantially from the UK or US residential real estate markets, which are more often investigated – usually with samples of listed property companies and REITs.

Fifth, compared to residential real estate markets in other countries and real estate sectors in general, the performance of residential real estate in Germany has shown much less volatility

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<sup>4</sup> See § 1 (1) and § 3 (9) of the German REIT Act (REITG).

over the past decade and is dominated by long-term investors. Consequently, even the influence of the recent financial crisis should be less severe for the German residential real estate market and its investors.

Since most studies on this subject relate to the Anglo-Saxon markets in the UK and the US where listed (residential) property companies and REITs prevail, the analysis of GRPCs offers new insights in addition to previous research.

## **4.2 Tax considerations**

Differences in the taxation of equity and debt are potentially highly relevant for the optimal capital structure of GRPCs. In particular, incorporated companies (in contrast to privately owned and non-incorporated enterprises which are not subject to corporate taxation) suffer from double taxation on the corporate and on the individual level. While companies cannot deduct the cost of equity (i.e. distributed dividends) from their taxable income, the paid interest on debt is usually tax deductible with certain limitations.

The profits of German corporations are taxed at a linear corporate income tax rate. The profits of non-incorporated enterprises are taxed on the level of the individual shareholder. This also applies to interest payments to individual debt holders and to dividends of incorporated companies distributed to individual shareholders.

Additionally, corporate profits of both incorporated and non-incorporated companies are subject to a local business tax. Shareholders of non-incorporated companies are allowed to deduct business tax to a certain extent from their income taxes. Interest payments on debt are only partly deductible from the business tax basis.

Another very important topic with respect to real estate taxation is non-debt tax shields, in particular deductions for depreciation. Here legislation has changed in the period under consideration from a declining-balance method scheme for buildings purchased or built before end of 2005 to a linear deduction scheme.<sup>5</sup>

This brief description demonstrates that tax considerations are potentially highly important for capital structure planning of RPCs in Germany. Substantial differences should be expected particularly between non-incorporated and incorporated companies. Our sample, in principle, only includes incorporated companies. However, one exception is the hybrid structure of a

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<sup>5</sup> See § 7 (5) of the German Income Tax Act (EStG).

GmbH & Co. KG, which is non-incorporated in general (as a KG), but has an incorporated shareholder with limited liability (GmbH). In practice, this structure can be used either to limit liability of the firm or to reduce corporate taxes.

Another exception to the principle of double taxation on corporate and shareholder level are cooperatives: as long as letting provides for more than 90 per cent of their yield, they are exempt from corporate income tax and local business tax.

For these reasons, we expect tax shields in general to be less important for non-incorporated companies, some hybrids (GmbH & Co. KG), and some cooperatives than for the other legal types.

## **5 Data and methodology**

The data employed in this research differ in two major aspects from the data used by previous research on the capital structure of real estate firms. First, we use a substantially larger sample of companies and second, in our sample of GRPCs and typical for the German market, only a small fraction of the firms are listed. The large sample and its composition come at the cost of limited data availability in some cases. All data are obtained from the Dafne database (Bureau van Dijk). The sample period spans from 1996 to 2009. The sample allows us to distinguish companies with respect to their legal forms: most GRPCs are not publicly listed and thus, have mainly access to bank credit and shareholder loans. In the following, we sketch the steps towards our working sample, the empirical modeling, and the sample statistics.

First, we choose only companies that state “rent and lease of own or leased residential estates, residential building and dwellings” (WZ Code 2008: L68201) as their primary activity. Second, we require availability of various items from the balance sheets and from profit and loss accounts which allow for the construction of variables needed in our tests of the POT and the TOT. Third, a minor share of the companies in our sample is non-incorporated. Due to their small number and potentially different regulation (with respect to this legal form), we exclude these cases from our sample, with the exception of some hybrid companies, non-incorporated but with an incorporated main shareholder. Finally, since systematic adjustments in a company’s capital structure are at the heart of this research, we exclude cases where we either find extreme adjustments to the capital structure or where we find extreme financing deficits as

outliers.<sup>6</sup> For the tests of the POT and the TOT applied in the following, we use a procedure similar to Shyam-Sunder and Myers (1999). Similar approaches are also taken by Frank and Goyal (2003, 2009), and Huang and Ritter (2009).

## 5.1 Modeling of the POT

The POT says that unless leverage is extremely high, companies cover their financing deficits by raising new debt. The idea is that debt (relative to other external sources of financing) economizes on costs caused by informational asymmetries between a superiorly informed company management, which acts in favor of existing shareholders, and outside investors. Thus, the POT implies: “*Change in Liabilities*” = “*Financing Deficit*”, i.e. the financing deficit is entirely covered by raising new debt. The stylized POT regression is:

$$\Delta D_{it} = a + b_{\text{POT}} \text{DEF}_{it} + e_{it}, \quad (1)$$

where:

$\Delta D_{it}$  = change in liabilities of firm  $i$  in period  $t$ ,

$\text{DEF}_{it}$  = financing deficit, and

$e_{it}$  = random disturbance term.

For the coefficients  $a$  and  $b$ , the POT predicts:  $a = 0$ ,  $b_{\text{POT}} = 1$ .

The change in liabilities ( $\Delta D_{it}$ ) and the financing deficit ( $\text{DEF}_{it}$ ) are defined in the following way:

$$\Delta D_{it} = D_{it} - D_{it-1},$$

where:

$D_{it}$  = overall liabilities of firm  $i$  in period  $t$ , and

$$\text{DEF}_{it} = \text{DIV}_{it} + X_{it} + \Delta W_{it} - C_{it},$$

where:

$\text{DIV}$  = dividend payments,

$X$  = capital expenditure (proxied by change in tangible assets),

$\Delta W$  = net change in working capital, and

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<sup>6</sup> We exclude observations in which the year-on-year adjustment to the ratio of overall liabilities to total assets exceeds twenty percentage points.

C = operating cash flow after interest and taxes.

Thus, we slightly modify the approach of Shyam-Sunder and Myers (1999): instead of using the change in long-term liabilities – as they do – we use overall liabilities as the dependent variable. Accordingly, we also include short-term liabilities, which must be repaid in the respective period, in the financing deficit, while Shyam-Sunder and Myers (1999) only refer to currently expiring long-term liabilities. We choose to proceed in this way due to lack of data on the maturity structure of liabilities for a significant number of cases. Furthermore, the results should be quite robust against this modification since GRPCs mainly use long-term liabilities given the long-term nature of their investments. This might, of course, be different for non-property companies. As a robustness check, we also test the model in the very specification proposed by Shyam-Sunder and Myers (1999) for the subsamples for which such data are at hand (see tables 2 and 3).

As in Shyam-Sunder and Myers (1999), no equity issues or repurchases are included in the financing deficit. Thus, equity issues at high debt levels improve the fit of the TOT regression presented below and degrade the fit of the POT regression (Shyam-Sunder and Myers 1999, p. 225).

In contrast to Shyam-Sunder and Myers (1999) – as mentioned before – our sample contains companies of different legal forms and, thus, different sources of funding attainable. Therefore, we add legal form-specific adjustment parameters  $b_{POT}$  to Equation 1 (not indicated above).

## 5.2 Modeling of the TOT

According to the TOT, firms adjust their leverage towards a target leverage ratio. Thus, the TOT implies: “*Change in Liabilities*” = “*b*”  $\times$  (“*Actual Liabilities*” – “*Target Liabilities*”), where “*b*”  $\in$  [-1, 0] represents (minus) the share of the deviation of the actual liabilities from the target liabilities that is typically adjusted during one period. The stylized TOT regression is:

$$\Delta D_{it} = a + b_{TOT}(D_{it-1} - D^*_{it-1}) + e_{it}, \quad (2)$$

where:

$$D^*_{it-1} = \text{target leverage ratio.}$$

As in the POT model before, we allow for legal form-specific rates of adjustment  $b_{TOT}$ . The TOT predicts that  $b_{TOT} \in$  [-1, 0], implying adjustment towards the target ratio, where positive



adjustment costs could cause the adjustment to be incomplete and to lag by more than one period, i.e. they could cause an adjustment parameter smaller than 1 in absolute value.

The target leverage ratio is calculated as the historical average of firm leverage over the preceding years (cf. Shyam-Sunder and Myers 1999). Thereby, leverage is measured as overall liabilities scaled by total assets.

### 5.3 Sample description

The POT and the TOT regressions require different sets of data: The POT regressions build on data from profit and loss accounts; the TOT regressions call for historical averages of a company's leverage ratio.<sup>7</sup> Therefore, the maximum available regression samples differ in size. As a consequence, we construct three samples (see box 1): sample 1 is the maximum sample available for the POT regressions, sample 2 is the maximum sample available for the TOT regressions, and sample 3 is the maximum sample which equally allows for both regressions. Sample 1 is the largest, consisting of 4,391 observations, sample 2 includes 1,735 observations, and sample 3 comprises 1,329 observations.

#### Box 1: Sample structure

- Sample 1: maximum sample available for the POT regressions with complete data
- Sample 2: maximum sample available for the TOT regressions with complete data
- Sample 3: maximum sample which allows for the POT and the TOT regressions simultaneously (intersecting set of samples 1 and 2)
- Sample 1a / 2a: all companies that never undercut a threshold of fifty million Euros in total assets (subsample of sample 1 or 2)
- Sample 1b / 2b: companies with information on maturity structure of debt, allowing to apply the definition of Shyam-Sunder and Myers (1999) (subsample of sample 1 or 2)

The samples comprise GRPCs which are organized in four distinct legal forms: AGs are stock corporations, GmbHs are non-stock corporations with limited liability, GmbH & Co. KGs are a special hybrid type of limited partnership, and eGs are housing cooperatives (see box 2). The three aforementioned samples are fairly similar in terms of their legal form compositions:

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<sup>7</sup> We require at least three years of data to compute the historical averages.

A share of 3 to 4 per cent represents AGs, 47 to 54 per cent are GmbHs, 2 to 5 per cent are GmbH & Co. KGs, and 41 to 45 per cent are cooperatives (eGs). Companies under the legal form “eG” (housing cooperatives) are by definition held in free float. Other companies may be privately or publicly held. Using Creditreform data on company ownership, we find that a substantial share of AGs and GmbHs (for which ownership data are at hand) are directly or indirectly publicly held. For the remaining legal forms public ownership plays a negligible role.

Box 2: Legal types of RPCs in the German market

- AG: stock corporation (often, but not always publicly listed)
- GmbH: corporation with limited liability (not publicly listed)
- GmbH & Co. KG: limited partnership with a limited liability company as general partner (not publicly listed)
- eG: housing cooperative (not publicly listed)

Table 1 reports means and standard deviations of the variables involved in regressions (1) and (2). Each variable (actual leverage, financing deficit, target leverage) is standardized by total assets. The reported means and standard deviations refer to sample 3. Note, however, that the statistics are similar for the larger samples 1 and 2.

Table 1: Summary statistics

| <b>Legal Form</b>            | <b>Statistics</b>         | <b>Actual<br/>Leverage</b> | <b>Financing<br/>Deficit</b> | <b>Target<br/>Leverage</b> |
|------------------------------|---------------------------|----------------------------|------------------------------|----------------------------|
| <i>AG</i>                    | <i>Mean</i>               | 0.6948                     | -0.0189                      | 0.7429                     |
|                              | <i>Standard Deviation</i> | 0.1314                     | 0.0559                       | 0.0916                     |
|                              | <i>Observations</i>       | 53                         | 53                           | 53                         |
| <i>GmbH</i>                  | <i>Mean</i>               | 0.6454                     | -0.0347                      | 0.6543                     |
|                              | <i>Standard Deviation</i> | 0.1644                     | 0.0580                       | 0.1469                     |
|                              | <i>Observations</i>       | 700                        | 700                          | 700                        |
| <i>GmbH &amp;<br/>Co. KG</i> | <i>Mean</i>               | 0.7368                     | -0.1148                      | 0.7608                     |
|                              | <i>Standard Deviation</i> | 0.3226                     | 0.1320                       | 0.3054                     |
|                              | <i>Observations</i>       | 19                         | 19                           | 19                         |
| <i>EG</i>                    | <i>Mean</i>               | 0.5714                     | -0.0265                      | 0.5850                     |
|                              | <i>Standard Deviation</i> | 0.1699                     | 0.0337                       | 0.1633                     |
|                              | <i>Observations</i>       | 557                        | 557                          | 557                        |
| <i>Total</i>                 | <i>Mean</i>               | 0.6177                     | -0.0317                      | 0.6303                     |
|                              | <i>Standard Deviation</i> | 0.1736                     | 0.0522                       | 0.1613                     |
|                              | <i>Observations</i>       | 1,329                      | 1,329                        | 1,329                      |

For each of the three variables, we use the Kruskal-Wallis rank sum test (Kruskal and Wallis 1952) in order to test for identical distributions across the legal forms. The test rejects equal distributions for each variable. For all variables, the small subsample of GmbH & Co. KGs displays the highest variation, while the other subsamples are more homogeneous. On average, actual leverage and thus – by construction – target leverage are exceptionally high for GmbH & Co. KGs and AGs. Leverage is relatively low for housing cooperatives (eGs). Furthermore, on average, we observe negative financing deficits across all legal forms (firms tend to have positive free cash flow) – albeit with a high standard deviation.

## 6 Empirical results

### 6.1 General findings

Table 2 reports estimates of the POT regressions on four samples or specifications: samples 1 and 3 have been outlined before; sample 1a includes all companies that never undercut a threshold of fifty million Euros in total assets, i.e. it excludes “small” GRPCs with limited sources

of funding by size. Sample 1b uses the definitions of “change of liabilities” and “financing deficit” proposed by Shyam-Sunder and Myers (1999). However, due to a lack of data the sample size reduces considerably (by almost 90 per cent) in the latter specification.

The results for the POT regressions in table 2 show a fairly stable pattern across the different samples and specifications: this indicates that parameter estimates are robust against outlier observations. Moreover, specification (4) shows that our definition of the variables gives rise to different parameter estimates: Estimates of specifications (1), (2), and (4) are fairly similar with respect to the legal forms eG and GmbH & Co. KG, but they differ markedly for the legal forms GmbH and AG. Explanatory power of the regressions is quite high.

Specification (1) shows that companies of different legal forms differ in the way they cover financing deficits: GmbHs cover around 53 per cent of their financing deficit with new debt. Stock corporations (AGs) and cooperatives (eGs) employ debt financing to even higher degrees: the rate of debt coverage is 63 per cent for AGs and 71 per cent for eGs. Though the coefficient estimate for eGs is rather high, we can clearly reject a true parameter equal to one, as would have been predicted by the POT. GmbH & Co. KGs are different: They cover less than 40 per cent of their financing deficit through new debt. Thus, our estimates of the coverage rate for stock corporations (AGs) are somewhat below the estimates of Shyam-Sunder and Myers (1999), whose estimates range from 0.69 to 0.85 in different specifications. The coefficient estimates in sample 1a, with the exception of the base category GmbH, are generally lower than in samples 1 and 3. This indicates a size effect: larger companies – other things being equal – rely less on debt financing than smaller ones.

Table 2: The POT regressions

| Specification                                                                 | 1                    |     | 2                    |     | 3                   |     | 4                    |     |
|-------------------------------------------------------------------------------|----------------------|-----|----------------------|-----|---------------------|-----|----------------------|-----|
| <i>Dependent variable:</i><br><i>y-o-y change</i><br><i>in leverage ratio</i> | <i>Sample 1</i>      | ∑   | <i>Sample 3</i>      | ∑   | <i>Sample 1a</i>    | ∑   | <i>Sample 1b</i>     | ∑   |
| <i>Deficit</i><br><i>(base category: GmbH)</i>                                | 0.528***<br>(18.30)  |     | 0.672***<br>(18.59)  |     | 0.627***<br>(21.15) |     | 0.185***<br>(3.32)   |     |
| <i>Deficit x AG</i><br><i>(difference from GmbH)</i>                          | 0.105*<br>(1.82)     | *** | 0.137<br>(1.33)      | *** | -0.035<br>(-0.51)   | *** | -0.024<br>(-0.35)    | *** |
| <i>Deficit x eG</i><br><i>(difference from GmbH)</i>                          | 0.182***<br>(6.61)   | *** | 0.176***<br>(6.04)   | *** | 0.0584<br>(1.32)    | *** | 0.463***<br>(3.12)   | *** |
| <i>Deficit x GmbH &amp;</i><br><i>Co. KG</i><br><i>(difference from GmbH)</i> | -0.217***<br>(-4.44) | *** | -0.484***<br>(-3.71) | *   | -0.195<br>(-1.40)   | *** | 0.273<br>(1.03)      | *   |
| <i>Constant</i>                                                               | 0.015***<br>(15.45)  |     | 0.019***<br>(15.22)  |     | 0.017***<br>(17.75) |     | -0.024***<br>(-3.71) |     |
| <i>Observations</i>                                                           | 4,349                |     | 1,329                |     | 2,021               |     | 466                  |     |
| <i>R-squared</i>                                                              | 0.549                |     | 0.674                |     | 0.592               |     | 0.190                |     |

*Note:* Coefficients of AG, eG and GmbH & Co. KG are incremental to the base category coefficient, i.e. for an AG – according to the estimates on sample 1 – an increase in the deficit by one percentage point will raise the leverage by  $0.528 + 0.105 = 0.633$  percentage points in the corresponding year. The columns indicated with “∑” show the significance level of a test for the significance of the overall effect for the incremental category, i.e. for the category AG it tests whether the above computed overall effect of 0.633 is significantly different from zero. Bootstrapped t-statistics are given in parentheses. The asterisks next to the estimates themselves indicate significance of the particular coefficient, e.g. the one asterisk next to the 0.105 estimate of the incremental effect for AGs indicates that the increase in debt in response to a financing deficit is significantly higher at the 10 per cent level for AGs than it is for the base category – GmbHs. Note that a single asterisk “\*” indicates significance at the 10 per cent level, “\*\*\*” corresponds to significance at the 5 per cent level, and “\*\*\*\*” corresponds to significance at the 1 per cent level. The variable “Deficit” is the financing deficit, variables “Deficit x ...” are interactions of “Deficit” and legal form dummies. Note that the legal form “GmbH” is the base category of the regression and the coefficient estimates for the remaining legal forms are incremental to the base category coefficient: E.g. for the GmbH & Co. KG, specification (1) estimates that a financing deficit of one per cent of total assets is covered by a  $0.528 - 0.217 = 0.311$  per cent of total assets rise in leverage.

The results from the TOT regressions are presented in table 3 below. Sample definitions are similar to those of the POT regressions. Sample 2 is the largest sample available for the POT regression; sample 3 comprises all observations that can be used for both the POT and the TOT estimations; sample 2a excludes small firms, corresponding to sample 1a in table 2; sample 2b applies the variable definitions of Shyam-Sunder and Myers (1999).

Across the subsamples, the TOT regressions show very low explanatory power, with R-squareds ranging between 1.4 and 3.8 per cent. With the notable exception of housing coop-

eratives (eGs), we do not find strong evidence of adjustments in the spirit of the TOT for any of the legal forms. Across all specifications coefficients are insignificant for AGs and GmbHs. For GmbH & Co. KGs the adjustment coefficient is only significant in sample 1 (the largest sample available). This may be due to the relative scarcity of GmbH & Co. KGs in our sample. In contrast, we do find systematic adjustments towards a target leverage ratio in three out of the four subsamples for housing cooperatives (eGs). According to the estimates from sample 2, eGs typically close 18 per cent of the gap between their actual leverage ratio and their target ratio per year. For the smaller samples 2a and 3, the adjustment rate is estimated to be 13.3 per cent and 16.7 per cent, respectively. Thus, even for housing cooperatives, estimated coefficients indicate a low speed of adjustment towards the target leverage ratio: full adjustment would take between 5 and 8 years. In sample 2b – which comprises 102 observations only – none of the coefficient estimates is significant.

Table 3: The TOT regressions

| Specification                                                                                                  | 1                    |     | 2                   |     | 3                    |    | 4                 |   |
|----------------------------------------------------------------------------------------------------------------|----------------------|-----|---------------------|-----|----------------------|----|-------------------|---|
| <i>dependent variable:</i><br><i>y-o-y change</i><br><i>in leverage ratio</i>                                  | <i>Sample 2</i>      | Σ   | <i>Sample 3</i>     | Σ   | <i>Sample 2a</i>     | Σ  | <i>Sample 2b</i>  | Σ |
| <i>Deviation from target</i><br><i>leverage</i><br><i>(base category: GmbH)</i>                                | -0.029<br>(-1.15)    |     | -0.052<br>(-1.53)   |     | -0.051<br>(-1.12)    |    | 0.022<br>(0.16)   |   |
| <i>Deviation from target</i><br><i>leverage x AG</i><br><i>(difference from GmbH)</i>                          | 0.041<br>(0.21)      |     | 0.058<br>(0.27)     |     | -0.026<br>(-0.17)    |    | 1.029<br>(0.78)   |   |
| <i>Deviation from target</i><br><i>leverage x eG</i><br><i>(difference from GmbH)</i>                          | -0.156***<br>(-3.45) | *** | -0.116**<br>(-2.13) | *** | -0.0827<br>(-1.01)   | ** | 0.261<br>(0.71)   |   |
| <i>Deviation from target</i><br><i>leverage x</i><br><i>GmbH &amp; Co. KG</i><br><i>(difference from GmbH)</i> | -0.187*<br>(-1.82)   | **  | 0.383*<br>(1.67)    |     | -0.709<br>(-0.44)    |    | -0.723<br>(-0.30) |   |
| <i>Constant</i>                                                                                                | -0.004***<br>(-3.82) |     | -0.003**<br>(-2.33) |     | -0.004***<br>(-2.65) |    | -0.038<br>(-1.53) |   |
| <i>Observations</i>                                                                                            | 1,700                |     | 1,329               |     | 747                  |    | 102               |   |
| <i>R-squared</i>                                                                                               | 0.018                |     | 0.017               |     | 0.014                |    | 0.038             |   |

Note: Coefficients of AG, eG and GmbH & Co. KG are incremental to the base category coefficient, i.e. for an eG – according to the estimates on sample 2 – an increase in the deviation from the target debt ratio by one percentage point will trigger an adjustment towards the target of  $-0.029 - 0.156 = -0.185$  percentage points in the following year. The columns indicated with “Σ” show the significance level of a test for the significance of the overall effect for the incremental category, i.e. for the category eG it tests whether the above computed overall effect of 0.185 is significantly different from zero. Bootstrapped *t*-statistics are given in parentheses. The asterisks next to the estimates themselves indicate significance of the particular coefficient, e.g. the three asterisks next to the 0.156 estimate of the incremental effect for eGs indicates that the coefficient for eGs is significantly larger in absolute value than it is for the base category – GmbHs. Note that a single asterisk “\*” indicates significance at the 10 per cent level, “\*\*” corresponds to significance at the 5 per cent level, and “\*\*\*” corresponds to significance at the 1 per cent level.

## 6.2 Discussion of the empirical results

The empirical results of this research indicate that we can distinguish two groups of GRPCs by the observed mechanisms in their capital structure choice. On the one hand, the adjustment behavior of companies of the legal forms of stock corporations (AGs) and non-stock corporations (GmbH, and GmbH & Co. KGs) is in line with the POT but stands in contrast to the TOT. On the other hand, cooperatives (eGs) display a financing behavior in accordance with

both the POT and the TOT.

We would have expected systematic capital structure adjustments to be most relevant for stock corporations (AGs) – due to their market exposure, their profit orientation and the ease of access to public debt and equity. We indeed find some indication of systematic adjustments according to the POT with coefficients for the financing deficit between around 0.6 and 0.8.

However, we see more pronounced results for cooperatives (eGs), a common legal form of GRPCs with a market share of nearly 25 per cent of all GRPCs. As table 1 shows, cooperatives display the lowest average leverage ratios of all legal types of GRPCs. They are known for their conservative financing behavior, which is in line with our findings. As the TOT regressions show, cooperatives to some extent do re-adjust their capital structure to a target leverage ratio, albeit at a relatively low speed. According to different regression estimates it typically takes cooperatives (eGs) between 5 and 8 years to revert to their specific target leverage ratio. This speed of adjustment may seem slow, yet it is credible due to the limited potential of cooperatives to raise new equity. New equity is either obtained by accumulating earnings or by issuing shares to new members of the cooperatives, who are usually obliged to buy a minimum number of shares. At the same time, however, eGs are often restricted to a maximum share. Therefore, expansion of the building stock must be financed first through debt and then subsequently be replaced by equity raisings predominantly from new members or by retained earnings. In the light of long-lasting construction periods for new buildings and an additional acquisition period for new members, who may even pay in their share in tranches over time, the observed slow adjustment to a target capital structure confirms our expectations. In contrast to this, tax motives are most probably not a reason for the stronger targeting behavior of German housing cooperatives compared to other legal forms, as a substantial portion of cooperatives are tax-exempt on the corporate level.

The POT effects are weaker for corporations with limited liability (GmbHs) in our sample but still point to a significant impact of pecking order considerations. The smaller coefficients can probably be explained by the high share of such companies that are – at least partly – in public (usually municipal) ownership. These companies are not exclusively profit-oriented, whilst information asymmetries and negative signaling effects of capital structure changes are less relevant in these cases.

The weakest results are obtained for the legal form GmbH & Co. KG, which is not too surprising. As mentioned in Section 4.2, this form is a hybrid serving flexible purposes and can either be used to limit shareholders' liability or to minimize corporate taxes.



## 7 Conclusion

Regression models following Shyam-Sunder and Myers (1999) among others are presented to test the POT and the TOT for GRPCs, differentiated by legal forms. Support is found for the POT in capital structuring decisions of GRPCs. Parameter estimates for cooperatives (eGs) are closest to the prediction of the POT, indicating that these cover up to 85 per cent of their financing deficit by issuing new debt. Effects for stock companies (AGs) and for corporations with limited liability (GmbHs) are smaller than for cooperatives. Firms in the hybrid legal form of a GmbH & Co. KG hardly act in the manner of the POT. We also find an indication for a size effect in that larger companies – other things being equal – rely less on debt financing than smaller ones, which is in accordance with the POT. Different sources of funding, ownership and control, approximated by the respective legal forms of GRPCs in this work, are potentially useful additions for international studies as well.

In general, the POT coefficients obtained in our regressions are smaller than in previous analyses for other industries. One explanation for this is the absence of large information asymmetries, which is a particularly common characteristic of larger RPCs: for this type of companies, growth opportunities are rare and firm assets are, for the major part, tangible. As Boudry et al. (2010, p. 93) state “the stable nature of this cash flow stream may limit the applicability of asymmetric information-based theories.”

The fact that the strongest effects in the POT and the TOT regressions are observable for cooperatives (eGs) reflects both the strong propensity of these organizations for targeting a conservative financing structure and the limited flexibility in adjusting their equity basis. As a consequence, cooperatives must finance additional investments first through debt and can only successively raise new equity.

Altogether, we find some evidence for strategic capital structure adjustment behavior, particularly according to the POT, for GRPCs. Evidence for capital structure targeting is only found for cooperatives. However, the low explanatory power of the TOT model points to other factors which may influence capital structure decisions. Besides tax considerations, which are not explicitly modeled in our tests, adjustment costs and probably some lack of consistent strategic capital structuring might play a crucial role in determining the actual capital structure of GRPCs. One further explanation for the lower importance of the POT for some GRPCs could be that these companies regularly exploit the cheapest sources of funding available at the time.

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