NGUYEN THU THUY

Capital Structure, Strategic Competition, and Governance

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Chapter 1: Introduction

1.1 Background

Leverage or capital structure, understood as the proportion of debt relative to equity in a firm's total assets, is an indication of how firms finance their activities and investments, and also the long-term solvency of a firm. For already half of a century, the financing decision, its determination and its influence on the valuation of firms has been one of the major issues in the theory and empirics of corporate finance. Researchers have been seeking the answers for what is an optimal capital structure, what are the factors determining actual capital structures, and what is the impact of capital structure choice on other decisions within the firm.

Corporate value is, from the viewpoint of corporate finance, the firm's main objective. Modigliani and Miller (1958), in their seminal study on capital structure, demonstrate that under a certain set of assumptions, leverage does not matter as the total value of a firm is independent of leverage. By introducing corporate and personal taxes into Modigliani and Miller's model, Miller (1977) shows that firms benefit from issuing more debt if the marginal personal tax rate is lower than the corporate tax rate. When bankruptcy costs and agency costs are also included into the model, it shows that optimal capital structure choice involves a trade-off between costs and benefits of debt (e.g., Jensen and Meckling, 1976; Kim, 1978; DeAngelo and Masulis, 1980). From that point on, various firm-specific factors have been theoretically linked with capital structure, and empirically tested in different contexts. The conventional theories to explain leverage determinants include the static trade-off considerations, agency theory, signaling with debt and pecking order theory.[1] The practical determinants of leverage have been widely examined. They range from taxation, non-debt tax shields, tangibility, firm size, growth opportunities, and profitability, to liquidity and stock returns. Yet, the literature keeps developing to incorporate new insights to the way a firm can optimize its value through organizing its leverage.

As for the convenience of following the next chapters of this book, this chapter reviews the major issues in the capital structure literature. The reviews not only serve as the background for the empirical studies presented in this book, but also open avenues for future research.

[1] See, for example, Myers (2003) and Harris and Raviv (1991) for a detailed review.

1.2 Literature

1.2.1 Conventional capital structure theories

In this section, we summarize the key conventional theories of capital structure, including the static trade-off hypothesis, agency theory, theories on signaling with debt, and the pecking order hypothesis.

In the static trade-off framework, the firm is viewed as setting a target debt-to-value ratio and gradually moving towards it. In particular, capital structure is adjusted towards targets that reflect tax rates, asset type, business risk, profitability and bankruptcy costs. The general hypothesis of this research is that the firm's optimal capital structure will involve the trade-off between the tax advantage of debt and various leverage-related costs. However, as pointed out by Bradley, Jarrell and Kim (1984), this kind of theoretical framework faces an upshot because of its recognition that the existence of an optimal capital structure is essentially an empirical issue as to whether or not the various leverage-related costs are economically significant enough to influence the costs of corporate borrowing.

Although the static trade-off hypothesis incorporates the role of agency costs, there are important theories for agency costs associated with debts. Agency costs are related to principal-agent conflicts, where agents are the firm's managers and principals refer to different stakeholders of the firm. Jensen and Meckling (1976) integrate the principal-agent relationships into capital structure theory. Agency costs include the costs for both debt and equity issuance. The costs involved with equity may include: (*i*) the monitoring expenses of the principal; (*ii*) the bonding expenses of the agent; and (*iii*) the value of the reduction in welfare experienced by the principal due to the divergence between the agent's decisions and those which maximize the welfare of the principal. On the other hand, the issue of debt also incurs agency costs, including the opportunity costs caused by the impact of debt on the investment decisions of the firm; the monitoring and bonding expenditures by both the bondholders and the owner-manager; and the costs associated with bankruptcy and reorganization. Since both equity and debt incur agency costs, the optimal debt-equity ratio involves a trade-off between the two types of costs.

An important set of agency problems is caused by shareholder-manager conflicts. This type of conflict stems from the separation of ownership and control and takes several distinct forms. The first is that managers prefer to have greater perquisite levels and lower effort levels, provided that they do not have to pay for these through lower wages or by a lower market value of their personal equity holdings (Jensen and Meckling, 1976). The second arises because managers may prefer short-term projects, which produce early results and enhance their reputation quickly, rather than more profitable long-term projects (Masulis, 1988). Third, managers may prefer less risky investments and lower leverage to lessen the

probability of bankruptcy (Hunsaker, 1999). Fourth, managers may wish to minimize the likelihood of employment termination (Garvey and Hanka, 1999). As this increases with changes in corporate control, management may resist takeovers, irrespective of their effect on shareholder value. Fifth, managers and shareholders may also disagree over a firm's operating decisions. Harris and Raviv (1990) observe that managers typically wish to continue operating even if liquidation of the firm is preferred by shareholders; managers may also prefer to invest all available funds even if shareholders want to be paid dividends.

The next set of agency problems concerns shareholder-bondholder conflicts. The typical manifestation of these conflicts is that the stockholders or their representatives make decisions transferring wealth from bondholders to shareholders. Certainly, the bondholders are aware of the situations in which this wealth expropriation may occur, therefore, will demand a higher return on their bonds or debts. Leverage aggravates agency conflicts between shareholders and bondholders in three distinguished categories that have been theoretically analyzed: (*i*) the direct wealth-transfer through dividend payment and claim dilution (Smith and Warner, 1979); (*ii*) asset-substitution is another source of the conflict (Jensen and Meckling, 1976; Smith and Warner, 1979); (*iii*) the problem of underinvestment (Myers, 1977). One way to minimize these shareholder-bondholder conflicts is that firms with high growth opportunities should have higher leverage and use a greater amount of long-term debt than firms in more mature industries. The conflicts can also be mitigated by adjusting the properties of debt contracts, for example, the adjustment can be done by including covenants as suggested by Smith and Warner (1979). Alternatively, debt can be secured by collateralization of tangible assets in debt contracts, as discussed in Stulz and Johnson (1985). Issuing convertible debt or debt with warrants can serve as another way of mitigating the conflicts as shown by Jensen and Meckling (1976) and Green (1984).

The conflict with outside stakeholders is another agency issue. The relative amount of debt can raise the costs of agency problems with stakeholders like customers and employees. Titman (1984) argues that the liquidation of a firm may impose costs on customers and employees. As a result they demand risk premia on products and wages, these costs are transferred to the shareholders. However, if the shareholders committed to liquidate only when the gains of liquidation exceed all costs, including those of customers and employees, this would decrease the cost of capital and increase the value of equity. Empirical evidence can be found in, for example, Titman (1984), Titman and Wessels (1988), and Maksimovic and Titman (1991).

The literature on signaling with debt is concerned with the ability of firms to signal their true quality to outsiders, by the capital structure that they choose.

Ross's model (1977) implies that the level of bankruptcy risk rises as the amount of debt issued by the firm increases, and the value of the firm is positively related to its debt-equity ratio, i.e., higher quality firms issue more debt. On the contrary, the model of Heinkel (1982) argues that high quality firms will have low levels of debt. According to Poitevin (1989), the advantage of debt is that the capital market places a higher value on the debt-financed firm because it is perceived to be low-cost; the disadvantage of debt is that it makes the entrant prone to be attacked by the all-equity incumbent via a price war, threatening the entrant with bankruptcy.

Myers and Majluf's (1984) model shows that the equity price is more affected by information asymmetry than less risky securities, such as debt. The nature of the asymmetric information in this case is that managers – who aim to maximize value for existing shareholders – know more about their companies' prospects, risks and values than outside investors do. The market reaction is, therefore, more negative for more risky securities. Managers will prefer to use internally generated funds for investments, and if external financing is necessary, less risky securities are preferred to more risky securities. This hierarchy in financing preference is referred to as the pecking order hypothesis or theory (Myers, 1984).

Narayanan (1988) and Heinkel and Zechner (1990) obtain results similar to Myers and Majluf (1984) with conclusions: (*i*) the firm should issue less risky securities over more risky ones; (*ii*) debt should be used in preference to equity; (*iii*) internal finance should be used in preference to external finance; and (*iv*) if equity is used, the stock price falls since the market views the firm as a "lemon" – whose quality cannot be ascertained. The pecking order hypothesis, however, does not always hold. There are plenty of examples of firms issuing stock when they could issue investment-grade debt. But when one looks at aggregates, the heavy reliance on internal finance and debt is clear – a description of typical behavior. This can be interpreted as due to the separation of ownership and control: managers avoid relying on external finance because it would subject them to the discipline of the capital market.

1.2.2 Capital structure and output market competition: a zoom-in

Product market related decisions are among the most crucial for firms, as finally firms' products need to reach customers and generate firms' income and profit as the outcome of all investments. The competition on product markets is closely related to corporate financing side. However, existing literature places relatively little emphasis on the strategic relationship between firm financial leverage and its competitive environment. A limited number of studies have so far theoretically discussed the strategic product market effect of leverage, typical examples include Brander and Lewis (1986, 1988), Maksimovic (1988), Bolton and Scharfstein

(1990), Showalter (1995), Dasgupta and Titman (1998), and Faure-Grimaud (2000). The predictions of competition-leverage models vary with the particular underlying assumptions, and there is an on-going debate on what the actual interactions should be.

The branch of literature on competition-leverage interactions begins with the model of limited liability effect. This widely cited model is put forward by Brander and Lewis (1986), and further extended by, among others, Maksimovic (1988) and Showalter (1995). According to the model, increased debt causes a firm to behave aggressively, increasing output, and its rivals to behave passively. Brander and Lewis argue that with more debt, firms will pursue the output strategies that raise returns in good states, and lower returns in bad states. However, shareholders ignore the decreases in returns in bankrupt states since bondholders would be the residual claimants. Firms make output decisions (e.g., to increase output, market shares) that improve the chances of driving their rivals into insolvency. Showalter (1995) extends the limited liability effect model by arguing that the incentives to issue debt depend on type of uncertainty and mode of competition. Firms do not issue debt in case of cost uncertainty with price competition because they would risk setting unprofitably low prices. The author argues that the optimal strategic debt choice of Bertrand (price) competitors depends on the type of uncertainty that exists in the output market. In the case of Bertrand competition where costs are uncertain, price-competing firms, unlike Cournot firms, will use no strategic debt. In particular, Bertrand competitors that experience uncertain costs find that the use of debt causes industry prices and expected firm profit to fall, and firms in this case do not become leveraged. Thus, if firms compete in Bertrand competition, the use of strategic debt is advantageous only if demand conditions are uncertain. In the context of demand uncertainty, an increase in the firm's debt induces a rise in the firm's and rival's price, which raises both the debt and equity value of the firm. Consequently, firms will take on at least some debt to raise industry prices and expected profits.

Another stream of literature, by contrast, suggests that product market competition becomes “softer” when leverage increases. The representatives of this stream include Bolton and Scharfstein (1990), Dasgupta and Titman (1998), and Faure-Grimaud (2000). The authors basically argue that higher leverage encourages timidness. Debt financing provides an opportunity for rival firms to take advantage of the debt-laden firm’s periodic need for refinancing by making the firm appear unprofitable, thereby motivating its investors to deny its refinancing. A key result from this line of research is that higher levered firms will behave passively, or at least less aggressively, while the aggressive competitors are the firms that have lower leverage. In addition, Poitevin (1989) presents a model of predatory theory, in which shallow-pocket firms are prone to predation by deep-

pocket competitors. This predation may force highly leveraged firms to lose their market share or even exit the industry, leading to a more concentrated market structure. This argument can be strengthened due to two reasons. First, the initial level of debt may negatively affect the firm's survival, because highly indebted firms may be unable to finance large new investments (Myers, 1977). This "debt overhang" might force leveraged firms to pass up profitable growth opportunities and, in the most extreme cases, even force them out of the market. Second, the initial level of debt may negatively affect survival because it directly affects a firm's ability to compete. This may also negatively affect survival, because it forces inefficient firms to liquidate (Harris and Raviv, 1990; and Stulz, 1990).

Also on the empirical side of the literature strand on competition-leverage interactions, there is still no agreement on what effect of leverage on competition or vice versa would be prevailing. Yet, the reason can be partly due to the scarcity in empirical evidence.

Several researchers who have empirically tested the link between a firm's financial structure and a firm's competitive environment show that competition becomes less tough – through lower quantities or higher prices – as leverage increases. These results may contradict the theoretical predictions of Brander and Lewis (1986) and Maksimovic (1988). These papers mostly focus on a small number of industries in which some firms have experienced sharp changes in their capital structure. Chevalier (1995a, b) examines the competition of local supermarkets who undertook leveraged buyouts (LBOs) and their rivals. The author finds that when firms radically increase their leverage through an LBO, they are more vulnerable and less aggressive, leading to a softer product market competition. Rivals' profits increase as they attempt to prey on the LBO firms, and the situation encourages local entry and rivals' expansion. Thus, a gradual movement toward a decrease in the market structure concentration can be observed. The author finds evidence supporting Bolton and Scharfstein (1990) and inconsistent with Brander and Lewis (1986). The event study of supermarket LBOs shows that the return responses of competing firms are positive, consistent with the expectation of softer competition. If an LBO leads to an increase in competition then rival firms would want to exit the local market. Chevalier also finds that supermarket chains are more likely to enter and expand if a large fraction of the incumbent firms in the local market undertake LBOs, again consistent with softer competition. Phillips (1995) and Kovenock and Phillips (1997) likewise find that highly levered firms tend to invest less aggressively. They also suggest that highly levered firms are likely to charge higher prices if they can. But competitors with deeper pockets may take advantage of their highly levered competitors by more intense price competition, which the competitors may have to follow accordingly.

Lyandres (2006), on the other hand, finds evidence to support the argument of stronger competition associated with debt by examining the competition-leverage relations in manufacturing sector as a whole. The study shows that the extent of interaction among product market rivals has a strong positive relation with all leverage ratios, serving as one of the important determinants of leverage. Lyandres also adds that that aggressiveness of a firm's operating strategy is increasing with debt; whereas one firm's aggressiveness is decreasing (increasing) with its rival's debt if the firms' strategies are substitutes (complements).

Empirical studies in this field, in general, point out the importance of including industry specific characteristics both on the supply and demand sides to understand the firms' capital structure decisions. Showalter (1999) finds the importance of demand and cost uncertainty within industries in explaining leverage choice of individual firms. Kovenock and Phillips (1995), on the other hand, provides empirical evidence on the interaction of capital structure decisions and product market behavior, in which firms with low-productivity plants in highly concentrated industries are more likely to recapitalize and increase debt financing. The findings suggest that debt plays a role in highly concentrated industries where agency costs are not significantly reduced by product market competition. More recently, MacKay and Phillips (2005) examine the importance of a firm's position within its industry. They show that capital structure is subject to different types of market structure. In competitive industries, firms' leverage depends on its natural hedge and the status as entrant, incumbent, or existing firm. In concentrated industries, leverage is higher and less dispersed, and strategic debt interactions are also stronger.

A potential reason why most of the studies so far do not find conclusive results for theoretical predictions is that most empirical papers do not take into account the distinction between quantity and price competition. Evidently, the studies of Brander and Lewis (1986) and Maksimovic (1988) are applicable for a Cournot setting, while Bolton and Scharfstein (1990) and Showalter (1995) are basically for a Bertrand setting. In addition, almost empirical work, except for MacKay and Phillips (2005) and Lyandres (2006), only focuses on a few specific industries where firms experience large increases in leverage through leveraged buy-outs and recapitalizations. These industries might not be representative for other industries.

Various research questions are open for competition-leverage interactions. There are theoretical predictions that have not been empirically clarified yet. The strategic choice of debt may significantly depend on competitive behavior of firms, which can be Cournot competition (strategic substitutes) or Bertrand competition (strategic complements). Brander and Lewis (1986) predict that Cournot firms subject to demand and/or cost uncertainty have an incentive to commit to a large output by using a higher level of debt. For Bertrand competition, Showalter (1995)

shows that debt carries a strategic advantage only when demand is uncertain, and when costs are uncertain Bertrand firms have an incentive to reduce their debt level. Similarly, theories also imply different relations between leverage and market share under Cournot and Bertrand competition (Dasgupta and Titman, 1998; Faure-Grimaud, 2000), but they are not empirically investigated. Other questions can be related to the strategic use of long-term or short-term debts (Glazer, 1994; Dasgupta and Titman, 1998; Erol, 2003); or the roles of different industry characteristics that have not been touched upon in the literature. Indeed, there is plenty of room for further research on the field.

1.2.3 International capital structure: the role of institutional factors

In this section, we zoom in another perspective of looking at capital structure issues, namely international evidence with the roles of institutional factors. Examining capital structure of firms in a single country, mostly the U.S., has received most attention in the literature. However, less attention has been paid to understanding how institutional and macro-economic differences across countries affect capital structure decisions. This branch of research potentially not only sheds light on the application and portability of conventional theories of capital structure across countries, but also brings in a new dimension to the literature – the role of institutional variables. This basically provides inter-country variations to identify the fundamental determinants of leverage.

It is only during the last decade that international studies comparing differences in the capital structure between countries started to appear. Rajan and Zingales (1995) break the path by investigating financial structures in seven advanced industrialized countries. They point out that although common firm-specific factors significantly influence capital structure of firms across countries, country-specific factors may also play an important role and should be explored more extensively. Demirgüç-Kunt and Maksimovic (1999) compare capital structure data of firms from 19 developed countries and 11 developing countries. They find that institutional differences between developed and developing countries explain a large portion of the variation in the use of long-term debt. They also observe some institutional factors in developing countries to influence directly the average leverage of large and small firms differently. In contrast, Booth et al. (2001) analyze data of ten developing countries and find that capital structure decisions of firms in these countries are affected by the same factors as in developed countries. However, they also observe that there are systematic differences in the way capital structure is affected by country-specific factors, which require more research efforts for a better understanding.

Recently, Giannetti (2003) argues that the lack of finding a significant impact of institutional variables may be due to the bias induced by inclusion of only large listed companies. She analyzes a large sample of unlisted firms from

eight European countries and finds a significant influence of a few institutional variables on cross-country leverages, such as creditor right protection and stock market development. She also advocates extending the analysis to a larger sample of countries. With a similar approach, Deesomsak et al. (2004) investigate the determinants of capital structure of firms in 4 Asia-Pacific countries. Their results suggest that the leverage decision of firms is influenced by the legal, financial and institutional environment in which they operate. In particular, the paper finds that the Asian financial crisis in 1997 had significant but diverse impact on capital structure decisions across the region. In addition, Fan et al. (2003) also empirically acknowledge the importance of institutional factors such as legal and tax systems, and banking sectors in determining capital structure choice across a sample of 39 countries. The paper also finds significant results with the impacts of some other country-specific factors, such as the degree of development in the banking sector, equity and bond markets, which influence corporate financing decisions. Similarly, by investigating 30 OECD countries, Song and Philippatos (2004) report that most cross-sectional variations in international capital structure are caused by the heterogeneities of firm-, industry, and country-specific determinants. However, they do not find evidence to support the importance of cross-country legal institutional differences in affecting firms' leverage.

In general, recent studies on international capital structure highlight the sizeable impacts of various country-specific factors in determining corporate financial structure. In the meantime, most of the papers implicitly assume that firm-specific determinants of leverage work the same for all countries. This assumption is questionable and the channels of interactions between country-specific variables and capital structure are not yet sufficiently examined.

1.2.4 Financing, governance and firm growth

In previous sections, we have reviewed the literature related to financial structure decisions and institutional factors. In this section, we place a focus on the studies of financing patterns, institutional factors as public governance mechanism, and firms' growth. We specially focus on the literature for small and medium sized enterprises (SMEs).

SMEs form a large part of private sector in many developed and developing countries. For example in the European Union, SMEs comprise approximately 99% of all firms and employ about 65 million people. In many sectors, SMEs are also responsible for driving innovation and competition.

The financing of small private firms has several distinctive features compared to publicly traded firms. Small businesses can observe the market rates, e.g., interest rates or required rates of returns, but they may not use the market rates for making financial decision. The decisions are often made subject to the entrepreneur's personal wealth, interests, or risk-taking. Other reasons not to rely

on the market rate may include over-optimistic perception of opportunities, lack of external funding, and limited outside alternatives to invest excess funds. In addition, small private firms emphasize the importance of informal relationships. Besides family and friends as the first source of outside financing, small business owners have more intimate knowledge with their stakeholders, such as local bankers, suppliers, customers and employees. These relationships allow more flexibility in arranging and adjusting the terms of informal financing (Ang, 1992).

Cross-country studies generally document the financing and growth constraints for small firms. Researchers also explore the effect of different policies on firms' access to finance and growth. Beck et al. (2006a) show that institutional development is the most important factor that explains the cross-country variation in firms' financing obstacles. Firms in countries with higher levels of institutional development report significantly lower financing obstacles than those in countries with less developed institutions. With a sample of 129 countries, Djankov et al. (2007) find that credit for firms rises after improvements in creditor rights and in information sharing mechanisms. Johnson et al. (2002), on the other hand, find evidence that weak property rights, in post-communist countries' small private firms in this study, discourage firms from reinvesting their profits, even when bank loans are available. Beck et al. (2006b) show that firms can grow faster in countries with higher levels of financial intermediary development, more rapid judicial conflict resolution mechanisms and better property right protection. The results suggest that agency problems between outside investors and corporate insiders keep firms smaller in countries with weak legal and financial systems.

Evidently, institutional factors play an important role in the financing and growth of firms in most of countries, especially in the case of small firms. Small firms tend to gain most from financial and institutional development, and the effect of financial and legal development is significantly stronger for small firms than for large firms (Beck et al. 2005).

While cross-country studies in the field are numerous, research within a particular country is far more limited. Such a single-country setting is likely to help to verify the findings of cross-country investigation, and also to highlight the importance of the local governance systems on financing and growth of firms. Ayyagari et al. (2008) examine Chinese firms' financing patterns and growth in 18 provinces. Although the roles of local governance are not yet studied in depth, the authors show that firms in poor institutional environments have to rely on collateral to access bank finance rather than relying on credit histories and growth opportunities. In a well-established legal system like India, Allen et al. (2007) find that firms use non-legal methods based on reputation, trust and relationships to settle disputes and enforce contracts, and rely on alternative financing channels such as trade credits to finance their growth. The findings are stronger for small and medium sized Indian firms. The reasons can be attributed to the country's poor

government institutions characterized by corruption and inefficiency. Using data across Mexican states, Laeven and Woodruff (2004) show that legal system efficiency is positively associated with firm size, an effect that is strongest in sectors where proprietorships dominate. Their findings suggest that more effective local governance systems can increase investment by firms by reducing the idiosyncratic risk that the proprietors face.

As the literature reveals a gap in within-country investigation of financing, governance and firm growth, we find it potentially promising to further explore the issue in new settings. We expect that the financial and institutional development would help alleviate SMEs' growth constraints and increase their access to external finance and thus level the playing field between firms of different sizes and sectors.

1.3 Approach and focus

In this dissertation, we contribute to the discipline of research in corporate finance by presenting four empirical studies. The studies focus on the corporate financing decision and its newly explored influential factors. We investigate firms' choice of capital structure in several perspectives, which can be summed up in two main parts.

In the first part of the dissertation (chapters 2 and 3), we specifically take into account the interactions of firms' capital structure and their competitive behavior in the product markets. We test several empirical implications for competition-leverage links in Cournot and Bertrand firms, using a competitive strategy measure to distinguish the two types of competitive behavior. We specifically examine, across Cournot and Bertrand firms, the impact of demand and cost uncertainty on debt level, and the joint determination of market share and leverage. Strategic competition is of main interest because it brings about distinctive outcomes related to capital structure. This part of the book is closely related to the literature on product market considerations while controlling for conventional theories of capital structure.

In the second part of the dissertation (chapters 4 and 5), we examine the roles of institutional and public governance factors that affect the firms' capital structures and/or growth. In particular, we investigate firm-specific and country-specific variables that influence firms' decision in taking more debt, in both direct and indirect ways, for a large sample of countries. Finally, we zoom in an individual country setting (Vietnam) to study the impacts of corruption – a specific issue related to public governance mechanism – on small private firms' growth. We conduct the analysis on private firms in contrast with larger and more established firms in the state sector. This second part of the dissertation adds to the literature of international capital structure and small firm financing.

1.4 Outline

The core of this thesis consists of four empirical studies. In this subsection we briefly discuss the set-up of each of these studies.

The first two studies constitute chapters 2 and 3, in which we test different theories and implications on the links between capital structure and product market competition. Specially, we distinguish firms competing under Cournot and Bertrand frameworks, and then examine possible links and interactions between leverage and several industry characteristics and structures.

Chapter 2 investigates how competitive behavior affects the capital structure of a firm. Theory predicts that the impact of different types of output market uncertainty (in particular, unanticipated shocks in demand and costs) on a firm's leverage depends on the type of competition in an industry. We test these predictions in a sample of U.S. manufacturing firms by classifying firms into Cournot competition (strategic substitutes), and Bertrand competition (strategic complements). We show that demand uncertainty is positively related to leverage for firms in both the Cournot and the Bertrand sample. Cost uncertainty has a significantly positive impact on the leverage of Cournot firms, but plays a negligible role for Bertrand firms. Our results support the strategic use of debt and highlight the role of firms' competitive behavior in the product market in their capital structure decisions.

In Chapter 3, we examine the joint determination of capital structure and market share. Theory predicts that the relations between leverage and market share depend on firms' strategic competition. Specifically, the effect of leverage on market share should be different for Cournot and Bertrand firms. Using a sample of U.S. manufacturing industries, we distinguish between Cournot and Bertrand firms based on an empirical measure of strategic substitutes and strategic complements, respectively. We jointly explain leverage and market share in a 2SLS procedure with lagged explanatory and instrumental variables. We show that in Cournot (Bertrand) competition, leverage negatively (positively) affects market share. Market share is shown to have a negative impact on leverage in Cournot firms, but no impact on leverage in Bertrand firms. Our findings emphasize the role of competitive behavior in the joint determination of capital structure and market share.

The last two empirical studies form chapters 4 and 5, in which we investigate the roles of institutional and governance factors. Apart from widely-accepted conventional determinants of leverage, country characteristics and national governance systems are shown to have non-trivial roles in affecting firms' financial structures. In addition, the conventional determinants also work variably across countries.

Chapter 4 analyzes the importance of firm-specific and country-specific factors in the leverage choice of firms from 42 countries around the world. Our analysis yields two new results. First, we find that firm-specific determinants of leverage differ across countries, while prior studies implicitly assume equal impact of these determinants. Second, although we concur with the conventional direct impact of country-specific factors on the capital structure of firms, we show that there is an indirect impact because country-specific factors also influence the roles of firm-specific determinants of leverage.

In Chapter 5, we provide a firm-level analysis of the relation between corruption, growth, and public governance in Vietnam. We examine how corruption affects growth in a comparative analysis of private firms and state-owned enterprises, and how provincial governance factors influence corruption. Our results indicate that corruption significantly hinders the growth of Vietnam's private sector. However, corruption is not detrimental for the growth in state sector. Our study highlights the role of local institutions and governance factors in affecting corruption. We present evidence that differences across provinces in regulatory entry costs, land access, the implementation and consistency of policies, and the private sector development policies can explain the severity of provincial corruption. Our findings underline the importance of within-country research to understand why and how corruption takes place, and suggest that the improvements in public governance quality should help to mitigate corruption and its adverse effects.

Finally, Chapter 6 presents a summary and conclusions of this dissertation. In this chapter, we also discuss potential avenues for future research.

Chapter 2: Strategic debt – Evidence from Cournot and Bertrand competition[2]

2.1 Introduction

Financing and output decisions are closely linked. Several theoretical studies (e.g., Brander and Lewis, 1986; Maksimovic, 1988; Bolton and Scharfstein, 1990; Showalter, 1995; Dasgupta and Titman, 1998; Faure-Grimaud, 2000; Wanzenried, 2003) emphasize the strategic role of debt in a firm's competitive strategy in the output market. An important feature of these theoretical models is that the strategic role of debt depends on the firm's competitive environment. In particular, the link between a firm's capital structure and its output market decisions is different in Cournot and Bertrand competition.

Brander and Lewis (1986) introduce a Cournot competition model to link the choice of debt level and output decisions. Because of limited liability, the equity holders of a firm that take on debt optimize their output strategy over non-bankruptcy states of the world. When the firm faces uncertainty in the output market (e.g., uncertainty about future demand or costs), equity holders ignore the bad states of demand or costs in which debt holders would suffer. Therefore, they have an incentive to gain a strategic advantage in the output market by competing more aggressively. In short, Brander and Lewis (1986) predict that Cournot firms subject to demand and/or cost uncertainty have an incentive to commit to a large output by using a highly leveraged capital structure. In a model of Bertrand competition, Showalter (1995) shows that different sources of output market uncertainty have a different effect on a firm's capital structure. When demand is uncertain, debt carries a strategic advantage. However, when costs are uncertain, Bertrand firms have an incentive to reduce their debt level.

The models of Brander and Lewis (1986) and Showalter (1995) thus produce testable hypotheses that depend on the type of competition. In Cournot competition, higher demand uncertainty leads to higher debt levels, and cost uncertainty also encourages firms to have a high leverage. In Bertrand competition, higher demand uncertainty induces higher debt, while higher cost uncertainty induces firms to choose lower debt levels.

[2] This chapter is based on de Jong, A., Nguyen, T.T., van Dijk, M.A., 2007, "Strategic debt: Evidence from Cournot and Bertrand competition", *ERIM Working Paper Series*.

Empirical research on the link between debt and product market competition is scarce. Chevalier (1995a, 1995b), Phillips (1995), and Kovenock and Phillips (1997) focus on a small number of industries in which some firms experience sharp changes in their capital structure. Lyandres (2006) presents a model that describes how the extent of competitive interaction among firms influences the role of strategic debt. He tests the predictions of the model on a large sample of U.S. manufacturing companies.

To our knowledge, Showalter (1999) is the only study that conducts an empirical test of the effect of demand and cost uncertainty on capital structure choice. Showalter shows that U.S. manufacturing firms increase debt as demand uncertainty becomes more important, but reduce debt as costs become more uncertain. He concludes that his findings are consistent with the predictions of models on Bertrand competition, and thus with the hypothesis that the firms in his sample engage in Bertrand competition.

Despite the clear distinction that theoretical models make between Cournot and Bertrand competition, empirical studies to date do not attempt to take the type of competitive behavior into account. Showalter (1999) appears too quick to assert that U.S. manufacturing firms are mostly competing in Bertrand. The aim of our study is to test the theoretical predictions of Brander and Lewis (1986) and Showalter (1995) and explicitly investigate the different implications these models have for firms in Bertrand and Cournot competition. We use the competitive strategy measure (CSM) of Sundaram, John and John (1996)[3] to characterize the competitive behavior of firms in different industries. This approach allows us to identify industries in which the competitive environment can be categorized as either Cournot or Bertrand competition. For the samples of Cournot and Bertrand firms, we estimate a capital structure model with conventional determinants of leverage and measures of cost and demand uncertainty as explanatory variables.

For Cournot firms, we find that both demand uncertainty and cost uncertainty are significantly positively associated with leverage. The effects are statistically significant across several different measures of leverage and proxies of uncertainty. For Bertrand firms, demand uncertainty has a significantly positive impact on leverage, but cost uncertainty does not have a significant effect on capital structure. The impact of different sources of uncertainty clearly differs in our two samples of Cournot and Bertrand firms.

Our findings are consistent with the theoretical predictions of Brander and Lewis (1986) that higher demand and cost uncertainty induce Cournot firms to increase debt levels. Our evidence also supports the positive impact of demand uncertainty on Bertrand firms' leverage, as predicted by Showalter (1995), but

[3] Lyandres (2006) also follows Sundaram et al. approach, and both studies use annual data for the whole study period to estimate the CSM. We use quarterly data for every period of 5 consecutive years to estimate the CSM, allowing for the fact that firms' competitive behavior may vary over time.

there is no evidence for the role of cost uncertainty among these firms. Our analysis underlines the role of strategic debt and shows that distinguishing firms according to their competitive behavior is important. Whether firms are competing in Cournot or Bertrand affects the way their capital structure choice is influenced by output market uncertainty.

2.2 Literature

In this section, we briefly review the theoretical and empirical literature on the relation between leverage and product market competition.

Brander and Lewis (1986) analyze a two-stage Cournot model. In Cournot competition, firms compete by setting the quantities they produce. With locally linear demand curves, Cournot firms compete as strategic substitutes (Bulow, Geanakoplos and Klemperer, 1985). In the first stage of the model, firms decide on the amount of debt. In the second stage, they compete in the output market. In this framework, debt commits the equity holders of a firm to pursue a more aggressive product market strategy by raising the quantity to produce. Because of the limited liability effect, the equity holders of firms that take on debt optimize only over non-bankruptcy states of the world. If the firm goes bankrupt, the equity holders' losses are limited by the value of their initially contributed investment, which is assumed to be zero in this model. Debt holders suffer in the case of a shortage of the firm's returns. A higher dispersion in anticipated levels of either demand or costs increases the uncertainty that the firm faces. And higher uncertainty induces equity holders in Cournot firms to compete more aggressively by producing more. As a result, higher uncertainty, regardless of whether the source is demand or costs, leads to higher levels of both output and debt. Debt is always of strategic advantage when Cournot firms face demand or cost uncertainty.

Showalter (1995) modifies Brander and Lewis' (1986) model to the case of Bertrand competition in which rival firms compete by setting prices. With non-increasing marginal costs, Bertrand firms compete as strategic complements (Bulow et al., 1985). Showalter shows that in this type of competition, the source of output market uncertainty plays a crucial role in determining the optimal debt level. With Bertrand competition, debt brings about a strategic advantage only when demand is uncertain. When this type of uncertainty is large, high prices are encouraged through high debt levels. By increasing its debt, a firm optimizes over good states of the world (i.e., high demand states) and therefore chooses a higher equilibrium price. Rival firms react by raising their prices, thus increasing the expected profit of the leveraged firms. However, when costs are uncertain, firms that take on debt place emphasis on low cost states, and therefore choose a lower equilibrium price. The commitment to a lower price induces rival firms to decrease their price, reducing the expected profit of the leveraged firm. As a result, Bertrand firms facing high cost uncertainty have no incentive to hold debt. Showalter (1999)

argues that in a more general model where debt has other advantages, higher cost uncertainty induces Bertrand firms to reduce leverage below the optimal debt level that firms would hold in the absence of any strategic motive.

Wanzenried (2003) shows that demand uncertainty (or volatility) also raises a firm's optimal debt level in models of both Cournot and Bertrand competition in the presence of differentiated products. She does not take uncertainty on the cost side into account. Haan and Toolsema (2007) present a numerical analysis of strategic debt using Wanzenried's (2003) two-stage differentiated goods model with a correction in solving the second stage of the model. In contrast to the result of Wanzenried, they find that the equilibrium debt level decreases for both Bertrand and Cournot firms as demand becomes more volatile.

Showalter (1999) is the only empirical study we know that empirically investigates the role of demand and cost uncertainty in determining a firm's capital structure. Showalter analyzes a sample of U.S. manufacturing firms over the period 1975-1994 and examines the relation between leverage and the demand/cost uncertainty that firms face in product markets. To measure demand and cost uncertainty, Showalter (1999) proposes an approach that uses trend regressions. Demand (cost) uncertainty is calculated as the natural logarithm of the standard error of regressions of sales (costs of good sold over sales) on linear and non-linear trends. His empirical results are in line with Showalter (1995). There is a positive relation between leverage and demand uncertainty and a negative relation between leverage and cost uncertainty. Showalter (1999) concludes that price competition is the prevalent competitive behavior in U.S. manufacturing.

The type of competitive behavior plays a crucial role in theoretical models of the link between competition and leverage. We are not aware of any studies that explicitly allow for the type of competition affecting this link. We contribute to the literature by directly testing the predictions of models of Cournot and Bertrand competition on the relation between output market uncertainty and capital structure. To that end, we classify firms in our empirical analysis into different types of strategic interaction in their industries. The hypotheses that we aim to test are as follows. Under Bertrand competition:

(*H1*) firms use more debt when demand is more uncertain;

(*H2*) firms use less debt when costs are more uncertain.

Under Cournot competition:

(*H3*) firms use more debt when demand is more uncertain;

(*H4*) firms use more debt when costs are more uncertain.

2.3 Methodology and data

2.3.1 Strategic competition measures: complements vs. substitutes

Sundaram et al. (1996) argue that whether competition occurs in strategic substitutes (SS) or strategic complements (SC) depends on the effects of a firm's moves on its competitor's marginal profits. Suppose two duopolistic firms, A and B, are in an initial equilibrium, i.e., both firms have set marginal revenues equal to marginal costs. If firm A changes its strategy due to an exogenous shock, this change affects its own as well as firm B's marginal profits. To reach a new equilibrium, both firms re-optimize based on the expected consequences for their marginal profits. If firm B re-optimizes by competing in SS, then its marginal profits must be decreasing. On the contrary, if firm B re-optimizes by competing in SC, then its marginal profits must be increasing. Thus, competition in SC and SS can be distinguished by examining the sign of the second derivative of firm A's profits with respect to its own and firm B's strategic variable.

Sundaram et al. (1996) provide an empirical measure of the type of competition by constructing a proxy for the second derivative in the context of R&D competition. Their competitive strategy measure (*CSM*) is the coefficient of correlation between $\Delta\pi^f/\Delta S^f$ and ΔS^c, where $\Delta\pi^f/\Delta S^f$ is the change in a firm's profit margin (which is the change in net income over the change in net sales), and ΔS^c is the change in the competitors' output.[4] If *CSM* is smaller than zero, then competition is in SS; if *CSM* is greater than zero, then competition is in SC. In the empirical implementation, Sundaram et al. use cutoff points of -0.05 and +0.05 to define the sample of SS and SC firms. Lyandres (2006) provides a mathematical proof for the validity of this *CSM* measure as a proxy for the nature of product market competition, under the assumption that the firm's value function remains constant in the short-run. In the long-run, an industry-wide shock might change a firm's value function and introduce noise in the relation between the firm's marginal profit and its rivals' sales. Lyandres (2006) develops a model in which a firm's leverage is positively related to the extent of competitive interaction within its industry. He uses the absolute value of *CSM* as a measure of the extent of interaction.

We follow the approach of Sundaram et al. (1996) to measure the type of strategic competition. We argue that competitive behavior may change over time when firms face industry shocks or changes in demand functions. Therefore, we estimate *CSM* based on quarterly data during a relatively short period of time: we require 20 consecutive quarters of sales (Compustat data *ITEM#*2, quarterly database) and profits (*ITEM#*8).[5]

[4] Sundaram et al. (1996) include all firms with the same 4-digit SIC except the firm in question in the set of competitors.

[5] Sundaram et al. (1996) use 40 quarters in the empirical estimation of *CSM*. Lyandres (2006) uses annual data for 10 years or more to estimate the extent of strategic interaction.

We use a narrow definition of industries based on their 4-digit SIC. Therefore, we argue that it is reasonable to assume that competitive behavior is consistent across firms in each industry-year. We derive a measure representative for each industry-year's competition type. After obtaining the *CSM* measures for each firm-year, we calculate the mean and the standard deviation of the *CSM* for each industry in each year. We use the following measures of competitive behavior: (*i*) *SSDUM* is a dummy that takes a value of one if the industry-year mean of *CSM* is significantly positive, and a value of zero otherwise; (*ii*) *SCDUM* takes a value of one if the industry-year mean of *CSM* is significantly negative, and a value of zero otherwise. We use a 10% significance level. This procedure is consistent with Lyandres (2006), although he does not take into account the statistical significance. Our approach results in the identification of three separate samples of firms: Cournot firms, Bertrand firms, and unidentified firms.[6]

2.3.2 Measures of demand and cost uncertainty

Following Showalter (1999), we define three demand uncertainty proxies (*DEM1*, *DEM2*, and *DEM3*) as the natural logarithm of the standard error of the following trend regressions:

$$Y_t = \beta_0 + \beta_1 t + e_t \quad (2.1)$$

$$Y_t = \gamma_0 + \gamma_1 t + \gamma_2 t^2 + u_t \quad (2.2)$$

$$Y_t = \lambda_0 + \lambda_1 t + \lambda_2 t^2 + \lambda_3 t^3 + v_t \quad (2.3)$$

where Y_t is either sales or costs of goods sold divided by sales at time t. Showalter's (1999) assumption behind this approach is that a firm's sales and costs grow or decline in a fairly predictable pattern. Deviations from the anticipated trends represent unanticipated shocks to demand or costs. We scale the demand uncertainty proxies by sales to prevent larger firms from having a larger uncertainty measure by definition. Our three cost uncertainty proxies (*COST1, COST2,* and *COST3*) are taken from the same regressions, but with the costs of goods sold (*ITEM#*30) divided by sales in quarter *t* as dependent variable.

Showalter (1999) assumes that demand and cost uncertainty are stable over a long period of time and he estimates the regressions over his whole sample period, from 1975 to 1994. We argue that a firm's demand or cost uncertainty may exhibit important changes over time. Therefore, we use quarterly data for five consecutive years in estimating demand and cost uncertainty. In addition, we control for predictable seasonal effects in the estimation by adding three quarter dummies to regressions (2.1), (2.2), and (2.3).

[6] The unidentified firms have an industry-year *CSM* which is not significantly different from zero. The sample of unidentified firms is not further analyzed in our study.

2.3.3 Leverage measures

To facilitate a comparison with Showalter's (1999) study, we stay close to his choice of measures for capital structure and other variables. As *CSM* and the output market uncertainty measures are based on five consecutive years of data, we compute the average of a firm's leverage and the firm-specific capital structure determinants over five consecutive years as well. We use four measures of leverage, two of which are based on book values and two on market values. The book value of the long-term debt ratio (*LDEBTBV*) is defined as the average of total long-term debt (Compustat data *ITEM#*9, annual database) over five consecutive years divided by the average of total assets (*ITEM* #6). The market value of the long-term debt ratio (*LDEBTMV*) is calculated as the average of total long-term debt divided by the average market value of total assets.[7] The book value of the total debt ratio (*TDEBTBV*) is average total debt (*ITEM* #9 + *ITEM* #34) divided by average total assets. The market value of the total debt ratio (*TDEBTMV*) is defined as average total debt divided by the average market value of total assets.

2.3.4 Capital structure determinants

Empirical capital structure research uses variables related to static trade-off, agency, and information asymmetry considerations to explain leverage. In the static trade-off framework, the firm is viewed as setting a target debt-to-assets ratio and moving towards it. A firm's capital structure is determined by the trade-off between tax advantages and bankruptcy-related costs. DeAngelo and Masulis (1980) argue that the tax advantage of debt diminishes as other tax reductions, such as tax and investment tax credits, increase. Because these variables act as a tax shield substitute for debt, a negative relation between leverage and these non-debt tax shields is expected. The proxy for non-debt tax shields used in this study (*NDTS*) is defined as the ratio of average depreciation (*ITEM#125*) and investment tax credit (*ITEM#208*) to average total assets. With respect to bankruptcy costs, we use the following variables: asset tangibility (higher tangibility of assets indicates lower risk for the lender as well as reduced direct costs of bankruptcy), firm risk (higher risk indicates higher volatility of earnings and higher probability of bankruptcy), and firm size (an inverse proxy for the probability of bankruptcy; larger firms are less likely to face financial distress). We measure tangibility (*TANG*) as the ratio of average net fixed assets (*ITEM#8*) to average total assets; firm risk (*RISK*) as the standard deviation of the ratio of operating income before

[7] The measure market value of total assets is calculated as (Total debt + Market value of equity + Preferred stock – Deferred taxes and investment credits) = *ITEM #9 + ITEM #34 + (ITEM #199*ITEM #54) + ITEM #10 – ITEM #35.*

depreciation (*ITEM#13*) to total assets; and firm size (*SIZE*) as the natural logarithm of average total assets.

Agency conflicts between equity holders and debt holders arise from asset-substitution and underinvestment. To minimize these conflicts, firms with high growth opportunities have a preference for a low leverage, thus seeking equity financing for their new projects instead of debt financing. Agency theory predicts that growth opportunities are negatively associated with leverage. We use the market-to-book ratio (*MTB*), defined as the average market value of total assets over the average book value of total assets, as a proxy for growth opportunities. If debt is not collateralized, equity holders have incentives to expropriate wealth from debt holders (Myers, 1977). Creditors may also demand a higher interest rate, forcing firms to choose equity instead. Our measure of tangibility can be used as a proxy for collateralization, which is expected to be positively related to leverage.

The pecking-order theory suggests that firms follow a specific hierarchy in financing: they prefer internal over external financing. If external financing is required, a firm issues the safest security first. That is, it first issues debt, then hybrid securities such as convertible bonds, and equity only as the last resort. It is common to use profitability to test the pecking-order theory: more profitable firms are likely to have less leverage as they make use of the internally generated fund first. We measure profitability (*PROFIT*) as the average operating income before depreciation divided by the average total assets.

From the asymmetric information viewpoint, bigger firms are likely to provide better information to the market and are expected to have better access to credit. Hence, firm size is expected to be positively correlated with debt levels. Liquidity is another variable that determines the capital structure choice of firms. The agency theory and pecking-order theory both predict a negative relation between liquidity and leverage. We measure liquidity (*LIQUID*) as the ratio of average cash and short-term investments (*ITEM#1*) to average total assets. In addition, we use 2-digit SIC industry dummies in our regression models to capture the unobservable influences of industry characteristics on leverage choice of firms with common product lines.[8]

2.3.5 Data

We obtain firm-level data from the COMPUSTAT North America database for the period 1985 to 2004. We collect data at two different frequencies: annually and quarterly. At the annual frequency, we take all manufacturing firms' relevant

[8] We conduct robustness checks by using alternative measures of leverage and capital structure determinants. For example, we also measure *LDEBTBV* as the average ratio of long-term debt to the book value of total assets (instead of the ratio of the of average long-term debt to the average book value of total assets), *LDEBTMV* as the average ratio of long-term debt to the market value of assets, *TANG* as the average ratio of fixed assets to total assets, *PROFIT* as the average ratio of operating income to total assets, etc. The results are similar.

financial information such as total assets, tangible assets, profits, debt levels, etc. At the quarterly frequency, we collect sales, profits, and costs of goods sold, all of which are needed to estimate *CSM* and demand/cost uncertainty.

We define competitors as all firms in the COMPUSTAT data base with the same 4-digit SIC code (*ITEM#*324) in each particular year. Therefore, we drop the observations that do not have records of 4-digit historical SIC. As we focus on U.S. manufacturing firms only, we omit observations with historical SIC below 2000 or above 3999. We exclude firms in industries concerned with miscellaneous items.[9] Competition within industries is the main focus of our study, so the identification of the relevant competitors within the same industry is essential. We require firms to have both total assets and sales greater than 1 million USD. We discard firms without quarterly data for sales, profits, and costs of goods sold. We follow MacKay and Phillips (2005) and drop observations with negative sales or assets for either annual or quarterly records.

The data screens yield a final sample of 126 industries, consisting of 14,007 firm-years and 2,660 distinct firms. We analyze data in three consecutive five-year periods to avoid that we use overlapping data for calculating *CSM*, demand and cost uncertainty, and the other variables. We present results that are based on the periods 1989-1994, 1995-1999, and 2000-2004.[10] After applying Sundaram et al.'s (1996) approach to measure strategic competition, we obtain a sample of Bertrand firms that includes 954 observations (the "Bertrand sample"), and a sample of Cournot firms that includes 633 observations (the "Cournot sample").

We estimate panel data models with firm random effects to investigate the relation between output market uncertainty and leverage.[11] We use time dummies (for three different periods) and White standard errors to correct for heteroskedasticity. The basic regression model is as follows:

$$LEV_{it} = \beta_0 + \sum_{i=1}^{19} \beta_i INDUSTRY_i + \beta_{20} TANG_{it} + \beta_{21} SIZE_{it} + \beta_{22} RISK_{it} + \beta_{23} NDTS_{it} +$$

$$+ \beta_{24} PROFIT_{it} + \beta_{25} MTB_{it} + \beta_{26} LIQUID_{it} + \beta_{27} DEM_{it} + \beta_{28} COST_{it} + \varepsilon_{it} \qquad (2.4)$$

where *LEV* is the proxy for leverage; $INDUSTRY_i$ are the industry dummies for 2-digit SIC industries; *DEM* and *COST* represent the demand and cost uncertainty proxies *DEM1*, *DEM2*, *DEM3* and *COST1*, *COST2*, *COST3*, respectively. The other explanatory variables are described above. In a robustness check, we include

[9] We do not take these industries as the last 2 digits of the 4-digit SIC code ending with 99 as in MacKay and Phillips (2005), but check these industries manually to make sure of the correct definitions. This procedure is in line with Clarke (1989) and Campello (2006).

[10] Other combinations of 3 consecutive periods are used for robustness checks: (i) 1987-1991, 1992-1996, and 1997-2001; (ii) 1988-1992, 1993-1997, and 1998-2002; and (iii) 1989-1993, 1994-1998, and 1999-2003. We find similar results.

[11] A Hausman test shows that the differences between the coefficients in the fixed and random effects panel models are not statistically significant.

a measure of competition intensity, the absolute value of industry-average *CSM*, as an additional explanatory variable as suggested by Lyandres (2006).

2.4 Empirical analysis of the link between leverage and demand/cost uncertainty

Table 2.1 presents summary statistics of firm characteristics in the Bertrand and Cournot samples. Many firm characteristics differ significantly across both samples. Generally, firms competing as strategic substitutes are smaller, less prone to business risk, and more profitable, and have smaller fixed assets, fewer growth opportunities, and less liquidity. Average demand and cost uncertainty are lower for firms in the Cournot sample compared to the Bertrand sample.

Table 2.2 presents correlations between the variables in the Bertrand sample (Panel A) and the Cournot sample (Panel B). Similar to Showalter (1999), we observe that the highest correlations between the explanatory variables are those between *PROFIT* and *DEM*/*COST* in both samples. The relatively high and negative correlations between profitability and both sources of uncertainty indicate that firms that experience less cost and demand uncertainty on average have higher profits. A potential explanation is that under predictable output market conditions, firms are better able to anticipate optimal capacity and inventory levels. Liquidity has a large, positive correlation with both *DEM* and *COST* in the Bertrand sample, while in the Cournot sample only the correlation between *LIQUID* and *COST* is relatively high. This may be explained by the fact that firms facing high output market uncertainty have a greater need for liquid assets in order to be well prepared for poor states of the world.

Table 2.1
Summary statistics

This table presents summary statistics for all variables used in this study and compares the means across the Bertrand and Cournot samples. the variable definitions are as follows. *LDEBTBV*: book value of long-term debt ratio, defined as average total long-term debt divided by average total assets. *TDEBTBV*: book value of total debt ratio, defined as average total debt divided by average total assets. *LDEBTMV*: market value of long-term debt ratio, defined as the average total long-term debt divided by the average market value of total assets (which is calculated as total debt plus market value of equity plus preferred stock minus deferred taxes and investment credits). *TDEBTMV*: market value of total debt ratio, defined as the average total debt divided by the average market value of total assets. *TANG*: tangibility, defined as the ratio of average net fixed assets to average total assets. *SIZE*: firm size, defined as the natural log of average total assets. *RISK*: firm business risk, defined as the standard deviation of the ratio between operating income before depreciation to total assets. *NDTS*: non-debt tax shields, defined as the ratio of average depreciation and investment tax credit to average total assets. *PROFIT*: profitability, defined as the average operating income before depreciation divided by average total assets. *MTB*: market-to-book ratio, defined as the average market value of total assets over average total assets. *LIQUID*: liquidity, defined as the ratio of average cash and short-term investments to average total assets. *DEM1*, *DEM2*, and *DEM3*: demand uncertainty proxies, defined as the natural log of the standard error (scaled by sales) of trend regressions (2.1), (2.2), and (2.3) with sales as the dependent variable. *COST1*, *COST2*, and *COST3*: cost uncertainty proxies, defined as the natural log of the standard error of trend regressions (2.1), (2.2), and (2.3) with costs of goods sold over sales as the dependent variable.

	Bertrand sample # obs. = 954				**Cournot sample # obs. = 633**				**Mean comparison (Cournot – Bertrand)**	
	Mean	**Stdev**	**Min**	**Max**	**Mean**	**Stdev**	**Min**	**Max**	**difference**	**p-value**
LDEBTBV	0.156	0.174	0.000	1.145	0.136	0.157	0.000	1.710	-0.020	0.021
TDEBTBV	0.208	0.221	0.000	1.915	0.183	0.183	0.000	1.778	-0.025	0.018
LDEBTMV	0.121	0.159	0.000	0.885	0.138	0.177	0.000	0.837	0.017	0.046
TDEBTMV	0.159	0.193	0.000	1.097	0.180	0.210	0.000	1.033	0.021	0.037

Table 2.1 (continued)

	Bertrand sample # obs. = 954				Cournot sample # obs. = 633				Mean comparison (Cournot – Bertrand)	
	Mean	**Stdev**	**Min**	**Max**	**Mean**	**Stdev**	**Min**	**Max**	**difference**	**p-value**
TANG	0.245	0.193	0.000	0.874	0.208	0.161	0.011	0.750	-0.037	0.000
SIZE	5.257	2.285	0.062	12.001	4.874	2.169	0.078	10.433	-0.383	0.001
RISK	0.102	0.150	0.003	2.445	0.087	0.112	0.004	1.010	-0.015	0.037
NDTS	0.046	0.028	0.000	0.313	0.048	0.030	0.005	0.365	0.002	0.194
PROFIT	0.003	0.250	-2.453	0.497	0.038	0.203	-1.129	0.417	0.035	0.004
MTB	2.486	2.213	0.230	25.333	1.914	1.835	0.156	24.779	-0.572	0.000
LIQUID	0.293	0.276	0.000	0.953	0.196	0.190	0.000	0.858	-0.097	0.000
DEM1	-3.149	1.011	-6.125	1.574	-3.399	0.858	-5.634	0.018	-0.250	0.000
DEM2	-3.367	1.074	-6.096	1.333	-3.655	0.921	-6.274	-0.020	-0.288	0.000
DEM3	-3.464	1.091	-6.073	1.358	-3.753	0.929	-6.258	-0.016	-0.289	0.000
COST1	-1.944	2.389	-5.259	6.786	-2.786	1.333	-5.024	4.903	-0.842	0.000
COST2	-2.031	2.401	-5.409	6.781	-2.888	1.363	-5.189	4.797	-0.857	0.000
COST3	-2.092	2.408	-5.378	6.824	-2.954	1.372	-5.393	4.824	-0.862	0.000

Table 2.2
Correlations

This table presents the correlations between all variables used in this study. Variable definitions are discussed in Table 2.1.

Panel A: Bertrand sample (# obs. = 954)

	LDEBTBV	TDEBTBV	LDEBTMV	TDEBTMV	TANG	SIZE	RISK	NDTS	PROFIT	MTB	LIQUID	DEM1	DEM2	DEM3	COST1	COST2	COST3
LDEBTBV	1.000																
TDEBTBV	0.841	1.000															
LDEBTMV	0.758	0.632	1.000														
TDEBTMV	0.674	0.738	0.925	1.000													
TANG	0.297	0.292	0.432	0.419	1.000												
SIZE	0.188	0.071	0.227	0.146	0.349	1.000											
RISK	-0.080	-0.019	-0.225	-0.201	-0.251	-0.381	1.000										
NDTS	0.130	0.187	0.174	0.204	0.380	0.075	0.036	1.000									
PROFIT	0.063	0.027	0.216	0.203	0.320	0.442	-0.629	-0.046	1.000								
MTB	-0.134	-0.148	-0.411	-0.438	-0.292	-0.192	0.332	-0.122	-0.361	1.000							
LIQUID	-0.293	-0.362	-0.480	-0.531	-0.590	-0.296	0.383	-0.327	-0.576	0.437	1.000						
DEM1	-0.109	-0.090	-0.211	-0.204	-0.302	-0.321	0.419	-0.026	-0.607	0.212	0.581	1.000					
DEM2	-0.108	-0.092	-0.205	-0.198	-0.278	-0.324	0.395	-0.038	-0.610	0.191	0.569	0.965	1.000				
DEM3	-0.113	-0.097	-0.207	-0.202	-0.284	-0.325	0.389	-0.035	-0.610	0.198	0.569	0.954	0.986	1.000			
COST1	-0.098	-0.102	-0.263	-0.271	-0.328	-0.345	0.491	-0.119	-0.742	0.328	0.661	0.694	0.692	0.692	1.000		
COST2	-0.097	-0.100	-0.259	-0.265	-0.323	-0.347	0.487	-0.116	-0.740	0.322	0.655	0.695	0.695	0.695	0.998	1.000	
COST3	-0.094	-0.096	-0.256	-0.261	-0.321	-0.347	0.485	-0.116	-0.739	0.320	0.650	0.695	0.696	0.697	0.996	0.999	1.000

Table 2.2 (continued)

Panel B: Cournot sample (# obs. = 633)

	LDEBTBV	TDEBTBV	LDEBTMV	TDEBTMV	TANG	SIZE	RISK	NDTS	PROFIT	MTB	LIQUID	DEM1	DEM2	DEM3	COST1	COST2	COST3
LDEBTBV	1.000																
TDEBTBV	0.911	1.000															
LDEBTMV	0.812	0.736	1.000														
TDEBTMV	0.745	0.788	0.946	1.000													
TANG	0.356	0.295	0.505	0.450	1.000												
SIZE	0.334	0.203	0.409	0.317	0.454	1.000											
RISK	-0.216	-0.111	-0.252	-0.217	-0.275	-0.460	1.000										
NDTS	-0.033	0.010	-0.047	-0.031	0.171	-0.102	0.186	1.000									
PROFIT	0.192	0.088	0.193	0.157	0.310	0.460	-0.713	-0.276	1.000								
MTB	-0.233	-0.230	-0.393	-0.420	-0.255	-0.225	0.319	0.033	-0.252	1.000							
LIQUID	-0.460	-0.498	-0.519	-0.558	-0.492	-0.358	0.345	-0.116	-0.398	0.417	1.000						
DEM1	-0.083	0.012	-0.088	-0.021	-0.271	-0.450	0.497	0.123	-0.552	0.086	0.279	1.000					
DEM2	-0.099	0.010	-0.104	-0.028	-0.300	-0.480	0.481	0.113	-0.555	0.062	0.272	0.942	1.000				
DEM3	-0.103	0.001	-0.113	-0.040	-0.308	-0.490	0.486	0.120	-0.557	0.065	0.272	0.923	0.983	1.000			
COST1	-0.132	-0.064	-0.151	-0.116	-0.243	-0.406	0.562	0.117	-0.607	0.226	0.436	0.592	0.582	0.580	1.000		
COST2	-0.130	-0.059	-0.146	-0.109	-0.252	-0.417	0.557	0.113	-0.600	0.226	0.422	0.587	0.586	0.587	0.992	1.000	
COST3	-0.126	-0.053	-0.143	-0.104	-0.249	-0.418	0.549	0.118	-0.596	0.227	0.409	0.583	0.583	0.586	0.986	0.996	1.000

In Table 2.3, we report the averages of the leverage and the demand and cost uncertainty measures for the industries included in the Bertrand and Cournot samples. The Bertrand (Cournot) sample consists of 24 (21) 4-digit SIC industries. Within each sample, industries are presented in order of descending long-term debt ratios based on book values. The table also shows the rank order for each of the variables, with 1 as the highest value.

Within the Bertrand sample, the industries with the highest average leverage ratios correspond to those characterized by low demand and cost uncertainty. The low leverage industries generally have relatively high demand and cost uncertainty. The industries that we classify as Bertrand and that have the highest debt levels include plastics (SIC 3081, 3086), alcohol (SIC 2084), and fabrics (SIC 2211); the lowest average leverage is observed in the semiconductor service (SIC 3674), telegraph apparatus (SIC 3661), and biological diagnostics (SIC 2836) industries.

Within the Cournot sample, we observe high average debt ratios in the paperboard (SIC 2631), aluminum (SIC 3334), steel works (SIC 3321), and insulating nonferrous wire (SIC 3357) industries; and low leverage in the electro-medical apparatus (SIC 3845), lab analytical instruments (SIC 3826), and magnetic optical recording (SIC 3695) industries. The industries competing in Cournot with the highest leverage appear to have medium or relatively high levels of uncertainty in both demand and costs. Clearly, the association between *DEM/COST* and leverage varies systematically across the two samples with different competitive behavior.

Table 2.4 reports the estimation results of our capital structure regressions. For each sample, and for each of the four measures of leverage, we estimate three panel models with three different proxies of demand and cost uncertainty as independent variables (in addition to the conventional determinants of capital structure used in previous studies). The results are consistent across different leverage proxies, but the statistical significance is somewhat stronger when market-value measures of leverage are used.

Table 2.3
Industry averages and ranks

This table presents the industry averages and ranks of four measures of leverage and three measures of both demand and cost uncertainty in the Bertrand and Cournot samples. Variable definitions are discussed in Table 2.1. The 4-digit SIC industry descriptions are taken from Compustat documentation.

Panel A: Bertrand sample (# obs. = 954)

SIC	Industry description	Obs.	LDEBTBV	rank	TDEBTBV	rank	LDEBTMV	rank	TDEBTMV	rank	DEM1	rank	DEM2	rank	DEM3	rank	COST1	rank	COST2	rank	COST3	rank
3081	Unsupp plastics film & sheet	17	0.37	1	0.44	2	0.38	3	0.45	4	-3.72	15	-3.90	12	-3.99	12	-2.71	7	-2.73	7	-2.77	6
3086	Plastics foam products	8	0.37	2	0.50	1	0.39	2	0.54	1	-3.92	22	-4.05	18	-4.07	15	-3.11	11	-3.28	13	-3.32	12
2084	Wine & brandy spirits	10	0.35	3	0.41	3	0.36	4	0.42	5	-3.91	21	-4.06	19	-4.13	20	-3.43	19	-3.48	17	-3.54	18
2421	Sawmills, planing mills, gen	7	0.35	4	0.39	4	0.31	6	0.35	6	-3.64	12	-3.92	14	-4.02	14	-3.39	17	-3.56	20	-3.58	20
3532	Mng machy, eq, ex oil field	2	0.32	5	0.34	7	0.21	12	0.23	13	-3.70	13	-4.12	22	-4.17	21	-3.34	15	-3.39	15	-3.36	14
2211	Broadwoven fabric mill	16	0.31	6	0.38	5	0.40	1	0.49	3	-3.80	19	-4.01	15	-4.12	18	-3.38	16	-3.43	16	-3.51	17
3444	Sheet metal work	5	0.28	7	0.38	6	0.34	5	0.51	2	-2.91	3	-3.36	5	-3.47	5	-2.78	8	-2.83	8	-2.85	8
3531	Construction machinery & eq	18	0.22	8	0.28	10	0.22	11	0.27	11	-3.42	8	-3.84	11	-4.02	13	-3.64	23	-3.74	23	-3.78	23
2911	Petroleum refining	74	0.22	9	0.26	13	0.27	7	0.31	8	-3.44	9	-3.57	8	-3.69	6	-3.15	13	-3.22	11	-3.25	11
2821	Plastics, resins, elastomers	19	0.22	10	0.26	12	0.25	10	0.30	9	-3.74	16	-4.02	16	-4.11	17	-3.56	21	-3.69	22	-3.77	22
2052	Cookies & crackers	4	0.21	11	0.23	16	0.26	9	0.27	12	-3.88	20	-4.05	17	-4.13	19	-3.71	24	-3.84	24	-4.06	24
3317	Steel pipe and tubes	13	0.21	12	0.26	14	0.26	8	0.33	7	-3.29	6	-3.56	6	-3.74	8	-3.07	10	-3.23	12	-3.35	13
3585	Air-cond, heating, refrig eq	27	0.20	13	0.29	8	0.20	13	0.28	10	-3.93	23	-4.23	23	-4.38	24	-3.47	20	-3.52	19	-3.56	19
2673	Plastic, foil, coated paper	2	0.18	14	0.26	11	0.17	15	0.22	15	-3.70	14	-4.32	24	-4.29	23	-2.50	5	-2.53	5	-2.59	4
2082	Malt beverages	14	0.16	15	0.18	20	0.10	17	0.12	19	-3.97	24	-4.10	21	-4.26	22	-3.57	22	-3.69	21	-3.76	21
2834	Pharmaceutical preparations	275	0.15	16	0.20	18	0.07	22	0.09	21	-3.06	4	-3.27	3	-3.37	3	-1.24	2	-1.34	2	-1.41	2
3812	Srch, det, nav, guid, aero sys	43	0.15	17	0.20	19	0.18	14	0.22	16	-3.55	11	-3.79	10	-3.90	10	-3.12	12	-3.19	10	-3.24	10
3634	Electric housewares & fans	13	0.15	18	0.22	17	0.15	16	0.22	14	-3.77	17	-3.91	13	-3.93	11	-3.32	14	-3.37	14	-3.48	15

Table 2.3 (continued)

SIC	Industry description	Obs.	LDEBTBV/rank		TDEBTBV/rank		LDEBTMV/rank		TDEBTMV/rank		DEM1/rank		DEM2/rank		DEM3/rank		COST1/rank		COST2/rank		COST3/rank	
2836	Biological pds diagnostics	116	0.13	19	0.15	22	0.05	24	0.05	24	-2.31	1	-2.49	1	-2.54	1	1.07	1	1.00	1	0.95	1
2024	Ice cream & frozen desserts	13	0.12	20	0.17	21	0.09	18	0.11	20	-3.78	18	-4.06	20	-4.10	16	-3.40	18	-3.49	18	-3.49	16
3674	Semiconductor service	93	0.11	21	0.13	23	0.07	21	0.09	23	-2.80	2	-3.06	2	-3.16	2	-2.40	3	-2.49	3	-2.58	3
3651	household audio & video eq	31	0.09	22	0.23	15	0.09	19	0.20	17	-3.38	7	-3.58	9	-3.79	9	-2.60	6	-2.72	6	-2.79	7
3821	Lab apparatus & furniture	20	0.08	23	0.28	9	0.07	20	0.18	18	-3.50	10	-3.57	7	-3.69	7	-3.01	9	-3.04	9	-3.07	9
3661	Tele & telegraph apparatus	114	0.08	24	0.13	24	0.06	23	0.09	22	-3.09	5	-3.35	4	-3.43	4	-2.44	4	-2.53	4	-2.60	5

Panel B: Cournot sample (# obs. = 633)

SIC	Industry description	Obs.	LDEBTBV/rank		TDEBTBV/rank		LDEBTMV/rank		TDEBTMV/rank		DEM1/rank		DEM2/rank		DEM3/rank		COST1/rank		COST2/rank		COST3/rank	
2631	Paperboard mills	13	0.38	1	0.43	1	0.47	2	0.55	1	-3.81	16	-4.02	16	-4.08	14	-2.78	6	-2.87	6	-2.92	7
3743	Railroad equipment	6	0.33	2	0.39	2	0.32	4	0.39	4	-3.32	10	-3.69	11	-3.80	12	-3.54	16	-3.59	16	-3.66	16
3334	Prim production of aluminum	8	0.29	3	0.32	3	0.49	1	0.52	2	-4.12	17	-4.43	17	-4.56	17	-3.73	18	-3.97	18	-4.05	18
3357	Insulating nonfer wire	6	0.24	4	0.28	5	0.27	5	0.31	6	-2.79	1	-3.00	1	-3.32	4	-2.78	7	-2.88	7	-2.89	6
3312	Steel works & blast furnaces	66	0.24	5	0.27	6	0.35	3	0.41	3	-3.50	13	-3.89	13	-4.02	13	-3.15	13	-3.28	13	-3.35	13
2711	Newspaper: pubg & print	48	0.23	6	0.25	9	0.18	8	0.20	11	-4.25	19	-4.60	21	-4.66	20	-3.56	17	-3.67	17	-3.74	17
2851	Paints, varnishes, lacquers	19	0.20	7	0.24	11	0.16	11	0.19	13	-4.23	18	-4.56	19	-4.58	19	-3.91	20	-4.03	19	-4.11	19
2085	Distilled & blended liquor	2	0.19	8	0.27	7	0.13	12	0.19	12	-4.40	21	-4.55	18	-4.56	18	-4.50	21	-4.47	21	-4.43	21
3652	Phono recrds, audio tape, disk	6	0.18	9	0.25	10	0.17	10	0.22	9	-3.34	11	-3.69	12	-3.74	11	-3.03	11	-3.06	10	-3.13	9
3724	Aircraft engine, engine parts	19	0.18	10	0.23	12	0.24	6	0.30	7	-3.71	14	-3.96	14	-4.19	16	-3.05	12	-3.10	11	-3.17	11
3949	Sporting & athletic goods, nec	24	0.16	11	0.30	4	0.20	7	0.32	5	-3.05	6	-3.27	6	-3.40	6	-2.66	5	-2.73	5	-2.74	5
3442	Metal doors, frames, trim	6	0.16	12	0.18	14	0.13	13	0.15	14	-4.35	20	-4.60	20	-4.73	21	-3.80	19	-4.10	20	-4.17	20
3942	Dolls & stuffed toys	10	0.15	13	0.26	8	0.12	14	0.22	10	-3.29	9	-3.50	9	-3.65	9	-3.33	15	-3.41	15	-3.48	15

Table 2.3 (continued)

SIC	Industry description	Obs.	LDEBTBV/rank		TDEBTBV/rank		LDEBTMV/rank		TDEBTMV/rank		DEM1/rank		DEM2/rank		DEM3/rank		COST1/rank		COST2/rank		COST3/rank	
3555	Printing trades machy, equip	15	0.12	14	0.21	13	0.17	9	0.30	8	-2.98	3	-3.17	3	-3.20	1	-3.01	10	-3.10	12	-3.17	10
3577	Computer peripheral eq, nec	62	0.09	15	0.14	15	0.07	18	0.10	19	-3.18	7	-3.46	8	-3.51	7	-2.46	4	-2.56	3	-2.64	3
3826	Lab analytical instruments	37	0.09	16	0.13	18	0.05	20	0.08	20	-3.77	15	-4.00	15	-4.13	15	-2.79	8	-2.89	8	-2.96	8
3663	Radio, TV broadcast,comm eq	117	0.08	17	0.13	17	0.07	19	0.10	18	-3.02	5	-3.21	5	-3.32	5	-2.46	2	-2.55	2	-2.61	2
3845	Electromedical apparatus	110	0.08	18	0.12	20	0.05	21	0.07	21	-3.21	8	-3.44	7	-3.52	8	-2.07	1	-2.16	1	-2.23	1
3823	Industrial measurement instr	51	0.08	19	0.12	19	0.08	17	0.12	17	-3.41	12	-3.62	10	-3.70	10	-3.20	14	-3.34	14	-3.38	14
2741	Miscellaneous publishing	4	0.08	20	0.10	21	0.11	15	0.13	16	-3.01	4	-3.15	2	-3.30	3	-2.46	3	-2.60	4	-2.64	4
3695	Magnetic, opticrecordngmedia	4	0.07	21	0.14	16	0.08	16	0.15	15	-2.96	2	-3.18	4	-3.24	2	-2.93	9	-3.05	9	-3.23	12

The regressions based on the Bertrand sample (see Panel A) support hypothesis *H1*, which states that Bertrand firms facing higher demand uncertainty use more debt. The results show that demand uncertainty indeed has a positive impact on the debt ratio of Bertrand firms, consistent with the theoretical models of Showalter (1995) and Wanzenried (2003). Due to the limited liability effect, Bertrand firms (and also Cournot firms) tend to take in more debt when the demand uncertainty in the product market rises. The coefficient of the *DEM* measures is significantly positive for all leverage proxies, except for *LDEBTBV*. The economic impact of demand uncertainty is substantial. For example, a one standard deviation increase in *DEM1* is associated with a 10.2%[12] increase in the average *TDEBTMV* of Bertrand firms. Different proxies of demand uncertainty all confirm the results.

Showalter (1995, 1999) contends that cost uncertainty is negatively associated with debt within Bertrand competition. However, the regressions for Bertrand firms indicate that none of the cost uncertainty proxies has a statistically significant effect on leverage. Coefficients are also not consistently negative across the panel models and they are generally very close to zero. We find no support for hypothesis *H2*.

With regard to the control variables in our Bertrand sample regressions, *TANG, SIZE, PROFIT, MTB*, and *LIQUID* show significant coefficients with the correct signs as predicted in the capital structure literature. Tangibility has a positive impact on leverage (especially debt ratios in book value) because higher tangibility helps to reduce the direct cost of bankruptcy. Bigger firms enjoy lower bankruptcy probability and information asymmetry, therefore can afford higher levels of debt. Higher profitability and liquidity limit the use of debt thanks to the availability of internal funds, especially in terms of liquid assets. Growth opportunities, in the regressions for debt ratios in market value, restrict the use of debt to avoid agency problems of underinvestment. The effect of the other control variables such as *RISK* and *NDTS* is not significant, although they have the expected sign in most cases.

In the Cournot sample, the results show a positive and statistically significant effect of both demand and cost uncertainty on leverage in all 12 regression models (see Panel B). Hence, we find evidence that both demand uncertainty and cost uncertainty encourage Cournot firms to use strategic debt, consistent with hypotheses *H3* and *H4*. These results are in line with the argument of Brander and Lewis (1986) that in the presence of output market uncertainty, firms have an incentive to have a high leverage to commit to aggressive competition. This aggressiveness induces their rival firms to reduce output, and

[12] The figure is derived from a straightforward calculation: one standard deviation of *DEM1* (1.011) is multiplied with its estimated coefficient (0.016) in regression (10) of Table 2.4., and then divided by the average of *TDEBMV* (0.159). Similar calculations of economic significance are used in the other sections of this book.

raises the expected profit of the leveraged firms. These effects are also significant from an economic point of view. A one standard deviation increase in *DEM1* (*COST1*) is associated with a 14.3% (13.3%) increase in the average *TDEBTMV* of Cournot firms.

For our Cournot sample regressions, the coefficients on the control variables are all in line with the capital structure literature. Different from Bertrand sample, all the conventional determinants of leverage, including *RISK* and *NDTS*, are significant. Higher business risk tends to make firms decrease their debt usage due to the higher probability of bankruptcy. Higher non-debt tax shield limits the tax advantage of debt, thus restricting firms' debt levels.

To investigate whether the coefficients of the demand and cost uncertainty measures and the control variables differ significantly across the Bertrand and Cournot samples, we run regressions with the same specification as in Table 2.4, but based on all observations in the two samples together and including interaction terms of all variables with *SSDUM*.[13] The results indicate that the coefficients of the cost uncertainty measures are significantly larger for Cournot firms than for Bertrand firms. Demand uncertainty does not significantly differ in terms of its impact on leverage across these two types of firms. The results are consistent with our main finding that demand uncertainty affects the leverage of all firms, but cost uncertainty is important for Cournot firms and not for Bertrand firms.

As a robustness check, we run all regressions in Table 2.4 with the absolute value of industry-average *CSM* as an additional explanatory variable. Lyandres (2006) suggests that there is a significantly positive relation between leverage and the extent of competitive interactions in the industry, regardless of the type of competitive behavior. The inclusion of the absolute value of industry-average *CSM* does not change our results. The demand and cost uncertainty proxies yield results that are consistent with Table 2.4: both *DEM* and *COST* measures have a significantly positive impact on the debt ratios of Cournot firms, while only demand uncertainty affects the leverage of Bertrand firms positively. The effect of the absolute value of industry-average *CSM* is statistically negligible in most of our regressions after controlling for demand and cost uncertainty. The exceptions are the three regressions with *TDEBT* as the dependent variable in the Cournot sample, in which the absolute value of *CSM* is positively associated with the debt ratio, consistent with Lyandres (2006).

In short, our results indicate that the competitive behavior of firms affects the link between output market uncertainty and a firm's capital structure choice.

[13] The results are available upon request.

Table 2.4
Capital structure regressions with demand and cost uncertainty

This table presents the results of 12 panel data regressions of leverage on conventional capital structure determinants and measures of demand and cost uncertainty. Data are from three consecutive periods: 1990-1994, 1995-1999, and 2000-2004. All models include firm random effects. Variable definitions are discussed in Table 2.1. *P*-values are reported in parentheses. The significant coefficients are printed in bold. The superscripts a, b, and c indicate statistical significance at the 1%, 5% and 10% level, respectively. White standard errors are used to correct for heteroskedasticity.

Panel A: Bertrand sample

	LDEBTBV			TDEBTBV			LDEBTMV			TDEBTMV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TANG	**0.091**[c]	**0.090**[c]	**0.091**[c]	**0.124**[c]	**0.122**[c]	**0.124**[c]	0.042	0.041	0.042	0.046	0.045	0.047
	(0.072)	(0.075)	(0.073)	(0.070)	(0.074)	(0.071)	(0.315)	(0.323)	(0.314)	(0.329)	(0.341)	(0.327)
SIZE	**0.016**[a]	**0.015**[a]	**0.015**[a]	**0.008**[b]	**0.008**[b]	**0.008**[b]	**0.008**[a]	**0.008**[a]	**0.008**[a]	0.002	0.002	0.002
	(0.000)	(0.000)	(0.000)	(0.018)	(0.019)	(0.021)	(0.001)	(0.001)	(0.001)	(0.373)	(0.387)	(0.395)
RISK	-0.003	0.001	0.001	0.053	0.060	0.061	-0.050	-0.047	-0.047	-0.048	-0.044	-0.043
	(0.952)	(0.988)	(0.979)	(0.234)	(0.195)	(0.189)	(0.129)	(0.139)	(0.14)	(0.136)	(0.163)	(0.164)
NDTS	-0.037	-0.020	-0.019	0.004	0.035	0.036	-0.076	-0.058	-0.060	-0.116	-0.092	-0.093
	(0.873)	(0.931)	(0.936)	(0.992)	(0.915)	(0.915)	(0.659)	(0.735)	(0.728)	(0.653)	(0.723)	(0.718)
PROFIT	**-0.139**[a]	**-0.139**[a]	**-0.139**[a]	**-0.202**[a]	**-0.201**[a]	**-0.200**[a]	**-0.112**[a]	**-0.113**[a]	**-0.112**[a]	**-0.150**[a]	**-0.149**[a]	**-0.148**[a]
	(0.004)	(0.004)	(0.004)	(0.006)	(0.007)	(0.007)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MTB	-0.002	-0.002	-0.002	-0.003	-0.003	-0.003	**-0.015**[a]	**-0.015**[a]	**-0.015**[a]	**-0.020**[a]	**-0.020**[a]	**-0.020**[a]
	(0.465)	(0.463)	(0.444)	(0.261)	(0.266)	(0.245)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LIQUID	**-0.189**[a]	**-0.185**[a]	**-0.183**[a]	**-0.384**[a]	**-0.378**[a]	**-0.376**[a]	**-0.168**[a]	**-0.164**[a]	**-0.163**[a]	**-0.289**[a]	**-0.284**[a]	**-0.284**[a]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Table 2.4 (continued)

DEM1	0.012			**0.023**[b]			**0.011**[b]			**0.016**[a]		
	(0.115)			(0.015)			(0.034)			(0.007)		
COST1	-0.001			-0.001			-0.002			-0.002		
	(0.875)			(0.852)			(0.323)			(0.492)		
DEM2		0.009			**0.018**[b]			0.006			**0.011**[b]	
		(0.197)			(0.037)			(0.183)			(0.045)	
COST2		0.000			0.000			-0.002			-0.001	
		(0.922)			(0.981)			(0.501)			(0.738)	
DEM3			0.007			**0.015**[c]			0.006			**0.010**[a]
			(0.319)			(0.088)			(0.187)			(0.070)
COST3			0.000			0.001			-0.002			-0.001
			(0.927)			(0.848)			(0.532)			(0.828)
No. (2-digit SIC)												
Industry dummies	12	12	12	12	12	12	12	12	12	12	12	12
Obs.	954	954	954	954	954	954	954	954	954	954	954	954
Within R^2	0.209	0.207	0.207	0.236	0.234	0.233	0.418	0.417	0.416	0.449	0.447	0.447
Between R^2	0.490	0.473	0.457	0.985	0.987	0.983	0.996	0.997	0.997	0.998	0.998	0.998
Overall R^2	0.208	0.207	0.206	0.234	0.233	0.232	0.425	0.424	0.424	0.458	0.456	0.456

Table 2.4 (continued)

Panel B: Cournot sample

	LDEBTBV			TDEBTBV			LDEBTMV			TDEBTMV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TANG	0.038	0.039	0.040	0.054	0.058	0.057	0.093	**0.094**[c]	**0.095**[c]	0.083	0.086	0.086
	(0.474)	(0.454)	(0.451)	(0.318)	(0.284)	(0.291)	(0.104)	(0.097)	(0.095)	(0.191)	(0.173)	(0.174)
SIZE	**0.011**[a]	**0.011**[a]	**0.011**[a]	0.004	0.005	0.005	**0.012**[a]	**0.012**[a]	**0.013**[a]	**0.007**[c]	**0.007**[c]	**0.007**[c]
	(0.006)	(0.004)	(0.003)	(0.314)	(0.249)	(0.254)	(0.000)	(0.000)	(0.000)	(0.079)	(0.060)	(0.063)
RISK	**-0.134**[a]	**-0.122**[a]	**-0.121**[a]	-0.098	-0.086	-0.083	**-0.163**[a]	**-0.157**[a]	**-0.154**[a]	**-0.205**[a]	**-0.196**[a]	**-0.192**[a]
	(0.002)	(0.005)	(0.006)	(0.227)	(0.279)	(0.294)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
NDTS	**-0.384**[b]	**-0.373**[b]	**-0.380**[b]	**-0.550**[a]	**-0.535**[b]	**-0.546**[a]	**-0.540**[a]	**-0.529**[a]	**-0.536**[a]	**-0.705**[a]	**-0.689**[a]	**-0.699**[a]
	(0.014)	(0.017)	(0.015)	(0.008)	(0.011)	(0.010)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)
PROFIT	-0.018	-0.020	-0.021	-0.101	-0.100	-0.104	**-0.096**[b]	**-0.095**[b]	**-0.096**[a]	**-0.134**[a]	**-0.131**[a]	**-0.134**[a]
	(0.706)	(0.691)	(0.669)	(0.13)	(0.14)	(0.127)	(0.011)	(0.012)	(0.010)	(0.006)	(0.008)	(0.006)
MTB	0.001	0.002	0.002	0.001	0.002	0.001	**-0.012**[a]	**-0.011**[a]	**-0.012**[a]	**-0.017**[a]	**-0.016**[a]	**-0.017**[a]
	(0.601)	(0.567)	(0.583)	(0.709)	(0.649)	(0.695)	(0.008)	(0.008)	(0.007)	(0.005)	(0.005)	(0.004)
LIQUID	**-0.305**[a]	**-0.299**[a]	**-0.297**[a]	**-0.493**[a]	**-0.485**[a]	**-0.483**[a]	**-0.298**[a]	**-0.294**[a]	**-0.292**[a]	**-0.469**[a]	**-0.464**[a]	**-0.461**[a]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DEM1	**0.029**[a]			**0.031**[b]			**0.022**[b]			**0.030**[a]		
	(0.005)			(0.011)			(0.015)			(0.004)		
COST1	**0.012**[b]			**0.016**[b]			**0.012**[b]			**0.018**[a]		
	(0.037)			(0.020)			(0.012)			(0.002)		
DEM2		**0.024**[b]			**0.029**[b]			**0.018**[b]			**0.027**[a]	
		(0.020)			(0.016)			(0.035)			(0.010)	

Table 2.4 (continued)

COST2		**0.012**[b]			**0.015**[b]			**0.013**[a]			**0.018**[a]	
		(0.030)			(0.022)			(0.007)			(0.001)	
DEM3			**0.023**[b]			**0.026**[b]			**0.018**[b]			**0.025**[b]
			(0.028)			(0.035)			(0.036)			(0.015)
COST3			**0.012**[b]			**0.015**[b]			**0.013**[a]			**0.018**[a]
			(0.030)			(0.017)			(0.009)			(0.002)
No. (2-digit SIC)												
Industry dummies	11	11	11	11	11	11	11	11	11	11	11	11
Obs.	633	633	633	633	633	633	633	633	633	633	633	633
Within R^2	0.322	0.319	0.318	0.331	0.329	0.328	0.518	0.518	0.517	0.516	0.516	0.515
Between R^2	0.997	0.991	0.989	0.999	0.999	0.999	0.992	0.995	0.996	0.989	0.995	0.996
Overall R^2	0.327	0.324	0.324	0.339	0.338	0.336	0.528	0.528	0.527	0.528	0.528	0.526

Table 2.5
Capital structure regressions with demand and cost uncertainty – robustness check

This table presents the results of 12 panel data regressions of leverage on conventional capital structure determinants, measures of demand and cost uncertainty, and *Abs. value CSM*, the absolute value of the industry-average competitive strategy measure. Data are from three consecutive periods: 1990-1994, 1995-1999, and 2000-2004. Other variable definitions are discussed in Table 2.1. All models include firm random effects. *P*-values are reported in parentheses. The significant coefficients are printed in bold. The superscripts a, b, and c indicate statistical significance at the 1%, 5%, and 10% level. White standard errors are used to correct for heteroskedasticity.

Panel A: Bertrand sample

	LDEBTBV			TDEBTBV			LDEBTMV			TDEBTMV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TANG	**0.091**^{c}	**0.091**^{c}	**0.092**^{c}	**0.123**^{c}	**0.122**^{c}	**0.124**^{c}	0.042	0.041	0.042	0.046	0.045	0.046
	(0.072)	(0.074)	(0.072)	(0.071)	(0.075)	(0.072)	(0.314)	(0.322)	(0.313)	(0.331)	(0.344)	(0.33)
SIZE	**0.015**^{a}	**0.015**^{a}	**0.015**^{a}	**0.008**^{b}	**0.008**^{b}	**0.008**^{b}	**0.008**^{a}	**0.008**^{a}	**0.008**^{a}	0.002	0.002	0.002
	(0.000)	(0.000)	(0.000)	(0.016)	(0.017)	(0.018)	(0.001)	(0.001)	(0.001)	(0.352)	(0.365)	(0.373)
RISK	-0.002	0.001	0.001	0.053	0.059	0.061	-0.050	-0.047	-0.047	-0.049	-0.044	-0.043
	(0.957)	(0.987)	(0.979)	(0.237)	(0.196)	(0.189)	(0.131)	(0.141)	(0.142)	(0.127)	(0.158)	(0.159)
NDTS	-0.054	-0.039	-0.038	0.043	0.074	0.074	-0.085	-0.069	-0.070	-0.088	-0.063	-0.065
	(0.818)	(0.868)	(0.872)	(0.899)	(0.827)	(0.827)	(0.619)	(0.689)	(0.682)	(0.733)	(0.807)	(0.802)
PROFIT	**-0.141**^{a}	**-0.142**^{a}	**-0.141**^{a}	**-0.198**^{a}	**-0.197**^{a}	**-0.196**^{a}	**-0.114**^{a}	**-0.114**^{a}	**-0.114**^{a}	**-0.147**^{a}	**-0.145**^{a}	**-0.145**^{a}
	(0.004)	(0.004)	(0.004)	(0.007)	(0.008)	(0.008)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MTB	-0.002	-0.002	-0.002	-0.003	-0.003	-0.003	**-0.015**^{a}	**-0.015**^{a}	**-0.015**^{a}	**-0.019**^{a}	**-0.019**^{a}	**-0.020**^{a}
	(0.442)	(0.436)	(0.417)	(0.315)	(0.323)	(0.299)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Table 2.5 (continued)

LIQUID	**-0.191**[a]	**-0.187**[a]	**-0.185**[a]	**-0.379**[a]	**-0.374**[a]	**-0.372**[a]	**-0.168**[a]	**-0.165**[a]	**-0.164**[a]	**-0.285**[a]	**-0.282**[a]	**-0.281**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Abs. value CSM	-0.202	-0.216	-0.217	0.465	0.440	0.439	-0.104	-0.117	-0.117	0.341	0.324	0.324
	(0.316)	(0.282)	(0.279)	(0.246)	(0.273)	(0.275)	(0.640)	(0.600)	(0.602)	(0.227)	(0.253)	(0.253)
DEM1	0.012			**0.024**[b]			**0.010**[b]			**0.017**[a]		
	(0.120)			(0.012)			(0.038)			(0.005)		
COST1	-0.001			-0.001			-0.003			-0.002		
	(0.861)			(0.881)			(0.315)			(0.517)		
DEM2		0.009			**0.018**[b]			0.006			**0.011**[b]	
		(0.211)			(0.034)			(0.193)			(0.038)	
COST2		0.000			0.000			-0.002			-0.001	
		(0.9)			(0.981)			(0.488)			(0.778)	
DEM3			0.007			**0.015**[c]			0.006			**0.010**[c]
			(0.338)			(0.081)			(0.197)			(0.059)
COST3			0.000			0.001			-0.002			0.000
			(0.947)			(0.815)			(0.519)			(0.867)
No. (2-digit SIC) industry dummies	12	12	12	12	12	12	12	12	12	12	12	12
Obs.	954	954	954	954	954	954	954	954	954	954	954	954
Within R^2	0.209	0.208	0.208	0.237	0.235	0.235	0.418	0.417	0.417	0.450	0.448	0.448
Between R^2	0.485	0.469	0.453	0.986	0.988	0.984	0.996	0.997	0.997	0.998	0.997	0.998
Overall R^2	0.209	0.207	0.207	0.237	0.234	0.233	0.426	0.424	0.424	0.459	0.457	0.457

Table 2.5 (continued)

Panel B: Cournot sample

	LDEBTBV			TDEBTBV			LDEBTMV			TDEBTMV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TANG	0.036	0.037	0.038	0.051	0.055	0.054	0.092	0.093	0.094	0.081	0.084	0.084
	(0.497)	(0.477)	(0.473)	(0.348)	(0.312)	(0.318)	(0.111)	(0.104)	(0.101)	(0.204)	(0.186)	(0.186)
SIZE	**0.011**[a]	**0.011**[a]	**0.011**[a]	0.004	0.005	0.005	**0.012**[a]	**0.012**[a]	**0.012**[a]	**0.007**[c]	**0.007**[c]	**0.007**[c]
	(0.006)	(0.004)	(0.003)	(0.324)	(0.26)	(0.264)	(0.000)	(0.000)	(0.000)	(0.082)	(0.062)	(0.065)
RISK	**-0.127**[a]	**-0.116**[a]	**-0.114**[b]	-0.087	-0.075	-0.072	**-0.158**[a]	**-0.152**[a]	**-0.149**[a]	**-0.197**[a]	**-0.189**[a]	**-0.184**[a]
	(0.005)	(0.010)	(0.011)	(0.290)	(0.348)	(0.369)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)
NDTS	**-0.438**[a]	**-0.427**[a]	**-0.435**[a]	**-0.641**[a]	**-0.624**[a]	**-0.638**[a]	**-0.579**[a]	**-0.568**[a]	**-0.575**[a]	**-0.763**[a]	**-0.746**[a]	**-0.759**[a]
	(0.005)	(0.006)	(0.005)	(0.002)	(0.004)	(0.003)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
PROFIT	-0.022	-0.024	-0.025	-0.107	-0.106	-0.110	**-0.099**[a]	**-0.098**[a]	**-0.099**[a]	**-0.138**[a]	**-0.135**[a]	**-0.139**[a]
	(0.649)	(0.633)	(0.613)	(0.107)	(0.115)	(0.104)	(0.008)	(0.008)	(0.007)	(0.004)	(0.005)	(0.004)
MTB	0.002	0.002	0.002	0.001	0.002	0.002	**-0.012**[a]	**-0.011**[a]	**-0.011**[a]	**-0.017**[a]	**-0.016**[a]	**-0.017**[a]
	(0.568)	(0.542)	(0.556)	(0.664)	(0.616)	(0.66)	(0.008)	(0.008)	(0.007)	(0.005)	(0.005)	(0.004)
LIQUID	**-0.311**[a]	**-0.305**[a]	**-0.303**[a]	**-0.503**[a]	**-0.495**[a]	**-0.493**[a]	**-0.302**[a]	**-0.299**[a]	**-0.296**[a]	**-0.476**[a]	**-0.470**[a]	**-0.467**[a]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Abs. value CSM	0.581	0.578	0.593	**0.972**[c]	**0.954**[c]	**0.981**[b]	0.412	0.410	0.420	0.623	0.613	0.634
	(0.172)	(0.177)	(0.164)	(0.052)	(0.058)	(0.049)	(0.419)	(0.419)	(0.407)	(0.304)	(0.309)	(0.291)
DEM1	**0.028**[a]			**0.029**[b]			**0.021**[b]			**0.029**[a]		
	(0.007)			(0.016)			(0.018)			(0.006)		
COST1	**0.013**[b]			**0.017**[b]			**0.013**[b]			**0.018**[a]		
	(0.030)			(0.015)			(0.011)			(0.002)		

Table 2.5 (continued)

DEM2		**0.023**[b]			**0.027**[b]			**0.018**[b]			**0.026**[b]	
		(0.026)			(0.023)			(0.041)			(0.012)	
COST2		**0.013**[b]			**0.016**[b]			**0.013**[a]			**0.019**[a]	
		(0.024)			(0.016)			(0.007)			(0.001)	
DEM3			**0.022**[b]			**0.024**[b]			**0.018**[b]			**0.024**[b]
			(0.035)			(0.047)			(0.042)			(0.019)
COST3			**0.012**[b]			**0.016**[b]			**0.013**[a]			**0.018**[a]
			(0.024)			(0.013)			(0.009)			(0.002)
No. (2-digit SIC) industry dummies	11	11	11	11	11	11	11	11	11	11	11	11
Obs.	633	633	633	633	633	633	633	633	633	633	633	633
Within R^2	0.323	0.320	0.320	0.335	0.333	0.332	0.519	0.518	0.518	0.518	0.518	0.516
Between R^2	0.999	0.995	0.994	0.997	0.998	0.999	0.989	0.993	0.995	0.986	0.992	0.993
Overall R^2	0.329	0.326	0.326	0.343	0.342	0.340	0.529	0.528	0.528	0.529	0.529	0.528

2.5 Conclusions

This study contributes to the limited empirical literature on the relation between a firm's capital structure decisions and its behavior in the product market. We investigate whether the type of competitive behavior (i.e., strategic complements or substitutes) plays a role in determining the impact of demand and cost uncertainty on leverage. While theoretical models of strategic debt explicitly distinguish between Cournot and Bertrand competition, empirical studies neglect this distinction in their analysis of the relation between competition and leverage.

By estimating a measure for competitive strategy developed by previous studies, we categorize firms into two samples: a sample with firms competing in Bertrand (strategic complements) and a sample with firms competing in Cournot (strategic substitutes). We find that the samples of Bertrand and Cournot firms differ systematically in terms of firm characteristics. The industries included in the Bertrand and Cournot samples show a different association between demand and cost uncertainty and average debt ratios.

We estimate a conventional capital structure regression for each of the two samples and include proxies of demand and cost uncertainty to investigate the strategic use of debt in different competitive environments. We show that for firms that engage in Cournot competition, both demand and cost uncertainty are positively associated with leverage, consistent with Brander and Lewis (1986). This result supports the argument that under limited liability, Cournot firms facing output market uncertainty use debt to commit to a large output in an attempt to gain a strategic advantage in the product market. For firms that are characterized by Bertrand competition, cost uncertainty does not significantly affect leverage, but demand uncertainty induces a higher debt ratio. This latter finding is in line with the prediction of Showalter (1995) that higher demand uncertainty is associated with higher debt in Bertrand firms.

Overall, we show that the strategic aspects of capital structure choice are important and that the type of competition matters for the role of output market uncertainty in the link between financing and output decisions.

Chapter 3: Strategic competition, capital structure, and market share[14]

3.1 Introduction

Since Brander and Lewis (1986) and Maksimovic (1988), researchers have studied the strategic role of debt. Theory suggests that a firm's capital structure affects pricing and output choices. Empirical evidence on the link between debt and competition is still limited. Recent papers test the relation between a firm's capital structure and several aspects of product market competition, such as industry concentration (Kovenock and Phillips, 1997; MacKay and Phillips, 2005), the extent of competitive interaction (Lyandres, 2006), output market uncertainty (Showalter, 1999; de Jong, Nguyen, and van Dijk, 2007), and firms' production and pricing decisions (Phillips, 1995).

This chapter zooms in on another key variable related to a firm's competitive position in the output market: its market share. We add to studies on industry concentration, competitive interaction, and output market uncertainty by studying the impact of capital structure choice on strategic competition at the level of the individual firm. We add to the detailed study of Phillips (1995) of four specific industries in which firms have sharply increased their leverage by providing a more general and more comprehensive analysis of the effect of leverage on market share in a large sample of U.S. manufacturing firms over the period 1985-2004. Furthermore, we recognize that not only is a firm's capital structure likely to affect its strategic behavior in the output market, the competitive environment of a firm could also have an impact on its capital structure choice. Thus, we test the interaction between leverage and market share in a simultaneous-equations system in which both variables are endogenous.

In contrast to almost all previous empirical studies, our study takes into account that theoretical predictions about the relation between capital structure and competition depend on the type of strategic competition in an industry. We examine the interaction between leverage and market share separately for two samples of Cournot and Bertrand firms. We distinguish between Cournot and Bertrand firms based on an empirical measure of strategic substitutes and strategic complements and we show that this distinction matters for the estimated effect of leverage on market share.

[14] This chapter is based on de Jong, A., Nguyen, T.T., van Dijk, M.A., 2008, "Strategic competition, capital structure, and market share", *ERIM Working Paper Series*.

Our focus on market share allows us to test the predictions of theoretical models that – to the best of our knowledge – have not been directly tested before. In the model of Dasgupta and Titman (1998), long-term debt induces firms to compete less aggressively in the output market, because it increases the rate at which future profits are discounted. In other words, higher debt induces a Bertrand firm to charge higher prices and a Cournot firm to produce less. The consequences of these actions for a firm's market share differ across Cournot and Bertrand firms, because their rivals react with different strategic moves. The rival of a levered Cournot firm is likely to increase its own production, as Cournot firms compete as strategic substitutes (Bulow, Geanakoplos, and Klemperer, 1985). As a result, the levered firm's market share decreases. The rival of a levered Bertrand firm reacts by also raising prices for its products, because Bertrand firms compete as strategic complements (Bulow et al., 1985). In the Bertrand case, the overall impact on market share is thus unclear as both firms raise their prices.

In a different theoretical setting, Faure-Grimaud (2000) also finds that debt causes firms to compete less aggressively. In his model of debt contracting under Cournot competition, levered firms behave less aggressively in the output market because they aim to limit the size of the default and increase the probability of getting a good credit record. The reduced aggressiveness of the levered Cournot firm leads to lower output and a lower market share in the next period.

We examine the joint determination of leverage and market share by estimating a simultaneous-equations system using two-stage least-squares. In line with theory, we investigate the interaction between leverage and market share separately for Cournot and Bertrand firms. In particular, we test the implication of the model of Dasgupta and Titman (1998) that under Cournot competition, leverage negatively affects market share, while under Bertrand competition, leverage has no effect on market share. We distinguish Cournot and Bertrand firms using the competitive strategy measure of Sundaram, John, and John (1996).

For Cournot firms, we find that leverage has a significantly negative impact on market share and that market share, in turn, has a significantly negative effect on leverage. The former finding is consistent with Dasgupta and Titman (1998) and Faure-Grimaud (2000). For Bertrand firms, on the other hand, we provide evidence that higher debt induces Bertrand firms to increase their market share. For these firms, we find no significant impact of market share on leverage. Our findings for Bertrand firms do not fit specific theoretical predictions. We discuss a potential explanation for these findings and offer several avenues for further research.

Our evidence indicates that competitive behavior has an influence on the interaction between capital structure and market share. Our results highlight the importance of incorporating the type of competitive behavior in studies of firms' capital structure in connection with output market considerations.

3.2 Literature and hypotheses

The model of Dasgupta and Titman (1998) is based on the argument of Klemperer (1987) that a firm can improve short-term profits at the expense of long-term profits by increasing its price today. Raising long-term debt increases a firm's discount rate for future profits, because outstanding debt raises the cost of new borrowing. The increase in borrowing costs due to existing debt can be traced back to the debt overhang problem of Myers (1977), who argues that debt removes the incentive to invest in positive net present value projects, because when debt repayments are large enough, the benefits from profitable investments go straight to creditors. The higher discount rate decreases the relative importance of long-term profits. Therefore, debt encourages Bertrand firms to raise prices to attempt to increase short-term profits. The argument carries over to Cournot firms, for which the model predicts a negative relation between output and debt. Dasgupta and Titman's model is summarized as follows.

Consider a two-period model in which firms A and B are rivals competing in prices (Bertrand competition). First-period profits depend only on first-period prices: $x_1^i = x_1^i(p_1^A, p_1^B)$. Second period-profits depend on firms' market shares (σ^A and σ^B) gained in the first period, i.e., the fraction of customers buying their products, and the second-period prices: $x_2^i = x_2^i(\sigma^i)$. The value of firm i is, therefore, equal:

$$V^i = x_1^i(p_1^A, p_1^B) + x_2^i(\sigma^i(p_1^A, p_1^B)) + E\tilde{I} - I \qquad (3.1)$$

in which $E\tilde{I}$ is the expected value of liquidation and I is the investment.

The first-period prices are the solutions of the system of first-order conditions:

$$V_i^i = \frac{\partial x_1^i}{\partial p_1^i} + \frac{\partial x_2^i}{\partial \sigma^i}\frac{\partial \sigma^i}{\partial p_1^i} = 0 \qquad i = A, B \qquad (3.2)$$

Assuming that higher first-period market share results in higher second-period profits $(\partial x_2^i / \partial \sigma^i) > 0$, and higher first-period price, ceteris paribus, results in lower customer base $(\partial \sigma^i / \partial p_1^i) < 0$. The first-order conditions in (3.2) require: $(\partial x_1^i / \partial p_1^i) > 0$. As mentioned earlier, existing debt in capital structure places more emphasis on the first-period profit, the Bertrand levered firm would increase its first-period prices p_1 to have higher x_1.

Similarly, in the case of Cournot competition, the value function of firm i that competes in quantities would be:

$$V^i = x_1^i(q_1^A, q_1^B) + x_2^i(\sigma^i(q_1^A, q_1^B)) + E\tilde{I} - I \qquad (3.3)$$

The first-period quantities are the solutions of the system of first-order conditions:

$$V_i^i = \frac{\partial x_1^i}{\partial q_1^i} + \frac{\partial x_2^i}{\partial \sigma^i}\frac{\partial \sigma^i}{\partial q_1^i} = 0 \qquad i = A, B \tag{3.4}$$

Under the same assumptions, now with quantity increases, ceteris paribus, Cournot firms can improve the market share: $(\partial \sigma^i / \partial q_1^i) > 0$. The first-order conditions in (3.4) require: $(\partial x_1^i / \partial q_1^i) < 0$. In order to improve first-period profit x_1, the Cournot levered firm would reduce first-period quantity q_1. In short, Dasgupta and Titman's model shows that levered firms behave less aggressively by raising prices (cutting quantities) in Bertrand (Cournot) competition

From a different perspective, Faure-Grimaud (2000) argues that debt contracts are renegotiable at different stages (e.g., when the firm needs new financing, or the creditor rewards the well-performing firm after some time in operation). However, the debt contract is renegotiation-proof ex post, i.e., once profits are realized. Therefore, even though the debt contracts obtained are the best possible ones in an environment with asymmetric information on profits ex post, they are not first-best contracts. The adverse selection results in an increase in financing costs, which is higher as the default size (or output) increases. Under these circumstances, the firm's competitive position is weakened, and debt makes the Cournot firm less aggressive. By decreasing output, Cournot firms aim to limit the size of the default, and also to increase the probability of getting a good credit record for further financing. Faure-Grimaud shows that the negative effect due to financing costs offsets the positive limited liability effect of Brander and Lewis (1986) for Cournot firms.

In short, the models of Dasgupta and Titman (1998) and Faure-Grimaud (2000) predict that under both Cournot and Bertrand competition leverage induces a firm to engage in softer competition: a Cournot firm does so by reducing output, while a Bertrand firm raises the price. However, the implications of this strategic behavior for the market share of the firm are different for Cournot and Bertrand firms. Softer competition causes the rival of a Cournot firm to increase output because quantities are strategic substitutes, but the rival of a Bertrand firm increases its price because prices are strategic complements (Bulow et al., 1985). As a result, the levered Cournot firm experiences a reduction in market share, while the impact of debt on market share is undetermined for Bertrand firms. Accordingly, we aim to test the following hypotheses: (*i*) for Cournot firms, leverage has a negative effect on market share; and (*ii*) for Bertrand firms, leverage has no effect on market share.

The interaction between leverage and market share is not a one-way relation. Previous studies have identified a significant impact of the market position of a firm on its capital structure choice (e.g., Kovenock and Phillips, 1997; MacKay and Phillips, 2005). A firm's market share is an important indicator of its current market position and its market power within the industry. Therefore, we take into account both directional effects in our empirical analysis of the

interaction between leverage and market share. Although theory does not provide us with clear predictions on the signs of the effect of market share on leverage in Cournot or Bertrand firms, we will empirically explore this relation and proceed to do the analysis separately for our samples of Cournot and Bertrand firms.

3.3 Data

We collect firm-level data on U.S. manufacturing firms over the period 1985 to 2004 from Compustat. We obtain data at both annual and quarterly frequencies. At the annual frequency, we take all manufacturing firms' relevant financial information (such as total assets, tangible assets, profits, debt levels, etc.). At the quarterly frequency, we collect data on sales and profits, which are needed to estimate the measure of strategic competition within industries.

We define competitors as all firms in the Compustat data base with the same 4-digit SIC code (ITEM#324) in each particular year. We drop firms that do not have records of 4-digit historical SIC. As we focus on U.S. manufacturing firms only, we omit observations with historical SICs below 2000 or above 3999. We also exclude firms in industries concerned with miscellaneous items. We require firms to have both total assets and sales greater than 1 million USD. We discard firms without quarterly data for sales, profits, and costs of goods sold. We follow MacKay and Phillips (2005) and drop observations with negative sales or assets for either annual or quarterly records.

The data screens yield a final sample of 126 industries, consisting of 14,007 firm-years and 2,660 distinct firms. We use the competitive strategy measure (*CSM*) – developed by Sundaram, John, and John (1996) and used by, among others, Lyandres (2006) – to distinguish firms competing in Cournot and Bertrand. We estimate *CSM* as the coefficient of correlation between the change in a firm's profit margin and the change in the competitors' output, based on 20 consecutive quarters of sales (ITEM#2, quarterly database) and profits (ITEM#8). We estimate *CSM* based on quarterly data during a relatively short period of time, because competitive behavior may change over time.

Sundaram et al. (1996) show that if *CSM* is smaller than zero, competition can be viewed to be in strategic substitutes (Cournot); if *CSM* is greater than zero, competition is in strategic complements (Bertrand). We use a narrow definition of industries based on their 4-digit SIC. Therefore, we argue that it is reasonable to assume that competitive behavior is consistent across firms in each industry-year. After obtaining the *CSM* measures for each firm-year, we calculate the mean and the standard deviation of the *CSM* for each industry in each year. If the industry-year mean *CSM* is significantly positive at the 10% level, we group the firm-year observations into the "Bertrand sample." If the industry-year mean *CSM* is significantly negative at the 10% level, we group the firm-year observations into

the "Cournot sample." This procedure is consistent with Lyandres (2006), although he does not take into account the statistical significance.

After measuring strategic competition and obtaining other key variables, our sample of Bertrand firms includes 3,513 observations and our sample of Cournot firms includes 2,504 observations.

3.3.1 Dependent variables: Leverage and market share

We consider four alternative definitions of leverage: (*i*) the book value of the long-term debt ratio (*LDBV*) is defined as total long-term debt (Compustat data ITEM#9) divided by total assets (ITEM#6); (*ii*) the market value of the long-term debt ratio (*LDMV*) is defined as total long-term debt divided by the market value of total assets[15]; (*iii*) the book value of the total debt ratio (*TDBV*) is calculated as total debt (which are long-term debt plus debt in current liabilities (ITEM#34)) over total assets; (*iv*) the market value of the total debt ratio (*TDMV*) is calculated as total debt over market value of total assets.

We compute the market share (*MKTSH*) of each firm as the annual sales of the firm divided by total industry sales. For the total sales of the 4-digit SIC industry, we add up the sales of all firms with the relevant historical SIC in each industry-year.

3.3.2 Determinants of leverage

Empirical capital structure research uses variables related to static trade-off, agency, and information asymmetry considerations to explain leverage (see, e.g., Titman and Wessels, 1988; Frank and Goyal, 2003). In the static trade-off framework, the firm is viewed as setting a target debt-to-assets ratio and moving towards it. The firm's target capital structure is then determined by the trade-off between tax advantages and bankruptcy-related costs. With respect to bankruptcy costs, we use the following variables: asset tangibility (higher tangibility of assets indicates lower risk for the lender as well as lower direct costs of bankruptcy), firm risk (higher risk indicates higher volatility of earnings and a higher probability of bankruptcy), and firm size (an inverse proxy for the probability of bankruptcy; larger firms are less likely to face financial distress). We measure tangibility (*TANG*) as the ratio of net fixed assets (ITEM#8) to total assets; firm risk (*RISK*) as the standard deviation of the ratio of operating income before depreciation (ITEM#13) to total assets during a 5-year period which consists of the current year plus four prior years; and firm size (*SIZE*) as the natural logarithm of total assets.

DeAngelo and Masulis (1980) argue that the tax advantage of debt diminishes as other tax reductions, such as tax and investment tax credits, increase.

[15] The market value of total assets is calculated as (Total debt + Market value of equity + Preferred stock – Deferred taxes and investment credits) = ITEM#9 + ITEM#34 + (ITEM#199*ITEM#54) + ITEM#10 – ITEM#35.

Because these variables act as a tax shield substitute for debt, a negative relation between leverage and these non-debt tax shields is expected. The proxy for non-debt tax shields we use (*NDTS*) is defined as the ratio of depreciation (ITEM#125) and investment tax credit (ITEM#208) to total assets.

Agency conflicts between equity holders and debt holders arise from asset-substitution and underinvestment. To minimize these conflicts, firms with high growth opportunities have a preference for a low leverage, thus seeking equity financing for their new projects instead of debt financing. Agency theory predicts that growth opportunities are negatively associated with leverage. We use the market-to-book ratio (*MTB*), defined as the market value of total assets over the book value of total assets, as a proxy for growth opportunities. If debt is not collateralized, equity holders have incentives to expropriate wealth from debt holders. Creditors may also demand a higher interest rate, forcing firms to choose equity instead. Our measure of tangibility can be used as a proxy for collateralization, which is expected to be positively related to leverage.

The pecking-order theory suggests that firms follow a specific hierarchy in financing: they prefer internal over external financing. If external financing is required, a firm issues the safest security first. That is, it first issues debt, then hybrid securities such as convertible bonds, and equity only as the last resort. We use profitability to test the pecking-order theory: more profitable firms are likely to have less leverage as they make use of the internally generated fund first. We measure profitability (*PROFIT*) as operating income before depreciation (ITEM#13) divided by the total assets. Similarly, we expect liquidity to have a negative relation with leverage as accumulated cash and other liquid assets serve as internal sources of funding, which will be used first instead of debt. We measure liquidity (*LIQUID*) as the ratio of cash and short-term investments (ITEM#1) to total assets. Bigger firms are likely to exhibit less asymmetric information and are expected to have better access to credit. Hence, firm size is expected to be positively correlated with debt levels.

3.3.3 Determinants of market share

We expect firm size to be positively associated with market share as larger firms have more financing power in the competition for market share. We use our measure of firm size (*SIZE*) as discussed in section 3.2. R&D expenses, advertising and selling expenses are made in an attempt to gain a better position in the market, improving the firm's market share in the near future. Therefore, we include these as explanatory variables of market shares in our analysis: (*i*) the research and development expenditure ratio (*R&D*) is R&D expenses (ITEM#46) scaled by total sales (ITEM#12); (*ii*) the advertisement expense ratio (*ADVERT*) is advertisement expenses (ITEM#45) scaled by sales; and (*iii*) the selling, general and administration expense ratio (*SGA*) is selling, general and administration expenses

(ITEM#189) scaled by sales. We follow Frank and Goyal (2003) in recoding missing values of R&D expenditure, advertisement expenses, selling, general and administration expenses as zero. In addition to the sales-related variables, growth opportunity is another variable to take into account. Firms with high growth opportunities, proxied by market-to-book ratio, can gradually increase their positions and market shares in the product market.

As argued by Davies and Geroski (1997), concentration tends to have a positive relation with market share. If firms are faced with less competition, or some rivals leave the market (the industry becomes more concentrated), they are more likely to have opportunities to gain higher market shares. To measure the industry concentration, we use the Herfindahl-Hirschman Index, taking into account both the number of firms and the inequality of market shares. $HHI = S_1^2 + S_2^2 + S_3^2 + ... + S_K^2 = \sum_{i=1}^{K} S_i^2$, in which K is the number of firms in the industry and S_i denotes the market share of firm i. *HHI* is measured by industry (4-digit SIC) and by year. Similar to our market share measure, we calculate *HHI* by using all firms available in Compustat in the particular industry-year.

Firms often have to make a trade-off between their markup and market share. Other things equal, if firms want to have higher margins they tend to increase their prices and lose a portion of their market share to rivals. We expect a negative relation between markup and market share. We measure the annual markup of firms (*MARKUP*) using the approach of Phillips (1995), who computes markups as (Sales – costs of good sold + change in inventories) / (Sales + change in inventories) = (ITEM#12 – ITEM#41 + ΔITEM#3) / (ITEM#12 + ΔITEM#3).

3.4 Methodology

We conduct a panel data analysis by using firm fixed effect models with time dummies. Leverage and market share are both persistent over time, creating a link between different periods. Therefore, endogeneity is expected to be a coherent issue in analyzing these two variables. To overcome the endogeneity problem, we estimate the following system of simultaneous equations using two-stage least squares (2SLS):

$$MKTSH_{i,t} = \sum_{j=1}^{N} \gamma_{0j} d_{ij} + \gamma_1 SIZE_{i,t-1} + \lambda_2 R\&D_{i,t-1} + \gamma_3 SGA_{i,t-1} + \gamma_4 ADV_{i,t-1} +$$
$$+ \gamma_5 MTB_{i,t-1} + \gamma_6 HHI_{i,t-1} + \gamma_7 MARKUP_{i,t-1} + \gamma_8 LEV_{i,t-1} +$$
$$+ \sum_{k=9}^{21} \gamma_k YEARDUM + u_{i,t} \quad (3.5)$$

$$LEV_{i,t} = \sum_{j=1}^{N} \beta_{0j} d_{ij} + \beta_1 NDTS_{i,t-1} + \beta_2 TANG_{i,t-1} + \beta_3 SIZE_{i,t-1} + \beta_4 RISK_{i,t-1} +$$
$$+ \beta_5 MTB_{i,t-1} + \beta_6 PROFIT_{i,t-1} + \beta_7 LIQUID_{i,t-1} + \beta_8 MKTSH_{i,t-1} +$$
$$+ \sum_{k=9}^{21} \beta_k YEARDUM + \varepsilon_{i,t} \quad (3.6)$$

where i denotes the i^{th} firm in the sample and $i = 1, 2, \ldots, N$; d_{ij} is a firm dummy which equals 1 if $i = j$ and 0 elsewhere; *MKTSH* is a firm's market share; and *SIZE* (firm size), *R&D* (R&D expenditure ratio), *SGA* (selling, general and administration expense ratio), *ADV* (advertisement expense ratio), *MTB* (market-to-book ratio), *HHI* (Herfindahl-Hirschman Index), and *MARKUP* (price-cost markup) are determinants of market shares; *LEV* is the leverage measure, which can be one of our four proxies: *LDBV* (book value of the long-term debt ratio), *LDMV* (market value of the long-term debt ratio), *TDBV* (book value of the total debt ratio), or *TDMV* (market value of the total debt ratio); *NDTS* (non-debt tax shields), *TANG* (tangibility), *RISK* (business risk), *SIZE* (firm size), *MTB* (market-to-book ratio), *PROFIT* (profitability), and *LIQUID* (liquidity) are the conventional determinants of leverage. We add year dummies in every equation to account for year fixed effects.

We use lagged explanatory variables as well as instrumental-variable (IV) estimation to overcome the possibility of endogeneity of our dependent variables. The instrumental variables for $LEV_{i,t-1}$ in Equation (3.5) are: $NDTS_{i,t-2}$, $TANG_{i,t-2}$, $RISK_{i,t-2}$, $PROFIT_{i,t-2}$, $LIQUID_{i,t-2}$. The instrumental variables for $MKTSH_{i,t-1}$ in Equation (3.6) are: $R\&D_{i,t-2}$, $SGA_{i,t-2}$, $ADV_{i,t-2}$, $HHI_{i,t-2}$, and $MARKUP_{i,t-2}$. To examine the validity of our instruments we measure the between-R^2 in the first-stage regressions. For the market share and leverage regressions we find R^2-values of 12% and 30%, respectively. In the first-stage regression for leverage, all instruments have significant coefficients (at the 1% level), while in the market share model only the coefficient on *HHI* is significant at the 1% level. We perform a robustness check with *HHI* as the only instrument for market share in Equation (3.6), and find qualitatively similar results[16]. In addition, we run the joint

[16] Available upon request. In addition, without using instrumental variables, our OLS regressions also yield non-conflicting results in all regression models.

F-tests (Verbeek, 2004, p. 147-148) to check for the problem of weak instruments. The results yield values of the *F*-statistic of between 8.2 and 16.4, which are good enough to overcome the weak instrument problem.

Our initial analysis concentrates on the estimation results of the simultaneous-equations system for the Cournot and Bertrand sample separately. As a further step in the analysis, we combine the Cournot and Bertrand firms into one sample and re-estimate the model with interactions of two dummy variables (the strategic substitutes, or *SS*, dummy to indicate a Cournot firm, and the strategic complements, or *SC*, dummy to indicate a Bertrand firm) with all explanatory variables in both equations. We use a χ^2-test to investigate whether the right-hand-side variables (notably, leverage and market share) have identical coefficients in the samples of Cournot and Bertrand firms.

3.5 Empirical results

We start our discussion with the summary statistics of all the variables in our analysis, presented in Table 3.1. The mean value of our leverage proxies ranges from 0.136 to 0.224, similar to previous studies on U.S. firms (see e.g., Frank and Goyal, 2003; MacKay and Phillips, 2005; Lyandres, 2006). Cournot firms have a higher leverage in market value terms, but a lower leverage in book value terms. This is consistent with the fact that Cournot firms have considerably lower market-to-book ratios compared to Bertrand firms. The distribution of market shares is remarkably similar for Cournot and Bertrand firms. Generally, Cournot firms are smaller, less prone to business risk, and more profitable than Bertrand firms. Cournot firms also have higher markups, but smaller fixed assets, fewer growth opportunities, and fewer liquid assets. The Cournot firms in our sample tend to spend more on selling and administration activities, while the Bertrand firms spend more on R&D and advertisement.

Table 3.1
Summary statistics

This table presents summary statistics of the measures of leverage, market share, and their determinants across two samples of Cournot and Bertrand firms, period 1985-2004. *TDBV*: Total debt ratio in book value, defined as total debt (long-term debt plus debt in current liabilities) over total assets. *TDMV*: Total debt ratio in market value, defined as total debt over market value of total assets (which is total debt plus market value of equity plus preferred stock minus deferred taxes and investment credits). *LDBV*: Long-term debt ratio in book value, defined as long-term debt over total assets. *LDMV*: Long-term debt ratio in market value, defined as long-term debt over market value of total assets. *MKTSH*: Market share, defined as the firm's sales over industry sales. *NDTS*: Non-debt tax shield defined as the ratio of depreciation and investment tax credit to total assets. *TANG*: Tangibility, defined as the ratio of net fixed assets to total assets. *SIZE*: Firm size, defined as the natural logarithm of total assets. *RISK*: Business risk, defined as the standard deviation of the ratio of operating income before depreciation to total assets during the current year and 4 prior years. *MTB*: Market-to-book ratio, defined as market value of total assets over book value of total assets. *PROFIT*: Profitability, defined as the ratio of operating income before depreciation to total assets. *LIQUID*: Liquidity, defined as the ratio of cash and short-term investments to total assets. *R&D*: R&D expenditure scaled by sales. *SGA*: Selling, general and administration expenses scaled by sales. *ADVERT*: Advertisement expenses scaled by sales. *HHI*: Herfindahl-Hirschman Index, computed as the sum of the squared sales of all firms within the 4-digit SIC industry. *MARKUP*: Markup defined as the value of sales minus costs of good sold plus change in inventories over the value of sales plus change in inventories. *t* denotes the current year, and *t-1* denotes a one year lag.

	Cournot sample # obs. = 2504				**Bertrand sample # obs. = 3513**				**Mean comparison (Cournot – Bertrand)**	
	Mean	**Stdev**	**Min**	**Max**	**Mean**	**Stdev**	**Min**	**Max**	**difference**	***p*-value**
$LDBV_t$	0.136	0.157	0.000	0.968	0.153	0.176	0.000	0.963	-0.017	0.000
$LDBV_{t-1}$	0.138	0.156	0.000	0.899	0.148	0.170	0.000	0.939	-0.010	0.025
$TDBV_t$	0.191	0.185	0.000	0.994	0.200	0.196	0.000	0.993	-0.009	0.069

Table 3.1 (continued)

	Cournot sample # obs. = 2504				Bertrand sample # obs. = 3513				Mean comparison (Cournot – Bertrand)	
	Mean	**Stdev**	**Min**	**Max**	**Mean**	**Stdev**	**Min**	**Max**	**difference**	***p*-value**
$TDBV_{t-1}$	0.190	0.179	0.000	0.969	0.193	0.189	0.000	1.000	-0.003	0.565
$LDMV_t$	0.161	0.210	0.000	0.957	0.143	0.187	0.000	0.986	0.018	0.001
$LDMV_{t-1}$	0.161	0.208	0.000	0.957	0.141	0.187	0.000	0.979	0.020	0.000
$TDMV_t$	0.224	0.252	0.000	0.996	0.187	0.218	0.000	0.993	0.037	0.000
$TDMV_{t-1}$	0.220	0.244	0.000	0.984	0.184	0.216	0.000	0.984	0.036	0.000
$MKTSH_t$	0.047	0.120	0.000	0.931	0.043	0.111	0.000	0.973	0.004	0.194
$MKTSH_{t-1}$	0.046	0.120	0.000	0.956	0.042	0.109	0.000	0.973	0.004	0.106
$NDTS_t$	0.054	0.046	0.004	1.270	0.051	0.036	0.000	0.453	0.003	0.052
$NDTS_{t-1}$	0.052	0.034	0.000	0.581	0.051	0.036	0.000	0.783	0.001	0.846
$TANG_t$	0.229	0.169	0.004	0.814	0.265	0.199	0.000	0.898	-0.036	0.000
$TANG_{t-1}$	0.233	0.168	0.004	0.809	0.270	0.199	0.000	0.917	-0.037	0.000
$SIZE_t$	4.895	2.202	0.276	10.654	5.374	2.295	0.027	12.087	-0.479	0.000
$SIZE_{t-1}$	4.861	2.176	0.368	10.654	5.283	2.278	-0.326	11.977	-0.422	0.000
$RISK_t$	0.092	0.142	0.002	4.864	0.106	0.163	0.003	2.741	-0.014	0.000
$RISK_{t-1}$	0.094	0.161	0.004	5.592	0.114	0.200	0.003	4.264	-0.020	0.000
MTB_t	1.595	1.755	0.000	22.224	2.200	2.708	0.055	46.494	-0.605	0.000
MTB_{t-1}	1.603	1.744	0.009	26.736	2.306	3.067	0.058	46.191	-0.703	0.000

Table 3.1 (continued)

	Cournot sample # obs. = 2504				Bertrand sample # obs. = 3513				Mean comparison (Cournot – Bertrand)	
	Mean	**Stdev**	**Min**	**Max**	**Mean**	**Stdev**	**Min**	**Max**	**difference**	***p*-value**
$PROFIT_t$	0.039	0.247	-4.369	0.569	0.022	0.275	-3.303	0.778	0.017	0.013
$PROFIT_{t-1}$	0.045	0.222	-1.872	0.569	0.025	0.268	-2.594	0.743	0.020	0.002
$LIQUID_t$	0.157	0.178	0.000	0.871	0.245	0.263	0.000	0.997	-0.088	0.000
$LIQUID_{t-1}$	0.160	0.184	0.000	0.871	0.242	0.263	0.000	0.993	-0.082	0.000
$R\&D_t$	0.090	0.233	0.000	5.533	0.577	2.306	0.000	45.213	-0.487	0.000
$R\&D_{t-1}$	0.164	2.179	0.000	84.453	0.710	3.396	0.000	76.900	-0.546	0.000
SGA_t	0.355	0.327	-0.038	4.487	0.284	0.300	0.000	2.784	0.071	0.000
SGA_{t-1}	0.344	0.290	-0.038	2.140	0.284	0.300	0.000	2.570	0.060	0.000
$ADVERT_t$	0.009	0.033	0.000	0.515	0.011	0.036	0.000	0.633	-0.002	0.051
$ADVERT_{t-1}$	0.009	0.034	0.000	0.531	0.011	0.037	0.000	0.582	-0.002	0.016
HHI_t	0.258	0.178	0.049	0.897	0.194	0.168	0.057	0.948	0.064	0.000
HHI_{t-1}	0.253	0.181	0.056	0.916	0.190	0.164	0.054	0.948	0.063	0.000
$MARKUP_t$	0.389	1.435	-4.947	68.197	-0.230	4.072	-80.715	31.623	0.619	0.000
$MARKUP_{t-1}$	0.366	0.718	-6.773	28.375	-0.091	2.771	-66.947	9.400	0.457	0.000

3.5.1 Results – Cournot sample

Table 3.2 presents the 2SLS estimation results of the system of Equations (3.5) and (3.6) for the Cournot sample. We find clear evidence in favor of the hypothesis that leverage has a negative impact on market share for Cournot firms. All four measures of leverage have negative coefficients, three of which are statistically significant. The effect of leverage on market share is also economically significant. A one standard deviation increase in previous year *LDBV*, *TDBV*, or *TDMV* leads to a 5.31%, 8.38%, or 8.31% decrease, respectively, in the firms' average market share in the following year. We note that because we estimate the model with firm fixed effects, the dependent variables are essentially measured as the deviation from their long-term average, which implies that we can indeed interpret the coefficients as measuring the impact of the explanatory variables in terms of changes in a firm's market share. Our estimation results of the market share model support the prediction of Dasgupta and Titman (1998) and Faure-Grimaud (2000) that leverage induces Cournot firms to behave less aggressively in the output market.

The signs of the coefficients on the other determinants of market share are generally in line with expectations. In particular, we find evidence that firm size, selling expenses, and industry concentration have a significantly positive effect on the market share. Other explanatory variables do not have a coefficient that is statistically significant at conventional significance levels.

Estimation results of Equation (3.6) show a negative impact of lagged market shares on leverage choice. This relation is statistically significant for both book value measures of leverage. The effects are non-trivial from an economic point of view. A one standard deviation increase in the one-year lagged market share is associated with a 9.62% (7.04%) decrease in the average *LDBV* (*TDBV*) of Cournot firms. Apparently, Cournot firms with a high market share tend to restrict the use of debt. A potential explanation is that these firms have lower leverage to maintain their strong position in the output market.

Table 3.2
A simultaneous-equations model for market share and leverage – Cournot sample

This table presents the estimation results of the following system of equations for the 2504 observations in our sample of Cournot firms:

$$MKTSH_{i,t} = \gamma_0 + \gamma_1 SIZE_{i,t-1} + \lambda_2 R\,\&\,D_{i,t-1} + \gamma_3 SGA_{i,t-1} + \gamma_4 ADV_{i,t-1} + \gamma_5 MTB_{i,t-1} + \gamma_6 HHI_{i,t-1} + \gamma_7 MARKUP_{i,t-1} + \gamma_8 LEV_{i,t-1} + \sum_{k=9}^{21} \gamma_k YEARDUM + u_{i,t}$$

$$LEV_{i,t} = \beta_0 + \beta_1 NDTS_{i,t-1} + \beta_2 TANG_{i,t-1} + \beta_3 SIZE_{i,t-1} + \beta_4 RISK_{i,t-1} + \beta_5 MTB_{i,t-1} + \beta_6 PROFIT_{i,t-1} + \beta_7 LIQUID_{i,t-1} + \beta_8 MKTSH_{i,t-1} + \sum_{k=9}^{21} \beta_k YEARDUM + \varepsilon_{i,t}$$

We estimate the system using two-stage least squares (2SLS). Variable definitions are included in Table 3.1. We do not report intercept and year dummy coefficients to conserve space. All models include firm fixed effects. We estimate each of the equations of each of the four leverage measures. The significant coefficients are printed in bold. The superscripts a, b, and c indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A: Estimation results for the market share equation

Dependent variable: $MKTSH_t$

	Coefficient	*p*-value		Coefficient	*p*-value		Coefficient	*p*-value		Coefficient	*p*-value
$SIZE_{t-1}$	**0.011**[a]	0.000		**0.011**[a]	0.000		**0.011**[a]	0.000		**0.011**[a]	0.000
$R\&D_{t-1}$	0.000	0.950		0.000	0.936		0.000	0.959		0.000	0.960
SGA_{t-1}	**0.012**[c]	0.094		**0.012**[c]	0.077		**0.012**[c]	0.094		**0.012**[c]	0.079
ADV_{t-1}	0.013	0.827		0.014	0.808		0.017	0.778		0.017	0.768
MTB_{t-1}	0.000	0.805		0.000	0.743		0.000	0.763		0.000	0.632
HHI_{t-1}	**0.044**[a]	0.000		**0.045**[a]	0.000		**0.044**[a]	0.000		**0.045**[a]	0.000
$MARKUP_{t-1}$	0.000	0.808		0.000	0.833		0.000	0.838		0.000	0.898
$LDBV_{t-1}$	**-0.016**[c]	0.093	$TDBV_{t-1}$	**-0.022**[a]	0.005	$LDMV_{t-1}$	-0.010	0.157	$TDMV_{t-1}$	**-0.016**[b]	0.014

Table 3.2 (continued)

Within R^2	0.028		0.030		0.027		0.029	
Between R^2	0.393		0.379		0.397		0.394	
Overall R^2	0.368		0.360		0.372		0.371	

Panel B: Estimation results for the leverage equation

Dependent variable	$LDBV_t$		$TDBV_t$		$LDMV_t$		$TDMV_t$	
$NDTS_{t-1}$	0.029	0.767	0.191	0.791	-0.092	0.477	0.079	0.577
$TANG_{t-1}$	**0.076**[b]	0.032	**0.125**[a]	0.002	**0.079**[c]	0.091	**0.164**[a]	0.001
$SIZE_{t-1}$	**0.033**[a]	0.000	**0.050**[a]	0.000	**0.048**[a]	0.000	**0.060**[a]	0.000
$RISK_{t-1}$	0.027	0.470	**0.085**[b]	0.045	-0.026	0.594	0.015	0.782
MTB_{t-1}	-0.002	0.196	-0.002	0.202	**-0.006**[a]	0.004	**-0.008**[a]	0.001
$PROFIT_{t-1}$	-0.014	0.422	**-0.042**[b]	0.031	-0.028	0.210	**-0.051**[b]	0.041
$LIQUID_{t-1}$	**-0.078**[a]	0.000	**-0.164**[a]	0.000	**-0.086**[a]	0.002	**-0.175**[a]	0.000
$MKTSH_{t-1}$	**-0.109**[c]	0.052	**-0.112**[c]	0.084	-0.074	0.319	-0.074	0.361
Within R^2	0.045		0.094		0.075		0.149	
Between R^2	0.255		0.155		0.260		0.190	
Overall R^2	0.233		0.153		0.227		0.180	

Several of the conventional determinants of leverage also have significant coefficients. The sign of these coefficients is in line with capital structure theories. Tangibility, firm size, and liquidity consistently show significant coefficients with signs as predicted in the capital structure literature. The coefficients on the market-to-book ratio and on profitability have the correct sign, but are only significant in two of the specifications. The coefficients on non-debt tax shields and business risk are not significant, although they do have the expected signs in most cases. For the business risk variable, we find one (out of four) significantly positive coefficient, which is inconsistent with the argument that higher risk should induce firms to restrict their debt usage.[17]

3.5.2 Results – Bertrand sample

Table 3.3 shows the estimated coefficients in the simultaneous-equations system of leverage and market share for the Bertrand sample. Interestingly, the estimation results of the market share equation show positive coefficients for all four measures of leverage, all of which are significant at the 1% level. Theory does not offer a clear prediction about the impact of the debt level of a Bertrand firms on its market share, but our empirical analysis indicates that more highly levered Bertrand firms enjoy higher market shares in the output market. These effects are substantial, even larger than the magnitude found for Cournot firms. A one standard deviation increase in lagged *LDBV*, *TDBV*, *LDMV*, or *TDMV* is associated with a 12.26%, 8.79%, 18.70%, or 14.57% decrease, respectively, in the average market share of Bertrand firms. This result is robust to excluding or including different control variables.

Why is the effect of leverage on market share for Bertrand firms opposite to what we find for Cournot firms? A specific aspect of the paper of Dasgupta and Titman (1998) can potentially explain this finding. Their main prediction that debt induces firms to compete less aggressively in the output market is based on a theoretical result derived within the context of a Nash model. However, Dasgupta and Titman argue that when firms do not determine their output market strategies simultaneously, but one firm (the Stackelberg follower) selects its strategy after observing the actions of the other firm (the Stackelberg leader), this result does not necessarily hold. In other words, in the Stackelberg case debt can induce firms to compete more aggressively. Dasgupta and Titman (1998) do not investigate exactly under which conditions this result obtains. This argument could potentially explain our empirical results if competition in our Bertrand sample is more accurately characterized by a Stackelberg model, while Cournot competition resembles a Nash model. We are not aware of studies that support this view, but

[17] Considering that the risk variable might have a measurement error, we run all the regressions again without *RISK* as a robustness check. The regressions yield similar results.

intuitively it makes sense, since prices are easier to observe than output. In any case, our results highlight the need for a theory that describes in more detail the interaction of Bertrand firms' capital structure with various aspects of industry competition.

Another plausible explanation of our empirical results is the possibly partial reaction[18] of rival firms, which can be true in both cases of Cournot and Bertrand competition. When a Bertrand levered firm behaves less aggressively by raising its price, the rivals as strategic complements may not fully react by increasing their prices in the short run. As a result, the sales of the Bertrand levered firm increases while rivals' sales may not change much. The market share of the levered firm is thus improved accordingly. The same mechanism may also hold for Cournot firms. The levered firm behaves less aggressively by reducing its production, while the rivals as strategic substitutes increase their output. Even if the rivals partially react to the levered firm's behavior, still the final outcome is a decline in Cournot levered firm's market share.

[18] We thank Robert Lensink for suggesting this point.

Table 3.3: A simultaneous-equations model for market share and leverage – Bertrand sample

This table presents the estimation results of the following system of equations for the 3513 observations in our sample of Bertrand firms:

$$MKTSH_{i,t} = \gamma_0 + \gamma_1 SIZE_{i,t-1} + \lambda_2 R\,\&\,D_{i,t-1} + \gamma_3 SGA_{i,t-1} + \gamma_4 ADV_{i,t-1} + \gamma_5 MTB_{i,t-1} + \gamma_6 HHI_{i,t-1} + \gamma_7 MARKUP_{i,t-1} + \gamma_8 LEV_{i,t-1} + \sum_{k=9}^{21} \gamma_k YEARDUM + u_{i,t}$$

$$LEV_{i,t} = \beta_0 + \beta_1 NDTS_{i,t-1} + \beta_2 TANG_{i,t-1} + \beta_3 SIZE_{i,t-1} + \beta_4 RISK_{i,t-1} + \beta_5 MTB_{i,t-1} + \beta_6 PROFIT_{i,t-1} + \beta_7 LIQUID_{i,t-1} + \beta_8 MKTSH_{i,t-1} + \sum_{k=9}^{21} \beta_k YEARDUM + \varepsilon_{i,t}$$

We estimate the system using two-stage least squares (2SLS). Variable definitions are included in Table 3.1. We do not report intercept and year dummy coefficients to conserve space. All models include firm fixed effects. We estimate each of the equations of each of the four leverage measures. The superscripts [a], [b], and [c] indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A: Estimation results for the market share equation

Dependent variable: $MKTSH_t$

	Coefficient	*p*-value		Coefficient	*p*-value		Coefficient	*p*-value		Coefficient	*p*-value
$SIZE_{t-1}$	**0.007**[a]	0.000		**0.007**[a]	0.000		**0.007**[a]	0.000		**0.008**[a]	0.000
$R\&D_{t-1}$	0.000	0.695		0.000	0.680		0.000	0.665		0.000	0.663
SGA_{t-1}	**0.010**[c]	0.067		**0.010**[c]	0.070		**0.010**[c]	0.067		**0.010**[c]	0.061
ADV_{t-1}	0.048	0.267		0.049	0.257		0.051	0.236		0.052	0.228
MTB_{t-1}	0.000	0.655		0.000	0.758		0.000	0.519		0.000	0.541
HHI_{t-1}	**0.030**[b]	0.011		**0.031**[a]	0.008		**0.028**[b]	0.015		**0.030**[a]	0.010
$MARKUP_{t-1}$	0.000	0.814		0.000	0.843		0.000	0.956		0.000	0.940
$LDBV_{t-1}$	**0.031**[a]	0.000	$TDBV_{t-1}$	**0.020**[a]	0.003	$LDMV_{t-1}$	**0.043**[a]	0.000	$TDMV_{t-1}$	**0.029**[a]	0.000
Within R^2	0.033			0.029			0.039			0.034	
Between R^2	0.210			0.211			0.217			0.225	
Overall R^2	0.189			0.189			0.188			0.196	

Table 3.3 (continued)

Panel B: Estimation results for the leverage equation

Dependent variable	$LDBV_t$		$TDBV_t$		$LDMV_t$		$TDMV_t$	
$NDTS_{t-1}$	0.022	0.833	0.028	0.804	-0.030	0.770	-0.137	0.247
$TANG_{t-1}$	**0.073**[b]	0.041	**0.116**[a]	0.002	0.039	0.258	**0.112**[a]	0.004
$SIZE_{t-1}$	**0.033**[a]	0.000	**0.037**[a]	0.000	**0.041**[a]	0.000	**0.045**[a]	0.000
$RISK_{t-1}$	**0.051**[b]	0.020	**0.043**[c]	0.067	0.025	0.245	0.019	0.428
MTB_{t-1}	**-0.002**[b]	0.017	**-0.004**[a]	0.001	**-0.002**[c]	0.082	**-0.003**[a]	0.002
$PROFIT_{t-1}$	0.022	0.137	-0.014	0.382	**-0.065**[a]	0.000	**-0.114**[a]	0.000
$LIQUID_{t-1}$	**-0.112**[a]	0.000	**-0.158**[a]	0.000	**-0.132**[a]	0.000	**-0.180**[a]	0.000
$MKTSH_{t-1}$	-0.019	0.684	-0.046	0.370	0.057	0.219	0.062	0.243
Within R^2	0.056		0.071		0.094		0.123	
Between R^2	0.108		0.093		0.159		0.160	
Overall R^2	0.080		0.084		0.118		0.124	

Table 3.4

Tests for equality of coefficients in the models for market share and leverage across Cournot and Bertrand firms

This table presents the results of tests of equality of the coefficients of key variables in our simultaneous-equations model of market share and leverage across the samples of Cournot and Bertrand firms. We carry out these tests by estimating the system of equations using the full sample of firms and including the interactions of dummy variables for *SS* (strategic substitutes, indicating Cournot competition) and *SC* (strategic complements, indicating Bertrand competition) with all the explanatory variables. Variable definitions are included in Table 3.1.

Panel A: Estimation results for the market share equation – Tests for the equality of coefficients across Cournot and Bertrand firms

Leverage measure:	$LDBV_{t-1}$		$TDBV_{t-1}$		$LDMV_{t-1}$		$TDMV_{t-1}$	
	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Cournot	-0.016	0.093	-0.022	0.005	-0.010	0.157	-0.016	0.014
Bertrand	0.031	0.000	0.020	0.003	0.043	0.000	0.029	0.000
Cournot – Bertrand	-0.047	0.163	-0.042	0.000	-0.053	0.000	-0.045	0.000
Test result	No rejection		Rejection		Rejection		Rejection	

Panel B: Estimation results for the leverage equation – Tests for the equality of coefficients across Cournot and Bertrand firms

Dependent variable:	$LDBV_{t-1}$		$TDBV_{t-1}$		$LDMV_{t-1}$		$TDMV_{t-1}$	
	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Cournot	-0.109	0.052	-0.112	0.084	-0.074	0.319	-0.074	0.361
Bertrand	-0.019	0.684	-0.046	0.370	0.057	0.219	0.062	0.243
Cournot – Bertrand	-0.090	0.239	-0.066	0.334	-0.131	0.121	-0.136	0.115
Test result	No rejection		No rejection		No rejection		No rejection	

The coefficients on the other variables in the market share equation exhibit a similar pattern for Bertrand firms as for Cournot firms. Consistent with expectations, we again find that firm size, selling expenses, and industry concentration have a significantly positive effect on the market share.

The estimation results for the leverage equations show no discernible effect of a firm's market share on its future choice of leverage. This finding suggests that the impact of a firm's market position within the industry on capital structure decisions is different under Cournot and Bertrand competition. Consistent with de Jong, Nguyen, and van Dijk (2007), we find that output market considerations are less important for Bertrand firms than for Cournot firms in determining their capital structure choice. We invite future theoretical and empirical work to shed more light on the rationale for these findings.

Similarly to what we observe for Cournot firms, the traditional capital structure variables perform well in Equation (3.6) for Bertrand firms. Tangibility, firm size, market-to-book ratio, profitability, and liquidity have significant explanatory power for the leverage choice of Bertrand firms. However, in general the overall-R^2 values for Bertrand firms are lower than those for Cournot firms. Specifically, the overall-R^2 in the market share models for Bertrand firms falls between 18.8% and 19.6%, and the overall-R^2 in the leverage models ranges from 8% to 12.4%.

It is remarkable that the estimated effects of leverage on market share and market share on leverage exhibit considerable differences across our Cournot and Bertrand samples, while the coefficients on the other variables are very similar. In section 3.5.3, we present formal tests for the equality of the leverage and market share coefficients across the Cournot and Bertrand samples.

3.5.3 Results – Tests for equality of coefficients across Cournot and Bertrand firms

In this section, we estimate the simultaneous-equations model of leverage and market share for the combined sample of Cournot and Bertrand samples and test whether the coefficients of the leverage and market share variables are the same for the two types of competitive behavior. We do so by interacting all explanatory variables with two dummy variables (*SS* and *SC*) to indicate a Cournot and a Bertrand firm. We compute a χ^2-statistic to test the hypothesis that the leverage effect on market share and the market share effect on leverage are equal across the samples of Cournot and Bertrand firms.

Table 3.4 presents the results of these tests. The test results confirm our conclusions from Tables 3.2 and 3.3 with respect to the impact of leverage on market share. For three out of the four measures of leverage, we detect a statistically significant difference between the estimated coefficients for the Cournot and Bertrand samples. Again, the impact of leverage on market share is

negative for Cournot firms and positive for Bertrand firms. For $LDBV_{t-1}$, the estimated coefficients on leverage interacted with *SS* and *SC* are similar, but the difference is not statistically significant with a *p*-value of 0.163. With respect to the leverage equation, the results in Table 3.4 are in line with the estimation results for the two separate samples, but the difference in the estimated coefficients across the Cournot and Bertrand samples is not statistically significant at conventional significance levels.

Table 3.5 summarizes our findings. The table gives an overview of the hypotheses – derived from theoretical models – and our empirical results. Overall, we find empirical support for our main hypothesis that leverage has a negative effect on market share for Cournot firms, while leverage has no effect on market share for Bertrand firms. Our results are particularly strong for our measure of long-term debt, which accords well with the debt overhang channel that plays a central role in the model of Dasgupta and Titman (1998). The results for Cournot firms are also consistent with Faure-Grimaud's (2000) prediction that debt causes firms to compete less aggressively. Our analysis indicates that models of the strategic role of debt in firms' output market decisions provide us with important insights into their competitive behavior. Conversely, we support previous empirical research that suggests that product market competition affects a firm's capital structure. We still lack a full theoretical understanding of how these mechanisms work, and why and how they work differently under Cournot and Bertrand competition.

Table 3.5

Summary of hypotheses and empirical evidence

This table summarizes the testable hypotheses for firms competing in Cournot and Bertrand, and the relevant empirical results with different proxies for leverage (long-term debt and total debt ratio's measured on the basis of book values and market values, see the definitions in Table 3.1).

	Cournot firms		**Bertrand firms**	
Impact of	Hypothesis	Empirical result	Hypothesis	Empirical result
Leverage on market share	–		0	
Leverage = LDBV		–		+
Leverage = LDMV		–		+
Leverage = TDBV		0		+
Leverage = TDMV		–		+
Market share on leverage	?		?	
Leverage = LDBV		–		0
Leverage = LDMV		–		0
Leverage = TDBV		0		0
Leverage = TDMV		0		0

3.5.4 Robustness checks

We conduct various robustness checks. First, we introduce 2-digit SIC industry dummies into our regression models to explain leverage. The purpose is to capture the unobservable effects of industry characteristics on the capital structure choice of firms with common product lines. We obtain similar results. Second, our risk variable might suffer from measurement error, so we re-estimate all models without the *RISK* variable. Estimation results are virtually identical. Third, we drop *MARKUP* from the market share model because of its fairly high correlation with *HHI*, and we still arrive at similar conclusions. Fourth, as mentioned in section 3.4, we use *HHI* as the only instrument for *MKTSH* in Equation (3.6) that explains leverage, and we obtain almost the same results.

3.6 Conclusions

This study contributes to the limited empirical literature on the interaction between a firm's financing decisions and its competitive behavior and position in the output market. In contrast to most of the previous papers, we analyze the impact of capital structure on the position of individual firms in the output market, as measured by their market share. We test the implications of the models of Dasgupta and Titman's (1998) and Faure-Grimaud (2000) on the interaction between leverage and market share. Because these implications depend on the type of strategic competition, we empirically distinguish between Cournot and Bertrand firms using the competitive strategy measure of Sundaram, John, and John (1996).

Our study focuses on testing hypotheses regarding the influence of leverage on market share, but we take into account possible feedback effects of a firm's competitive position on its capital structure choice by estimating a system of simultaneous equations in which capital structure and market share are jointly determined. We present evidence that under Cournot competition, levered firms tend to have a lower future market share. This finding is consistent with Dasgupta and Titman's (1998) argument that due to a higher discount rate for future profits debt causes firms to produce less, and with Faure-Grimaud's (2000) proposition that non-optimal debt contracting leads to restricted production. Conversely, we find that a higher market share induces Cournot firms to restrict their use of debt.

For Bertrand firms, we find a markedly different pattern of interactions. Market share has no significant impact on leverage, while a higher debt level induces substantially greater market shares for Bertrand firms in the next period. Theory provides us with little guidance about the expected interaction between leverage and market share under Bertrand competition. We hope that our empirical findings will encourage future theoretical work in this area.

Our research highlights the importance of strategic aspects of capital structure choice. The use of debt influences the future competitive position of a firm. We emphasize that competitive behavior has an important impact on the interaction between a firm's market share and its leverage. Cournot and Bertrand firms are different in the way their financial structure affects their output market position and vice versa.

Chapter 4: The roles of firm- and country-specific determinants of capital structure[19]

4.1. Introduction

Prior research (e.g., Demirgüç-Kunt and Maksimovic, 1999; Booth, Demirgüç-Kunt and Maksimovic, 2001; Claessens, Djankov and Nenova, 2001; Bancel and Mittoo, 2004) finds that a firm's capital structure is not only influenced by firm-specific factors but also by country-specific factors. In this study, we demonstrate that country-specific factors can affect corporate leverage in two ways. On the one hand, these factors can influence leverage *directly*. For example, a more developed bond market facilitating issue and trading of public bonds may lead to the use of higher leverage in a country, while a developed stock market has the opposite effect. On the other hand, we show that country-specific factors can also influence corporate leverage *indirectly* through their impact on the effect of firm-specific factors. For example, although the developed bond market of a country stimulates the use of debt, the role of asset tangibility as collateral in borrowing will be rather limited for firms in the same country. In other words, country characteristics may explain why in one country a firm's tangibility affects leverage, but not in another country. Previous studies have not systematically investigated these indirect effects.

International studies comparing differences in the capital structure between countries started to appear only during the last decade. An early investigation of seven advanced industrialized countries is performed by Rajan and Zingales (1995). They argue that although common firm-specific factors significantly influence the capital structure of firms across countries, several country-specific factors also play an important role. Demirgüç-Kunt and Maksimovic (1999) compare capital structure of firms from 19 developed countries and 11 developing countries. They find that institutional differences between developed and developing countries explain a large portion of the variation in the use of long-term debt. They also observe that some institutional factors in developing countries influence the leverage of large and small firms differently. Several recent studies on the field have indicated that even among developed economies like the U.S. and

[19] This chapter is based on de Jong, A., Kabir, R., Nguyen, T.T., 2008, "Capital structure around the world: The roles of firm- and country-specific determinants", *Journal of Banking and Finance* 32, 1954-1969.

European countries, the financing policies and managers' behavior are influenced by the institutional environment and international operations (see, for example, Graham and Harvey, 2001; Bancel and Mittoo, 2004; and Brounen, De Jong and Koedijk, 2006).

The literature specifically examines only the *direct* impact of country characteristics on leverage. In an analysis of ten developing countries, Booth et al. (2001) find that capital structure decisions of firms in these countries are affected by the same firm-specific factors as in developed countries. However, they find that there are differences in the way leverage is affected by country-specific factors such as GDP growth and capital market development. They conclude that more research needs to be done to understand the impact of institutional factors on firms' capital structure choices. The importance of country-specific factors in determining cross-country capital structure choice of firms is also acknowledged by Fan *et al.* (2006) who analyze a larger sample of 39 countries. They find a significant impact of a few additional country-specific factors such as the degree of development in the banking sector, and equity and bond markets. In another study of 30 OECD countries, Song and Philippatos (2004) report that most cross-sectional variation in international capital structure is caused by the heterogeneity of firm-specific, industry-specific, and country-specific determinants. However, they do not find evidence to support the importance of cross-country legal institutional differences in affecting corporate leverage. Giannetti (2003) argues that the failure to find a significant impact of country-specific variables may be due to the bias induced in many studies by including only large listed companies. She analyzes a large sample of unlisted firms from eight European countries and finds a significant influence on the leverage of individual firms of a few institutional variables such as creditor protection, stock market development and legal enforcement. Similarly, Hall *et al.* (2004) analyze a large sample of unlisted firms from eight European countries. They observe cross-country variation in the determinants of capital structure and suggest that this variation could be due to different country-specific variables.

A remarkable feature of most existing studies on international capital structure is the implicit assumption that the impact of firm-specific factors on leverage is equal across countries (see for example Booth et al., 2001; Giannetti, 2003; Deesomsak et al., 2004; Song and Philippatos, 2004; and Fan et al., 2006). By reporting the estimated coefficients for firm-specific determinants of leverage per country, these papers, on the one hand, acknowledge that the impact of firm-level determinants does differ in terms of signs, magnitudes and significance levels. On the other hand, in the analysis of country-specific determinants of corporate leverage, these papers also make use of country dummies in pooled firm-year regressions, thus forcing the firm-specific coefficients to have the same value. With an extremely large number of firm-year observations, it is more likely for this

procedure to produce statistically significant results for many country-specific variables. But, utilizing an alternative regression framework where a single average capital structure for each country is used as an observation, one hardly finds strong evidence on this issue (e.g., Booth et al., 2001; Demirgüç-Kunt and Maksimovic, 1999). As an additional contribution of our study, we show the invalidity of this implicit assumption. Our analysis without imposing such restriction thus provides a more reliable analysis on the importance of country-specific variables.

This study encompasses a large number of countries (42 in total) from every continent for the period 1997-2001. We construct a database of nearly 12,000 firms. All types of firms – large and small – are included as long as a reasonable amount of data is available. We analyze the standard firm-specific determinants of leverage like firm size, asset tangibility, profitability, firm risk and growth opportunities. Besides, we incorporate a large number of country-specific variables in our analysis, including legal enforcement, shareholder/creditor right protection, market/bank-based financial system, stock/bond market development and growth rate in a country's gross domestic product (GDP).

We first make a detailed comparative analysis of the impact of various firm-specific factors. We find that the impact of some factors like tangibility, firm size, risk, profitability and growth opportunities is strong and consistent with standard capital structure theories across a large number of countries. Using a model with several firm-specific explanatory variables, we find a relatively large explanatory power of leverage regressions in most countries. However, a few determinants remain insignificant, and in some countries one or two coefficients are significant with an unexpected sign. Performing a simple statistical test, we reject the hypothesis that firm-specific coefficients across countries are equal. It indicates that the often-made implicit assumption of equal firm-level determinants of leverage across countries does not hold.

In the analysis of the *direct* impact of country-specific factors, we observe that certain factors like GDP growth rate, bond market development and creditor right protection significantly explain the variation in capital structure across countries. Moreover, we find considerable explanatory power of country-specific variables beyond firm-specific factors. We then proceed to measure the *indirect* impact of country-specific variables. The results consistently show the importance of country factors as we document significant effects of these via firm-specific determinants. For example, we observe that in countries with a better law enforcement system and a more healthy economy, firms are not only likely to take more debt, but the effects of some firm-level determinants of leverage such as growth opportunities, profitability and liquidity are also reinforced. Overall, our findings indicate that the conventional theories on capital structure, developed using listed firms in the United States as a *role model*, work well in similar

economies with developed legal environment and high level of economic development.

4.2 Data

Firm-specific and country-specific determinants are the two major types of variables that we take into account in analyzing the impacts on firms' leverage choice.

The firms in our sample cover 42 countries that are equally divided between developed and developing countries.[20] Data for leverage and firm-specific variables are collected from *COMPUSTAT Global* database. We exclude financial firms and utilities. Data on country-specific variables are collected from a variety of sources, mainly *World Development Indicators* and *Financial Structure Database* of the World Bank. Additional country-specific variables are taken from previous studies including La Porta *et al*. (1998), Claessens and Klapper (2002) and Berkowitz *et al*. (2003).

Our sample period covers the years 1997-2001. We require that the firms in our sample have at least 3 years of available data over the study period. The selection of a time-period involves a trade-off between the number of countries that can be included in the study and the availability of enough firm-specific data. Whenever needed, we resort to some other sources to collect any missing data. It is still impossible to obtain data for each and every variable from all 42 countries during this time period. The final sample consists of 11,845 firms. Even though we aim to keep the number of countries high enough and also maintain a reasonable number of firms, our dataset has unavoidably a limited number of firms in a few countries.[21]

In order to calculate the leverage (*LEV*) ratio of a firm, we adopt the following widely-used measure: the book value of long-term debt (item#106, *COMPUSTAT Global* database) over market value of total assets which is calculated as book value of total assets (item#89) minus book value of equity (item#146) plus market value of equity (item#MKVAL). We use the long-term debt ratio following Titman and Wessels (1998), Demirgüç-Kunt and Maksimovic (1999), Booth *et al*. (2001), and Hall et al. (2004).[22] Since the short-term debt

[20] The choice of countries in the sample depends on the availability of firm-level financial data in Compustat Global. We take countries that have the highest numbers of observations in the period of study and exclude those with less than 10 firms per year. The categorization of a country into developing and emerging economy is based on Bekaert and Harvey (2003) and S&P emerging market indices.

[21] The inclusion of countries with relatively fewer numbers of firms yields similar results in terms of firm-specific effects. However, due to the unavailability of country-specific data, we are unable to conduct further analysis.

[22] Papers that use total debt ratios are Rajan and Zingales (1995) and Deesomsak et al. (2004). However, studies that investigate both long-term and total debt ratio (e.g., Wald, 1999; Giannetti, 2003; Fan et al., 2006) generally find similar results for both measures. We also perform robustness checks by defining long-term debt in terms of book value of total assets and find almost no contradictory results. We try

consists largely of trade credit which is under the influence of completely different determinants, the examination of total debt ratio is likely to generate results which are difficult to interpret.

The firm-specific determinants of leverage we use are also selected from prior studies and are defined as follows. *TANG*: Tangibility is defined as net fixed assets (item#76) over book value of total assets. *RISK*: Business risk is defined as the standard deviation of operating income (item#14) over book value of total assets during the sample period. *SIZE*: Firm size is defined as the natural logarithm of total sales (item#1). *TAX*: Tax rate of firms is the average tax rate of the year directly extracted from *COMPUSTAT Global* (item#TR).[23] *GROWTH*: Growth opportunity is defined as the market value of total assets over book value of total assets. *PROFIT*: Profitability is defined as operating income over book value of total assets. *LIQUID*: Liquidity is defined as total current assets (item#75) divided by total current liabilities (item#104).[24] Several industry dummies are included as additional control variables to check the robustness of our results.[25] All firm-specific variables, except for *RISK*, are averaged over the sample period.

Table 4.1 presents mean and median values of leverage and other firm-specific factors from all 42 countries during 1997-2001. For the sample of 42 countries, the mean long-term debt ratio is 12.9%, while the median is 11.9%.

Previous studies analyze long-term leverage ratios across a limited number of countries for the period of 1980s and 1990s and tend to observe a lower leverage in emerging economies. In this study, we observe a wide-ranging pattern of leverage around the world. Many industrialized countries have a median leverage ratio of less than 10% (e.g. Australia, Austria, Belgium, France, Germany, Greece, Italy, Japan, The Netherlands, Sweden and the UK). With respect to emerging economies, we also observe very low leverage in some economies, such as China, Malaysia, Poland and Turkey. However, there are some developing countries with high long-term debt ratio (above 15%), such as Argentina, India and Korea.

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another robustness test with total debt ratio in market value, and find almost consistent results. The only discrepancy is the pattern of direct impact of country-specific variables, whereby the total debt ratio tends to be more affected by country factors.

[23] Tax rate in *COMPUSTAT Global* is defined as total income taxes divided by pre-tax income. We use this measure instead of marginal tax rates, because our explanatory variable concerns levels of debt, whereas the simulated marginal tax rates serve to explain incremental change in debt rather than the debt level itself."

[24] Potential measurement errors in calculating firm-specific variables can be expected as we assume that the countries in our sample apply similar accounting standards.

[25] The following industry groups are considered in our analysis: Agriculture, forestry, fishing and resources (SIC code 0100 – 1499); Construction (SIC code 1500 – 1799); Food (SIC code 2000 – 2099); Tobacco, textiles, wood and furniture (SIC code 2100 – 2599); Paper, printing and publishing (SIC code 2600 – 2799); Chemicals, pharmaceuticals, and petroleum (SIC code 2800 – 2999); Rubber, leather, and stone (SIC code 3000 – 3299); Metal, machinery and other manufacturing (SIC code 3300 – 3599 and 3700 – 3999); Electronics (SIC code 3600 – 3699); and Transportation, trade and services (SIC code 4000 – 5999 and 6500 – 8999). Inclusion of these industry dummies does not yield a materially different result.

Table 4.1 also presents summary statistics of firm characteristics per country. For example, we observe that countries with low median tax rates are Hong Kong, Taiwan and Thailand; those with high rates include France, Germany, Italy, Japan, New Zealand and the US. Countries with the lowest values of asset tangibility are France, Germany, Italy, Sweden and US, while those with the highest values are Argentina, Chile, Croatia, Mexico and Pakistan. Among all firm-specific variables, the values of profitability exhibit the lowest variation.

We make use of an array of country-specific variables in our analysis of international capital structure. We consider a number of variables characterizing the macro-economic, legal and financial development of countries. The variables are also averaged, where applicable, over the study period. The selection of some other country-specific variables related to corporate governance is mainly based on La Porta *et al*. (1998) and Claessens *et al*. (1999)[26], proxying a country's legal enforcement, shareholder/creditor right protection and market/bank-based financial system. Other variables, such as bond and stock market development, capital formation, GDP growth, come from World Development Indicators and World Bank Financial Structure Database. Table 2.2 provides details on definitions, data sources and summary statistics of all country-specific variables.

There may a problem of multi-collinearity arising from high correlations between several country-specific variables.[27] Therefore, we construct two new variables to use as alternatives in the regression analysis. These new variables are: (1) *STDMKTSTOCK*, describing the level of stock market orientation of countries, calculated as the average of normalized values of *MKTBASE* and *STOCK*; and (2) *STDENFOR*, indicating the development of countries' legal enforcement system, calculated as the average of normalized values of *JUDICIAL*, *RULE*, *LEGAL* and *CORRUP*. The details on these variables are also presented in Table 4.2.

[26] These variables, associated with 1982-1995 (La Porta et al., 1998) and 1996-1999 (Claessens et al., 1999), usually remain relatively stable enough over different years.

[27] The correlation between *MKTBASE* and *STOCK* is 0.40. The pair-wise correlations between *JUDICIAL*, *RULE*, *LEGAL* and *CORRUP* are 0.73, 0.86, 0.86, 0.96 and 0.97, respectively.

Table 4.1
Cross-country summary statistics of leverage and other firm-specific variables

This table presents mean (median in parentheses) values of leverage and other firm-specific characteristics from 42 countries. All variables are averaged over the period 1997-2001, in which data are required to be available for at least three years. The firm-specific variables are as follows. *LEV*: Leverage defined as book value of long-term debt (item#106 in Compustat Global database) over market value of total assets, calculated as book value of total assets (item#89) minus book value of equity (item#146) plus market value of equity (item#MKVAL). *TANG*: Tangibility defined as net fixed assets (item#76) over book value of total assets. *RISK*: Risk defined as the standard deviation of operating income (item#14) over book value of total assets during the sample period. *SIZE*: Firm size defined as the natural logarithm of total sales (item#1). *TAX*: Tax rate of firms is the average tax rate (item#TR) of the year. *GROWTH*: Growth opportunity defined as the market value of total assets over book value of total assets. *PROFIT*: Profitability defined as operating income over book value of total assets. *LIQUID*: Liquidity defined as total current assets (item#75) divided by total current liabilities (item#104). Obs. is the number of firms per country.

Country	*LEV*	*TANG*	*RISK*	*SIZE*	*TAX*	*GROWTH*	*PROFIT*	*LIQUID*	Obs.
Argentina	0.229	0.600	0.030	5.99	15.96	2.308	0.105	1.749	23
	(0.236)	(0.567)	(0.030)	(6.11)	(15.61)	(0.900)	(0.095)	(0.905)	
Australia	0.116	0.338	0.113	4.85	21.99	1.936	0.035	2.718	254
	(0.081)	(0.296)	(0.063)	(5.05)	(27.37)	(1.362)	(0.069)	(1.463)	
Austria	0.103	0.327	0.037	5.04	17.78	1.418	0.076	3.198	60
	(0.081)	(0.361)	(0.023)	(5.14)	(23.02)	(1.133)	(0.086)	(1.556)	
Belgium	0.112	0.291	0.039	5.32	31.80	1.908	0.119	1.688	82
	(0.088)	(0.278)	(0.023)	(5.17)	(27.06)	(1.344)	(0.121)	(1.363)	
Brazil	0.162	0.485	0.044	6.84	22.07	0.951	0.118	1.297	101
	(0.136)	(0.517)	(0.039)	(6.72)	(24.34)	(0.856)	(0.121)	(1.179)	
Canada	0.150	0.447	0.082	5.32	23.41	2.029	0.071	3.036	413
	(0.128)	(0.425)	(0.048)	(5.57)	(28.02)	(1.419)	(0.114)	(1.792)	

Table 4.1 (continued)

Country	*LEV*	*TANG*	*RISK*	*SIZE*	*TAX*	*GROWTH*	*PROFIT*	*LIQUID*	Obs.
Chile	0.187	0.572	0.034	4.31	10.50	1.032	0.107	2.500	81
	(0.134)	(0.598)	(0.025)	(4.35)	(11.70)	(0.954)	(0.101)	(1.543)	
China	0.17	0.435	0.038	7.26	11.83	1.019	0.071	1.848	108
	(0.047)	(0.370)	(0.028)	(7.28)	(13.74)	(0.823)	(0.066)	(1.408)	
Colombia	0.112	0.501	0.025	5.79	14.96	0.764	0.062	1.635	14
	(0.089)	(0.500)	(0.022)	(5.66)	(17.24)	(0.794)	(0.083)	(1.551)	
Croatia	0.128	0.617	0.022	2.37	29.88	1.001	0.133	1.703	13
	(0.086)	(0.632)	(0.014)	(2.08)	(30.32)	(0.914)	(0.113)	(1.166)	
Denmark	0.134	0.356	0.055	6.87	27.48	1.685	0.098	2.061	99
	(0.104)	(0.336)	(0.030)	(6.81)	(28.87)	(1.107)	(0.113)	(1.586)	
Finland	0.121	0.315	0.061	5.08	30.95	2.271	0.132	2.147	97
	(0.107)	(0.272)	(0.040)	(4.70)	(29.20)	(1.372)	(0.135)	(1.739)	
France	0.097	0.184	0.053	4.92	26.07	2.034	0.111	1.880	504
	(0.073)	(0.143)	(0.031)	(4.58)	(33.68)	(1.382)	(0.110)	(1.492)	
Germany	0.072	0.226	0.082	4.82	31.03	3.122	0.080	3.625	575
	(0.040)	(0.194)	(0.054)	(4.62)	(34.24)	(1.401)	(0.108)	(2.218)	
Greece	0.055	0.338	0.039	5.04	24.43	2.431	0.132	1.845	64
	(0.029)	(0.310)	(0.033)	(4.99)	(25.75)	(2.202)	(0.118)	(1.652)	
Hong Kong	0.099	0.324	0.086	6.99	11.32	1.176	0.009	2.561	110
	(0.056)	(0.298)	(0.043)	(7.00)	(9.10)	(0.907)	(0.033)	(1.620)	
Hungary	0.094	0.535	0.035	3.64	10.61	1.714	0.154	2.454	15
	(0.079)	(0.520)	(0.027)	(3.95)	(12.61)	(1.464)	(0.145)	(2.062)	
India	0.222	0.414	0.046	1.96	14.84	1.993	0.145	1.894	226
	(0.183)	(0.406)	(0.035)	(1.91)	(13.85)	(1.099)	(0.141)	(1.634)	

Table 4.1 (continued)

Country	*LEV*	*TANG*	*RISK*	*SIZE*	*TAX*	*GROWTH*	*PROFIT*	*LIQUID*	Obs.
Indonesia	0.189	0.427	0.059	6.06	197.34	1.272	0.122	2.377	177
	(0.148)	(0.423)	(0.049)	(6.01)	(16.98)	(1.095)	(0.112)	(1.319)	
Ireland	0.144	0.426	0.081	4.94	17.86	2.093	0.069	1.784	37
	(0.115)	(0.422)	(0.028)	(5.39)	(17.13)	(1.428)	(0.116)	(1.520)	
Italy	0.080	0.246	0.041	5.37	32.99	1.762	0.087	1.931	164
	(0.054)	(0.201)	(0.024)	(5.24)	(39.27)	(1.341)	(0.096)	(1.566)	
Japan	0.108	0.314	0.021	3.59	38.83	1.307	0.072	1.787	2920
	(0.084)	(0.300)	(0.014)	(3.45)	(45.35)	(0.981)	(0.066)	(1.353)	
Korea	0.164	0.400	0.044	6.58	32.23	1.144	0.102	1.915	144
	(0.173)	(0.434)	(0.031)	(6.59)	(24.96)	(0.912)	(0.091)	(1.048)	
Malaysia	0.087	0.408	0.062	5.14	15.38	1.274	0.068	2.049	498
	(0.045)	(0.399)	(0.041)	(4.93)	(16.22)	(1.071)	(0.076)	(1.457)	
Mexico	0.181	0.503	0.037	1.95	32.15	1.226	0.134	1.977	54
	(0.142)	(0.566)	(0.025)	(2.09)	(25.09)	(1.105)	(0.128)	(1.447)	
Netherlands	0.091	0.265	0.072	5.78	24.31	2.388	0.101	2.584	136
	(0.073)	(0.254)	(0.036)	(5.77)	(29.01)	(1.459)	(0.135)	(1.459)	
New Zealand	0.169	0.546	0.064	5.36	24.94	1.554	0.129	1.681	47
	(0.150)	(0.511)	(0.034)	(5.50)	(32.14)	(1.225)	(0.137)	(1.511)	
Norway	0.198	0.315	0.089	6.37	23.92	2.049	0.068	4.558	97
	(0.142)	(0.243)	(0.050)	(6.14)	(24.46)	(1.255)	(0.089)	(1.761)	
Pakistan	0.166	0.506	0.053	1.48	18.26	1.117	0.153	1.245	45
	(0.123)	(0.598)	(0.042)	(1.19)	(17.80)	(0.995)	(0.141)	(1.065)	
Peru	0.117	0.498	0.037	5.74	21.98	0.916	0.137	1.820	19
	(0.092)	(0.492)	(0.028)	(5.87)	(27.69)	(0.850)	(0.121)	(1.445)	

Table 4.1 (continued)

Country	*LEV*	*TANG*	*RISK*	*SIZE*	*TAX*	*GROWTH*	*PROFIT*	*LIQUID*	Obs.
Philippines	0.136	0.476	0.088	0.25	21.14	6.551	0.086	5.491	77
	(0.074)	(0.466)	(0.041)	(0.40)	(12.73)	(0.886)	(0.065)	(1.249)	
Poland	0.052	0.403	0.054	6.53	31.84	1.401	0.124	2.075	23
	(0.037)	(0.458)	(0.043)	(6.36)	(30.58)	(1.139)	(0.120)	(1.592)	
Portugal	0.135	0.407	0.030	5.82	29.69	1.565	0.100	1.079	31
	(0.116)	(0.417)	(0.026)	(6.03)	(26.69)	(1.167)	(0.093)	(1.085)	
Singapore	0.093	0.354	0.060	4.56	19.04	1.326	0.074	1.897	310
	(0.056)	(0.346)	(0.042)	(4.46)	(20.48)	(1.115)	(0.073)	(1.536)	
Spain	0.103	0.383	0.028	5.99	22.87	1.809	0.120	1.423	93
	(0.078)	(0.379)	(0.022)	(5.92)	(25.39)	(1.362)	(0.111)	(1.223)	
Sweden	0.103	0.216	0.101	6.30	21.57	2.244	0.017	3.081	206
	(0.057)	(0.163)	(0.057)	(6.49)	(24.17)	(1.608)	(0.091)	(2.180)	
Switzerland	0.148	0.367	0.050	5.98	20.30	1.875	0.096	2.290	164
	(0.114)	(0.340)	(0.024)	(5.90)	(22.14)	(1.275)	(0.114)	(1.821)	
Taiwan	0.113	0.370	0.029	2.39	6.70	1.605	0.076	1.690	153
	(0.092)	(0.370)	(0.022)	(2.41)	(8.05)	(1.330)	(0.065)	(1.461)	
Thailand	0.174	0.452	0.053	7.52	10.41	0.994	0.094	1.665	244
	(0.126)	(0.431)	(0.043)	(7.43)	(5.31)	(0.938)	(0.090)	(1.49)	
Turkey	0.059	0.324	0.081	4.55	30.05	2.648	0.221	1.799	39
	(0.031)	(0.313)	(0.061)	(4.57)	(27.03)	(1.967)	(0.232)	(1.579)	
UK	0.084	0.333	0.082	4.71	21.20	2.212	0.092	2.259	795
	(0.056)	(0.280)	(0.048)	(4.64)	(25.52)	(1.564)	(0.119)	(1.426)	
US	0.144	0.295	0.084	5.86	24.90	2.667	0.074	2.982	2537
	(0.093)	(0.232)	(0.046)	(5.94)	(32.42)	(1.760)	(0.116)	(2.061)	

Table 4.2
Description and summary statistics of country-specific variables

This table presents country-specific variable names, abbreviations, definitions, sources of data, numbers of observations, and means/medians of the available data. Obs. is the number of countries with available data and information.

Name (abbreviation)	Description	Statistics		
		Mean	Median	Obs.
Efficiency of judicial system (*JUDICIAL*)	The assessment of the "efficiency and integrity of the legal environment as it affects business, particularly foreign firms", as defined by La Porta *et al.* (1998), averaged through 1980-1983.	7.836	8.375	38
Rule of law (*RULE*)	The assessment of the law and order tradition in the country, defined by La Porta *et al*. (1998), averaged through 1982-1995.	7.584	8.545	40
Legality (*LEGAL*)	The index derived from a principal component analysis of the five observed legality variables, defined by Berkowitz *et al*. (2003), period: 1980-1995.	17.074	18.270	38
Corruption (*CORRUP*)	International Country Risk assessment of the corruption in governments as defined by La Porta *et al*. (1998), average through 1982-1995.	7.321	7.800	38
Standardized enforcement (*STDENFOR*)	The average of standardized values of *JUDICIAL*, *RULE*, *LEGAL*, and *CORRUP*. In case of missing values, we take the average of available data.	0.000	0.077	40
Creditor right protection (*CREDITOR*)	Creditor right protection, an index aggregating different creditor rights as defined by La Porta *et al*., 998. (Source: La Porta *et al*. 1998, and Claessens and Klapper, 2002).	2.050	2.000	40
Bond market development (*BOND*)	The development of bond market defined as the total (private plus public) bond market capitalization over GDP, average through 1997-2001 (source: World Bank, Financial Structure Database). Data for Indonesia are averaged through 1990-1994 (source: World Bank, The emerging Asian bond market, June 1995).	0.577	0.496	40

Table 4.2 (continued)

Name (abbreviation)	Description	Statistics		
		Mean	Median	Obs.
Market/Bank-based financial system (*MKTBASE*)	A dummy variable that equals 1 if the country's financial system is market-based and 0 if it is bank-based. (Sources: Demirgüç-Kunt and Levine, 2001; for China, Taiwan and Croatia: the National Bank and Statistics Office of the corresponding country).	0.568	1.000	42
Stock market development (*STOCK*)	The development of stock market in a country is defined as the stock market capitalization over the country's GDP, average through 1997-2001. (Source: World Development Indicators and Financial Structure Database).	0.640	0.440	42
Standardized stock market (*STDMKTSTOCK*)	The average of standardized *MKTBASE* and standardized *STOCK*.	0.000	0.017	42
Shareholder right protection (*SHAREHOLDER*)	Shareholder right protection, an index aggregating different shareholder rights as defined by La Porta *et al*. (1998). (Source: La Porta *et al*. 1998).	3.132	3.000	38
Capital formation (*CAPITAL*)	Defined as the average of annual gross capital formation (as a proportion of GDP) in each country, averaged through 1997-2001. (Source: World Development Indicators).	0.228	0.222	42
GDP growth (*GDP*)	Defined as the average of annual real GDP growth rate (unit: %) of each country, averaged through 1997-2001. (Source: World Development Indicators).	3.122	2.972	42

We, hereinafter, refer to the country-specific variables in four groupings. Creditor right protection (*CREDITOR*), bond market development (*BOND*) and legal enforcement (*STDENFOR*) tend to strengthen the role of the bond market in the economy; thus, we group these three country-specific variables as "*bond market structure*". Shareholder right protection (*SHAREHOLDER*) and the level of stock market orientation (*STDMKTSTOCK*) together represent the importance of the stock market in a country, and thus we refer to this group of variables as "*stock market structure*". In addition, we take into account the role of capital formation (*CAPITAL*), i.e. the level of gross domestic capital mobilization, which can have an impact on corporate financial decisions. Finally, we control for the impact of general economic conditions represented by GDP growth rate (*GDP*).

4.3 Impact of firm-specific factors

4.3.1 Hypotheses

Table 4.3 summarizes the hypotheses for the firm-specific effects. The table also includes the hypotheses for the equal firm-specific coefficient tests, which will be described in Section 4.3.2, and the hypotheses for the country-specific effects, which will be discussed in Section 4.4.1.

Booth et al. (2001) observe that capital structures of firms are usually explained by several variables arising out of static trade-off, agency and information asymmetry considerations. In a static trade-off framework, the firm is viewed as setting a target debt-to-assets ratio and moving towards it. In particular, the firm's capital structure moves towards targets that involve the trade-off between bankruptcy-related costs and tax advantages. With respect to the bankruptcy costs, we expect that these costs have a negative impact on leverage, and one can use the following proxy variables: asset tangibility (higher tangibility of assets indicates lower risk for the lender as well as reduced direct costs of bankruptcy – see hypothesis *F1* in Table 4.3), firm risk (higher risk indicates higher volatility of earnings and higher probability of bankruptcy – hypothesis *F2*), and firm size (an inverse proxy for the probability of bankruptcy whereby larger firms are less likely to face financial distress and bankruptcy – hypothesis *F3*). In order to examine the influence of taxation on leverage, which is expected to be positive, Fan *et al.* (2006) suggest using the effective tax rate as a proxy (hypothesis *F4*).

Agency conflicts between stockholders and bondholders arise from asset-substitution and underinvestment. In order to minimize these conflicts firms with high growth opportunities go for lower leverage, thus seeking equity financing for their new projects instead of debt financing. Growth opportunities are thus expected to be negatively associated with firms' leverage (hypothesis *F5*). According to Jensen and Meckling's (1976) framework, if a firm has a high

fraction of tangible assets, then these assets can be used as collateral, mitigating the lender's risk. Hence, a large fraction of tangible assets is expected to be associated with high leverage, and in case of bankruptcy, the value of tangible assets should be higher than that of intangibles. Tangibility can be used as a proxy for collateralization which is expected to be positively related to leverage (hypothesis *F1*).

The asymmetric information or pecking-order view suggests that firms follow a specific hierarchy in financing: firms prefer internal to external financing. If external finance is required, a firm issues the safest security first. That is, it first issues debt, then possibly hybrid securities such as convertible bonds, and equity only as a last resort. For testing the firm-specific determinants using information asymmetry considerations, it is common to use variables like profitability (more profitable firms will have less leverage – hypothesis *F6*), firm size (smaller firms are expected to be financed less by debt because of the relatively larger information asymmetry problem – hypothesis *F3*), and liquidity (accumulated cash and other liquid assets serve as internal source of fund and will be used first instead of debt – hypothesis *F7*).

Table 4.3
Hypotheses

The table summarizes the hypotheses for the firm- and country-specific effects, and the hypotheses for equal firm-specific coefficient tests.

Firm-specific effects	
Hypothesis F1:	Tangibility has a positive effect on leverage
Hypothesis F2:	Business risk has a negative effect on leverage
Hypothesis F3:	Firm size has a positive effect on leverage
Hypothesis F4:	Tax has a positive effect on leverage
Hypothesis F5:	Growth opportunities have a negative effect on leverage
Hypothesis F6:	Profitability has a negative effect on leverage
Hypothesis F7:	Liquidity has a negative effect on leverage

Table 4.3 (continued)

Equal firm-specific coefficients	
Hypothesis EC1:	Tangibility coefficients are equal across all countries
Hypothesis EC2:	Risk coefficients are equal across all countries
Hypothesis EC3:	Size coefficients are equal across all countries
Hypothesis EC4:	Tax coefficients are equal across all countries
Hypothesis EC5:	Growth opportunity coefficients are equal across all countries
Hypothesis EC6:	Profitability coefficients are equal across all countries
Hypothesis EC7:	Liquidity coefficients are equal across all countries
Hypothesis EC8:	All firm-specific variables' coefficients are simultaneously equal across all countries
Direct country-specific effects	
Hypothesis D1:	Bond market structure (i.e. standardized enforcement, creditor right protection and bond market development) has a positive effect on leverage
Hypothesis D2:	Stock market structure (i.e. standardized stock market and shareholder right protection) has a negative effect on leverage
Hypothesis D3:	Capital formation has a negative effect on leverage
Indirect country-specific effects	
Hypothesis I1:	Bond market structure mitigates the effect of bankruptcy costs (tangibility, risk and size) on leverage
Hypothesis I2:	Capital formation mitigates the effect of bankruptcy costs (tangibility, risk and size) on leverage
Hypothesis I3:	Bond market structure mitigates the effect of agency costs (growth opportunities and tangibility) on leverage
Hypothesis I4:	Stock market structure mitigates the effect of agency costs (growth opportunities and tangibility) on leverage
Hypothesis I5:	Capital formation strengthens the effect of pecking order financing (profitability and liquidity) on leverage

4.3.2 Methodology

In the analysis of firm-specific determinants of leverage we test the conventional theoretical framework on capital structure choice of firms. We run firm-level ordinary-least-squares regressions with leverage as the dependent variable and country's firm-specific factors as explanatory variables for each of the 42 countries in our data set as follows:

$$LEV_{ij} = \beta_{0j} + \beta_{1j}TANG_{ij} + \beta_{2j}RISK_{ij} + \beta_{3j}SIZE_{ij} + \beta_{4j}TAX_{ij} + \beta_{5j}GROWTH_{ij} + \\ + \beta_{6j}PROFIT_{ij} + \beta_{7j}LIQUID_{ij} + \varepsilon_{ij} \qquad (4.1)$$

where *i* denotes an individual firm and *j* denotes a country.

Next, we conduct a few statistical tests. First, we test the null hypothesis that each firm-specific coefficient is equal across countries. The procedure includes seven different tests to examine whether one or more of the seven firm-specific coefficients, namely tangibility (hypothesis *EC1*), business risk (*EC2*), firm size (*EC3*), taxation (*EC4*), growth opportunities (*EC5*), profitability (*EC6*) and liquidity (*EC7*), have the same value for all countries in the sample.[28] To conduct these tests, we make use of an unrestricted regression model (where all coefficients are allowed to vary across countries), and seven restricted models (e.g. for tangibility null hypothesis, we restrict that the tangibility coefficients are the same for all countries, but other coefficients of business risk, firm size, etc. can vary).

Second, using a similar approach, we test the null hypothesis that all firm-specific coefficients of 42 countries have the same value (hypothesis *EC8*). In this case, our single restricted model of regression imposes that all seven firm-specific coefficients do not vary at all. This particular test is more important because it allows one to decide whether it is acceptable to use a single model for firms in all countries. In other words, only if *EC8* is not rejected, one can assume that firm-specific coefficients are the same across countries. The former tests (from *EC1* to *EC7*) provide additional evidence to further confirm the rejection or acceptance of *EC8*, and in case of *EC8* rejection, they help to point out which firm-specific factors may largely influence such a rejection.

The tests are related to the joint test of significance of regression coefficients described in Verbeek (2004, p.27). The test statistic is defined as:

$$f = \frac{(S_R - S_{UR})/J}{S_{UR}/(N-K)}$$

where N is the number of observations, J is the number of regressors omitted in the restricted models, K is the number of regressors remaining in the restricted models including the intercept, and S_R and S_{UR} denote the sum-squared-residuals of the restricted and unrestricted models, respectively. For each measure of leverage, using the Seemingly Unrelated Regression (SUR) estimation method, we get S_{UR}

[28] These hypotheses are summarized in Table 4.3.

by adding all sum-squared-residuals (SSR) from all the equations for firm-specific determinants of leverage (as specified in Equation 4.1). For S_R in each test (still using SUR), we add the SSR from the restricted equations in the system with respective assumptions that the relevant coefficients are the same across countries. The values of *f*-statistic provide evidence whether to reject or not the hypotheses.

4.3.3 Results

We start our discussion of the results with a country-by-country analysis of firm-specific determinants of leverage. We run regressions to explain leverage from firm-specific factors as shown in Equation (4.1). The results are reported in Table 4.4.

We find that almost all coefficients of tangibility are statistically significant and consistent with theoretical proposition (hypothesis *F1*). The cross-sectional regressions yield as many as 36 significant positive coefficients for tangibility. In general, firm-level data in our sample serve the framework put forward by Jensen and Meckling (1976) on the shareholder-bondholder conflict.

Table 4.4
Impact of firm-specific variables on leverage across countries

This table presents regression results of leverage on firm-specific variables for 42 countries using annual average data of 1997 – 2001 estimated from Equation (4.1): $LEV_{ij} = \beta_{0j} + \beta_{1j}TANG_i + \beta_{2j}RISK_i + \beta_{3j}SIZE_i + \beta_{4j}TAX_i + \beta_{5j}GROWTH_i + \beta_{6j}PROFIT_i + \beta_{7j}LIQUID_i + \varepsilon_i$ where *i* denotes an individual firm and *j* denotes a country. All variables are defined in Table 4.1. *P*-values are reported in parentheses. The significant coefficients are printed in bold. The superscripts a, b, and c indicate statistical significance at 1%, 5% and 10% level, respectively. White heteroskedasticity adjustment is used. Obs. is the number of firms per country in the regressions. Adj-R^2 is the value of adjusted-R^2 for the regression.

Country	**Intercept**	***TANG***	***RISK***	***SIZE***	***TAX***	***GROWTH***	***PROFIT***	***LIQUID***	**Obs.**	**Adj-R^2**
Argentina	-0.151	**0.620** [a]	1.976	0.012	**-0.003** [b]	0.003	-0.400	**-0.020** [c]	23	0.55
	(0.441)	(0.000)	(0.298)	(0.698)	(0.021)	(0.140)	(0.582)	(0.078)		
Australia	0.030	**0.161** [a]	**-0.161** [b]	**0.016** [a]	0.000	**-0.007** [b]	**-0.160** [a]	-0.001	254	0.23
	(0.258)	(0.000)	(0.026)	(0.000)	(0.903)	(0.034)	(0.000)	(0.231)		
Austria	-0.010	**0.201** [b]	0.464	0.011	0.000	-0.017	-0.019	0.001	60	0.23
	(0.886)	(0.011)	(0.419)	(0.239)	(0.180)	(0.192)	(0.878)	(0.361)		
Belgium	**0.097** [b]	**0.226** [a]	-0.086	-0.001	0.000	**-0.015** [a]	-0.097	-0.007	82	0.30
	(0.070)	(0.000)	(0.408)	(0.917)	(0.352)	(0.005)	(0.176)	(0.378)		
Brazil	**0.192** [c]	**0.139** [c]	0.034	-0.005	0.000	0.014	**-0.423** [c]	-0.020	101	0.04
	(0.093)	(0.080)	(0.942)	(0.691)	(0.372)	(0.362)	(0.069)	(0.442)		

Table 4.4 (continued)

Country	Intercept	*TANG*	*RISK*	*SIZE*	*TAX*	*GROWTH*	*PROFIT*	*LIQUID*	Obs.	Adj-R^2
Canada	0.024	**0.184** [a]	**-0.194** [a]	**0.021** [a]	0.000	**-0.014** [a]	**-0.259** [a]	-0.001	413	0.36
	(0.372)	(0.000)	(0.003)	(0.000)	(0.745)	(0.003)	(0.000)	(0.132)		
Chile	0.075	**0.243** [a]	-0.851	**0.034** [a]	0.000	**-0.145** [a]	0.037	-0.002	81	0.37
	(0.373)	(0.010)	(0.237)	(0.002)	(0.910)	(0.000)	(0.909)	(0.695)		
China	**-0.321** [a]	**0.414** [a]	-0.289	**0.041** [a]	0.000	-0.014	**-0.421** [c]	0.008	108	0.44
	(0.001)	(0.000)	(0.264)	(0.000)	(0.646)	(0.353)	(0.077)	(0.178)		
Colombia	-0.068	0.095	0.174	0.006	-0.004	0.172	-0.097	0.016	14	0.001
	(0.882)	(0.482)	(0.922)	(0.799)	(0.319)	(0.408)	(0.895)	(0.834)		
Croatia	0.459	-0.101	2.673	0.089	**-0.011** [c]	-0.128	-0.390	-0.014	13	0.48
	(0.230)	(0.804)	(0.397)	(0.112)	(0.070)	(0.234)	(0.563)	(0.765)		
Denmark	0.015	**0.297** [a]	0.004	0.008	0.000	**-0.017** [a]	-0.102	0.000	99	0.27
	(0.823)	(0.000)	(0.987)	(0.269)	(0.256)	(0.002)	(0.289)	(0.996)		
Finland	**0.103** [b]	**0.249** [a]	**-0.264** [c]	0.003	-0.001	-0.003	**-0.164** [b]	-0.006	97	0.39
	(0.060)	(0.000)	(0.053)	(0.536)	(0.138)	(0.204)	(0.044)	(0.429)		
France	**0.065** [a]	**0.275** [a]	-0.034	**0.004** [c]	0.000	**-0.009** [a]	**-0.075** [b]	**-0.004** [b]	503	0.32
	(0.000)	(0.000)	(0.596)	(0.066)	(0.934)	(0.000)	(0.024)	(0.026)		
Germany	**0.019** [c]	**0.266** [a]	-0.053	0.001	0.000	**-0.001** [a]	0.003	**-0.001** [c]	571	0.31
	(0.058)	(0.000)	(0.113)	(0.761)	(0.391)	(0.000)	(0.895)	(0.055)		
Greece	-0.040	**0.249** [a]	-0.141	**0.017** [c]	-0.001	0.008	**-0.409** [a]	-0.010	64	0.47
	(0.395)	(0.000)	(0.632)	(0.059)	(0.236)	(0.316)	(0.008)	(0.217)		

Table 4.4 (continued)

Country	Intercept	*TANG*	*RISK*	*SIZE*	*TAX*	*GROWTH*	*PROFIT*	*LIQUID*	Obs.	Adj-R^2
Hong Kong	-0.017	**0.110**[b]	**-0.319**[a]	**0.017**[a]	0.000	-0.009	**-0.342**[a]	-0.001	109	0.15
	(0.698)	(0.030)	(0.001)	(0.004)	(0.346)	(0.412)	(0.001)	(0.188)		
Hungary	0.165	0.252	0.155	0.015	-0.002	-0.037	-1.079	-0.005	15	0.20
	(0.326)	(0.246)	(0.851)	(0.444)	(0.383)	(0.1441)	(0.165)	(0.798)		
India	**0.124**[a]	**0.550**[a]	**-0.478**[c]	0.011	**-0.001**[c]	**-0.005**[c]	**-0.817**[a]	0.006	226	0.54
	(0.004)	(0.000)	(0.073)	(0.157)	(0.064)	(0.085)	(0.000)	(0.631)		
Indonesia	-0.074	**0.270**[a]	-0.011	**0.040**[a]	**-0.000**[a]	**-0.035**[c]	**-0.409**[a]	0.000	177	0.22
	(0.318)	(0.000)	(0.974)	(0.000)	(0.001)	(0.056)	(0.001)	(0.686)		
Ireland	0.105	**0.239**[b]	-0.190	**0.025**[a]	-0.001	**-0.024**[a]	**-0.401**[a]	**-0.046**[c]	37	0.52
	(0.422)	(0.035)	(0.135)	(0.010)	(0.471)	(0.001)	(0.000)	(0.095)		
Italy	-0.009	**0.131**[b]	-0.007	**0.017**[a]	0.000	**-0.011**[b]	-0.070	-0.002	164	0.28
	(0.740)	(0.011)	(0.948)	(0.000)	(0.657)	(0.015)	(0.166)	(0.532)		
Japan	**0.014**[c]	**0.337**[a]	**-0.127**[a]	**0.010**[a]	**0.001**[a]	0.000	**-0.355**[a]	**-0.007**[a]	2920	0.37
	(0.052)	(0.000)	(0.008)	(0.000)	(0.004)	(0.819)	(0.000)	(0.000)		
Korea	-0.007	**0.209**[a]	0.119	**0.020**[a]	**0.0001**[b]	**-0.015**[c]	**-0.365**[a]	-0.001	142	0.40
	(0.867)	(0.000)	(0.545)	(0.000)	(0.046)	(0.069)	(0.001)	(0.574)		
Malaysia	0.006	**0.118**[a]	**-0.163**[b]	**0.017**[a]	0.000	**-0.011**[c]	**-0.356**[a]	**-0.005**[a]	496	0.16
	(0.822)	(0.000)	(0.015)	(0.000)	(0.675)	(0.051)	(0.000)	(0.004)		
Mexico	**0.298**[a]	**0.262**[a]	-0.300	-0.019	0.001	**-0.110**[a]	-0.365	-0.018	54	0.39
	(0.000)	(0.010)	(0.225)	(0.144)	(0.106)	(0.003)	(0.145)	(0.206)		

Table 4.4 (continued)

Country	Intercept	*TANG*	*RISK*	*SIZE*	*TAX*	*GROWTH*	*PROFIT*	*LIQUID*	Obs.	Adj-R^2
Netherlands	0.042	**0.147** [a]	**-0.303** [b]	**0.013** [a]	0.000	0.001	**-0.295** [a]	**-0.001** [b]	136	0.24
	(0.213)	(0.004)	(0.017)	(0.000)	(0.249)	(0.492)	(0.001)	(0.044)		
New Zealand	0.117	**0.101** [c]	-0.498	**0.021** [c]	0.000	**-0.063** [b]	-0.071	0.021	47	0.23
	(0.310)	(0.312)	(0.183)	(0.077)	(0.235)	(0.043)	(0.728)	(0.221)		
Norway	0.002	**0.531** [a]	**-0.209** [a]	0.011	**-0.001** [a]	-0.004	**-0.170** [b]	**0.002** [a]	97	0.61
	(0.980)	(0.000)	(0.006)	(0.244)	(0.001)	(0.320)	(0.035)	(0.009)		
Pakistan	-0.099	**0.513** [a]	0.577	0.017	0.000	0.011	**-0.602** [a]	0.027	45	0.55
	(0.421)	(0.000)	(0.289)	(0.231)	(0.829)	(0.694)	(0.003)	(0.510)		
Peru	-0.025	0.160	-0.800	**0.045** [b]	**-0.001** [c]	**-0.077** [a]	**-0.611** [b]	0.001	19	0.54
	(0.855)	(0.175)	(0.207)	(0.030)	(0.070)	(0.007)	(0.039)	(0.959)		
Philippines	**0.115** [b]	0.040	0.049	0.000	0.000	**-0.001** [a]	0.106	-0.001	77	0.03
	(0.027)	(0.666)	(0.763)	(0.989)	(0.933)	(0.000)	(0.653)	(0.145)		
Poland	0.063	-0.021	0.142	0.009	0.000	-0.026	0.118	**-0.021** [c]	23	0.10
	(0.478)	(0.779)	(0.757)	(0.514)	(0.758)	(0.203)	(0.651)	(0.095)		
Portugal	0.068	**0.166** [b]	**-0.974** [c]	0.014	0.000	**-0.015** [b]	-0.525	0.024	31	0.26
	(0.618)	(0.063)	(0.076)	(0.298)	(0.273)	(0.014)	(0.127)	(0.503)		
Singapore	0.054	**0.168** [a]	-0.122	**0.013** [b]	0.000	**-0.030** [a]	**-0.214** [a]	**-0.009** [c]	310	0.23
	(0.197)	(0.000)	(0.153)	(0.016)	(0.555)	(0.000)	(0.000)	(0.053)		
Spain	0.038	**0.183** [a]	0.028	0.010	0.000	-0.006	**-0.377** [b]	-0.001	92	0.24
	(0.510)	(0.001)	(0.939)	(0.135)	(0.517)	(0.414)	(0.026)	(0.963)		

Table 4.4 (continued)

Country	Intercept	*TANG*	*RISK*	*SIZE*	*TAX*	*GROWTH*	*PROFIT*	*LIQUID*	Obs.	Adj-R^2
Sweden	**0.099** [a]	**0.339** [a]	**-0.173** [a]	0.000	**-0.0003** [c]	**-0.015** [a]	**-0.075** [b]	**-0.003** [c]	206	0.38
	(0.005)	(0.000)	(0.002)	(0.955)	(0.083)	(0.000)	(0.045)	(0.077)		
Switzerland	**0.152** [a]	**0.302** [a]	**-0.229** [c]	-0.009	0.000	**-0.013** [b]	-0.090	**-0.006** [c]	164	0.41
	(0.001)	(0.000)	(0.056)	(0.172)	(0.271)	(0.015)	(0.299)	(0.076)		
Taiwan	**0.053** [b]	**0.220** [a]	-0.200	**0.023** [a]	0.000	**-0.032** [a]	**-0.248** [b]	0.002	153	0.38
	(0.046)	(0.000)	(0.452)	(0.000)	(0.231)	(0.001)	(0.045)	(0.824)		
Thailand	-0.057	**0.228** [a]	**-0.499** [c]	**0.029** [a]	**-0.002** [a]	0.010	**-0.538** [a]	-0.005	244	0.23
	(0.448)	(0.000)	(0.077)	(0.001)	(0.006)	(0.526)	(0.000)	(0.470)		
Turkey	0.146	**0.167** [c]	0.148	**-0.016** [c]	0.000	-0.001	-0.144	-0.024	39	0.13
	(0.185)	(0.067)	(0.375)	(0.357)	(0.857)	(0.830)	(0.112)	(0.262)		
UK	-0.007	**0.170** [a]	-0.033	**0.012** [a]	0.000	**-0.004** [a]	**-0.086** [a]	0.000	795	0.31
	(0.505)	(0.000)	(0.227)	(0.000)	(0.611)	(0.006)	(0.000)	(0.352)		
US	**0.095** [a]	**0.239** [a]	**-0.181** [a]	**0.008** [a]	0.000	**-0.012** [a]	**-0.142** [a]	**-0.003** [b]	2533	0.30
	(0.000)	(0.000)	(0.000)	(0.000)	(0.204)	(0.000)	(0.000)	(0.043)		

Similar to tangibility results, we find 21 positively significant coefficients for firm size. The finding in half of the countries in our sample is in line with the hypothesis that larger firms have more debt (hypothesis *F3*). Since these firms are usually more diversified and have more stable cash flows, they can afford higher levels of leverage. Firm size can also be interpreted as a reverse proxy for bankruptcy costs. With respect to firm risk, there are only 14 significantly negative regression coefficients (hypothesis *F2*). Mixed results on this variable are also found in previous studies (e.g., Wald, 1999; Booth et al., 2001; Deesomsak et al., 2004).

We observe that the impact of corporate taxation on leverage choice of firms yields statistically significant coefficients in ten countries. However, only two out of ten significant coefficients are positive (hypothesis *F4*). MacKie-Mason (1990) notes that the reason why most studies fail to find plausible or significant tax effects on financing behavior is that the debt/equity ratios are the cumulative result of years of separate decisions and tax shields have a negligible effect on the marginal tax rate for most firms. In this study using global data, this observation seems to have a high relevance.

Growth opportunities yield 24 negative and significant coefficients. This negative relationship between growth opportunities and corporate leverage tends to support the agency theory (hypothesis *F5*). Firms with brighter growth opportunities in the future prefer to keep leverage low so they will not give up profitable investments because of the wealth transfer from shareholders to creditors.

As for the impact of profitability, our findings are consistent with the asymmetric information theory which suggests that firms first use retained earnings for new investments and then move to debt and equity, if necessary (hypothesis *F6*). The expected negative relation between profitability and leverage is found in 25 countries. Finally, there are limited significant results for liquidity although conventional theories suggest a negative relation between liquidity and leverage (hypothesis *F7*). Most of significant negative coefficients belong to advanced economies. Overall, the general finding from Table 4.4 is in favor of the view that the corporate sector's conditions in more developed countries are likely to meet the hypothetical requirements needed for the conventional theories in capital structure.[29]

An important question then arises: are firm-specific determinants of leverage *different* across countries? As argued earlier, it is meaningful to conduct additional analysis on the impact of country-specific determinants only after answering this question. If the firm-specific coefficients do not differ significantly across countries, we can apply *one* model for all firms in the world, similar to prior

[29] We also conduct panel data estimation using firm and year fixed effects. The results are broadly consistent with those presented here and therefore not reported for reasons of brevity.

studies (Booth et al., 2001; Deesomsak et al., 2004; Song and Philippatos, 2004; and Fan *et al*, 2006). Otherwise, the usually-adopted procedure of pooling firms from different countries into one regression model wrongly forces different firm-specific coefficients to be equal.

In order to test the hypotheses that each of these seven firm-specific coefficients is equal across countries and that all firm-specific coefficients across countries are equal, we utilize an *f*-test of the set-up described earlier in the methodology section. The estimates for seven firm-specific determinants per country are already provided in Table 4.4. The test results are presented in Table 4.5.

For the tests involving each firm-specific coefficient (*EC1, EC2, …, EC7*), we can reject the null hypotheses, except for *RISK* coefficients. For the relatively more important test (*EC8*), the calculated value of the *f*-statistic is 5.38. It provides a strong statistical evidence to reject the null hypothesis that all firm-specific coefficients are simultaneously equal for 42 countries in our sample.[30] The result implies that it is not valid to construct a model with a single pool of all companies in the world and test the impact of country-specific factors assuming that cross-country firm-specific determinants are equal. The result also suggests that the use of country dummies can be a potential solution in the analysis of country-specific influences on leverage, in which case each country should serve as a particular observation in the analysis, rather than using a pooled sample of all firms in all countries.

[30] The finding that regression coefficients differ across countries may be driven by the fact that there are countries in our sample which have very low number of firms. Therefore, we conduct a robustness check. We take two sub-samples of countries with more than 100 firms and countries with less than 100 firms and then perform the same *f*-tests within the two sub-samples. The results also reject all hypotheses.

Table 4.5

F-test for the equality of coefficients of firm-specific determinants across countries

This table presents the test results of the null hypotheses that each of the firm-specific coefficients is the same across countries (hypotheses *EC1* to *EC7*), and also the null hypothesis that all firm-specific coefficients of 42 countries have the same value (hypothesis *EC8*). The test statistic is $f = \frac{(S_R - S_{UR})/J}{S_{UR}/(N-K)}$ where N is the number of observations, J is the number of regressors omitted in the restricted models, K is the number of regressors remaining in the restricted models including the intercept, and S_R and S_{UR} denote the sum-squared-residuals of the restricted (equal coefficients are imposed) and unrestricted (coefficients may differ across countries) models, respectively. Using the Seemingly Unrelated Regression (SUR) estimation method, we get S_{UR} by adding all sum-squared-residuals (SSR) from all the equations for firm-specific determinants of leverage (as specified in Equation (4.1)). For S_R in each test (still using SUR), we add the SSR from the restricted equations in the system with respective assumption that the relevant coefficients are the same across countries. *Rejection* means the null hypothesis is rejected at 5% level. Variables are defined in Table 4.1.

	TANG	***RISK***	***SIZE***	***TAX***	***GROWTH***	***PROFIT***	***LIQUID***	**ALL**
f-statistic	7.290	1.165	3.676	1.551	8.773	4.369	2.305	5.383
p-value	0.000	0.218	0.000	0.014	0.000	0.000	0.000	0.000
N	11834	11834	11834	11834	11834	11834	11834	11834
K	295	295	295	295	295	295	295	49
J	41	41	41	41	41	41	41	287
Result	Rejection	No rejection	Rejection	Rejection	Rejection	Rejection	Rejection	Rejection

4.4 Direct and indirect impact of country-specific factors

4.4.1 Hypotheses

Several studies document that a firm's capital structure is also affected by country-specific factors (e.g., Demirgüç-Kunt and Maksimovic, 1999; Booth, Demirgüç-Kunt and Maksimovic, 2001; Claessens, Djankov and Nenova, 2001; Bancel and Mittoo, 2004). The country characteristics may influence leverage choice through two channels. The first channel is the direct impact, meaning that country-specific factors directly influence the debt levels of firms. We expect that corporate leverage is positively influenced by the bond market development, because firms have more options of borrowings and creditors are more willing to provide debts (see hypothesis *D1* in Table 4.3). Conversely, with the development of the stock market firms face more supply of funding and thus lower costs of equity. We, therefore, expect that firms are induced to restrict their leverage (hypothesis *D2*). Finally, we hypothesize that an increase in capital formation implies more retained earnings to be accumulated. The usage of this source of equity negatively affects leverage (hypothesis *D3*).

The second channel of country characteristics' impact on leverage is the indirect impact, meaning that country-specific variables influence the way in which firm-specific factors determine firms' capital structure. The conventional theories of capital structure provide us with four sets of firm-specific determinants of leverage, namely (*i*) bankruptcy cost variables, including tangibility, business risk and firm size, (*ii*) tax variable, (*iii*) agency cost variables, including growth opportunities and tangibility, and (*iv*) pecking order financing variables, including profitability and liquidity. We expect different indirect-impact relations across our three key groups of country factors, other than the control variable GDP, and four sets of firm factors.

With a better bond market structure, i.e., higher bond market development, better protection of creditors and better legal enforcement, the roles of bankruptcy cost variables (namely tangibility, business risk and firm size) can be mitigated as the structure provides protection for both creditors and borrowers. Thus, we expect a negative indirect impact of bond market related variables on leverage via this set of firm-specific factors (hypothesis *I1*). As for the impact of capital formation, we expect that the role of bankruptcy cost variables is mitigated because with more available internal funds, firms face less dependence on debt usage and therefore, bankruptcy costs are less of an issue (hypothesis *I2*).

With respect to taxation, we do not expect any significant relationship with the country-specific variables. In each country, the effect of taxation on leverage is the outcome of a complex set of tax rules, which make leverage more or less valuable. For a country's domestically active firms only national rules apply, while

international rules apply for importing and exporting firms and multinationals. Our country-level variables measure macro-economic effects, but cannot capture the subtleties of (inter)national tax effects.

Considering the agency cost variables, namely growth opportunities and tangibility, we expect that when bond and stock markets are further developed, agency problems among different stakeholders can be mitigated as security laws better protect both shareholders and creditors (La Porta et al., 1998). Consequently, the role of agency cost variables is reduced. We, therefore, hypothesize a negative relationship between bond and stock market structure variables and the impact of growth opportunities and tangibility on leverage (hypotheses *I3* and *I4*).

Finally, country variables can have an indirect impact on pecking order financing variables, namely profitability and liquidity. We expect that capital formation has an impact of strengthening the roles of pecking order financing variables (hypothesis *I5*). With a higher level of available funds from capital formation, high profitability and liquidity further reduce the use of debt among domestic firms.

4.4.2 Methodology

We adopt the following methodology to analyze the *direct* impact of country-specific variables on leverage. In the first step, we run a simple pooled OLS regression for all firms in all countries, taking into account cross-country differences via country dummies[31]:

$$LEV_{ij} = \sum_{j=1}^{42} \alpha_j d_j + \sum_{j=1}^{42} \beta_{1j} d_j TANG_{ij} + \sum_{j=1}^{42} \beta_{2j} d_j RISK_{ij} + \sum_{j=1}^{42} \beta_{3j} d_j SIZE_{ij} + \\ + \sum_{j=1}^{42} \beta_{4j} d_j TAX_{ij} + \sum_{j=1}^{42} \beta_{5j} d_j GROWTH_{ij} + \sum_{j=1}^{42} \beta_{6j} d_j PROFIT_{ij} + \\ + \sum_{j=1}^{42} \beta_{7j} d_j LIQUID_{ij} + u_{ij} \qquad (4.2)$$

in which $LEV_{ij}, TANG_{ij}, RISK_{ij}, SIZE_{ij}, TAX_{ij}, GROWTH_{ij}, PROFIT_{ij}$, and $LIQUID_{ij}$ respectively are the leverage and firm-specific characteristics of firm *i* in country *j*; d_j are the country dummies. The single Equation (4.2) yields exactly the same results as in Equation (4.1) which is run for each of 42 countries in our sample.

In the second step, we explore the role of country-specific variables in explaining the estimators of country dummy coefficients α_j (which are the countries' leverages after correcting for impacts of firm-specific determinants). Because unobserved heterogeneity in the estimations of the country dummy coefficients would bias estimations in the second stage we need to adjust for

[31] By construction, this regression yields the same coefficients as provided by Equation (4.1) in which the estimates of country dummies are equal to the intercepts.

measurement error in the first stage.[32] Therefore, we apply Weighted Least Squares (WLS) regression, where the weights are the inverse standard errors of the corresponding country dummies (α_j). These weights allow us to take into account the statistical significance of related variables.

$$\hat{\alpha}_j = \gamma_0 + \gamma_1 STDENFOR_j + \gamma_2 CREDITOR_j + \gamma_3 BOND_j + \gamma_4 STDMKTSTOCK_j +$$

$$+ \gamma_5 SHAREHOLDER_j + \gamma_6 CAPITAL_j + \gamma_7 GDP_j + w_j \qquad (4.3)$$

in which $STDENFOR_j$, $CREDITOR_j$, $BOND_j$, $STDMKTSTOCK_j$, $SHAREHOLDER_j$, $CAPITAL_j$, and GDP_j are country characteristics defined in Table 4.2. The observations for the dependent variable are the estimators of α_j in Equation (4.2). Equation (4.3) explains estimated country dummy coefficients against a set of country-specific variables explicitly allowing for the fact that the estimated coefficients of firm-specific determinants are different across countries.

Having established the *direct* impact of country-specific variables on corporate leverage, we proceed to examine the *indirect* impact of country-specific variables by estimating the effect on firm-specific determinants. In order to do this, we first estimate the regression coefficients of all firm-specific variables *TANG, RISK, SIZE, TAX, GROWTH, PROFIT,* and *LIQUID* ($\hat{\beta}_{1j}, \hat{\beta}_{2j}, \hat{\beta}_{3j}, \hat{\beta}_{4j}, \hat{\beta}_{5j}, \hat{\beta}_{6j}$, and $\hat{\beta}_{7j}$, respectively) from Equation (4.1) for each country. We then regress the values of coefficients on the country-specific variables, again using the WLS estimation as mentioned earlier. The weights used in Equation (4.4) are inverse standard errors of the corresponding estimated betas (β_{kj}, j = 1, 2, …, 7). The regression specification is written as follows:

$$\hat{\beta}_{kj} = \lambda_0 + \lambda_1 STDENFOR_j + \lambda_2 CREDITOR_j + \lambda_3 BOND_j + \lambda_4 STDMKTSTOCK_j +$$

$$+ \lambda_5 SHAREHOLDER_j + \lambda_6 CAPITAL_j + \lambda_7 GDP_j + e_k \qquad (4.4)$$

in which k denotes the coefficients of firm-specific factors estimated in Equation (4.1) and j denotes a country. We also test various reduced forms of this equation.[33]

4.4.3 Results: direct impact of country-specific factors

The results examining the direct impact of country-specific variables on leverage are presented in Table 4.6. The estimated regression coefficients of explanatory variables are shown in different columns. We observe that notwithstanding the limited number of countries in the sample, the adjusted-R^2 of all regressions is above 50%. It indicates that the model specification we use captures a good part of the variations in country dummy coefficients. Country-specific determinants,

[32] We thank two anonymous referees for pointing out the necessity of this adjustment.

[33] The analyses of both direct and indirect impacts of country-specific variables are the second stages of a two-stage procedure. As we estimate the regressions in independent runs, we implicitly assume that the residuals of the regressions in the first stage are not correlated with the country-specific variables.

therefore, should not be neglected in capital structure studies since they have a sizeable explanatory power.

The regression results show that corporate leverage is directly related to a number of country-specific factors. Factors like creditor right protection, bond market development and GDP growth rate consistently show statistically significant impact on capital structure. We find that the level of bond market development has a positive impact on capital structure, which is consistent with hypothesis *D1*. When a country's bond market is further developed, firms have more choice for borrowing and are willing to take in more debt. Next, creditor right protection has a significantly negative impact on the leverage level of corporate sector, which does not support hypothesis *D1*. A possible explanation for this effect is that higher creditor right protection implies that debt is more risky for firms in general since firms are likely to be forced into bankruptcy in times of financial distress. Firms, therefore, are more reluctant to borrow as they become concerned with relatively stringent debt contracts that the creditors may impose on them.

Table 4.6
Direct impact of country-specific variables on leverage

This table presents the WLS regression results of country dummy coefficients ($\hat{\alpha}_j$) against country-specific factors estimated from Equation (4.3):
$\hat{\alpha}_j = \gamma_0 + \gamma_1 STDENFOR_j + \gamma_2 CREDITOR_j + \gamma_3 BOND_j + \gamma_4 STDMKTSTOC K_j + \gamma_5 SHAREHOLDE R_j + \gamma_6 CAPITAL_j + \gamma_7 GDP_j + w_j$ in which the country dummy coefficients are reported in Table 4.4 (intercept). All country-specific variables are defined in Table 4.2. The weights are inverse standard errors of the corresponding country dummy coefficients estimated from Equation (4.2). *P*-values are reported in parentheses. The significant coefficients are printed in bold. The superscripts a, b, and c indicate statistical significance at the 1%, 5% and 10% level, respectively. The number of observations is 37, which are the countries that have all country-specific variables available. Adj-R^2 is the value of adjusted-R^2 for the regression.

Dependent	**Explanatory variables**								**Adj-R^2**
variable	**Intercept**	***STDENFOR***	***CREDITOR***	***BOND***	***STDMKTSTOCK***	***SHAREHOLDER***	***CAPITAL***	***GDP***	
COUNTRYDUM	0.005	-0.018	**-0.016**[a]	0.037	0.004	-0.003	0.027	**0.020**[a]	0.54
	(0.925)	(0.134)	(0.007)	(0.122)	(0.708)	(0.544)	(0.881)	(0.006)	
	0.011	-0.018	**-0.016**[a]	0.037	0.003	-0.003		**0.020**[a]	0.55
	(0.789)	(0.122)	(0.006)	(0.109)	(0.727)	(0.548)		(0.005)	
	0.003	-0.018	**-0.016**[a]	**0.040**[c]		-0.003		**0.022**[a]	0.56
	(0.936)	(0.109)	(0.006)	(0.065)		(0.596)		(0.000)	
	0.002	-0.018	**-0.016**[a]	**0.040**[c]		-0.003	0.004	**0.022**[a]	0.55
	(0.976)	(0.116)	(0.007)	(0.070)		(0.602)	(0.983)	(0.000)	
	-0.002	**-0.019**[c]	**-0.017**[a]	**0.037**[c]				**0.021**[a]	0.57
	(0.962)	(0.089)	(0.004)	(0.072)				(0.000)	

We do not find any significant support for hypotheses *D2* and *D3*. Finally, as we control for the general economic conditions of the countries, GDP growth rate variable yields a positive impact and the coefficients are significant at 1% level across all model specifications. The finding indicates that in countries with relatively higher rate of economic growth, firms are more willing to use higher levels of debt to finance new investments.

4.4.4 Results: indirect impact of country-specific factors

The novel argument in this study is that country-characteristics have the potential to influence the importance of firm-specific determinants of corporate leverage. Therefore, we now examine to what extent institutional differences across countries affect the impact of firm-specific factors. As discussed earlier, the estimated coefficient of each of the firm-specific determinants for each country (Equation 4.1) is used as the dependent variable. The results on the indirect impact of country factors (Equation 4.4) are presented in Table 4.7. The regression coefficients of country-specific factors used as explanatory variables are presented in various columns. As robustness checks, we also run many other regressions with different combinations of explanatory variables; none of the results are found to be conflicting (therefore not reported here). We do not report the regressions for TAX because no specification yields a statistically significant coefficient, as predicted.

The overall results indicate that country-specific factors also have an impact on the roles of firm-specific determinants of capital structure. We find a significantly negative effect of the variable representing market/bank-based financial system and stock market development (*STDMKTSTOCK*) on the estimated coefficient of asset tangibility, supporting a part of hypothesis *I4*. A developed stock market, for example, tends to mitigate the use of debt as it instead promotes the use of equity. As a result, the role of tangibility as collateral in borrowing is limited. We also find a strong evidence for hypothesis *I5* as all the coefficients of *CAPITAL* are significantly negative for the case of profitability and liquidity. The negative impact of these two firm-specific variables on leverage is further strengthened when more domestic capital funds are accumulated.

Table 4.7
Indirect impact of country-specific variables on leverage

This table presents the WLS regression results of coefficients of firm-specific variables ($\hat{\beta}_{kj}$ estimated from Equation 4.1 and reported in Table 4.4) against country-specific variables, estimated from Equation (4.4):

$$\hat{\beta}_{kj} = \lambda_0 + \lambda_1 STDENFOR_j + \lambda_2 CREDITOR_j + \lambda_3 BOND_j + \lambda_4 STDMKTSTOCK_i + \lambda_5 SHAREHOLDER_i + \lambda_6 CAPITAL_j + \lambda_7 GDP_j + e_k$$

in which *k* denotes the coefficients of firm-specific factors and *j* denotes a country. All country-specific variables are defined in Table 4.2. The weights are inverse standard errors of the corresponding firm-specific coefficients estimated in Equation (4.2). *P*-values are reported in parentheses. The significant coefficients are printed in bold. The superscripts a, b, and c indicate statistical significance at the 1%, 5% and 10% level, respectively. The number of observations is 37, which are the countries that have all country-specific variables available. Adj-R^2 is the value of adjusted-R^2 for the regression.

Dependent	**Explanatory variables**								**Adj-R^2**
variable	**Intercept**	***STDENFOR***	***CREDITOR***	***BOND***	***STDMKTSTOCK***	***SHAREHOLDER***	***CAPITAL***	***GDP***	
TANG	**0.199** [c]	-0.004	-0.009	0.053	**-0.047** [b]	0.012	0.040	-0.008	0.13
	(0.099)	(0.874)	(0.514)	(0.294)	(0.038)	(0.408)	(0.921)	(0.566)	
	0.207 [b]	-0.004	-0.009	0.053	**-0.047** [b]	0.012		-0.008	0.16
	(0.022)	(0.866)	(0.511)	(0.277)	(0.024)	(0.397)		(0.561)	
	0.213 [a]		-0.009	0.049	**-0.047** [b]	0.011		-0.009	0.19
	(0.010)		(0.495)	(0.239)	(0.022)	(0.397)		(0.515)	
	0.186 [a]		-0.007	0.060	**-0.053** [a]	0.009			0.20
	(0.008)		(0.591)	(0.118)	(0.003)	(0.470)			

Table 4.7 (continued)

Dependent variable	Explanatory variables								Adj-R^2
	Intercept	***STDENFOR***	***CREDITOR***	***BOND***	***STDMKTSTOCK***	***SHAREHOLDER***	***CAPITAL***	***GDP***	
RISK	0.051	-0.037	0.023	0.039	-0.046	-0.002	**-1.063** [b]	0.006	0.12
	(0.695)	(0.249)	(0.130)	(0.518)	(0.144)	(0.917)	(0.021)	(0.754)	
	0.046	-0.037	0.023	0.039	-0.048		**-1.061** [b]	0.006	0.14
	(0.699)	(0.232)	(0.124)	(0.508)	(0.077)		(0.019)	(0.762)	
	0.063	-0.035	0.021	0.031	**-0.043** [c]		**-1.025** [b]		0.17
	(0.542)	(0.239)	(0.115)	(0.549)	(0.055)		(0.017)		
	0.091	-0.028	0.017		**-0.037** [c]		**-1.020** [b]		0.19
	(0.328)	(0.298)	(0.135)		(0.060)		(0.016)		
SIZE	-0.003	-0.004	0.001	-0.003	0.000	**0.002** [b]	0.031	0.000	0.17
	(0.769)	(0.103)	(0.358)	(0.518)	(0.922)	(0.035)	(0.409)	(0.931)	
	-0.003	**-0.004** [c]	0.001	-0.003	0.000	**0.002** [b]	0.030		0.19
	(0.765)	(0.094)	(0.338)	(0.429)	(0.862)	(0.031)	(0.403)		
	-0.002	**-0.004** [c]	0.001	-0.003		**0.003** [b]	0.027		0.22
	(0.784)	(0.086)	(0.328)	(0.431)		(0.011)	(0.386)		
	-0.004	**-0.005** [b]	0.001			**0.002** [b]	0.024		0.23
	(0.581)	(0.019)	(0.146)			(0.012)	(0.432)		

Table 4.7 (continued)

Dependent variable	Explanatory variables								Adj-R^2
	Intercept	***STDENFOR***	***CREDITOR***	***BOND***	***STDMKTSTOCK***	***SHAREHOLDER***	***CAPITAL***	***GDP***	
GROWTH	0.006	-0.001	0.000	-0.003	-0.001	-0.001	0.007	**-0.002** [b]	0.58
	(0.575)	(0.520)	(0.964)	(0.413)	(0.456)	(0.400)	(0.866)	(0.044)	
	0.006	-0.001		-0.003	-0.001	-0.001	0.007	**-0.002** [b]	0.60
	(0.512)	(0.342)		(0.360)	(0.438)	(0.379)	(0.866)	(0.040)	
	0.007	-0.001		-0.003	-0.002	-0.001		**-0.002** [b]	0.61
	(0.145)	(0.325)		(0.357)	(0.289)	(0.278)		(0.030)	
PROFIT	**0.317** [c]	**0.107** [a]	0.005	-0.004	0.030	**-0.050** [a]	**-1.853** [a]	0.003	0.44
	(0.050)	(0.006)	(0.769)	(0.952)	(0.323)	(0.005)	(0.002)	(0.861)	
	0.312 [b]	**0.106** [a]	0.006		0.030	**-0.050** [a]	**-1.856** [a]	0.004	0.46
	(0.024)	(0.002)	(0.692)		(0.267)	(0.005)	(0.002)	(0.818)	
	0.319 [b]	**0.106** [a]	0.005		0.031	**-0.050** [a]	**-1.850** [a]		0.48
	(0.017)	(0.002)	(0.708)		(0.226)	(0.004)	(0.001)		
	0.327 [b]	**0.104** [a]			0.029	**-0.050** [a]	**-1.831** [a]		0.49
	(0.012)	(0.001)			(0.239)	(0.003)	(0.001)		

Table 4.7 (continued)

Dependent variable	Explanatory variables								Adj-R^2
	Intercept	***STDENFOR***	***CREDITOR***	***BOND***	***STDMKTSTOCK***	***SHAREHOLDER***	***CAPITAL***	***GDP***	
LIQUID	**0.008** [b]	**0.001** [a]	-0.000	**-0.005** [a]	-0.000	-0.000	**-0.026** [b]	0.000	0.53
	(0.041)	(0.005)	(0.718)	(0.000)	(0.562)	(0.360)	(0.020)	(0.497)	
	0.007 [a]	**0.001** [a]		**-0.005** [a]	-0.001	-0.000	**-0.025** [b]	0.001	0.55
	(0.009)	(0.001)		(0.000)	(0.357)	(0.382)	(0.019)	(0.164)	
	0.006 [b]	**0.001** [a]		**-0.005** [a]	-0.001		**-0.026** [b]	0.001	0.55
	(0.012)	(0.001)		(0.0000)	(0.158)		(0.015)	(0.189)	

We also observe that a country' legal system of enforcement *(STDENFOR)* indirectly influences capital structure in several ways. Firstly, a negative impact on firm size coefficients indicates that firm size is relatively less important for leverage choice of firms. As firm size is a reverse proxy of bankruptcy cost/risk, better law enforcement is likely to force borrowers to abide by their debt contracts. The result is consistent with our hypothesis *I1*. On the other hand, in countries with lower enforcement, the role of firm size as a proxy for information asymmetry alleviation is further enhanced. Secondly, firms operating in an environment with effective enforcement have to consider more carefully about their leverage choice because bankruptcy risk becomes more important. Higher law enforcement also makes the impact of profitability more important. Debt is used as a bonding or disciplinary device to ensure that the management pays out profits, rather than engages in empire-building activities (Jensen, 1986). Better law enforcement, including reduced level of corruption, further strengthens the role of profitability in making debt more aligned with its disciplinary role.

Although we do not find any evidence for hypotheses *I2* and *I3*, we do observe several significant relationships which are not hypothesized but can be explained. Shareholder right protection has a significant positive effect on firm size coefficient and a significant negative effect on profitability coefficient. Firm size can be a proxy for information asymmetry: larger firms are expected to have less information asymmetry. When shareholders are better protected, firms are more likely to be operated in alignment with shareholders' interest, thereby strengthening the influence of firm size. On the other hand, shareholder right protection strengthens the negative impact of profitability on leverage, as firms have to care more about their performance to fit with shareholders' interests. The control variable, *GDP*, shows up with a significantly strengthening impact on the role of growth opportunities.

Taken as a whole, the results presented in Tables 4.6 and 4.7 suggest significant roles of various country-specific factors, not only directly determining corporate leverage, but also affecting the way firm-specific factors influence firms' choice of capital structure. We find that legal enforcement-related factors and variables characterizing the economic development of countries tend to show the greatest impacts, both directly and indirectly.

4.5 Conclusions

Capital structure theories have been mostly developed and tested in the single-country context. Researchers have identified several firm-specific determinants of a firm's leverage, based on the three most accepted theoretical models of capital structure, i.e. the static trade-off theory, the agency theory and the pecking-order theory. A large number of studies have been conducted to date investigating to

what extent firm-specific factors influence capital structures of firms operating within a specific country. In this chapter, we examine the role of these factors in a large sample of 42 countries, divided equally between developed and developing countries. Our main objective is to analyze the role of various country-specific factors in determining corporate capital structure. We distinguish two types of effects: the *direct* effect of country factors on corporate leverage and the *indirect* effect through their influence on firm-specific factors.

We find that the impact of several firm-specific factors like tangibility, firm size, risk, growth and profitability on cross-country capital structure is significant and consistent with the prediction of conventional capital structure theories. On the other hand, we also observe that in each country one or more firm-specific factors are not significantly related to leverage. For a very small number of countries, we find results that are inconsistent with theoretical predictions.

Several studies analyzing international capital structure assume cross-country equality of firm-level determinants. We show that this assumption is unfounded. Rather, it is necessary to *avoid* a specification using a pooled regression method and instead conduct an analysis of country-specific factors by including countries as observations. Utilizing appropriate estimations we perform regressions using country-specific factors to explain coefficients of country dummies as well as firm-specific determinants.

Analyzing the direct impact of country-specific factors on leverage, the evidence suggests that creditor right protection, bond market development, and GDP growth rate have a significant influence on corporate capital structure. In measuring the impact indirectly, we find evidence for the importance of legal enforcement, creditor/shareholder right protection, and macro-economic measures such as capital formation and GDP growth rate. The finding implies that in countries with a better legal environment and more stable and healthier economic conditions, firms are not only likely to take more debt, but the effects of firm-level determinants of leverage are also reinforced. Overall, the evidence provided here highlights the importance of country-specific factors in corporate capital structure decisions. Our conclusion is that country-specific factors do matter in determining and affecting the leverage choice around the world, and it is useful to take into account these factors appropriately in the analysis of corporate capital structure. If the limitations of data, especially the number of countries, can be overcome, one might find even more significant results with respect to the direct as well as indirect impact of country-specific factors.

Chapter 5: Corruption, growth, and governance: Private vs. state-owned firms in Vietnam[34]

5.1 Introduction

A large body of literature studies the causes and consequences of corruption.[35] As for causes of corruption, the studies to date investigate several channels, such as the availability of rents due to the government intervention (e.g., trade restriction, price controls, provision of credit, etc.) as opportunities for public officials to misconduct and the low pay for civil servants that induces their need to collect bribes. From the perspective of consequences of corruption, authors have analyzed the impact of corruption on economic growth, income distribution, and the composition of government expenditure.

One prominent observation is that the focus of the literature is almost exclusively on the country-level[36]. In this chapter, we investigate the effects of corruption on firm growth, and the roles of public governance in determining the corruption severity in Vietnam. Our study is one of a very limited number of within-country studies on corruption. This branch of the literature, to the best of our knowledge, consists of Del Monte and Papagni (2001), Glaeser and Saks (2006), and Fisman and Svensson (2007) for corruption effects, and Svensson (2003) and Del Monte and Papagni (2007) for corruption causes.

There are a number of advantages of within-country studies on corruption compared to cross-country studies. First, corruption exhibits substantial variations within countries.[37] Macro-economic factors such as inflation and economic development, which have been examined in cross-country studies, are unable to explain within-country variations in corruption. To understand why the level of corruption and the impact of corruption vary across firms, a firm-level analysis is

[34] This chapter is based on Nguyen, T.T., van Dijk, M.A., 2008, Corruption and growth: Private vs. state-owned firms in Vietnam, *ERIM Working Paper Series*.
[35] For a review and summary, refer for example to Bardhan (1997), Jain (2001), and Aidt (2003).
[36] See, for example, Mauro (1995), Ades and Di Tella (1999), Li et al. (2000), Treisman (2000), Paldam (2002), Herzfeld and Weiss (2003), Persson et al. (2003), Méndez and Sepúlveda (2006), and Ahlin and Pang (2007).
[37] We document significant variations of corruption severity across provinces and industries in Vietnam. There are also significant differences in bribery payments among Ugandan firms and industries (Svensson, 2003; Fisman and Svensson, 2007), and in the level of corruption across U.S. states (Glaeser and Saks, 2006).

needed. In particular, the effects of corruption on individual firms are likely to differ due to the unequal treatments of public officials of firms in different sectors[38]. Furthermore, within-country studies can provide specific countries with a high level of corruption with policy advice on which local institutions matter for the prevalence and impact of corruption.

Corruption in Vietnam is severe. Vietnam is ranked 118 out of 163 countries[39] in the 2007 Global Corruption Report.[40] According to Transparency International (2007), Vietnam is one of the countries, whose government commitment to ensure adequate support for courts and their personnel has weakened, inviting corruption and undermining the rule of law.[41] Therefore, the deteriorating public governance mechanisms are potentially the factors that lead to higher level of corruption.

Vietnam is interesting as a single country setting because of two reasons. First, although there are studies that investigate the role of the overall national legal effectiveness[42] and the legal origins in affecting corruption (e.g., Herzfeld and Weiss, 2003; Treisman, 2000), the role of within-country governance structures is not discussed in the literature, partly due to the unavailability of data. Provinces and cities under the central governance are important administrative units in Vietnam. Our data on Vietnam's provincial governance indices, therefore, offer an opportunity to examine how the public governance structure and quality impact corruption practice and corporate sector.

Second, corruption effects in Vietnam are likely to work differently across economic sectors, due to the potentially unequal treatments of public authorities towards firms in those sectors. We study a distinctive form of entrepreneurship in Vietnam that operates in the absence of well-established market institutions: state-owned enterprises (SOEs). Vietnam keeps the tradition to favor SOEs which used to be the only major driving force of the economy. Many researchers consider corruption to be bad for economic growth (e.g., North, 1990; Shleifer and Vishny, 1993; Romer, 1994). However, due to the close relationships and the mutual benefits between SOEs and public officials (Tenev et al., 2003; Nguyen, 2006), SOEs in Vietnam may incur less adverse effects of corruption compared to non-

[38] This issue is especially non-trivial in socialism-oriented and post-socialist countries with historically high priorities towards their state sector.

[39] Vietnam scores 2.6 in the Corruption Perceptions Index (CPI), which ranges between 10 (highly clean) and 0 (highly corrupt). This score is similar to those in 2000-2005 period, but the country's ranking is getting worse.

[40] The within-country studies on corruption until now are conducted for only three countries, namely the U.S, Italy and Uganda, which have the 2006 CPI scores of 7.3, 4.9 and 2.7, and country ranks of 22, 45, and 110, respectively.

[41] Corruption has become a serious issue in the country. It was particularly pressing when in 2006 a number of major corruption cases were discovered, such as the case of Project Management Unit 18 (PMU18), land corruption in Hai Phong, the corruption case in purchasing equipments by 38 provincial and municipal post offices (CIEM, 2007).

[42] The legal effectiveness in Herzfeld and Weiss (2003) is defined as the citizens' willingness to accept the established institutions to make and implement laws and adjudicate disputes.

state firms. Our study provides a comparative analysis of the relation of corruption, growth, and governance across state and private sectors.

We measure corruption from two different perspectives: (*i*) the level of corruption severity in the local business environment[43] as perceived by firms; and (*ii*) corruption as the choice to pay and the amount of informal payments in accordance with industry practice as perceived by firms. Previous firm-level studies measure corruption as the bribery payments made by individual firms (Svensson, 2003; Fisman and Svensson, 2007). Such a variable potentially has an endogenous relation with firm growth, because growth affects a firm's ability to pay informal charges (Svensson, 2003). Given the construction of our corruption measures, an important advantage of our study is that it does not suffer from this endogeneity problem.

Our study adds to the scarce literature on corruption at firm-level within individual country contexts. We provide new evidence on corruption effects on growth, and governance effects on corruption across economic sectors in Vietnam. Using information from the World Bank's Productivity and Investment Climate Enterprise Survey and the Vietnam Provincial Competitiveness Index Survey in 2005, we show that corruption has a negative impact on the growth of private firms' growth, while corruption puts no harm on the growth of SOEs. Our findings suggest that the priorities and treatments from the government in favor of the state sector likely generate distortions in a market economy mechanism. We also find that local public governance structures play a significant role in determining the severity of corruption. The governance factors that significantly affect corruption severity are regulatory entry costs, land access, the implementation and consistency in policies, and the provincial policies for private sector development. Our study suggests that improvements in governance quality, including the leveling of the playing field for firms in all economic sectors, are necessary for curbing down corruption, and its adverse effects on firm growth and development.

5.2 Corruption effect literature

Corruption is widely understood as "the acts in which the power of public office is used for personal gain in a manner that contravenes the rules of the game" (Jain, 2001, p. 73). People involved with corruption are often public officials and politicians, who control the power of public office. The empirical investigation on corruption causes has been conducted in large samples of countries. The major determinants of corruption that have received attention include rent-seeking

[43] Corruption in the local business environment is the judgment of firms about how corrupt the local authorities are. The local authorities include the provincial departments of taxes, customs, land administration, and business registration and licensing.

opportunities and corporate competition (e.g., Ades and Di Tella, 1999)[44], legal effectiveness (e.g., Herzfeld and Weiss, 2003)[45], legal origins, religions, status of economic development (e.g., Treisman, 2000; Paldam, 2002)[46]. Also on a cross-country level, a wide recognition of corruption consequences is established. Authors generally find negative impact of corruption on national economic growth and investment, although the negative effects in a few cases are weak and/or inclusive (e.g., Mauro, 1995; Li, Xu, and Zou, 2000; Méndez and Sepúlveda, 2006; Ahlin and Pang, 2007). The literature documents a few other consequences of corruption, for example its negative impact on level of human capital (Mo, 2001).

With regards to corruption effects, corruption may influence a society in a variety of ways. Theoretically, there are two broad viewpoints on the impact of corruption on growth. First, many authors highlight the possibility that economic growth and/or development are negatively influenced by corruption. According to North (1990), cumbersome and dishonest bureaucracies may delay the distribution of permits and licenses, thereby slowing down the process by which technological advances become embodied in new equipment or new productive processes. On the other hand, bureaucrats may distort investment toward projects offering better opportunities for secret corruption, such as defense and infrastructure (Shleifer and Vishny, 1993). The distortion in the composition of the modern sector raises the relative return to rent-seeking activity and, as a result, growth rates and income levels drop. Corruption is also viewed as a tax on the profits from the productive sector. Romer (1994) suggests that corruption as a tax may in general stifle the entry of new goods or technology which requires an initial fixed cost investment. An increase in corruption, in addition, amounts to a tax hike, pulling talented entrepreneurs toward the rent-seeking sector, and growth rates, in turn, drop. Murphy, Shleifer, and Vishny (1991) provide evidence that countries where talented people are allocated to rent-seeking activities tend to grow more slowly.

Second, however, there is another strand in the literature suggesting that corruption may actually improve efficiency and help growth, especially in the context of pervasive and cumbersome regulations in developing countries. Several authors (e.g., Leff, 1964; Huntington, 1968; Lui, 1985) suggest that corruption might raise economic growth through two types of mechanisms: (*i*) corrupt practices such as "speed money" would enable individuals to avoid bureaucratic delay[47]; and (*ii*) government employees who are allowed to levy bribes have

[44] Ades and Di Tella (1999) provide evidence that countries where firms enjoy higher rents tend to have higher corruption levels. In addition, the study shows that corruption is higher in countries where domestic firms are sheltered from foreign competition, with economies dominated by a few number of firms, or where antitrust regulations are not effective.

[45] Herzfeld and Weiss (2003) find a negative association between corruption levels and the national legal effectiveness.

[46] Treisman (2000) shows that countries with Protestant traditions, common law legal systems, and more developed economies are less corrupt.

[47] This argument may face potential criticism, for example, "corrupt officials may, instead of speeding up, actually cause administrative delays in order to attract more bribes" (Bardhan, 1997, p.1323).

incentives to work harder and more efficiently. While the first mechanism would increase the likelihood that corruption be beneficial to growth only in countries where bureaucratic regulations are cumbersome, the second one would operate regardless of the level of red tape (Mauro, 1995).

Most studies of the consequences of corruption are performed on a cross-country scale. The empirical evidence generally supports the viewpoint of harmful effects of corruption. Mauro (1995) documents a significantly negative association between the corruption index and the rates of investment and economic growth in a sample of 67 countries. The effects hold in subsamples of countries which report cumbersome bureaucratic regulations. This suggests that bureaucracy acts as a catalyst for corruption to take place. Mo (2001), for a sample of 46 countries, finds that a 1% increase in the corruption level reduces the growth rate of a country by about 0.72%. Ahlin and Pang (2007) similarly show that across the sample of 71 countries the control of corruption can help to promote countries' economic growth.

Some evidence, however, challenges the argument for the adverse effect of corruption. Li et al. (2000), for a sample of 46 countries, show that corruption reduces GDP growth rate, but only in some of the regression models. In addition, when interacting corruption with an Asia dummy, corruption appears to have a far less harmful effect on growth in Asia than elsewhere. This may raise questions whether corruption indeed reduces growth. From the perspective of long-term growth, Méndez and Sepúlveda (2006) study the effects of corruption on countries' economic growth in the long run. Unlike other papers, they find evidence of a non-monotonic relation between corruption and growth when restricting the sample to those countries considered being politically free. The results indicate that the growth-maximizing level of corruption is significantly greater than zero, with corruption beneficial for economic growth at low levels of corruption, and detrimental at high levels of corruption.

Empirical evidence about corruption consequences within individual countries is scarce, especially at firm-level. The only example of a firm-level analysis, to our knowledge, is Fisman and Svensson (2007) who study the relation between bribery payments and firm growth in Ugandan firms. The authors find that bribery payment acts similarly as taxes on firms, and a one-percentage point increase in the bribery rate is associated with a reduction in firm growth of three percentage points. A few other papers analyze countries' regional data. Del Monte and Papagni (2001) investigate whether corruption is one of the causes of the limited success of the policies addressed to the development of Southern Italy. The results basically show that corruption has a negative effect on economic growth, private investment, and the efficiency of expenditures on public investment in Italian regions. Glaeser and Saks (2006) use information on corruption severity in

the states of the U.S. to examine the impact of corruption on economic development, and find a weak negative relationship between them.

5.3 Private sector vs. state sector in Vietnam

5.3.1 Overview of the private and state sectors

After the national reunification in 1975 until 1986, Vietnam followed a centrally planned economic regime, in which the only major driving force of the entire economy was the state sector. SOEs exclusively generated the national industrial production, and cooperatives were mostly in charge of agricultural production. The country experienced a post-war period of poor economic conditions. The economic reform ("*Doimoi*") took place in 1986, aiming to renovate the socio-economic system toward higher productivity and efficiency, and better national living standards. *Doimoi* process has led to the decentralization of state economic management, the replacement of administrative measures in a command economy by economic ones in a socialism-oriented market economy. Vietnam's private sector was officially born and has now become an important engine of economic growth.

The private sector is the driving force of growth and development in many economies. In Vietnam, on the contrary, the dominance of the public sector represented by SOEs has been emphasized for several decades until now.[48] However, Vietnamese private firms have been accelerating their contribution to the economic growth and national wealth. From nearly nothing before 1989, Vietnamese private sector, including foreign invested firms, produces 50% of total industrial output in 1996, 66% in 2000 and nearly 73% in 2004 (GSO, 2005). The private sector has also created most of the new jobs and has become the most dynamic component of the Vietnamese economy (Tenev et al., 2003). After the revision of Enterprise Law in 2000, the number of private companies rapidly increased. During 1995-1999 around 8,000 companies were established (GSO, 2002). Afterwards, this number roared from approximately 35,000 private companies that were registered in 2000 to around 84,000 in 2004 (GSO, 2005). Until 2005, Vietnamese private firms accounted for nearly 90% of total number of enterprises, and attracted about 44% of total employees. However, nearly 90% of the registered private companies are small and medium sized enterprises (SMEs). Private SMEs have difficulties in getting access to resources such as land and financing for further development (JBIC, 2003; Tenev et al., 2003).

With regards to Vietnam's state sector, there were about 5,900 SOEs in the country during the 1990s (JBIC, 2003). The number decreased to slightly more

[48] Vietnamese SOEs have been exclusively dominating in many industries such as utilities, aviation, national defense, oil and gas exploration and production, and all heavy industries. In addition, SOEs enjoy priorities in government investments, occupying 60% of national capital resources (Nguyen, 2006).

than 4,500 in 2004 (GSO, 2005) due to the process of equitization and privatization, and the policy of restructure and/or dissolution of SOEs toward business efficiency. The equitization, however, accounted for only 9% of total state capital in SOEs until 2005 (Nguyen, 2006). The figures imply that after nearly 20 years of transition from a planned economy towards a socialist-oriented market economy, Vietnam's government still maintains their large state sector.

There are problematic issues inherent in Vietnam's state sector. SOEs' bad debts are large but finally ignored or deleted by the state banking system. Although the fraction of bad debt in Vietnam's SOEs is kept confidential, the SOEs' losses are partially known by the public. It was reported that 11 State Civil Engineering Construction Corporations (CIENCO) suffered huge losses: one of these firms lost VND 2 trillion, roughly equivalent to USD 130 million. Similarly, subsidiaries of Vietnam State Paper Corporation totally made a loss of more than USD 2 million in 2004 (Nguyen, 2006). Moreover, the losses and squandering in state budget investments are estimated to account for 20 to 40 percent of the total investment. At the local level, more than 2,000 projects were inspected in 2003 and almost all were discovered to commit violations of state financial regulations, thus required to revoke VND 136 billion for state budget (CIEM, 2006).

In general, there is not yet a level playing field for firms in Vietnam. With regard to access to both land and finance, SOEs continue to crowd out the private sector. For example, banks regularly offer loans for SOEs under pressures from governmental authorities regardless of the risks of the proposed projects (Nguyen, 2006). Private firms, to a greater extent, depend on social networks for access to market, capital and business services, but their business networks are weaker than it is the case for SOEs (ANU and CIEM, 2002; Tenev et al., 2003). In general, government's preferential treatment of SOEs remains a major obstacle to the development of private firms. Evidence is the slow pace of implementation of recent reform measures, including SOE reform (ANU and CIEM, 2002).

5.3.2 Corruption and growth in the private and state sectors

The two alternative views of corruption effect on growth are interesting to verify, especially since empirical evidence is limited. Vietnam offers a good setting for this purpose: due to the country's history, private and state sectors in Vietnam face different government interventions, receive different endowments and treatments. Moreover, managers in private firms and SOEs are generally believed to have different incentives and targets. Agency theorists argue that managers of state companies seek to maximize their own benefits rather than those of the state or the firm itself due to the coherent problem of principal-agent relationship (e.g., Jensen and Meckling, 1976; Grossman and Hart, 1983). Managers in SOEs are not constrained by the threat of bankruptcy and takeover through market operations as it is the case in private sector (Nguyen, 2006). Managers of private firms, on the

other hand, are correctly disciplined by a number of external control mechanisms such as the labor market for managers, and by internal control mechanisms such as compensation and rewards incentives (Cuervo and Villalonga, 2000).

Politicians, the representatives of state ownership, often exert insufficient effort into monitoring SOEs' managers. The reasons, among others, include: (*i*) politicians tend to be concerned about the chances of re-election or promotion, rather than monitoring SOEs' activities; (*ii*) there is generally a close relationship between SOEs' managers and governmental authorities (Nguyen, 2006). The public authorities, as the owner of SOEs, are likely to give regulatory privileges in resource allocation to SOEs. Moreover, many politicians gain their power in the political system after having taken the top executive positions in SOEs. The previous working relationship also plays a role when public officials tend to deal with SOEs in a more favorable way. Based on such a relationship, the SOEs' management likely has more chance to approach and lobby the public officials in order to obtain favorable conditions for their growth and development.

The especially close relationship (including the lobby activities) between SOEs and public officials, which is usually perceived as corruption by non-state firms, tends to be beneficial for SOEs' performance. The benefits can be very large, especially in case of high bureaucracy in developing countries like Vietnam. The private firms, under the relative discrimination by regulatory bodies, do not enjoy a level playing field in doing business. We, therefore, expect that the effects of perceived corruption levels on firm growth differ across SOEs and private firms in Vietnam.

The major causes of corruption in Vietnam include: (*i*) abuse of power from positions of public officials; (*ii*) arbitrary decisions related to policies and administration; (*iii*) weak accountability of officials and government agencies; and (*iv*) weak state implementation and monitoring (CIEM, 2005). The Transparency International reports, in the meantime, emphasize that the court system effectiveness, the rule of law, and the public governance personnel are among the factors that influence cross-country corruption. We, therefore, expect that the within-country governance mechanisms can also explain the occurrence and severity of corruption in the business environment. We generally expect that better governance mechanisms narrow down the chance of corruption incidence. Specifically, the local policies that improve, for example, the transparency and information access, and the implementation and consistency of policies are likely to mitigate corruption. On the contrary, the increases in regulatory entry costs, the time costs of regulatory compliance, and the bias towards SOEs or firm discrimination in general may enhance corruption.

5.4 Data and methodology

We analyze the corruption impact on growth in Vietnam for both sectors: private firms and SOEs, and then investigate the roles of governance variables on corruption severity in Vietnam's business environment.

We use data from two sources of information, both of which were based on surveys implemented in 2005. The first is firm-level data obtained from the Productivity and Investment Climate Enterprise Survey conducted by the World Bank. This data set includes firm characteristics, firm financial information and firms' assessments on various aspects of the local business environment. The second data source consists of province-level indicators of public governance quality which are constructed based on the 2005 Vietnam Provincial Competitiveness Index survey. This survey was supported by Vietnam Competitive Initiative (VNCI) and Vietnam Chamber of Commerce and Industry (VCCI).

Dependent variables – growth and corruption

One of the dependent variables in our analysis is firm growth. We follow Allen et al. (2007) to define firm growth (*GROWTH*) as the ratio of book value of total assets at the year end of 2004 relative to the total assets of 2003. The data items are obtained from the World Bank's survey.

Next, we examine two measures of corruption. The first one is the respondents' perception about the corruption level in their local business environment – *CORRUPTION*. This measure is the sum of scores of corruption ranks indicated by the firms in the World Bank survey. The firms are asked to rank the corruption extent of various agencies, using a scale ranging from 0 = no corruption to 4 = widespread corruption. The agencies to be ranked are tax department officials, officials in business registration and licensing, import/export license authorities, customs department, construction permit authorities, traffic police, municipal and other police market controller, land administration agency, and district peoples' committee.[49] Our measure *CORRUPTION*, thus, represents the general corruption seriousness in the local business environment as perceived by the firm.[50]

[49] We calculate Cronbach's alpha coefficient for our measure *CORRUPTION*. The alphas for our different samples range from 0.79 to 0.83, meaning that we have high reliability in constructing the measure. In addition, we run a factor analysis for the sub-scores of *CORRUPTION*, and find that there is only one factor that has an *Eigen* value greater than 1. For this factor, the factor loadings of the sub-scores are highly comparable (results are available upon request). The procedures indicate a reliable construction of our measure of *CORRUPTION*.

[50] We perform our empirical analysis for sub-scores of *CORRUPTION*, instead of this measure itself. The results show that our findings are not driven by any particular sub-score, and the sub-scores separately do

The second measure is the corruption practice in the industry where firms are operating. We use two proxies as firms' perception at the level of their active industry: (*i*) *PAYMENTDUM* is a dummy that takes the value of 1 if the firm perceives that there are informal payments to public officials in the industry, and the value of zero otherwise; and (*ii*) *PAYMENTAMOUNT* is the ratio of informal payments over annual sales that the industry, as estimated by the firms, pays.

Determinants of growth

We use the following determinants of growth in our baseline model. Firstly, firm age (*AGE*) is a growth determinant. In general, younger firms have high growth rates, while in a later stage of development, firms tend to slow down in growth to reach their maturity. We expect that *AGE* has a negative impact on firms' growth. Second, firm size (*SIZE*) serves as another determinant of growth. Smaller firms are more likely to grow faster since they have more flexibility and a neat management team, thus incurring lower monitoring and agency costs. We expect that *SIZE* has a negative effect on firm growth.

Next, the application and innovation in technology (*TECH*) is a driving force for firms to grow. In our study, *TECH* is the dummy for any new technological application that the firms take during the period 2003-2004. In addition, we consider the utilization of production capacity (*CAPACITY*). The better use of machinery and equipment is likely to bring about a higher growth rate. *CAPACITY* is defined as the capacity utilization, measured by the amount of output actually produced relative to the maximum amount that could be produced with existing machinery and equipment and regular shifts in 2004.

Financing is another determinant of firm growth. We follow Ayyagari et al. (2008) to use financing dummies in the model to explain growth. A dummy for bank financing (*BANKDUM*) takes the value of one if the firm has a strictly positive amount of bank financing for working capital or new investments, and the value of zero otherwise. Bank financing is defined as loans provided by private commercial banks, state-owned commercial banks, international commercial banks, leasing arrangements, development assistance funds and state budget.[51] A dummy for informal financing (*INFORMALDUM*) takes the value of one if the firm has a strictly positive amount of informal financing for working capital or new investments, and the value of zero otherwise. Informal financing is defined as coming from family, friends and informal sources such as money lenders.

Besides all above explanatory variables, we use 16 industry dummies in robustness checks to represent the following industries: food and beverage,

not yield many informative regression coefficients. This explains why we do not focus on analyzing the roles of corruption sub-scores.

[51] The World Bank's survey provides percentages of firms' financing that come from different sources used for working capital and new investments.

textiles, apparel, leather products, wood and wood products, paper, chemical and chemical products, rubber and plastic products, non-metallic mineral products, basic metals, metal products, machinery and equipment, electrical machinery, electronics, construction materials, and vehicles and other transport equipment. In addition, we introduce province dummies in our robustness checks.

Governance variables as determinants of corruption

We examine how the quality of the local public governance affects the corruption severity in the business environment and industries in Vietnam. We use provincial governance indicators provided by VNCI and VCCI, which are all standardized to a ten-point scale. The indicators are: (*i*) *ENTRYCOST* (entry costs): a measure of the time it takes firms to register, acquire land and receive all the necessary licenses to start business; (*ii*) *LANDACCESS* (access to land): a measure of whether firms possess their official land-use-right certificate, whether they have enough land for their business expansion requirements and the effective price of land in the province, taking into account demand and supply in the provinces, and the quality of industrial zone policies; (*iii*) *TRANSPARENCY* (transparency and access to information): a measure of whether firms have access to the proper planning and legal documents necessary to run their business, whether those documents are equitably available, whether new policies and laws are communicated to firms and predictably implemented, and the business utility of the provincial web page; (*iv*) *TIMECOST* (time costs of regulatory compliance): a measure of how much time firms waste on bureaucratic compliance as well as how often and for how long firms must shut down their operations for inspections by local regulatory agencies; (*v*) *INFORMALCHARGE* (informal charges)[52]: a measure of how much firms pay in informal charges and how much of an obstacle those extra fees pose for their business operations; (*vi*) *IMPLEMENTATION* (implementation and consistency of policies): a measure of the coordination between central and provincial governments, as well as the consistent application of central policies across provincial sub-agencies; (*vii*) *STATEBIAS* (state sector bias): a measure of the bias of provincial governments toward SOEs in terms of incentives, policy and access to capital; (*viii*) *PROACTIVE* (proactivity of provincial leadership): a measure of the creativity and cleverness of provinces in both implementing central policy and designing their own initiatives for private sector development; (*ix*) *PRIVSECDEV* (private sector development policies): a measure of provincial policies for private sector trade promotion, provision of regulatory information to firms, business partner matchmaking and capacity training to improve the quality of labor in the province. Finally, *PCI* (provincial competitiveness index) is the weighted combination of the nine above mentioned

[52] This specific indicator is ultimately not used in the analysis of corruption determinants due to the fact that this measure is, by construction, highly similar to our corruption proxies.

sub-indices, taking into account the importance of the sub-indices in explaining cross-provincial performance. *PCI* indicates the overall governance quality across provinces in Vietnam.

Sample

We start the sample with all firm observations in the World Bank's survey. The surveyed firms come from 24 provinces in Vietnam. We then exclude firms that do not have information on total assets, sales, or after-tax profits. We discard the observations with firm age equal to zero, and production capacity greater than one. We leave out the outliers, which are firms with asset growth above 5 or below -5. Next, we incorporate the data of provincial governance variables from the VNCI and VCCI's survey into our sample. Our final data sample consists of 741 private firms and 133 SOEs. Private firms are limited liability corporations, companies with foreign direct investment, one member limited liability companies, joint stock companies, partnerships, and sole proprietorships.[53]

Methodology

We use OLS regressions with robust standard errors to examine the effect of corruption on firms' growth while controlling for other growth determinants. The baseline model is constructed as follows.

$$GROWTH = \gamma_0 + \gamma_1 AGE + \gamma_2 SIZE + \gamma_3 TECH + \gamma_4 CAPACITY + \lambda_5 BANKDUM + \\ + \gamma_6 INFORMALDUM + \gamma_7 CORRUPT + v \qquad (5.1)$$

in which *CORRUPT* is a corruption measure (*CORRUPTION, PAYMENTDUM* or *PAYMENTAMOUNT*), and other variables' definitions are presented in Appendix 1. In the regression analysis, we especially highlight the potential differences of effects between private firms and SOEs by interacting a SOE dummy with all explanatory variables. For robustness checks, we introduce governance variables, industry and/or province dummies into the baseline model (5.1).

One may argue that the problem of endogeneity may incur between the two variables of corruption and growth because growth affects the firms' ability to pay bribery or other informal charges. In this study, the endogeneity problem is far less likely to play a role due to the construction of our measures of corruption. Corruption is defined as firms' perception and judgment about how corrupt the local business and industrial environments are, rather than the level of corruption that the individual firms commit. Consequently, we argue that the corruption severity in our study is independent of firm characteristics, but dependent on public

[53] The information is obtained from the firms' responses about their legal status in World Bank's survey.

governance quality in the local environments. We, therefore, estimate the following equation:

$$CORRUPT = \beta_0 + \sum_{k=1}^{8} \beta_k GOVERNANCE_k + u \qquad (5.2)$$

in which *CORRUPT* is a corruption measure (*CORRUPTION, PAYMENTDUM* or *PAYMENTAMOUNT*); $GOVERNANCE_k$ are the sub-indices of Vietnam's Provincial Competitiveness Index, namely *ENTRYCOST*, *LANDACCESS*, *TRANSPARENCY*, *TIMECOST*, *IMPLEMENTATION*, *STATEBIAS*, *PROACTIVE*, and *PRIVSECDEV*. These governance variables are defined earlier and summarized in Appendix 5.1. For Equation (5.2), we use OLS regressions for explaining the level of corruption in local business environment (*CORRUPTION*) and the amount of informal payments as industry practice (*PAYMENTAMOUNT*), and use logit regressions for investigating the probability that a firm within a particular industry pays informal charges (*PAYMENTDUM*). All regressions are with robust standard errors.

5.5 Firm growth and the effect of corruption

We, in Table 5.1, present the summary statistics[54] of corruption measures and other variables in our full sample, as well as the sub-samples of private firms and SOEs. The sub-samples show similar patterns of corruption measures. The only exception is the marginally significant difference in *PAYMENTDUM*, meaning that private firms pay informal charges to public officials with a lower frequency. In general, corruption levels in Vietnam are pretty high. More than 60% of firms think that their industry counterparts pay informal charges as a common industry practice. The sampled firms acknowledge that the firms operating within their industry pay 0.7%, on average, out of their revenues to corrupt public officials. In our sample, the average return on sales[55] is 1.74% and 0.5% for private firms and SOEs, respectively. Therefore, the informal payments that firms pay are really large. The perception of private firms and SOEs about corruption level is likely to be consistent, which is a good signal indicating that there is no bias in firms' judgments on local and industry business environments.

[54] For brevity, the medians are not presented for the sub-samples. In addition, the medians are very close to the means.
[55] The return on sales is measured as the ratio of after-tax profits over sales.

Table 5.1
Summary statistics

This table presents summary statistics of the measures of corruption, firm growth and their determinants across full sample and sub-samples of private firms and SOEs. Definitions of variables are presented in Appendix 5.1. *SIZE* in this table is total sales (in million VND). The differences of sub-samples that are significantly different from zero at the 10% level are in bold.

Panel A: All firms						
	Mean	**Median**	**Std. Dev**	**Min**	**Max**	**Obs.**
CORRUPTION	7.027	6.000	5.557	0	39	874
PAYMENTDUM	0.613	1.000	0.487	0	1	862
PAYMENTAMOUNT	0.007	0.000	0.020	0.000	0.200	765
GROWTH	0.196	0.106	0.402	-0.592	4.283	874
AGE	11.919	7.000	12.260	1	115	874
SIZE	68678.85	9.399	226384.8	0	4100000	874
TECH	0.443	0.000	0.497	0	1	874
CAPACITY	0.790	0.800	0.193	0.030	1.000	874
BANKDUM	0.752	1.000	0.432	0	1	874
INFORMALDUM	0.343	0.000	0.475	0	1	874
PCI	58.803	59.610	7.566	38.810	76.820	874
ENTRYCOST	6.415	6.230	0.981	4.270	8.770	874

Table 5.1 (continued)

LANDACCESS	6.474	6.210	1.288	3.670	8.320	874
TRANSPARENCY	4.970	5.190	0.894	3.230	6.720	874
STATEBIAS	5.971	5.900	0.837	4.270	8.530	874
TIMECOST	6.584	6.560	0.699	4.640	8.350	874
IMPLEMENTATION	5.369	4.840	1.241	2.770	8.270	874
PRISECDEV	5.490	5.090	1.486	2.390	8.140	874
PROACTIVE	5.859	6.110	1.681	1.200	9.300	874

Panel B: Samples of private firms and SOEs – comparison

	Private firms					**SOEs**					**Private – SOEs**	
	Mean	**Std.Dev**	**Min**	**Max**	**Obs.**	**Mean**	**Std.Dev**	**Min**	**Max**	**Obs.**	**#**	**P-value**
CORRUPTION	7.066	5.508	0	39	741	6.812	5.840	0	27	133	0.254	0.642
PAYMENTDUM	0.601	0.490	0	1	732	0.677	0.469	0	1	130	**-0.076**	0.094
PAYMENTAMOUNT	0.007	0.021	0.000	0.200	654	0.007	0.015	0.000	0.100	111	0.000	0.995
GROWTH	0.204	0.399	-0.592	4.283	741	0.147	0.415	-0.550	2.500	133	0.057	0.145
AGE	9.687	10.143	1	65	741	24.353	15.282	2	115	133	**-14.666**	0.000
SIZE	49726	186996	0	4100000	741	174271	360096	0	2776733	133	**-124544**	0.000
TECH	0.435	0.496	0	1	741	0.489	0.502	0	1	133	-0.054	0.252

Table 5.1 (continued)

CAPACITY	0.790	0.193	0.030	1.000	741	0.790	0.195	0.070	1.000	133	-0.001	0.976
BANKDUM	0.714	0.452	0	1	741	0.962	0.191	0	1	133	**-0.249**	0.000
INFORMALDUM	0.366	0.482	0	1	741	0.218	0.414	0	1	133	**0.148**	0.000
PCI	58.778	7.728	38.810	76.820	741	58.946	6.616	38.810	76.820	133		
ENTRYCOST	6.387	0.982	4.270	8.770	741	6.571	0.968	4.270	8.770	133		
LANDACCESS	6.486	1.283	3.670	8.320	741	6.407	1.316	3.670	8.320	133		
TRANSPARENCY	4.959	0.897	3.230	6.720	741	5.032	0.878	3.230	6.720	133		
STATEBIAS	5.980	0.868	4.270	8.530	741	5.917	0.632	4.270	8.530	133		
TIMECOST	6.589	0.698	4.640	8.350	741	6.551	0.709	4.640	8.240	133		
IMPLEMENTATION	5.383	1.245	2.770	8.270	741	5.291	1.221	2.770	8.270	133		
PRISECDEV	5.449	1.491	2.390	8.140	741	5.718	1.439	2.560	8.140	133		
PROACTIVE	5.867	1.722	1.200	9.300	741	5.814	1.436	1.200	9.300	133		

Table 5.1 shows that the SOEs in our data sample are significantly older, and bigger in terms of sales. With data from the World Bank's survey, we also find that SOEs use auditing services more frequently, but have lower profitability compared to the sampled private firms[56]. This is consistent with the newly emerged private sector in Vietnam. Private firms, on the other hand, depend more heavily on the informal sources of financing, while SOEs get better access to bank financing. Despite the differences in firm characteristics, both sub-samples show similar patterns of corruption measures and asset growth. In addition, firms' growth is not significantly different across provinces[57].

Estimating the variations of Equation (5.1), we present 12 regression models for the full sample in Table 5.2 that explain the asset growth in the cross-section of Vietnamese firms. Our regressions are checked for robustness by incorporating industry and/or province dummies. We do not include corruption measures in the first 3 models. For the next sets of 3 models, we introduce the presence of corruption measures, one by one: *CORRUPTION*, *PAYMENTDUM*, and *PAYMENTAMOUNT*. We additionally interact the SOE dummy with all explanatory variables in order to find possibly different effects in state sector. In general, the regression R^2 values in Table 5.2 are comparable to studies on firm-level economic growth, e.g., Allen et al. (2007) and Ayyagai et al. (2007).

We find different pictures of corruption effect on firm growth in Vietnam, across private firms and SOEs. Our full sample consists of 741 private firms and 133 SOEs. Therefore, private firms are dominating our sample, and the key results of estimated coefficients in Table 5.2 are mostly driven by private firms. By estimating the regressions separately for the sub-samples, we find that the effects in private firms are the same as those in the full sample. The interactions with SOE dummy indeed highlight the significant differences in estimated effects between SOEs and the full sample dominated by private firms.

The negative coefficients of *CORRUPTION* and *PAYMENTAMOUNT*, which are robustly significant, are found for full sample (and the sub-sample of private firms[58]) in all related regressions in Table 5.2. Conversely, none of corruption measures matters for the sub-sample of SOEs. The interaction terms between all three measures of corruption and the SOE dummy show significantly positive coefficients in most of regression models in Table 5.2. The results indicate that corruption negatively impacts Vietnamese private firms only. Vietnamese SOEs, on the other hand, are not influenced by corruption and this effect is statistically different from what found in private firms. Most of the coefficients of corruption measures in SOEs' regressions even have positive signs, although not

[56] Data on firms' profitability and usage of auditing services are not used in our regression analysis, therefore not specifically reported here. The information is available upon request.
[57] The statistics and tests for growth differences across provinces are available upon request.
[58] The estimation results for the sub-samples of the private firms and SOEs are available upon request.

statistically significant. The impact of corruption on SOEs' growth, therefore, is significantly less negative than for private firms' growth.

Our robust results suggest that corruption in Vietnam is distorting the overall business environment for firms. Corruption adversely affects the development of private firms, while it is statistically harmless for SOEs' growth. Note that Vietnam's state sector has been underperforming non-state sector, despite of enjoying huge investments from the government.[59] Corruption in Vietnam may play a role in keeping relatively inefficient SOEs in operation. The close relationship between SOEs and public officials induces corruption that may benefit both parties, compensating the usual negative effect of corruption on firm growth. The private sector, the most dynamic sector in Vietnam at the moment, has to suffer. In general, our results suggest that corruption in Vietnam is imposing adverse effects on the free market mechanism that the country has been following.

Another interesting finding in our growth models concerns the roles of formal and informal financing. Small and medium-sized enterprises (or private firms in the case of Vietnam) generally have a harder time finding access to formal sources of capital than larger and more established firms (see, e.g., Ang, 1992; Berger and Udell, 1998). As a consequence, they more often rely on informal sources of funding, such as loans from family, friends, or money lenders, rather than banks and other financial institutions. In our sample, 71.4% private firms have access to bank financing for their working capital and/or new investments, while 96.2% of SOEs do (Table 5.1). In general, private firms get bank credit in the form of short-term credit, primarily for day-to-day working capital or trading needs, rather than for more long-term fixed capital investment needs. On the other hand, private firms (36.6%) have to rely more heavily on informal financing sources compared to SOEs (21.8%).

[59] In 2006, Vietnamese SOEs borrowed VND 48.5 trillion for investments in business expansion, while in total they created a value of VND 42 trillion of production (source: public media news about Vietnam's Nation Assembly congress, 2008). Although the SOEs have been given with priorities in receiving government investments and thus occupy 60% of national capital resources, for the past ten years they generated about 40% of total profit before taxes only (Nguyen, 2006).

Table 5.2
Determinants of firm growth – the role of corruption

This table presents the OLS regressions for the determinants of firm growth (*GROWTH*) for the full sample. Definitions of variables are presented in Appendix 5.1. The significant coefficients are printed in bold. The superscripts a, b, and c indicate statistical significance at the 1%, 5% and 10% level, respectively. Robust standard errors are used. Intercepts are not reported. The number of significant coefficients of province and/or industry dummies over the total number of dummies in use is shown in brackets.

Model	(1)		(2)		(3)		(4)		(5)		(6)	
	coeff.	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*
AGE	**-0.003**[b]	*0.02*	**-0.004**[a]	*0.01*	**-0.003**[b]	*0.04*	**-0.003**[b]	*0.02*	**-0.004**[a]	*0.01*	**-0.003**[b]	*0.03*
SIZE	0.01	*0.53*	0.01	*0.18*	0.01	*0.33*	0.01	*0.42*	0.02	*0.11*	0.01	*0.23*
TECH	**0.11**[a]	*0.00*	**0.11**[a]	*0.00*	**0.12**[a]	*0.00*	**0.12**[a]	*0.00*	**0.11**[a]	*0.00*	**0.12**[a]	*0.00*
CAPACITY	**0.22**[a]	*0.00*	**0.20**[a]	*0.01*	**0.22**[a]	*0.00*	**0.21**[a]	*0.00*	**0.19**[a]	*0.01*	**0.21**[a]	*0.00*
BANKDUM	0.02	*0.55*	-0.01	*0.86*	0.00	*0.96*	0.01	*0.65*	-0.01	*0.71*	-0.01	*0.80*
INFORMALDUM	**-0.06**[c]	*0.06*	-0.04	*0.16*	**-0.05**[c]	*0.07*	**-0.06**[c]	*0.06*	-0.04	*0.16*	**-0.05**[c]	*0.07*
CORRUPTION							**-0.01**[b]	*0.02*	**-0.01**[b]	*0.04*	**-0.01**[b]	*0.02*
PAYMENTDUM												
PAYMENTAMOUNT												
SOE	-0.12	*0.48*	-0.26	*0.17*	-0.22	*0.25*	-0.15	*0.41*	-0.23	*0.23*	-0.21	*0.27*
*SOE*AGE*	0.00	*0.36*	0.00	*0.30*	0.00	*0.51*	0.00	*0.37*	0.00	*0.34*	0.00	*0.56*
*SOE*SIZE*	0.00	*0.99*	0.00	*0.83*	0.01	*0.68*	0.00	*0.89*	0.00	*0.88*	0.00	*0.89*
*SOE*TECH*	-0.11	*0.16*	-0.08	*0.35*	-0.13	*0.11*	-0.12	*0.12*	-0.09	*0.25*	**-0.14**[c]	*0.07*
*SOE*CAPACITY*	-0.03	*0.85*	0.05	*0.74*	0.01	*0.95*	-0.03	*0.87*	0.05	*0.75*	0.01	*0.93*

Table 5.2 (continued)

*SOE*BANKDUM*	**0.13**[c]	*0.08*	0.13	*0.15*	**0.14**[c]	*0.08*	**0.13**[c]	*0.09*	0.12	*0.20*	**0.13**[c]	*0.10*
*SOE*INFORMALDUM*	-0.04	*0.50*	-0.07	*0.32*	-0.06	*0.38*	-0.05	*0.49*	-0.08	*0.26*	-0.07	*0.32*
*SOE*CORRUPTION*							0.01	*0.16*	**0.01**[b]	*0.04*	**0.01**[c]	*0.07*
*SOE*PAYMENTDUM*												
*SOE*PAYMENTAMOUNT*												
Industry dummies	Yes (5/16)		No		Yes (2/16)		Yes (5/16)		No		Yes (2/16)	
Province dummies	No		Yes (4/23)		Yes (2/23)		No		Yes (2/23)		Yes (2/23)	
Obs.	874		874		874		874		874		874	
R^2	0.0897		0.0758		0.12		0.10		0.08		0.12	

Table 5.2 (continued)

Model	(7)		(8)		(9)		(10)		(11)		(12)	
	coeff.	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*
AGE	**-0.003**[b]	*0.02*	**-0.004**[a]	*0.01*	**-0.003**[b]	*0.03*	**-0.003**[b]	*0.03*	**-0.003**[b]	*0.02*	**-0.003**[c]	*0.06*
SIZE	0.01	*0.42*	0.01	*0.13*	0.01	*0.27*	0.00	*0.69*	0.01	*0.34*	0.01	*0.51*
TECH	**0.11**[a]	*0.00*	**0.11**[a]	*0.00*	**0.12**[a]	*0.00*	**0.12**[a]	*0.00*	**0.12**[a]	*0.00*	**0.12**[a]	*0.00*
CAPACITY	**0.21**[a]	*0.01*	**0.20**[a]	*0.01*	**0.21**[a]	*0.00*	**0.19**[b]	*0.02*	**0.17**[b]	*0.02*	**0.19**[b]	*0.02*
BANKDUM	0.02	*0.62*	-0.01	*0.78*	0.00	*0.89*	0.01	*0.73*	-0.01	*0.77*	-0.01	*0.80*
INFORMALDUM	**-0.06**[c]	*0.08*	-0.04	*0.22*	**-0.05**[c]	*0.10*	**-0.07**[c]	*0.06*	-0.05	*0.15*	**-0.06**[c]	*0.07*
CORRUPTION												
PAYMENTDUM	-0.03	*0.42*	-0.01	*0.68*	-0.02	*0.62*						
PAYMENTAMOUNT							**-1.31**[a]	*0.01*	**-1.09**[b]	*0.02*	**-1.20**[a]	*0.01*
SOE	-0.13	*0.50*	-0.29	*0.15*	-0.24	*0.24*	-0.22	*0.26*	-0.33	*0.11*	-0.30	*0.17*
*SOE*AGE*	0.00	*0.40*	0.00	*0.36*	0.00	*0.55*	0.00	*0.91*	0.00	*0.96*	0.00	*0.86*
*SOE*SIZE*	-0.01	*0.57*	-0.01	*0.70*	0.00	*0.90*	0.01	*0.48*	0.02	*0.30*	0.02	*0.32*
*SOE*TECH*	-0.10	*0.22*	-0.06	*0.48*	-0.12	*0.16*	-0.13	*0.13*	-0.10	*0.27*	-0.14	*0.11*
*SOE*CAPACITY*	-0.02	*0.91*	0.08	*0.61*	0.03	*0.85*	0.01	*0.94*	0.06	*0.69*	0.04	*0.78*
*SOE*BANKDUM*	**0.16**[c]	*0.08*	**0.17**	*0.10*	**0.17**[c]	*0.06*	0.09	*0.31*	0.06	*0.52*	0.08	*0.36*
*SOE*INFORMALDUM*	-0.06	*0.42*	-0.09	*0.23*	-0.08	*0.30*	-0.03	*0.72*	-0.05	*0.57*	-0.04	*0.58*

Table 5.2 (continued)

*SOE*CORRUPTION*												
*SOE*PAYMENTDUM*	**0.13**[c]	*0.06*	**0.15**[b]	*0.04*	**0.14**[b]	*0.05*						
*SOE*PAYMENTAMOUNT*							**2.85**[b]	*0.04*	1.75	*0.22*	2.36	*0.13*
Industry dummies	Yes (4/16)		No		Yes (2/16)		Yes (3/16)		No		Yes (1/16)	
Province dummies	No		Yes (4/23)		Yes (2/23)		No		Yes (5/23)		Yes (3/23)	
Obs.	862		862		862		765		765		765	
R^2	0.09		0.08		0.12		0.09		0.09		0.12	

Table 5.2 shows that the reliance on informal financing is deterring the growth of not only private firms but also SOEs. Firms may choose the resort to informal financing, but this appears unfavorable for further development and growth. Surprisingly, the reliance on bank financing does not significantly help to promote firm growth in Vietnam. However, the interaction between SOE dummy and *BANKDUM* is significantly positive in most of the cases. It seems that SOEs' advantage in accessing to bank financing partly helps them improve their performance in terms of asset growth, compared to the general situation of corporate sector in Vietnam.

Besides the story of corruption and the roles of informal versus formal financing, we find a number of significant results for the control variables. Regressions show that firms' growth is negatively associated with firm age, and positively associated with technology application and capacity utilization. The findings are robust and do support the expectations about the roles of those control factors. Younger firms tend to grow faster as they have higher flexibility; the firms with more efforts in technology investment and better capacity utilization obtain the capability to accelerate their performance and growth. We find that the results for control variables are mostly driven by the sub-sample of private firms (see Table 5.4). For the sub-sample of SOEs, we do not find any particular control factor that plays a role in their growth rates.

We, in addition, add the provincial governance variables into the baseline models as potential explanatory variables. However, the estimation shows that none of the governance variables is significant and/or consistent across various model specifications. In addition, the values of R^2 are not remarkably improved when including provincial public governance. We also run a simple test for the potential effects of provincial factors by including province dummies, in addition to firm-level variables, into Equation (5.1). However, the results indeed indicate a negligible role of those province dummies in explaining firms' growth, for both private firms and SOEs.

5.6 Corruption and governance

5.6.1 Corruption across provinces and industries

During October 2006 till September 2007, 400 corruption cases in Vietnam were brought to court, with the involvement of 820 persons. The total estimated damages in these cases were estimated to be up to VND 290 billion. The cases took place with high frequencies in Hanoi, Ho Chi Minh city, Nghe An, Thanh Hoa, Long An, Binh Thuan.[60]

[60] News released on Vnexpress.net by Hoang Khue (17 December, 2007).

In our study, we have data available for 24 provinces[61] and 17 industries in the full sample. We, in Table 5.3, present the means of corruption measures across provinces, for full sample and sub-samples of private firms and SOEs, and perform an ANOVA to test the mean differences of the variables.[62] Similarly, we also compute the means of corruption measures across industries, and perform an ANOVA to test the mean differences of the related variables.[63]

In Table 5.3, the highest levels of corruption in local business environment are found in the provinces of Hai Duong, Hai Phong, Thanh Hoa, Hanoi, Ho Chi Minh city, and Thua Thien Hue. The least corrupt environments are in Dong Thap, Quang Nam, An Giang, Quang Ngai, Nghe An, and Can Tho.[64] ANOVA tests confirm that there are significant variations of corruption measures across provinces.

The statistics on corruption measures are confirmed by anecdotal evidence obtained from the official public media. In Hai Phong, for example, in December 2007 the vice president of the municipal people's committee was brought to criminal court due to his involvement in two big corruption cases of land allocation. Hai Phong also dismissed the general secretary of the communist party in one municipal district and the director of municipal department of natural resources and environment, who were convicted of land corruption. In Thanh Hoa province, many local leaders at commune level were arrested also due to land corruption and sentenced for even 10 years. Similarly, in Ho Chi Minh city in July 2007, the president of Go Vap district's people's committee, the general secretary of the communist party, and many other officials were caught and sentenced for 11 to 25 years due to bribery and land corruption.[65] The cases of land corruption were mostly due to the illegal allocation of land for private usage or for unauthorized groups of people.

[61] For the convenient referring to the governance quality across 24 provinces, we provide in Appendix 5.2 the *PCI* and other provincial governance indices in 2005 as constructed by VNCI and VCCI. The scores of the indices represent the governance quality in the local business environment.

[62] Note that in Table 5.2, the means of *PAYMENTAMOUNT* in Dong Thap province shown in Panels A and B are actually greater than zero (0.00000276 and 0.00000331, respectively), but the numbers are too small to appear properly in the table.

[63] For brevity, we do not present industry means of corruption measures and the related ANOVA tests. The results are available upon request.

[64] Appendix 5.2 shows that Hai Duong and Thanh Hoa, among those provinces having the highest scores of corruption measures, are generally reported with the lowest *PCI*. For the other provinces, there are unclear patterns of corruption associated with *PCI*.

[65] The information is extracted from articles in Vietnam's officially authorized electronic newspapers, e.g., Vnexpress, Tienphong, and Thanhnien.

Table 5.3
Corruption across provinces

This table presents the cross-province means of the corruption severity of local business environment (*CORRUPTION*), the choice of firms' paying informal charges as industry practice (*PAYMENTDUM*), and the level of informal charges paid as industry practice (*PAYMENTAMOUNT*), for the full samples, and sub-samples of private firms and SOEs. Definitions of variables are presented in Appendix 5.1.

Panel A: Full sample

	CORRUPTION		***PAYMENTDUM***		***PAYMENTAMOUNT***	
Province	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**
Hanoi	9.156	109	0.583	97	0.011	108
Hai Phong	11.119	67	0.955	56	0.012	67
Ha Tay	4.231	26	0.500	24	0.007	26
Bac Ninh	7.476	21	0.714	15	0.007	21
Hai Duong	11.700	10	1.000	7	0.002	10
Nam Dinh	7.423	26	0.731	26	0.009	26
Thanh Hoa	9.434	53	0.830	49	0.006	53
Nghe An	3.222	27	0.259	22	0.001	27
Ha Tinh	2.840	25	0.458	23	0.004	24
Thua Thien Hue	7.786	14	1.000	12	0.028	14
Da Nang	4.719	32	0.531	30	0.003	32
Quang Nam	1.786	14	0.357	13	0.005	14
Quang Ngai	2.167	6	0.400	4	0.005	5
Binh Dinh	6.882	34	0.412	33	0.003	34
Khanh Hoa	6.676	34	0.588	33	0.012	34
Ho Chi Minh city	7.983	181	0.692	151	0.006	172
Binh Duong	6.552	58	0.569	47	0.008	58
Dong Nai	5.563	32	0.469	30	0.002	32
Ba Ria-Vung Tau	4.714	14	0.500	12	0.001	14
Long An	5.286	28	0.679	24	0.006	28
Dong Thap	0.000	6	0.167	6	0.000	6
An Giang	1.933	15	0.333	14	0.000	15
Tien Giang	4.063	16	0.188	13	0.000	16
Can Tho	3.615	26	0.308	24	0.000	26
ANOVA (F test) of mean differences of the variable across provinces						
p-value	0.000		0.029		0.000	

Table 5.3 (continued)

Panel B: Sample of private firms						
	CORRUPTION		***PAYMENTDUM***		***PAYMENTAMOUNT***	
Province	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**
Hanoi	8.931	87	0.540	78	0.010	87
Hai Phong	11.731	52	0.942	45	0.012	52
Ha Tay	4.348	23	0.478	21	0.005	23
Bac Ninh	7.476	21	0.714	15	0.007	21
Hai Duong	11.000	9	1.000	6	0.002	9
Nam Dinh	7.818	22	0.727	22	0.009	22
Thanh Hoa	9.620	50	0.840	46	0.007	50
Nghe An	3.056	18	0.278	14	0.001	18
Ha Tinh	2.905	21	0.400	19	0.004	20
Thua Thien Hue	8.077	13	1.000	12	0.028	13
Da Nang	4.250	24	0.500	24	0.003	24
Quang Nam	1.667	9	0.333	9	0.002	9
Quang Ngai	2.000	3	0.333	3	0.007	3
Binh Dinh	6.968	31	0.387	30	0.003	31
Khanh Hoa	6.613	31	0.581	30	0.010	31
Ho Chi Minh city	7.704	152	0.660	129	0.006	144
Binh Duong	6.833	54	0.593	44	0.008	54
Dong Nai	5.821	28	0.500	26	0.002	28
Ba Ria-Vung Tau	5.000	12	0.500	10	0.001	12
Long An	5.407	27	0.667	23	0.007	27
Dong Thap	0.000	5	0.200	5	0.000	5
An Giang	1.917	12	0.333	11	0.000	12
Tien Giang	4.357	14	0.214	11	0.000	14
Can Tho	3.565	23	0.261	21	0.000	23
ANOVA (F test) of mean differences of the variable across provinces						
p-value	0.000		0.185		0.000	

Table 5.3 (continued)

Panel C: Sample of SOEs						
	CORRUPTION		***PAYMENTDUM***		***PAYMENTAMOUNT***	
Province	**Mean**	**Obs.**	**Mean**	**Obs.**	**Mean**	**Obs.**
Hanoi	10.045	22	0.762	19	0.015	21
Hai Phong	9.000	15	1.000	11	0.008	15
Ha Tay	3.333	3	0.667	3	0.024	3
Bac Ninh				0		0
Hai Duong	18.000	1	1.000	1	0.005	1
Nam Dinh	5.250	4	0.750	4	0.010	4
Thanh Hoa	6.333	3	0.667	3	0.002	3
Nghe An	3.556	9	0.222	8	0.000	9
Ha Tinh	2.500	4	0.750	4	0.003	4
Thua Thien Hue	4.000	1	1.000	0		1
Da Nang	6.125	8	0.625	6	0.000	8
Quang Nam	2.000	5	0.400	4	0.013	5
Quang Ngai	2.333	3	0.500	1	0.000	2
Binh Dinh	6.000	3	0.667	3	0.004	3
Khanh Hoa	7.333	3	0.667	3	0.034	3
Ho Chi Minh city	9.448	29	0.857	22	0.002	28
Binh Duong	2.750	4	0.250	3	0.000	4
Dong Nai	3.750	4	0.250	4	0.001	4
Ba Ria-Vung Tau	3.000	2	0.500	2	0.001	2
Long An	2.000	1	1.000	1	0.001	1
Dong Thap	0.000	1	0.000	1	0.000	1
An Giang	2.000	3	0.333	3	0.000	3
Tien Giang	2.000	2	0.000	2	0.000	2
Can Tho	4.000	3	0.667	3	0.001	3
ANOVA (F test) of mean differences of the variable across provinces						
p-value	0.004		0.106		0.007	

In addition, we find variations of corruption across industries for the full sample and the sub-sample of private firms. However, the corruption levels are not statistically different for the SOEs sub-sample. The most corrupt industries include electrical machinery, non-metallic mineral products, vehicles and transport equipment, and basic metal. Those heavy industries have been historically dominated by SOEs. The least corrupt ones are found to be construction materials, food and beverage. For the SOEs sub-sample, ANOVA tests show insignificant variations of corruption, perhaps there are not enough observations of SOEs for several industries to generate a more meaningful test.

5.6.2 Public governance effects on corruption

The previous section shows that there are variations of corruption across Vietnam's provinces. Provincial governance variables may play a role in explaining those variations. In Table 5.4, we present the regression results of Equation (5.2) to examine the governance factors that explain corruption severity in Vietnam. Our measures of corruption do not have unusually high correlations[66]: *CORRUPTION* is across provinces or local business environments; *PAYMENTDUM* and *PAYMENTAMOUNT* are across industries.

We present the OLS regression results explaining the corruption level in local business environment (*CORRUPTION*) in Panel A of Table 5.4. We interacting a SOE dummy with all explanatory variables to capture the effect differences, if any, for SOEs. The estimation shows that indeed governance variables significantly determine the level of corruption severity in local business environment. We find that better land access (*LANDACCESS*) can significantly help reducing the corruption level as generally perceived by firms. Good land access means that firms have legal land-use rights and enough land for business expansion at reasonable prices. Because land corruption mostly involves land distribution, as shown in previous examples, when the firms have better land access, public officials would have less control over land and thus less chance to extract payments. However, for SOEs the effect of land access on corruption turns out to be positive, although only marginally significant[67]. Surprisingly, when provinces provide better access to land resource, corruption seems to be more severe for SOEs. The result suggests that the SOEs may informally pay more (or be more willing to pay) to influence public officials in the competition for land resource with private firms.

Similarly, we find that when provinces take more policies for promoting private sector development (*PRIVSECDEV*), private firms (SOEs) observe lower (higher) levels of corruption. The reason may be that the SOEs face the risk of being taken away from their previous "monopolistic" privileges and hence are willing to induce more corruption in favor of their own benefits.

Also in Panel A of Table 5.4, we find further evidence in our full sample for the roles of governance variables. The implementation and consistency of policies (*IMPLEMENTATION*) significantly mitigate firms' perception about corruption in the business environment. The coefficients for this governance variable are consistently significant and negative, and show no difference between private firms

[66] The correlations between *CORRUPTION*, *PAYMENTDUM*, and *PAYMENTAMOUNT* range from 10% to 47% depending on the full sample or sub-samples.

[67] The coefficients and significance levels for SOEs sub-sample are not reported for brevity (available upon request).

and SOEs. The results generally suggest that better quality in public governance would help to mitigate corruption, especially in the perception of private firms.

In Panel B of Table 5.4, we present a logit regression analysis of the firms' choice of paying informal charges or not in accordance with industry practice (*PAYMENTDUM*). The results once again highlight the roles of provincial governance factors, providing similar findings as the analysis of corruption in local business environment. *IMPLEMENTATION* and *PRIVSECDEV* help to cope with corruption across industries by reducing the chance that firms have to pay corrupt public officials. *LANDACCESS*, although having no effect among private firms, stimulates corruption SOEs' perception. The coefficient of *LANDACCESS* is significantly positive at the 10% level for SOEs, and significantly different from the effect in the full sample. Besides, the analysis yields additional results, in which *TRANSPARENCY* tends to enlarge the perception of firms about the chance of informal payment. This results seems to counter-intuitive as we expect transparency of information should curb corruption down, but we do not find a plausible explanation.

For the determinants of the amount of informal charges that firms have to pay (*PAYMENTAMOUNT*), we present the related OLS regression models in Panel C of Table 5.4. We find only one governance variable, *IMPLEMENTATION*, consistent with previous results. We, in addition, observe that higher regulatory entry costs for firms (*ENTRYCOST*) create an environment for informal payment to grow. The high entry costs force firms to approach public officials and become more willing to pay informally in order to accelerate the speed of fulfilling all required procedures for start-ups. The results we find in Panel C of Table 5.4 are not significantly different across private firms and SOEs.

Our analysis, in general, shows that provincial governance variables play significant roles in determining the corruption levels as perceived by firms. Among the sub-indices of provincial governance quality, land access, the implementation and consistency of policies, and the promotion measures for private sector development appear to be the most important. Although some of the effects are different across SOEs and private firms, our results suggest that improvements in governance quality are necessary for curbing down corruption, and thus its adverse effects on firm growth and development. In addition, to level the playing fields for firms in all economic sectors should help to improve the business efficiency, and is crucial for Vietnam's economic growth and development.

Table 5.4
Determinants of corruption – the role of public governance

This table presents the regressions that highlight the roles of governance variables in determining the corruption severity of local business environment (*CORRUPTION*), the probability of firms' paying informal charges as industry practice (*PAYMENTDUM*), and the level of informal charges paid as industry practice (*PAYMENTAMOUNT*). Definitions of variables are presented in Appendix 5.1. The significant coefficients are printed in bold. The superscripts a, b, and c indicate statistical significance at the 1%, 5% and 10% level, respectively. Robust standard errors are used. Intercepts are not reported.

Panel A: Determinants of corruption in business environment (OLS regression)

Model	(1)		(2)		(3)		(4)	
	coeff.	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*
PCI	-0.01	*0.83*						
ENTRYCOST			0.08	*0.78*				
LANDACCESS			**-0.59**[b]	*0.02*	**-0.60**[b]	*0.02*	**-0.59**[b]	*0.02*
TRANSPARENCY			0.37	*0.18*	0.36	*0.18*	0.38	*0.16*
STATEBIAS			0.17	*0.62*	0.18	*0.58*		
TIMECOST			-0.56	*0.14*	-0.53	*0.13*	**-0.61**[c]	*0.06*
IMPLEMENTATION			**-1.65**[a]	*0.00*	**-1.66**[a]	*0.00*	**-1.69**[a]	*0.00*
PRIVSECDEV			**-0.35**[b]	*0.05*	**-0.33**[b]	*0.04*	**-0.34**[b]	*0.03*
PROACTIVE			**0.80**[a]	*0.01*	**0.82**[a]	*0.00*	**0.90**[a]	*0.00*
SOE	-3.27	*0.42*	0.06	*0.99*	1.12	*0.90*	-7.91	*0.24*
*SOE*PCI*	0.05	*0.46*						
*SOE*ENTRYCOST*			0.65	*0.28*				
*SOE*LANDACCESS*			**1.43**[a]	*0.01*	**1.31**[b]	*0.02*	**1.41**[a]	*0.01*
*SOE*TRANSPARENCY*			-0.20	*0.75*	-0.06	*0.92*	-0.14	*0.83*
SOESTATEBIAS			-1.20	*0.14*	-1.23	*0.13*		
SOETIMECOST			-0.49	*0.55*	-0.24	*0.76*	0.08	*0.92*
*SOE*IMPLEMETATION*			-0.49	*0.42*	-0.52	*0.41*	-0.23	*0.69*
*SOE*PRIVSECDEV*			0.55	*0.16*	**0.69**[c]	*0.09*	**0.98**[a]	*0.01*
*SOE*PROACTIVE*			-0.53	*0.44*	-0.34	*0.64*	-0.98	*0.09*
Obs.	874		874		874		874	
R^2	0.001		0.096		0.095		0.093	

Table 5.4 (continued)

Panel B: Logit regression of firms' choice of paying informal charges

Model	(5)		(6)		(7)		(8)	
	coeff.	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*
PCI	-0.01	*0.15*						
ENTRYCOST			0.17	*0.17*	0.18	*0.13*	0.14	*0.19*
LANDACCESS			-0.09	*0.36*	-0.08	*0.35*	-0.07	*0.39*
TRANSPARENCY			**0.18**[c]	*0.09*	**0.19**[c]	*0.08*	0.15	*0.11*
STATEBIAS			0.13	*0.36*	0.14	*0.27*	0.16	*0.17*
TIMECOST			-0.11	*0.47*	-0.10	*0.49*		
IMPLEMENTATION			**-0.37**[a]	*0.00*	**-0.36**[a]	*0.00*	**-0.34**[a]	*0.00*
PRIVSECDEV			**-0.23**[a]	*0.00*	**-0.22**[a]	*0.00*	**-0.21**[a]	*0.00*
PROACTIVE			0.02	*0.85*				
SOE	1.12	*0.57*	4.35	*0.38*	**7.62**[b]	*0.03*	3.45	*0.17*
*SOE*PCI*	-0.01	*0.69*						
*SOE*ENTRYCOST*			-0.13	*0.72*	-0.21	*0.54*	-0.40	*0.22*
*SOE*LANDACCESS*			**0.56**[b]	*0.05*	**0.42**[c]	*0.06*	**0.42**[b]	*0.05*
*SOE*TRANSPARENCY*			0.38	*0.24*	0.39	*0.24*	0.12	*0.69*
SOESTATEBIAS			-0.51	*0.30*	**-0.79**[b]	*0.05*	**-0.64**[c]	*0.09*
SOETIMECOST			-0.64	*0.14*	**-0.73**[c]	*0.07*		
*SOE*IMPLEMETATION*			-0.40	*0.17*	**-0.57**[a]	*0.01*	**-0.33**[c]	*0.08*
*SOE*PRIVSECDEV*			**0.49**[c]	*0.07*	**0.37**[c]	*0.08*	0.34	*0.11*
*SOE*PROACTIVE*			-0.36	*0.42*				
Obs.	862		862		862		862	
Pseudo-R^2	0.005		0.061		0.060		0.056	

Table 5.4 (continued)

Panel C: Determinants of how much informal charge firms pay (OLS regression)

Model	(9)		(10)		(11)		(12)	
	coeff.	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*	*coeff.*	*p-value*
PCI	0.00	*0.99*						
ENTRYCOST			**0.001**[c]	*0.07*	**0.001**[b]	*0.05*	**0.001**[b]	*0.05*
LANDACCESS			-0.001	*0.21*	-0.001	*0.24*	-0.001	*0.25*
TRANSPARENCY			0.000	*0.80*	0.000	*0.80*		
STATEBIAS			0.000	*0.86*	0.000	*0.85*		
TIMECOST			**-0.002**[b]	*0.05*	**-0.002**[b]	*0.04*	**-0.002**[b]	*0.02*
IMPLEMENTATION			**-0.002**[a]	*0.01*	**-0.002**[a]	*0.01*	**-0.002**[a]	*0.00*
PRIVSECDEV			0.000	*0.94*				
PROACTIVE			0.001	*0.47*	0.001	*0.54*	0.001	*0.39*
SOE	0.02	*0.21*	0.035	*0.19*	**0.045**[c]	*0.08*	**0.032**[c]	*0.07*
*SOE*PCI*	0.00	*0.19*						
*SOE*ENTRYCOST*			0.000	*0.95*	0.000	*0.84*	0.000	*0.92*
*SOE*LANDACCESS*			0.000	*0.94*	0.000	*0.82*	-0.001	*0.38*
*SOE*TRANSPARENCY*			-0.004	*0.13*	**-0.004**[c]	*0.09*		
SOESTATEBIAS			-0.002	*0.48*	-0.003	*0.32*		
SOETIMECOST			-0.001	*0.55*	-0.002	*0.44*	-0.003	*0.21*
*SOE*IMPLEMETATION*			0.000	*0.93*	-0.001	*0.70*	-0.001	*0.64*
*SOE*PRIVSECDEV*			0.001	*0.48*				
*SOE*PROACTIVE*			0.000	*0.88*	0.001	*0.66*	0.000	*0.84*
Obs.	765		765		765		765	
R^2	0.002		0.023		0.023		0.018	

5.7 Conclusions

This chapter contributes to the limited literature that investigates the linkages between corruption, growth, and public governance within an individual country context. We highlight the importance of distinguishing private and state sectors in doing such an analysis. The different priorities and treatments from the government, as well as public governance structures may lead to variations in the corruption effects on the growth of firms in these two different sectors.

By using a sample of nearly 900 Vietnamese firms across 24 provinces, we show that corruption has different effects on private and state sectors. Specifically, corruption in Vietnam, which may arise from the special relationship between SOEs and public officials, imposes no harm for the low-efficiency state sector. The

private sector, on the other hand, suffers from corrupt business environments, although they are more dynamic and profitable compared to state-owned firms. We suggest that the government's discriminated treatments to firms in different sectors distort the business environment, and are harmful for the development of the economy as a whole. With regards to other growth determinants, we find that informal financing negatively affects all firms' growth, while better access to bank financing tends to provide the state sector with advantages in growth compared to non-state sector.

We document that corruption widely differs across provinces and industries in Vietnam. We show evidence for the significant roles of public governance factors in determining levels of corruption, such as regulatory entry costs, land access, the implementation and consistency in policies, and the provincial policies for private sector development. Our results indicate the necessity of studying the variations in public governance mechanism and quality within countries. Within-country research is crucial for understanding why and how corruption takes place, and thus essential for central and local governments' policy-making process. We suggest that improvements in public governance quality, including the leveling of the playing fields for firms in all economic sectors, are necessary for curbing down corruption and its harmful effects for economic growth.

Appendix 5.1
Definitions of variables

Variables	Definitions
CORRUPTION	Sum of all the sub-scores of corruption ranks indicated by the firms (scale: from 0 = no corruption to 4 = widespread corruption). The sub-scores are corruption levels for tax department officials, officials in business registration and licensing, import/export license authorities, customs department, construction permit authorities, traffic police, municipal and other police market controller, land administration agency, and district peoples' committee.
PAYMENTDUM	Dummy for the presence of informal payments to public officials in the industry
PAYMENTAMOUNT	Ratio of informal payments over annual sales that the industry pays
GROWTH	Growth rate of total assets
SIZE	Logarithm of total sales (sales are in million VND)
AGE	Firm age (in years)
TECH	Dummy for new technological application
CAPACITY	Design capacity utilization as the amount of output actually produced relative to the maximum amount that could be produced
BANKDUM	Dummy of bank financing for working capital or new investments. Banking financing comes from private commercial banks, state-owned commercial banks, international commercial banks, leasing arrangements, development assistance funds and state budget
INFORMALDUM	Dummy of informal financing for working capital or new investments. Informal financing comes from family, friends and informal sources such as money lenders
ENTRYCOST	A provincial score that measures the time that takes firms to register, acquire land and receive all the necessary licenses to start business
LANDACCESS	A provincial score that measures the access of firms to land resources, i.e., whether firms possess their official land-use-right certificate, whether they have enough land for their business expansion requirements.
TRANSPARENCY	A provincial score that measures transparency and access to information.
TIMECOST	A provincial score that measures time costs of regulatory compliance.
INFORMALCHARGE	A provincial score that measures how much firms pay in informal charges and how much of an obstacle those extra fees pose for their business
IMPLEMENTATION	A provincial score that measures the implementation and consistency of policies

Appendix 5.1 (continued)

Variables	Definitions
STATEBIAS	A provincial score that measures the bias toward SOEs in terms of incentives, policy and access to capital
PROACTIVE	A provincial score that measures the proactivity of provincial leadership
PRIVSECDEV	A provincial score that measures the local policies for promoting private sector development
PCI	Provincial competitiveness index: the weighted combination of the nine sub-indices (*ENTRYCOST*, *LANDACCESS*, *TRANSPARENCY*, *TIMECOST*, *INFORMALCHARGE*, *IMPLEMENTATION*, *STATEBIAS*, *PROACTIVE*, and *PRIVSECDEV*)

Appendix 5.2
Provincial governance indices

This appendix presents the Provincial Competitiveness Index (PCI) and its sub-indices as provincial governance indicators in 2005, constructed and provided by VNCI and VCCI, for 24 Vietnam's provinces in our sample. Definitions of variables are presented in Appendix 5.1.

Province	*PCI*	*ENTRYCOST*	*LANDACCESS*	*TRANSPARENCY*	*STATEBIAS*	*TIMECOST*	*IMPLEMENTATION*	*PRISECDEV*	*PROACTIVE*
Hanoi	*60.32*	7.28	6.05	4.12	5.72	6.78	4.32	7.73	6.23
Hai Phong	*59.40*	7.02	5.68	5.69	5.98	6.42	4.69	5.29	5.32
Ha Tay	*38.81*	4.27	3.67	3.75	4.27	6.10	4.84	3.27	1.20
Bac Ninh	*58.06*	6.19	6.21	5.37	4.68	8.35	6.62	2.39	7.53
Hai Duong	*45.79*	4.50	5.26	4.18	5.39	6.18	6.62	2.93	3.39
Nam Dinh	*45.97*	5.82	4.23	4.19	5.85	7.41	2.77	2.56	1.60
Thanh Hoa	*49.29*	4.86	5.05	4.54	5.27	7.06	4.17	4.30	3.65
Nghe An	*59.56*	7.15	4.18	5.55	6.01	6.52	5.82	5.82	5.61
Ha Tinh	*51.67*	4.66	6.09	4.52	5.90	5.80	5.60	5.06	4.62
Thua Thien Hue	*56.77*	6.31	5.56	4.49	5.15	6.48	5.52	6.93	5.07
Da Nang	*70.67*	8.77	6.90	6.72	5.26	8.24	6.35	7.54	7.18
Quang Nam	*59.72*	6.23	6.22	4.65	5.92	5.23	8.00	7.03	7.01
Quang Ngai	*47.99*	5.27	5.32	3.85	5.33	5.65	5.67	3.96	4.13
Binh Dinh	*60.60*	5.50	6.40	6.04	5.85	5.92	7.05	5.45	7.11
Khanh Hoa	*54.08*	6.22	6.05	3.33	5.85	5.46	6.30	5.09	5.62
Ho Chi Minh city	*59.61*	6.23	8.32	5.57	6.28	6.56	4.55	4.99	6.11
Binh Duong	*76.82*	7.65	7.88	6.05	8.53	6.29	7.39	6.92	9.30
Dong Nai	*64.14*	6.52	6.42	5.19	6.30	7.88	5.30	4.58	7.74

Appendix 5.2 (continued)

Province	*PCI*	*ENTRYCOST*	*LANDACCESS*	*TRANSPARENCY*	*STATEBIAS*	*TIMECOST*	*IMPLEMENTATION*	*PRISECDEV*	*PROACTIVE*
Ba Ria-Vung Tau	*59.15*	5.33	7.06	4.69	5.80	6.43	6.54	5.93	6.54
Long An	*58.49*	7.24	6.37	3.51	6.22	6.23	5.34	5.17	5.89
Dong Thap	*58.65*	6.27	6.76	4.72	6.29	5.60	6.01	4.53	5.91
An Giang	*50.90*	6.36	7.07	4.10	4.75	4.64	7.96	4.18	5.61
Tien Giang	*55.89*	6.40	6.71	3.23	6.19	6.58	8.27	3.72	5.51
Can Tho	*61.29*	6.13	6.01	5.15	5.40	6.75	5.97	8.14	5.62

Chapter 6: Summary and recommendations

Capital structure, competition and governance in firms has fascinated and inspired researchers. This dissertation continues those streams of research. It bundles four empirical studies, which can basically grouped in two parts: one on the interactions of capital structure and product market competition; and the other on several aspects of governance and its connections with firm financing and growth.

In this concluding chapter we will summarize the key conclusions of the preceding chapters and suggest several topics for further research. We, in this dissertation, provide several key conclusions as follows.

1. Firms choose their capital structures and indeed use strategic debt in correspondence with their competitive behavior in the product markets (Chapters 2 and 3). One cannot neglect the roles of competitive behavior in studying the interactions between financial structure and product market decisions.

2. Cournot and Bertrand types of competitive behavior determine the way in which demand and cost uncertainties in the product markets influence leverage choice of firms. Specifically, demand uncertainty is positively related to leverage for firms under both Cournot and Bertrand. On the other hand, cost uncertainty has a positive impact on the leverage of Cournot firms, but plays a negligible role for Bertrand firms. (Chapter 2).

3. The joint determination of leverage and market share shows that in Cournot (Bertrand) competition, leverage negatively (positively) affects market share. Conversely, market share has a negative impact on leverage for Cournot firms, but no impact for Bertrand firms. The positive effect of leverage on market share for Bertrand firms invites further theoretical investigation. (Chapter 3).

4. Firm-specific determinants of leverage vary and work differently across countries, meaning that the implicit assumption of previous studies about their equal impact is possibly misleading (Chapter 4).

5. Country-specific factors significantly influence not only the capital structure choice of firms, but also the way that firm-specific variables affect that choice. The important country characteristics include legal enforcement, bond market development, GDP growth, capital formation, creditor right protection. (Chapter 4).

6. Within-country research on corruption is crucial for explaining the variations of corruption and its effects on corporate sector. Public governance factors show significant roles in determining the corruption severity in local business

environment and industry practice. The important governance factors include regulatory entry costs, land access, the implementation and consistency of policies, and the private sector development policies. Improvements in public governance measures are necessary for curbing down corruption and its adverse effects for economic growth. (Chapter 5).

7. The effects of corruption on firm growth differ across economic sectors in Vietnam. Corruption hinders private firms' growth but has no harm for state-owned enterprises' growth. This can be explained by the close relationship and mutual benefits between public officials and SOEs' managers. (Chapter 5).

Overall, the essays in this dissertation have made an attempt to close several gaps in the literature of corporate finance. Although our work is neither complete nor comprehensive, it continues to reveal exciting paths for academic research.

Chapters 2 and 3 have not touched upon the roles of long-term vs. short-term debts in firms' capital structure. Glazer (1994) mentions that when rival firms issue long-term debt, their product market behavior is driven by strategic considerations that would not be present if they did not have debt or if the debt was short term. The choice of debt, in addition, involves firms' decisions of investing in new or existing projects. Investment decisions, in turn, affect firms' output and market share. The linkages of leverage, investment and competition should be paid attention to in future studies.

Our empirical findings provide the inspiration for further theoretical research. Chapter 3 points out that Bertrand levered firms behave less aggressively by increasing prices and gains market share, while their rivals – as strategic complements – also raise prices accordingly. Although the story can be plausibly explained by the partial price reaction of the rivals, there is no theoretical background to back it up. Prices are very often easily observed and therefore should be imitated by Bertrand rivals.

Generally, there is plenty of room for further research on the field of interactions between capital structure and product market competition, which has not been discussed yet in this dissertation. Different markets, product lines, competitive structures and/or other industry characteristics may influence the firms' joint decisions of financing and their entry, exit, or competition in the market.

In addition, the roles of public governance and institutional factors in firm financing and growth constitute another challenging area which certainly needs to be further explored. Chapter 4 indicates that country-specific or institutional variables affect firms' choice of financing in both direct and indirect ways. However, due to the limited data availability, especially the number of country observations, we have not been able to generalize our findings to all continents, and may have missed important institutional factors. The study in Chapter 4 only looks at public listed firms with available information, while small unlisted firms

face different constraints that affect their capital structures. Moreover, the local public governance factors in individual countries should also be important in explaining the variations in corporate leverage choice.

Corruption is a specific issue related to public governance mechanism. We, in Chapter 5, have shown that within-country studies on corruption are necessary to provide meaningful insights of corruption causes and consequences. There are a number of issues open for firm-level analysis in this strand of literature. Corruption, especially in the local business environment, may have non-trivial impacts on the access to financing and other resources for firm growth. We suggest firm-level research be necessary for understanding the corruption effects of on different types of financing (e.g., formal and informal financing), and on capital structure choices of small and medium-sized enterprises.

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Nederlandse samenvatting
(Summary in Dutch)

Vermogensstructuur, concurrentie en governance

De vermogensstructuur, de concurrentiepositie en de governance-structuur van ondernemingen hebben onderzoekers gefascineerd en geïnspireerd. In deze dissertatie worden deze thema's verder onderzocht. Het is een bundeling van vier empirische studies, die in twee onderdelen verdeeld kan worden: onderzoek naar de interactie tussen de vermogensstructuur en competitie op productmarkten; en onderzoek naar verschillende governance-aspecten in relatie tot vermogens-structuur en groei.

De eerste twee studies vormen de hoofdstukken 2 en 3, waarin we verschillende theorieën en de implicaties voor de relatie tussen de vermogensstructuur en productmarkt concurrentie testen. We onderscheiden ondernemingen die concurreren binnen een Cournot of Bertrand competatieve omgeving, en onderzoeken vervolgens mogelijke interacties tussen vermogensstructuur en de industriekenmerken en -structuren.

Hoofdstuk 2 onderzoekt hoe concurrentie de vermogensstructuur van een onderneming beïnvloedt. De financieel-economische theorie voorspelt dat het effect van verschillende soorten onzekerheid binnen afzetmarkten (in het bijzonder ten aanzien van onvoorziene veranderingen in de vraag en productiekosten) op de vermogensstructuur van ondernemingen afhankelijk is van het soort concurrentie binnen de industrie. We toetsen de theoretische voorspellingen voor een steekproef van Amerikaanse ondernemingen, door deze ondernemingen te classificeren volgens een empirische maatstaf als Cournot-concurrentie (strategische substituten) en Bertrand-concurrentie (strategische complementen). We tonen aan dat de onzekerheid met betrekking tot de vraag een positieve relatie heeft met de ratio van de boekwaarde van het vreemd vermogen en de boekwaarde van de totale activa (hierna genoemd: schuldratio). We testen deze relatie separaat voor ondernemingen van het type Cournot-concurrentie en voor ondernemingen van het type Bertrand-concurrentie. De onzekerheid met betrekking tot de kosten heeft een significant positieve invloed op de schuldratio van ondernemingen van het type Cournot-concurrentie; deze invloed is echter verwaarloosbaar voor ondernemingen van het type Bertrand-concurrentie. Onze resultaten bevestigen het strategische

gebruik van vreemd vermogen, en benadrukken de rol van concurrentiegedrag van ondernemingen binnen een productmarkt ten aanzien van hun vermogensstructuurkeuze.

In hoofdstuk 3 onderzoeken wij de onderlinge relaties en determinanten van de vermogensstructuur en het marktaandeel van ondernemingen. De theorie voorspelt, dat de relaties tussen de schuldratio en het marktaandeel afhangen van de strategische concurrentie van ondernemingen. Het effect van deze relaties zou verschillend moeten zijn voor ondernemingen van het type Cournot-concurrentie en van het type Bertrand-concurrentie. We testen de voorspellingen voor een steekproef van Amerikaanse ondernemingen, door deze ondernemingen te classificeren gebaseerd op een empirische maatstaf als Cournot-concurrentie (strategische substituten) en Bertrand-concurrentie (strategische complementen). We verklaren gelijktijdig de schuldratio en het marktaandeel middels een 2SLS procedure met vertraagde verklarende en instrumentele variabelen. We tonen aan dat voor ondernemingen van het type Cournot-concurrentie respectievelijk Bertrand-concurrentie, de schuldratio een negatieve respectievelijk positieve relatie heeft met het marktaandeel. Het marktaandeel heeft een negatieve invloed op de schuldratio van ondernemingen van het type Cournot-concurrentie, maar heeft geen invloed voor ondernemingen van het type Bertrand-concurrentie. Onze bevindingen benadrukken de rol van concurrerend gedrag in de gezamenlijke bepaling van de vermogensstructuur en het marktaandeel.

De laatste twee empirische studies vormen de hoofdstukken 4 en 5, waarin wij de rollen van institutionele en governance-factoren onderzoeken. Behalve algemeen geaccepteerde conventionele determinanten van de vermogensstructuur, tonen we aan dat landskenmerken en de nationale governance-systemen een niet onbeduidende rol spelen bij de bepaling van de financiële structuren van ondernemingen. De conventionele determinanten kunnen per land een andere invloed hebben.

Hoofdstuk 4 analyseert het belang van ondernemingspecifieke en landspecifieke factoren voor de vermogensstructuurkeuze van ondernemingen uit 42 landen. Onze analyse levert twee nieuwe resultaten op. Ten eerste vinden wij in tegenstelling tot eerdere studies - die impliciet een gelijk effect voor deze determinanten veronderstellen - dat de ondernemingspecifieke determinanten van vermogensstructuur per land verschillen. Ten tweede, hoewel we overeenstemming vinden met het conventionele directe effect van landspecifieke factoren op de vermogensstructuur van ondernemingen, tonen wij tevens aan, dat er een indirect effect bestaat; de landspecifieke factoren beïnvloeden de ondernemingspecifieke determinanten van de vermogensstructuur.

In hoofdstuk 5 presenteren we een analyse op bedrijfsniveau naar de relatie tussen corruptie, groei, en het openbaar bestuur van Vietnam. We onderzoeken hoe

corruptie de groei beïnvloedt in een vergelijkende analyse van particuliere ondernemingen en staatsondernemingen en hoe provinciale bestuursfactoren corruptie beïnvloeden. Onze resultaten wijzen erop, dat de corruptie de groei van de particuliere sector in Vietnam significant belemmert. Corruptie is echter niet schadelijk voor de groei van staatsondernemingen. Onze studie beklemtoont de rol van lokale instellingen en governance factoren in de beïnvloeding van corruptie. We presenteren bewijs, dat de verschillen per provincie met betrekking tot kosten gerelateerd aan wettelijke vestigingskosten, de toegankelijkheid van en mogelijkheid om gebruik te maken van grond, de implementatie en de consistentie van beleid, en het ontwikkelingsbeleid van de particuliere sector de hevigheid van provinciale corruptie kunnen verklaren. Onze bevindingen onderstrepen het belang van binnenlands_onderzoek voor een beter begrip waarom en hoe corruptie plaatsvindt, en dat verbeteringen van de kwaliteit van het openbaar bestuur zouden moeten leiden tot een reductie van corruptie en haar negatieve gevolgen.

Samenvattend, de essays in deze dissertatie vormen een poging om enkele hiaten in de literatuur van de ondernemingsfinanciering te dichten. Deze studies brengen een aantal nieuwe inzichten voort in de relaties tussen de vermogensstructuur, de concurrentiepositie en de governance-structuur van ondernemingen. Bovendien openen zij nieuwe richtingen voor toekomstig academisch onderzoek.

Tóm tắt luận án
(Summary in Vietnamese)

Cơ cấu vốn, cạnh tranh chiến lược và quản trị

Cơ cấu vốn, cạnh tranh chiến lược và công tác quản trị trong các doanh nghiệp lâu nay đã thu hút sự quan tâm của các nhà nghiên cứu. Luận án này tiếp tục theo đuổi các hướng nghiên cứu đó. Luận án bao gồm 4 nghiên cứu thực nghiệm có thể nhóm thành hai phần: một phần đề cập tới sự tương tác giữa cơ cấu vốn doanh nghiệp và sự cạnh tranh trên thị trường sản phẩm; và phần thứ hai đề cập tới một số khía cạnh của quản trị, quản lý công và các mối liên quan của chúng đến tài chính và tăng trưởng của các doanh nghiệp.

Hai nghiên cứu đầu tiên là các chương 2 và 3 của luận án, trong đó chúng tôi kiểm định các lý thuyết khác nhau về mối liên hệ giữa cơ cấu vốn doanh nghiệp và loại hình cạnh tranh trên thị trường. Đặc biệt, chúng tôi phân biệt các doanh nghiệp cạnh tranh theo mô hình Cournot và Bertrand, sau đó nghiên cứu các tương tác có thể có giữa cơ cấu vốn và một số cấu trúc và đặc điểm của ngành.

Chương 2 xem xét hành vi cạnh tranh ảnh hưởng như thế nào đến cơ cấu vốn một doanh nghiệp. Lý thuyết dự đoán rằng tác động của các biến bất định (*uncertainty*) khác nhau trên thị trường sản phẩm (cụ thể là các đột biến không dự tính trước được về nhu cầu và chi phí) đối với cơ cấu vốn của doanh nghiệp phụ thuộc vào cách thức cạnh tranh trong ngành. Chúng tôi kiểm định các dự đoán này trong một mẫu nghiên cứu gồm các doanh nghiệp sản xuất của Mỹ, bằng cách phân loại các doanh nghiệp thành loại cạnh tranh kiểu Cournot (hay thay thế chiến lược – *strategic substitutes*) và loại cạnh tranh kiểu Bertrand (hay bổ sung chiến lược – *strategic complements*). Chúng tôi chỉ ra rằng mức độ bất ổn định về nhu cầu có quan hệ tỉ lệ thuận với tỉ lệ nợ trên tổng tài sản của doanh nghiệp trong cả hai mẫu nghiên cứu Cournot và Bertrand. Mức độ bất ổn định về chi phí có tác động tỉ lệ thuận với tỉ lệ nợ của các doanh nghiệp cạnh tranh kiểu Cournot, nhưng lại không có vai trò gì trong các doanh nghiệp cạnh tranh kiểu Bertrand. Kết quả nghiên cứu của chúng tôi khẳng định sử dụng vay nợ là một công cụ chiến lược và nhấn mạnh vai trò quan trọng của hành vi cạnh tranh của các doanh nghiệp trên thị trường sản phẩm khi ra quyết định về cơ cấu vốn của họ.

Trong chương 3, chúng tôi nghiên cứu mối tương tác đồng thời giữa cơ cấu vốn và thị phần sản phẩm của doanh nghiệp. Lý thuyết dự đoán rằng mối quan hệ giữa tỉ lệ nợ và thị phần phụ thuộc vào loại hình cạnh tranh chiến lược của các

doanh nghiệp. Cụ thể là tác động của tỉ lệ nợ lên thị phần sẽ phải khác nhau giữa các doanh nghiệp cạnh tranh theo mô hình Cournot và Bertrand. Sử dụng mẫu nghiên cứu là các ngành công nghiệp sản xuất của Mỹ, chúng tôi phân biệt giữa các doanh nghiệp cạnh tranh Cournot và Bertrand dựa trên một công thức thực nghiệm về các hãng thay thế chiến lược và bổ sung chiến lược. Chúng tôi đồng thời xem xét các nhân tố quyết định của cơ cấu vốn và thị phần bằng mô hình hồi quy 2SLS với các biến độc lập và biến công cụ trễ (*lagged explanatory and instrumental variables*). Chúng tôi chỉ ra rằng trong mô hình cạnh tranh Cournot (Bertrand), tỉ lệ nợ tác động tỉ lệ nghịch (tỉ lệ thuận) tới thị phần. Thị phần ngược lại có tác động tỉ lệ nghịch tới tỉ lệ nợ của các doanh nghiệp cạnh tranh Cournot, nhưng không có tác động gì tới tỉ lệ nợ của các doanh nghiệp Bertrand. Kết quả của chúng tôi nhấn mạnh vai trò của hành vi cạnh tranh khi cơ cấu vốn và thị phần sản phẩm tác động tới nhau đồng thời.

Hai nghiên cứu tiếp theo cấu thành các chương 4 và 5 của luận án, trong đó chúng tôi xem xét vai trò của các nhân tố thể chế và quản lý công (*institutional and governance factors*). Ngoài các nhân tố quyết định cơ cấu vốn doanh nghiệp đã được chấp nhận rộng rãi, các đặc điểm riêng biệt của các nước cũng như các hệ thống quản lý quốc gia được cho thấy là cũng đóng những vai trò không nhỏ trong việc quyết định cơ cấu vốn doanh nghiệp. Ngoài ra, các nhân tố quyết định truyền thống cũng hoạt động khác nhau ở các quốc gia khác nhau.

Chương 4 phân tích tầm quan trọng của các yếu tố đặc trưng của doanh nghiệp và đặc trưng của quốc gia ảnh hưởng đến quyết định lựa chọn cơ cấu vốn trong các doanh nghiệp của 42 nước khác nhau trên khắp thế giới. Nghiên cứu của chúng tôi đưa ra hai kết quả mới. Thứ nhất, chúng tôi thấy rằng các nhân tố đặc trưng của doanh nghiệp ảnh hưởng đến tỉ lệ nợ có tác động khác nhau giữa các quốc gia, trong khi đó các nghiên cứu trước đây đều ngầm giả định rằng các nhân tố này có tác động bằng nhau. Thứ hai, mặc dù chúng tôi nhất trí về sự tác động trực tiếp của các nhân tố đặc trưng của quốc gia đối với cơ cấu vốn doanh nghiệp, chúng tôi cũng đồng thời chỉ ra rằng chúng còn có một tác động gián tiếp bởi vì các yếu tố mang tính quốc gia cũng ảnh hưởng đến vai trò của các nhân tố quyết định tỉ lệ nợ mà mang tính đặc trưng của doanh nghiệp.

Trong chương 5, chúng tôi tiến hành một phân tích với số liệu ở tầm doanh nghiệp (*firm-level analysis*) về mối quan hệ giữa tham nhũng, tăng trưởng, và quản lý công ở Việt Nam. Chúng tôi xem xét tham nhũng ảnh hưởng như thế nào đến tăng trưởng thông qua một nghiên cứu so sánh giữa các doanh nghiệp tư nhân và doanh nghiệp nhà nước. Kết quả nghiên cứu của chúng tôi cho thấy tham nhũng cản trở đáng kể mức độ tăng trưởng của khu vực tư nhân ở Việt Nam. Tuy nhiên, tham nhũng lại không có hại cho sự tăng trưởng của khu vực nhà nước. Nghiên cứu của chúng tôi làm nổi bật vai trò của các thể chế ở địa phương và các nhân tố quản lý công có tác động tới mức độ tham nhũng. Chúng tôi cung cấp bằng chứng

cho thấy sự khác biệt giữa các tỉnh/thành phố về các chi phí hành chính gia nhập thị trường (*regulatory entry costs*), về tiếp cận nguồn lực đất đai (*land access*), về việc thực thi và sự nhất quán trong chính sách (*implementation and consistency of policies*), và về các chính sách phát triển khu vực tư nhân, có thể giải thích được mức độ nghiêm trọng về tham nhũng ở các tỉnh thành. Kết quả của chúng tôi nhấn mạnh tầm quan trọng của các nghiên cứu trong phạm vi từng quốc gia để hiểu được tại sao có tham nhũng và nó diễn ra như thế nào, và đồng thời đề xuất rằng việc cải thiện chất lượng quản lý công sẽ giúp hạn chế tham nhũng cũng như các tác hại của nó.

Nhìn chung, các nghiên cứu trong luận án này đã nỗ lực làm rõ một số vấn đề còn bỏ ngỏ trong lĩnh vực nghiên cứu về tài chính và quản trị doanh nghiệp. Mặc dù nghiên cứu của chúng tôi chưa hẳn đã đầy đủ và hoàn chỉnh, nhưng đã phần nào đóng góp vào nghiên cứu học thuật, cũng như tiếp tục chỉ ra các hướng nghiên cứu mới đầy thú vị.

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Thuy Thu Nguyen Nguyễn Thu Thủy n he n e ngu ge n n n en n [n] e u y he he un e g u e g *oreign ra e ni ersit* n ng n n e n n e n n e e e he eg ee n n he e ye he e he ee e u e n e e he *oreign ra e ni ersit* e u ng n u ne n n n n y n Thuy Thu Nguyen ne n eg ee n e e en e n he g g n e y he *ational ono i s ni ersit* n n he *Institutes o o ial tu ies* The gue n he e he ne en u e he Ne he n n hen g he n n n e *il urg ni ersit* T u g n Thuy ne he *inan e e art ent otter a hool o anage ent ras us ni ersit* e n *I* h g

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CAPITAL STRUCTURE, STRATEGIC COMPETITION, AND GOVERNANCE

This thesis consists of four studies on the interactions of capital structure and product market competition, and on several aspects of governance, firm financing and growth. The first study investigates how competitive behavior and market uncertainty affect the capital structure of a firm in the U.S. manufacturing. We show that demand uncertainty is positively related to leverage for firms in both the Cournot and the Bertrand samples. Cost uncertainty has a significantly positive impact on the leverage of Cournot firms, but plays a negligible role for Bertrand firms. In the second study, we examine the joint determination of capital structure and market share in U.S. manufacturing firms. We provide evidence that in Cournot competition, leverage negatively affects market share, while in Bertrand competition this effect is positive. Market share is shown to have a negative impact on leverage in Cournot firms, but no impact on leverage in Bertrand firms. Both studies highlight the role of firms' competitive behavior in the product market in their capital structure decisions. The third study analyzes the importance of firm-specific and country-specific factors in the leverage choice of firms from 42 countries around the world. We find that firm-specific determinants of leverage differ across countries, while prior studies implicitly assume equal impact of these determinants. Although we concur with the conventional direct impact of country-specific factors on the capital structure of firms, we show that there is an indirect impact because country-specific factors also influence the roles of firm-specific determinants of leverage. Finally, in the forth study, we provide a firm-level analysis of the relation between corruption, growth, and public governance in Vietnam. Our results indicate that corruption significantly hinders the growth of Vietnam's private sector. However, corruption is not detrimental for the growth in state sector. Our study emphasizes the role of local institutions and governance factors in affecting corruption.

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