UNIVERSITY OF TWENTE

MASTER THESIS

The effects of external debt financing and internal financing on firm performance: empirical evidence from automobile listed firms

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Abstract

This research investigates the impacts of external debt financing and internal financing on firm performance using panel data from listed companies in automobile industry during the year from 2011 to 2019. Five different factors (return on equity, return on asset, Tobin's Q, return on capital employed, return on invested capital) are used to measure firm performance. Three different factors (short term debt ratio, long term debt ratio and total debt ratio) are used to measure external debt financing. Internal financing ratio is used as the fourth independent variable. Tangibility, size, liquidity and asset growth are control variables.

The results suggest that firm performance, measured by return on equity (ROE), return on asset (ROA), Tobin's Q, return on capital employed (ROCE) and return on invested capital (ROIC) all have negative relationship with short term debt ratio (STDR), long term debt ratio (LTDR), total debt ratio (TDR), as independent variable. Moreover, internal financing ratio (IFR) is not only increasingly important for automobile firms, but also positively affects firm performance (ROE, ROA, Tobin's Q, ROCE and ROIC) for all sectors.

According to the agency theory, the negative relationship between debt ratios and firm performance indicates that the monitoring role of debt is not substantial. Instead, debt financing increases conflicts between shareholders and creditors, decreasing firm performance. Based on pecking order theory, the positive relationship between internal financing ratio and firm performance supports that internal financing has the lowest capital cost and avoids insufficient external financing caused by information asymmetry, thus benefiting firm performance.

Keywords: capital structure, firm performance, automobile industry, listed firms

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1. Introduction

This thesis focuses on the impact of external debt financing and internal financing on firm performance from automobile industry. The first chapter starts with a brief background to the research topic. It also discusses the research question and contribution of this thesis. An overview of the structure of this thesis will be presented in the end.

1.1 Background

Capital structure refers to the financing method of the firm's assets. If the cash outs generated by the company's investment activities exceed the monetary resources generated by its current operating activities, the firm needs to raise new funds from investors (Renzetti, 2015). Myers (1984) state that capital structure will be driven by firms' desire to finance new investments. The company's financing is carried out in the order of internal financing, low-risk debt and equity. Gareth and Meeghan (2018) argue that capital structures are not set in isolation. They put forward the theory of the corporate finance trilemma. Because of cash flow constraints, companies cannot simultaneously choose the ideal policies for equity payments, cash holdings and debt. A stable and efficient capital structure is conducive to firm’s profitability. Numerous scholars have introduced several theories to explain capital structure and its effect on firm performance. MM theory (Modigliani & Miller, 1958) based on the restrictive assumptions of a perfect capital market, states the firm value would be unaffected by the choice of capital structure. To include market imperfection, trade-off theory, pecking order theory and agency theory come up. Trade-off theory (Kraus & Litzenberger, 1973) claims that firms will set up a target debt ratio, where debt tax shields are maximized and bankruptcy costs associated with the debt are minimized. When the debt ratio is low, the tax shield benefit of the debt will increase firm value. After the debt ratio reaches the optimal point, the tax shield benefit of the debt begins to be offset by the cost of financial distress. Debt thus has a negative impact on firm value. The pecking order theory suggests that firms prefer internal to external financing and debt to equity to minimize information asymmetry (Myers & Majluf, 1984). Retained earnings involve fewer transaction costs and issuing costs than other sources. Agency theory (Jensen & Meckling, 1976) contends that the optimal capital structure to maximize firm value must be the one with least conflict of interest among stakeholders. It suggests that debt financing can be used as a disciplinary measure to reduce waste in managing cash flows through the threat of liquidation or the pressure to generate cash flow to pay off debts. However, the shareholder-creditor conflict arises because debt can lead shareholders to invest sub-optimally (Myers, 1977), thus reducing firm performance. The creditors will also require higher interest rates to compensate for the higher risk of liquidation.

It's worth noting that there is no single theory that can fully interpret the effect of capital structure on firm performance. All above theories are based on many critical assumptions but the real market is extremely complex and diversified (Ardalan, 2017). The empirical research on the relationship between capital structure and firm performance has also attracted many researchers. (e.g. Abor, 2005; Zeitun & Tian, 2007; Margaritis & Psillaki, 2010; Gill et al., 2011; Abeywardhana, 2015; Vatavu, 2015; Le & Phan, 2017). They investigate the influence of debt financing in capital structure on both accounting and market measure of firm performance. Previous empirical studies prove that the impact of debt financing on firm performance varies with industries and countries. Furthermore, the significance level of short term debt and long term debt is not always consistent.

Compared with labor-intensive businesses, capital-intensive firms typically use a lot of financial leverage as they need large amounts of funds to produce goods or services and plant and equipment can be used as collateral. However, they are also relatively more susceptible to economic shocks. Because they have to pay fixed costs, such as overhead of the plants that store the equipment and depreciation of the equipment even when the industry is in recession (Frankenfield, 2020). Automobile industry is an important capital intensive industry. It is the backbone of mobility, employment, economic growth and innovation. In Europe, it contributes over 7% of the EU's GDP in 2019. The automobile industry is defined as all those companies and activities involved in the manufacturing of motor vehicles. These include most components, such as engines and bodies, but exclude tires, batteries, and fuel. The passenger automobiles and light trucks, including pickups, vans, and sport utility vehicles are this industry's principal products (Rae & Binder, 2018).

1.2 Research question and objective

Meanwhile, automobile industry is being hit by a double whammy—falling profits and huge funds required to fund upcoming electric vehicles. The auto manufacturers have to bear the huge cost of developing new technologies (e.g. electric cars and self-driving services) in the face of declining profits. With increased investment in technological innovation and stricter environmental regulation, auto industry managers must optimize the financing structure to improve capital utilization.

Based on the pecking order theory that firms prefer internal to external financing and debt to equity, this thesis will analyze from both external debt financing and internal financing. Therefore, the following research question is formulated:

How do the external debt financing and internal financing ratio affect firm performance of the automobile industry respectively?

Based on a sample of 303 listed firms in automobile industry from 2011– 2019, this study finds that there is a significant negative relationship between debt financing ratio and firm performance. Internal financing ratio has a positive and significant effect on firm performance. These results are consistent across different measurements of firm performance and other robustness tests.

1.3 Contribution

Taking automobile industry as an example, this study enriches the existing studies by providing an insight into the relationship between debt financing and firm performance in a capital-intensive industry. These results can be compared with studies done in other capital-intensive industries, such as construction sector and trading and services sector. Also, the practical relevance of this study will help auto makers in understanding the impacts of their capital structure. Therefore, they can improve the firm performance by optimizing the capital structure, thereby getting rid of the current predicament.

According to the objectives of this study, this thesis also attempts to explore the effect of internal financing on firm performance. The positive relationship provides some evidence that firms should follow the pecking order theory.

1.4 Outline

The remaining parts of this thesis is organized as follows. In the second chapter, a theoretical framework will be constructed. In the third chapter, two hypotheses will be developed. The fourth chapter will discuss variables and multiple regression models. The fifth chapter provides data collection and sample size. In the sixth chapter, the results will be presented and discussed. Conclusions will be made in the seventh chapter.

2. Literature review

Firms raise new investment funds externally through security issues, and internally from retained earnings (Myers, 1991). Internal financing refers to the ability to use retained earnings to finance a company's growth, rather than borrowing or raising funds through an equity or bond issue. A company's net profit may be paid in dividend, retained for internal financing or mixture of these two. External financing includes debt financing and equity financing. The former includes a variety of loans, bond financing and commercial credit; the latter includes the issuance of common shares, additional shares and rights issues. Modern financing structure theories were mainly formed in the 1960s and 1970s, based on the MM theory proposed by Modigliani and Miller. After the 1970s, scholars enriched the MM theory and formed new financing structure theories (e.g. Trade-off Theory, Pecking order Theory and Agency Theory). Plentiful research has also been done to test these theories.

2.1 MM Theory

In the 1950s, MM theory stated that in a perfect market, any combination of securities would function as well as any other. Thus, the value of the firm would be unaffected by the choice of capital structure. Firm value would be determined on the left-hand side of the balance sheet by real assets, not by the proportion of debt and equity. Under the premise of no tax, the increase of financial leverage would not reduce the cost of capital, so there would be no optimal financing structure.

This theory uses the arbitrage argument which describes the act of buying a security in one market and selling it at a higher price in another so that investors benefit from a temporary cost differential. With no transaction costs, investors can profit from this arbitrage process without risk (Bloomenthal, 2020). This path will continue until the security prices of the two firms are equal. In a perfect market, this happens very quickly. Therefore, MM theory draws the conclusion that firm value is not affected by leverage.

MM theory is based on the following assumptions: 1) The firm is in a fully effective capital market, and there is no bankruptcy, taxes or transaction costs; 2) There is no difference in investors' expectations of the firm's future cash flow; 3) The investors borrow or lend funds at the risk-free rate; 4) There is no conflict of interest between shareholders and management, i.e., there is no principal-agent cost; 5) The firm's investment decisions and business decisions do not interfere with each other. However, in an imperfect capital market where these above-mentioned assumptions do not exist, the result will be very different, which implies that capital structure affects firm value.

2.2 Trade-off Theory

In the 1970s, Robichek, Myers and Kraus developed the trade-off theory. It took into account the fact that the increase of debt, which was ignored by MM theory, would worsen the financial condition of firms, due to an increase in financial risks and bankruptcy costs. Debt level increases the risk of bankruptcy (i.e. bankruptcy costs) because as the debt to equity ratio increases the creditors will require higher interest rates. The possible payoffs to stockholders and the present market value of their shares are also reduced (Brealey & Myers, 2003). Bankruptcy costs consist of direct and indirect costs. Branch (2002) argues that the direct cost of dealing with bankruptcy is mostly paid to professionals (such as lawyers and accountants). And indirect costs include the costs of a short-run focus, as well as costs caused by a loss of market share.

Myers (1984) found that by including market imperfections, firms appeared to get an optimal debt-equity ratio that maximizes its value by weighing the advantages and the disadvantages of debt. In following trade-off theory, firms would set up a target debt ratio under which debt tax shields are maximized and debt-related bankruptcy costs minimized. Bankruptcy costs play an important role in determining the optimal capital structure because a large part of the value of a bankrupt firm is used to deal with its predicament. The cost of dealing with a bankruptcy adversely affects the risk premium, the cost of capital and the tax rates required (Branch, 2002).

From the empirical evidence of the trade-off theory, there are some findings that support trade-off theory and some that don't. Hackbarth et al. (2007) studied the optimal mixture and priority structure of bank and market debt and concluded that the trade-off theory is sufficient to explain many facts regarding corporate debt structure. Serrasqueiro and Nunes (2010) studied 39 quoted Portuguese companies for the period of 1998 to 2006 and found that trying to balance the debt tax shield against the cost of bankruptcy seemed to have little to do with explaining the capital structure among them. They argued that high transaction costs discourage firms from adjusting their actual debt ratios toward target debt ratios. Besides that, a study from Degryse et al. (2012) showed that the capital structure for SMEs does not support the trade-off theory. That's because small firms tend to be less profitable than large ones, and benefits of tax advantages are less valuable for SMEs. Therefore, a consensus on how to determine the optimal capital structure that maximize firm value has not been reached in the context of trade off theory.

Trade-off theory suggests a non-linear relationship between leverage and firm performance. The optimal capital structure is determined by the trade-off between the tax benefits and the cost of distress. Firms would set up a target debt ratio under which debt tax shields are maximized and debt-related bankruptcy costs minimized. Before the optimal point is reached, debt can increase firm performance through the tax shield, reducing agency costs of equity or informing a better prospect. After the target debt ratio has been reached, the effect of debt on the firm value becomes negative, since the costs of debt, including financial distress and agency costs of debt, outweigh the benefits from the tax shield.

2.3 Pecking order Theory

This theory was proposed by Myers and Majluf in 1984. The pecking order theory starts with asymmetric information. Managers obviously know more than investors. Information asymmetry affects the choice between internal and external financing, as well as new issues of bonds and equity securities. The pecking order theory indicates that investment is financed first with internal funds, then by new issues of debt, and finally with new issues of equity. In this theory, there is no well-defined debt-equity target mix. The pecking order theory believes the most profitable firms often borrow less because they don’t need outside capital. Less profitable firms issue debt because they don’t have enough internal capital to invest.

In general, mature firms have more cash available because they are more profitable and have fewer opportunities to expand. The findings from Bulan et al. (2009) also supported that mature firms followed the pecking order more than young and growing firms. They argued that mature firms were more stable, have higher profitability and good credit histories which reduced the cost of debt, while young firms faced more financial constraints. However, Ezeoha et al. (2012) demonstrated that the relationship between age and debt financing is theoretically ambiguous. Because the deterioration of assets faced by older companies can erode their value, which has a negative impact on their profitability. And other reasons for older firms to seek equity financing are the uncertainty and information asymmetry issues. In this way, the applicability of pecking order theory also needs specific analysis.

Unlike the trade-off theory, the pecking order theory does not mention the optimal debt ratio that maximizes the firm value. The pecking order theory states that firms prefer internal to external financing and debt to equity. Internal financing involves fewer transaction costs and issuing costs than other sources. And issuing debts acquire lower information costs than that of equity. Myers (2001) proposed that the preference of listed companies for internal financing and the relatively infrequent issuances of shares by established firms have long been attributed to the separation of ownership and control and the desire of managers to avoid the "discipline of capital markets". Graham and Harvey (2001) argue that managers prefer internal financing when the fluctuations of firms' stock prices are closely related to their personal wealth and human capital because internal financing has the lowest capital cost and limits volatility from external borrowing and equity markets.

2.4 Agency Theory

Ross (1973) regarded the agency problem as the problem of incentives and identified the principal–agent problem as the consequence of the compensation decision. Jensen and Meckling (1976) regarded agency relationship as a kind of contract between the principal and agent, where both parties worked for their self-interest, leading to the agency problem. The parties performed well not only for the survival of the firm but also for their interest.

Panda and Leepsa (2017) summarize agency problem into three types in their research. The first type is Principal-Principal Problem. The underlying assumption in such problem is the conflict of interest between the major and minor owners. The majority owners have higher voting power and can take any decision in favor of their benefits, which may harm the interests of the minor shareholders (Fama & Jensen, 1983). The second type is Principal-Agent Problem. The owners expect managers to work for the benefit of the owners. Managers, however, are more interested in maximizing their compensation. The misalignment of interest between them leads to the conflict. The third type is Principal-Creditor Problem. The owners try to invest in riskier and higher-return projects. The risk involved in the projects increases the financing cost and reduces the value of the outstanding debt, thereby affecting creditors.

Based on the above three types of agency problem and empirical research, the effect factors of agency cost were considered from three aspects: ownership concentration, managerial ownership and governance variables.

2.4.1 Agency cost and ownership concentration

For Principal-Principal Problem, Demsetz (1983) and Fama and Jensen (1983) point out that in the presence of large controlling shareholders, the maximization of firm value depends on the entrenchment effect. Because the controlling shareholders have a vested interest in maintaining the value of existing capital. Theoretically, the more shares investors own, the greater the incentive to monitor and protect their investments.

Beiner et al. (2003) point out, the existence of concentrated holdings may decrease diversification and market liquidation, therefore, increase the incentives of large shareholders to expropriate firm's resources. Florackis (2008) found evidence supporting ownership concentration is effective in the UK. The results in the study indicated that firms with concentrated ownership had higher asset turnover and less discretionary spending in the UK. Therefore, ownership concentration may help reduce agency problems but it may also harm the firm by causing conflicts between large and minority shareholders.

Farooq (2015) showed that ownership concentration negatively affected debt level.

Because the information asymmetry increases with the concentration of ownership, the proportion of debt in capital structure goes down. The research also showed that under a certain degree of ownership concentration, the growth firms with low degree of information asymmetries had a higher proportion of debt in their capital structure.

2.4.2 Agency cost and managerial ownership

For Principal-Agent Problem, Jensen and Meckling (1976) advocated that management ownership may reduce the incentive for management to consume privileges or engage in suboptimal activities and thus helps align the interests of managers and shareholders which lowers agency costs.

In case of the publicly traded firms in which ownership is separated from the control and mostly outsiders manage the firm, agency cost is high. Hence, managerial ownership can align the interest of the owners and managers. Majority of previous studies have shown that management ownership helps reduce agency costs. For instance, Ahmed (2009) studied 100 Malaysian firms from 1997 to 2001 and proved that higher level of managerial ownership reduced the agency conflict thus reducing agency cost. Mustapha et al. (2011) found an inverse relationship between managerial ownership and monitoring cost in 235 Malaysian companies for the financial year 2006.

Managerial ownership also has implications for the firm’s capital structure. Brailsford et al. (2002) report a non-linear inverted U-shaped relation between managerial ownership and leverage. When managerial ownership is low, agency conflicts necessitate the use of more debt. But when managerial share ownership reaches a certain point, managers seek to reduce their risks and use less debt.

2.4.3 Agency cost and governance variables

Principal-Creditor Problem illustrates the conflicts between the different stakeholders of a firm. Corporate governance is generally defined as the relationship between the firm's owners, board of directors and other stakeholders. This relationship is designed in the form of a contract to regulate the behavior of all stakeholders to achieve firm goals (Gul & Tsui, 2005).

According to agency theory, good governance mechanism helps to reduce agency conflicts. The board size and different committees were common governance mechanisms to be considered. Fauzi et al. (2012) and Hastori et al. (2015) found that because of the power and effectiveness of the board of directors, the big board of directors is related to the high firm performance. But large boards also reduce asset utilization. As Siddiqui et al. (2013) discovered that smaller board size helped cut the agency cost. Independent board members also have an important influence on agency cost. Rashid (2015) noticed that independent board members positively improved the asset utilization ratio and reduced the agency cost using data from 118 non-financial firms in Bangladesh from 2006 to 2011.

Sheikh and Wang (2012) proved that board size and outside directors are positively related to the total debt ratio. Because firms with large boards are in a better position to raise money from outside sources to increase their value. They argued that the presence of independent directors on the firm board enhances the creditability, making it possible for the firm to borrow more to take advantage of the tax shields benefit.

Agency theory suggests two contradictory effects of debt on firm performance. The first effect is positive. In the case of high debt, managers are under pressure to invest in profitable projects to generate cash flow to pay interest and principal, thus reducing agency costs and encouraging managers to act for firm value (Jesen, 1986). The second effect is negative.

Although debt is an efficient way to reduce shareholder–manager conflict, it increases shareholder–creditor conflict. This conflict arises because debt can lead shareholders to invest sub-optimally (Myers, 1977). As debt levels rise, so will conflicts between creditors and shareholders, thus reducing firm performance. The debt holders will also require higher interest rates to compensate for the higher risk of liquidation.

2.5 Empirical evidence

In this section, the empirical evidence of the previous studies will be discussed. First, empirical evidence of firm specific and country specific determinants of capital structure will be discussed. Second, the effects of debt financing and internal financing on firm performance will be described. Next, research conducted in the context of the automotive industry will be present. Finally, the capital structure and firm performance during financial crisis will be discussed. The literature review summary in this section can be found in the Appendix A and Appendix B.

2.5.1 Determinants of capital structure

In the context of capital structure theory, the majority of literature is dedicated to identifying the relation between firm specific determinants and leverage. These studies implicitly assume that the effects of firm specific factors have the same effect on leverage in every country. However, De Jong et al. (2008) reported that firm leverage should be appropriately analyzed because they found that some attributes of capital structure were not equal across countries. Ramli et al. (2019) acknowledged that capital structure determinants can differ across countries after comparing certain attribute coefficients in the determinants of capital structure from Malaysia and Indonesia.

2.5.1.1 Firm-specific attributes

Pathak (2011) believes that capital structure should be designed very carefully. The company management ought to set a target capital structure and the subsequent financing decisions should focus on achieving the target capital structure.

Firm size is defined as the logarithm of total assets or the logarithm of sales in empirical studies. Most studies have found a positive relationship between size and firm leverage (Abor, 2008; Tesfaye & Minga, 2013). A rise in asset is linked with an increase in collateral securities. To go further, Jani and Bhatt (2015) in their studies showed that large firms chose long-term debt more often whereas small firms preferred short term debt. Because firm size plays a very important role in the negotiation for debt. Also, large firms are additionally diversified than small firms and have a steadier cash flow. The likelihood of bankruptcy for larger firms is minimal relative to smaller firms.

Liquidity is also an important factor affecting the capital structure. This is defined as the ratio of current assets to current liabilities in previous studies. The impact of liquidity on capital structure presents contradictory results. Sarlija and Harc (2012) studied the impact of corporate liquidity on capital structure in Croatia, and drew the conclusion that the increase of liquidity led to the decrease of leverage. Studies show that the more liquid assets a firm has, the less leverage it has. Lipson and Mortal(2009) pointed out that companies with high liquidity had a lower leverage ratio because their financing came from internal resources. However, Olayinka(2011) believed that from the perspective of Nigeria, leverage ratio was positively correlated with liquidity. When the firm uses the debt to solve the short-term debt repayment crisis, it pays the interest expense to the investor, which creates the tax benefit.

Asset tangibility is also seen as another important determinant of capital structure in previous studies. Those firms with higher levels of tangible assets are often large and can issue shares at reasonable prices, so they do not need to borrow to finance new investments. However, most empirical studies found that firms with more tangible assets tend to have more debt (Parsons & Titman, 2009; Giambona & Campello, 2013; Olakunle & Oni, 2014). Because many tangible assets contain appropriate collateral. When borrowers happen to get into trouble or default, they can be reallocated. Consequently, borrowing costs should be low.

In addition to these factors, a study by Gharaibeh (2015) revealed that firm's age, development opportunities, productivity and type of industry are determinants of capital structure of Kuwaiti companies. Ramli et al. (2019) proved that the capital structure decision are also influenced by the firm's own characteristics, such as asset structure, growth opportunities, non-debt tax shield.

2.5.1.2 Country-specific attributes

Some studies have found that some attributes of capital structure were not equal across countries. Several major country-specific determinants will be reviewed how they work on capital structure in this section. Those are economic growth, interest rate, inflation rate and stock and bond market development.

Economic growth is generally defined in two ways: annual gross domestic product (GDP) and the gross domestic investment (GDI). The pecking order theory argues that during an economic expansion, leverage should fall as internal capital is abundant. Based on empirical research, there are evidence supporting both positive and negative relationship. Frank and Goyal (2009) found that firms were likely to use debt during expansion and growth in GDP. However, Chen (2004) investigated the impact of economic development on leverage and showed a negative relationship in that study.

Interest rate was measured by the lending rate of commercial banks in empirical studies. Changes in interest rates affect taxes and bankruptcy costs and thus the capital structure. Fosu (2013) and Ramli and Nartea (2016) have found a negative relationship between interest rate and leverage. Firms borrow more whenever the cost of borrowing declines.

Inflation rate is generally measured as a percentage of the annual consumer price index. Whether inflation has a positive or negative impact on debt levels depends on the economy. During a recession, firms usually face difficulty repaying their debts. Fan et al. (2010) noted that lenders were normally discouraged from providing long term debt in times of high inflation. Inflation rate could affect a firm's debt structure in this way.

Stock and bond market development is another significant country-specific attribute affecting capital structure. Some studies used the ratio of stock market capitalization to GDP and the ratio of private and public bond market capitalization to GDP to measure the development of stock and bond markets. Research showed that in a particular country, the capital structure of a firm is closely related to market development. For example, as stock market activity increases, firms' preference for equity over debt increases. As a result, stock market activity is expected to be negatively related to debt (Demirguc-Kunt & Maksimovic, 1996) . De Jong et al. (2008) stated that firm leverage was greater in a developed country because bond issuing was easier than in a developing country.

2.5.2 Effects of external debt financing on firm performance

Previous research investigated the effect of debt financing on firm performance in different industrial settings. Some studies focused on a single industry and some studies looked into this relationship across multiple industries. Due to the different capital structure of different industries, the impact on firm performance is also different, and the regression results based on different industries may affect the effectiveness (Jayiddin et al., 2017). The sample from a single industry could avoid misleading results. Because some factors, such as economic risk, differ from firm to firm and therefore affect capital structure decisions (Vătavu, 2015).

When research focuses on a single industry, a capital-intensive industry, such as construction and manufacturing industry, is usually chosen. Because they are relatively more susceptible to economic shocks (Jayiddin et al., 2017). Previous studies proved that capital structure affects performance differently in different industries, and even within the same industry in different countries. Margaritis and Psillaki (2010) found higher leverage was associated with improved firm performance in French manufacturing industry. While in manufacturing industry in Romania, Vatavu (2015) found a negative relationship between leverage and firm performance. Gill et al. (2011) proved that there is a significant positive correlation between capital structure measured by total debt to total assets, short term debt to total assets and long term debt to total assets and ROE in American manufacturing in the period of 2005-2007. Azhagaiah and Gavoury (2011) argued that the increase in use of debt fund in capital structure tends to decrease the firm performance measured by ROA and ROCE of the IT firms listed in India. Khodavandloo (2017) reported there was a significant negative relationship between financial leverage and Malaysian firms’ performance in trading and services sector over 2004-2013. Jayiddin et al. (2017) uncovered a significantly negative effect of short term debt and an insignificant effect of long term debt on firm performance in Malaysian construction industry with data window between 2010 to 2014. Because short-term debt generally pushes firms to the risk of refinancing (i.e., the possibility that companies cannot replace old debt with new debt at a critical time for borrowers), thereby negatively affecting firm performance. Kashif et al. (2017) investigated the impact of debt financing on the financial performance in Pakistan textile industry and found a significant positive relationship among ROA, ROE and short term debt; ROA and long term debt but a negative relationship between ROE and long term debt.

Next, studies across non-financial multiple industries also have different results. When researchers conduct a multi-industry study, the financial sector sample is generally excluded. Because their financial statements are very different from those of other firms (Le & Phan, 2017) and the use of leverage is fundamentally different from that of other firms (Abeywardhana, 2015).

Some studies were conducted in the context of developed countries. Abeywardhana (2015) investigated the effect of debt financing for SMEs based in the UK from 1998 until 2008. The results show a negative and significant relationship. Nasimi (2016) stated that debt to equity ratio has a positive significant impact on ROE but negative significant impact on ROA and ROIC, using a sample of 30 firms from FTSE-100 index of the London Stock Exchange from 2005 to 2014. Abdullah and Tursoy (2019) confirm the positive relationship between leverage and firm performance using study sample of non-financial firms listed in Germany during the period 1993–2016.

Some studies were set in developing countries. Abor (2005) claimed that there is a significant positive effect of debt measured by short term debt to total assets and total debt to total assets on ROE using a sample of firms listed on the Ghana Stock Exchange from 1998 to 2002. Tian and Zeitun (2007) showed that a firm’s debt ratio had a significantly negative impact on the firm’s performance measures, in both the accounting measures (ROE, ROA, PROF) and market's measures (Tobin's Q, MBVR, P/E) using a panel data sample representing of 167 Jordanian companies during 1989-2003. Salim and Yadav (2012) indicated that firm performance, measured by return on asset (ROA), return on Equity (ROE) and earning per share (EPS) have negative relationship with short term debt, long term debt and total debt. While Tobin's Q reports a significant positive relationship between short term debt and long term debt. The investigation was performed using panel data procedure for a sample of 237 Malaysian listed companies during 1995-2011. Ebrati et al. (2013) claimed that leverage has a significant positive impact on ROE and Tobin's Q and negative impact on ROA among 85 firms listed in Tehran Stock Exchange from 2006 to 2011. Dada and Ghazali (2016) employed 100 non-financial firms of listed Nigerian companies for a period of 2010 to 2014 and report that there was no significant relationship between leverage and ROA and Tobin 's Q. Nwude et al. (2016) and Le and Phan (2017) used short-term debt, long-term debt and total debt ratios as indicators for debt structure. Nwude et al. (2016) provided evidence for a negative relationship between debt structure and firm performance for Nigerian listed enterprises from 2001 to 2012. In addition, Le and Phan (2017) reported all debt ratios have significantly negative relation to firm performance in all non-financial listed firms during the period 2007–2012 in Vietnam.

2.5.3 Effects of internal financing on firm performance

Myers and Majluf(1984) pointed out that if the investors did not know the value of the company's assets as well as the insiders, the stock might be mispriced by the market. Underpricing may result in new investors earning more than the NPV of new projects, resulting in a net loss to existing shareholders. In this case, even if the project has a positive net present value, it will be rejected, which means underinvestment. While using internal funds can avoid this problem. Vogt (1994) argued that internal finance is an important determinant of investment spending for low-payout firms, using a sample of 312 manufacturing firms for the period 1972-1986. He et al.(2019) took advantage of non-financial enterprises listed in China's Shanghai and Shenzhen stock markets from 2010 to 2015, and found that increasing internal financing could expand business investment, reduce investment shortage, and thus improve investment efficiency. From the point of view of behavioral finance, managers prefer internal financing because they have more control over internal funds.

2.5.4 Empirical evidence from automobile industry

Researchers also discussed effects of external debt and internal financing in automobile industry. Kirwok et al. (2017) conducted a study on 40 automobile firms in Kenya and found that these firms relied heavily on internal funds. Zubairi (2011) found that financial leverage had a significant positive impact on firms' profitability based on the panel data of automobile sector companies listed in Pakistan for the years 2000 to 2008. The results indicated that auto firms enjoyed such high profit margins that those using a higher proportion of debt in their capital structure are still more profitable than those using a lower proportion. A case study conducted by Jani and Bhatt (2015) in Indian automobile industry showed that these firms prioritized their sources of funding, from internal financing to equity, on the basis of "least effort or of least resistance". Szucs (2015) analyzed the Hungarian automobile industry and found that the impact of long term debt on firm performance was not obvious in the whole industry. Because the long-term fund raising was practically the privilege of firms having high market power. Some small firms had limited access to debt for lack of collateral.

Therefore, from previous studies, the impact of debt structure on performance varies with industry and the significance of short-term debt and long-term debt to performance is also different. For the auto industry, internal funds and debt are important sources of funding. In addition, the sample period also affects the results. Because the macroeconomic conditions such as the frequency of financial crisis and GDP growth are not always the same and affect findings.

2.5.5 capital structure during financial crisis

A severe financial crisis may leave a firm financially constrained. These financially constrained firms may find it difficult to raise internal or external capital and forgo investment opportunities, even if the investment has a positive net present value. During a financial crisis, firms may be forced to adjust capital structure to cope with adverse conditions, such as credit rationing and higher borrowing costs.

Harrison and Widjaja (2014) compared the determinants of capital structure before and after 2008 global financial crisis and found that internal financing capacity during the financial crisis became weaker and less influential in capital structure. Iwaki (2019) investigated the impact of the 2008 financial crisis on the capital structure of Japanese firms. He believed that the impact of the financial crisis on the structure of debt depended on the source of debt or whether firms have access to the public debt market. In the wake of the financial crisis, firms that relied on bank loans faced more underinvestment or uncertainty than those with access to public debt market.

3. Hypotheses

3.1 External debt financing and firm performance

As discussed in literature review, agency theory suggests both positive and negative effects of debt structure on firm performance. The empirical evidence supports both outcomes. Some researchers (Margaritis & Psillaki, 2010; Zubairi , 2011; Gill et al., 2011) found a positive relationship between leverage and firm performance. Whereas on the other side, some researchers (Abeywardhana, 2015; Vatavu, 2015; Nwude et al., 2016; Khodavandloo, 2017; Le & Phan, 2017) found that the relationship is negative. Moreover, Some studies (Kashif et al., 2017; Ebrati et al., 2013; Jayiddin et al., 2017) provided evidence that the relationship varied according to capital structure and performance measurements.

In particular, not only did Le and Phan (2017) reveal a negative relation between leverage and performance in all non-financial Vietnamese listed firms, but they found that the negative relation was more common in high-growth industries or countries, and the positive relation was generally found in low-growth industries or countries. The evidence that Vietnam has one of the highest economic growth rates in the world (World Bank 2011) could also verify this finding.

In addition, previous studies have also provided evidence. Stulz (1990) pointed out a positive relationship between leverage and firm performance in low-growth firms. Shareholders in the firms with poor investment opportunities may wish to issue bonds. This way could restrict management's ability to pursue its own objectives (i.e., greater visibility, more perks, better employees' promotion) when management has more information than shareholders. And managers are forced to pay off their debts with extra cash. McConnell and Servaes (1995) came to the same conclusion that for firms with fewer growth opportunities, the positive effect could predominate because in at least some circumstances, debt could prevent managers from taking on negative net present value projects. Overinvestment problem could be curtailed because managers have no the incentive or opportunity (i.e., excess cash flow) to make wasteful investments.

According to Parkin et al. (2017), two critical performance indicators show the automobile industry has entered a phase of slow growth with fewer growth opportunities. First, total shareholder return (TSR): Over the last five years, the average auto maker TSR was only 5.5%, which was much lower than 14.8% annual rate of return that the S&P 500 Industrial Average achieved for investors. Second, return on invested capital (ROIC): In 2016, the top 10 auto makers returned 4%, about half of the industry's cost of capital. With increased investment in technological innovation and stricter environmental regulation, auto industry managers must avoid overinvestment and use funds for profitable projects. According to agency theory, leverage can be used as a disciplinary measure to reduce waste in managing cash flows through the threat of liquidation or the pressure to generate cash flow to pay off debts. It is therefore hypothesized that:

H1: External debt financing has a positive influence on the performance of automobile listed firms.

3.2 Internal financing and firm performance

Information asymmetry and transaction costs have to be taken into account when a firm is financed by external funds. Information asymmetry indicates that managers know more about their firms' prospects, risks, and values than outside investors. Outside investors observe the firm's prospects by information transferred by managers. Financial intermediaries can reduce asymmetric information to a certain extent. They can pool the resources of many investors, which allows them to diversify at a lower cost. Transaction costs means any costs associated with completion of an exchange, including but not limited to broker commissions; bank charges; legal fees; search and monitoring costs and the opportunity cost of time devoted to investment-related activities. Transaction costs are also one reason why institutional intermediaries dominate external finance. They are important because they detract from bottom-line profits (Wright et al., 2009).

As the pecking order theory favored by Myers & Majluf (1984), it suggests that firms should follow the financing hierarchy in to minimize information asymmetry and transaction costs between parties. So when a firm's project needs funds, internal financing is the preferred method. Unless internal funds cannot meet the needs of the project, managers will only consider external financing. The advantages of internal financing are easy to use and low cost. And there are no restrictions and constraints from creditors.

Empirical research provides evidence that internal financing is preferred by some auto firms. Weiner (2006) recognized that internally generated funds are utilized than external funds since it’s cheaper. Kirwok et al. (2017) conducted a study on 40 automobile firms in Kenya and found that these firms relied heavily on internal funds. A case study conducted by Jani and Bhatt (2015) in Indian automobile industry showed that these firms prioritized their financing sources (from internal financing to equity) according to the principle of “least effort, least resistance”. This financing model is consistent with the pecking order theory. From this point of view, making full use of internal capital is an effective way to reduce the cost of capital and financing resistance.

Leary and Roberts (2005) believe that managers would take advantage of the information advantage to issue securities, but investors may realize the management’s motivation and therefore discount the price of the securities they are willing to pay. The result of this discount is a potential underfinancing problem. And this may cause managers to forgo profitable investment opportunities. To avoid underinvestment, firms prefer to use internal capital because they completely avoid the information problem. Therefore, internal funds can avoid the problem of underinvestment caused by insufficient external financing to a certain extent.

He et al. (2019) found that internal financing could reduce underinvestment and improve investment efficiency. Managers who believe their firms are undervalued by outside investors tend to opt for internal financing and keep cash inside. In this case, a firm’s investment efficiency is highly sensitive to internal funds. Based on the pecking order theory, internal financing can reduce cost of capital and avoid insufficient external financing caused by information asymmetry. It is therefore hypothesized that:

H2: Internal financing has a positive effect on the performance of automobile listed firms.

4. Methodology

In previous studies, the common method is to test the hypothesis from capital structure theories by testing the multivariate regression model of panel data (e.g. Ramli et al., 2019; Le & Phan, 2017; Jayiddin et al., 2017; Khodavandloo et al., 2017; Nwude et al., 2016; Vatavu, 2015; Abeywardhana, 2015; Ebrati et al., 2013; Gill et al,. 2011; Zubairi, 2011; Margaritis & Psillaki, 2010). The data are set up in a panel form since they are collected from the same sample at several time points (Babbie, 2012). It can use the estimation advantage of increasing the number of observations or degrees of freedom and reduction of collinearity, thereby improving the efficiency of estimators. The regression models adopted in previous studies will be present in this section.

4.1 Regression Models

Multiple regression analysis on the panel data is carried out on the panel data to investigate the degree and direction of the relationship between variables, after controlling for firm characteristics. Based on the previous studies, the linear regression is the most suitable and common model to explain the effects of capital structure. The linear correlation between a metric dependent variable and one or multiple metric independent variables will be examined. Specifically, the linear model can be presented as follows:

$$y = \alpha_0 + \beta_1 x_{i,t} + \beta_2 z_{i,t} + \mu$$

Where: y = Dependent Variable, α_0 = Constant (intercept) of y, $x_{i,t}$ = Independent Variables, $z_{i,t}$ = Control Variables, β_1 = Coefficients of Independent Variables, β_2 = Coefficients of Control Variables, µ = Random term.

In prior studies, Ordinary Least Squares, Fixed effects and Random effects estimation methods are common techniques for estimation of panel data. The summary of different regression methods used in previous studies could be found in Table 1.

Table 1 Regression methods used in previous studies

Author, year	**Regressions**
Abor, 2005	OLS
Tian & Zeitun, 2007	OLS, FE, RE
Margaritis & Psillaki, 2010	OLS, RE
Gill et al., 2011	OLS
Salim & Yadav, 2012	OLS
Vatavu, 2015	OLS, FE, RE
Abeywardhana, 2015	2SLS
Nwude et al., 2016	OLS, FE, RE
Dada & Ghazali, 2016	OLS, FE, RE
Nasimi, 2016	FE, RE
Le & Phan, 2017	OLS, FE, RE
Jayiddin et al., 2017	FE, RE
Khodavandloo et al., 2017	FE, RE

4.1.1 Ordinary Least Squares

Ordinary Least Squares (OLS) regression method has been employed in a wide range of economic relationships. OLS chooses the parameters of a linear function by the principle of least squares: minimizing the sum of the squares of the differences between the observed dependent variables in the given dataset and those predicted by the linear function. It should be noted that the OLS regression is based on following assumptions: linearity, homoscedasticity, exogeneity, non-autocorrelation, not stochastic and no multicollinearity. The advantage of OLS is that it is easy to implement and produce easy-to-understand solutions. Le and Phan (2017) argue that OLS estimators are unbiased and consistent if there is no unobserved heterogeneity at all and the random terms are independent of the independent variables. However, regression using OLS methods cannot control for the unobservable individual effects, which is common in most studies using cross-sectional data. Furthermore, according to Jayiddin et al. (2017), Ordinary Least Squares method is unable to control the individual or time-specific effect which is called unobserved effect. If the unobserved effect appears, the FE or RE estimators are better than the OLS method.

4.1.2 Fixed and random effects model

The rational for adopting FE and RE estimators is to control for the effect of the unobserved heterogeneity in the dataset by controlling time contrast and time invariant variables (Nwude, 2016). The fixed effects models explore the relationships between dependent variables and explanatory variables in independent entities, assuming that firms have their own characteristics that affect the relationships between variables. On the contrary, random effects models means a random variation across firms and is not related to explanatory variables (Vătavu, 2015). The Hausman test will reveal the better model from the above two.

Furthermore, for fixed effects and random effects model, fixed effects model is expected to be more suitable. From a logical perspective, it makes sense that firms have specific abilities, structures and operating practices that affect the financing structure and therefore the performance. Bell et al. (2019) state that one of the disadvantages of the fixed effects model is that it does not allow for the involvement of time-invariant independent variables. Because time invariant characteristics are technically perfectly collinear with the entity dummies and fixed effect models are used to study the cause of changes within an entity (Kohler & Kreuter, 2005). According to Dada and Ghazali (2016), the difference between the fixed-effect model and the random effect model is that, in the fixed-effect model, each individual is assigned its intercept α_i when the slope coefficient is the same, and the heterogeneity is associated with the regressors. In the random effect model, the individual heterogeneity is a correlated with all the observed variables.

4.1.3 Two-stage least squares model

Two-stage least squares (2SLS) model has also been used in previous studies, although not very often. 2SLS model is used by Abeywardhana (2015) to investigate the impact of leverage on ROA and ROCE of non-financial SMEs in the UK from 1998 to 2008, and a significant negative correlation between capital structure and profitability is confirmed in this study. The analysis is based on variants of equations and incorporating alternative proxies to measure firm performance, capital structure and specific characteristics. This technique is the extension of the OLS method. According to James and Singh (1978), 2SLS can be used to (a) To test for causality, (b) to eliminate biases resulting from random measurement errors, and (c) to assess the causal effects of correlated dependent variables measured at different points in time.

To employ the 2SLS approach, in the first stage, a new variable is created using the instrument variable. In the second phase, the model-estimated values from the first stage are then used instead of actual values of the problematic predictors to compute an OLS model. However, if there are weak instruments selected, the overall outcome will not change much (Wooldridge, 2012). So previous studies have not provided much information on determining the appropriate instrumental variables for performing 2SLS.

Finally, there are also empirical studies that used more than two method. Tian & Zeitun (2007), Vatavu (2015), Dada & Ghazali (2016), Nwude et al. (2016) and Le & Phan (2017) adopted all the three common methods (OLS, FE, RE) mentioned above in their studies. In Vatavu's research, the best to describe the impact on ROA was the fixed effects model. And the results from Dada & Ghazali (2016) and Nwude et al. (2016) showed that the outcome for the three regression analysis didn't differ significantly. Moreover, Le and Phan (2017) conducted FE and RE models for unobserved individual effects, and the values of adjusted R-squared increased, which reflected more changes in dependent variables are explained by this model.

4.2 Variables

Five variables are used to measure firm performance: ROE, ROA, Tobin's Q, ROCE and ROIC. Total debt ratio, long-term debt ratio, short-term debt ratio and internal financing ratio are used as independent variables. According to the literature summary in the Appendix B, tangibility, size, liquidity and asset growth will be used as control variables in this study. A description of all variables used can be found in Table 2.

4.2.1 Dependent variables

A total of five proxies for firm's performance will be used: ROE, ROA , Tobin's Q, ROIC and ROCE. ROE and ROA are widely accepted accounting-based measures of financial performance. ROE reveals how much profit a company generates from its shareholders' investments, usually as a proxy for the firm's profitability. In previous studies, some researchers (Abor, 2005; Gill et al., 2011) measure ROE by earnings before interest and tax over total equity. And some researchers (Le & Phan, 2017; Khodavandloo et al., 2017; Vatavu, 2015; Ebrati et al., 2013; Abdullah & Tursoy, 2019) measure ROE by net income over total equity. In this study, ROE is measured by the ratio of net income to total equity.

ROA is seen as a measure of ability of management to effectively use assets under its control, regardless of funding sources. ROA is a good approximation of how effectively managers are using the company's resources (Fosu, 2013). In previous studies, some research (Ebrati et al., 2013; Jayiddin et al., 2017) calculated ROA by dividing net income plus interest expenses with total assets. Some research (Vatavu, 2015; Abeywardhana, 2015; Le & Phan, 2017; Khodavandloo et al, 2017) measure ROA by dividing net income with total assets. In addition to the above two ways, Nwude et al. (2016) measure ROA by dividing earnings before interest and tax with total assets. And Zeitun and Tian (2007) use earnings before interest and tax plus depreciation to total assets together with ROA to cross check the results. In this study, ROA is measured by dividing earnings before interest and tax with total assets.

Tobin's Q is an appropriate performance measurement method introduced by Tobin in 1969, which is defined as the ratio of a firm's market value to its book value. Tobin's Q mixes market value with accounting value and is used as a proxy of firm value. The market value of the debt required for Tobin's Q measurement is not provided in the annual reports and statements of the selected company. To alleviate the problem some research (Zeitun & Tian, 2007; Ebrati et al., 2013; Le & Phan, 2017) employed the following form: Tobin's Q = (Market value of equity+ Book value of debt) / Book value of total assets. According to Le and Phan (2017), the market value of a firm includes the market value of debt and equity. The market value of debt can be thought of the book value and the market value of equity is the current market capitalization of equity. In this research, Tobin's Q is used as a market performance measure.

Two alternative dependent variables ROCE and ROIC are also used in the robustness tests. Return on Capital Employed (ROCE) is also considered as a profitability variable in previous studies (Abeywardhana, 2015; Azhagaiah & Gavoury, 2011). ROCE is calculated by earnings before interest and tax to capital employed. Capital employed is obtained by subtracting current liabilities from total assets, ultimately resulting in equity plus long term debt (James, 2020). Therefore, ROCE is a long-term profitability ratio because it shows how efficient the asset is when long term financing is taken into account, which differs from ROE. Return on invested capital (ROIC) is used to assess a company's efficiency in allocating the capital it controls to profitable investments. It gives a sense of how well a company is using its money to generate returns (Nasimi, 2016). According to James (2020) and Nasimi (2016), ROIC is measured by net operating profit after tax to invested capital in this research. Net operating profit after tax is a measure of EBIT x (1 – effective tax rate), which considers a company's tax obligations while ROCE usually does not. Since effective tax rate is not available in Orbis, this study will use EBIT minus income tax to measure net operating profit after tax. Invested capital is measured by adding the book value of equity to the book value of debt, and then subtracting non-operating assets, including cash and cash equivalents, securities and discontinued assets.

4.2.2 Independent variables

The first three independent variables adopted in this study are debt structure, which is portion of firm assets financed by fixed charges such as loans, overdrafts, leases, etc. It shows a company's exposure to interest and principal payments on its debt. Management of the debt structure measures the maturity profile of financial leverage. As argued by some scholars (Myers & Majluf, 1984; Jensen & Meckling, 1976) in literature review, it can influence firm performance.

Total debt ratio (TDR), short term debt ratio (STDR) and long term debt ratio (LTDR) are used to measure debt structure. Short term debt is debt obligation of the firm payable within one year. While long term debt is debt obligation having a maturity more than one year from the date it was issued. Short term debt ratio is short term debt divided by total assets; long term debt ratio refers to the ratio of long term debt to total assets; and total debt ratio is measured as the ratio of total debt to total assets. All these measures are based on book values of the firm. According to Booth et al. (2001), the payment of debt depends on the book value of the loans not the market value of debt. Le and Phan (2017) argued that the market value of debt can be considered the book value. In view of the above two points, in this study the ratios of book values of short term debt, long term debt and total debt to book value of total assets are employed.

Table 2 Variable Definitions

Types of variables	Name	Abbreviations	Calculation method	References	predicted sign
Dependent variable	Return on Equity	ROE	Net income / Total shareholder equity	Vatavu, 2015; Le & Phan, 2017; Ebrati et al., 2013	
	Return on Assets	ROA	EBIT / Total assets	Nwude et al., 2016	
	Tobin´s Q	Tobin´s Q	(Market value of equity + Book value of total debt) / Book value of total assets	Vatavu, 2015; Le & Phan, 2017; Ebrati et al., 2013	
	Return on capital employed	ROCE	EBIT / (Total assets-Current liability)	Abeywardhana, 2015	
	Return on invested capital	ROIC	(EBIT – Income Tax) / (Debt + Equity-Non operating assets)	Ramli et al., 2019; James, 2020; Nasimi, 2016	
Independent variable	Total debt ratio	TDR	Total debt / Total assets	Zeitun & Tian, 2007; Abeywardhana, 2015; Vatavu, 2015; Le & Phan, 2017	+
	Short-term debt ratio	STDR	Total short term debt / Total assets	Zeitun & Tian, 2007; Abeywardhana, 2015; Vatavu, 2015; Le & Phan, 2017	+
	Long-term debt ratio	LTDR	Total long term debt / Total assets	Zeitun & Tian, 2007; Abeywardhana, 2015; Vatavu, 2015; Le & Phan, 2017	+
	Internal financing ratio	IFR	(Retained earnings + Depreciation)/ Total assets	He et al., 2019; Myers ,2001; Harvey, 2012	+
Control variable	Tangibility	TANG	Tangible fixed assets / Total assets	Margaritis & Psillaki, 2010; Khodavandloo et al., 2017	+/-
	Size	SZ	Natural log of Total assets	Khodavandloo et al., 2017; Abdullah & Tursoy, 2019	+
	Liquidity	LIQ	Current assets/ Current liability	Abeywardhana, 2015; Vatavu, 2015; Le & Phan, 2017	+/-
	Asset growth	GRO	Total assets of time t / Total assets of time t-1	Salim & Yadav, 2012; Khodavandloo et al., 2017; Ramli et al., 2019	+
	Year dummies	$Year_t$	The dummy variable takes the value one in the observed year; otherwise it takes the value zero.	Zeitun & Tian, 2007; Le & Phan, 2017	
	Industry dummies	$Industry_i$	$Industry_i$ is assigned value one if firm is in the observed industry and zero otherwise	Zeitun & Tian, 2007; Le & Phan, 2017	

Internal financing ratio (IFR) is used as the fourth independent variable to capture the impact of internal financing on firm performance. Myers (2001) stated that internal cash flow includes depreciation and retained earnings. Internal financing is defined as financing obtained not through the issuance of shares or bonds but through a company's retained earnings and depreciation (Harvey, 2012). While He et al. (2019) used retained earnings over total assets to measure the internal financing ratio. Depreciation is an accounting practice that allows a company to write off the value of an asset over a period of time, usually the life of the asset. Depreciation is considered a non-cash expense because it does not represent the actual cash outflow (Tuovila, 2020). Therefore, from the above point of view from Myers (2001) and Harvey (2012), the internal financing rate will be measured by the ratio of the sum of retained earnings and depreciation to total assets in this study.

4.2.3 Control variables

Firm performance is not solely influenced by capital structure, and control variables are also used to create an overview of firm performance factors. This research scope is narrowed down to firm related factors, as the endogenous factors, most firm decision makers can control them as intrinsic factors that affect firm performance. In line with previous studies, especially those focusing on the capital structure-performance relationship, tangibility, size, liquidity and asset growth are control variables in this study. Furthermore, according to Zeitun and Tian (2007), Abeywardhana (2015) and Le and Phan (2017), industry and year dummy variables are also included to capture industry- or time-specific fixed effects.

This thesis does not focus on control variables regarding corporate governance, such as ownership concentration. Although they have been studied as control variables in some studies on the relationship between capital structure and firm performance (e.g. Margaritis & Psillaki, 2010), they are more often used in the research of the relationship between corporate governance mechanism and firm performance, such as board gender diversity-performance relationship and pay-performance relationship. Or they are used as independent variables to explore the relationship with performance separately.

Tangibility is measured by the ratio of tangible fixed assets to total assets, following prior research (e.g. Margaritis & Psillaki, 2010 and Khodavandloo et al., 2017). Tangibility as a control variable is used to measure the impact of asset structure on firm performance. Himmelberg et al. (1999) stated that tangibles provide good collateral and are easily monitored, so they tend to mitigate agency conflicts between creditors and shareholders. Margaritis and Psillaki (2010) found that tangibility has a non-monotonic effect; negative at low fixed tangibles to total assets ratios and positive at high fixed tangibles to total asset ratios. As Booth et al. (2001) discussed, a high proportion of hard tangible assets would diminish the agency costs of managerial discretion. Managerial discretion represents the cost to shareholders of potential opportunism or other selfish behaviors. Agency theory states managers are opportunistic and likely to misallocate firm resources for their own use unless they are constrained by well-designed incentives or important governance that limits the availability of discretionary capital. While in the research from Khodavandloo et al. (2017), tangibility has no significant effect on ROE or ROA, but it has a significant negative effect on the market based indicator PE (Price earnings ratio). Therefore, firm performance may be influenced by the proportion of tangible fixed assets and firm performance indicators.

Size is measured as the natural logarithm of total assets in this research, following previous studies (e.g. Zeitun & Tian, 2007; Abeywardhana, 2015; Khodavandloo et al., 2017; Nwude et al., 2016 and Abdullah & Tursoy, 2019). Size is the most common control variable used in similar studies. Margaritis and Psillaki (2010) argued that larger firms are expected to be more diversified and managed better which should improve firm performance. Zeitun and Tian (2007), Abeywardhana (2015), Khodavandloo et al. (2017) and Nwude et al. (2016) support a positive relationship between size and firm performance in their empirical research. While Abdullah and Tursoy (2019) found that accounting performance decreases with the increase of firm size, whereas market performance increases with the increase of size. Based on the above empirical research and such a view that relatively large firms tend to be more diversified and less prone to bankruptcy while small firms pay higher costs than large ones to meet their investment needs (Titman & Wessels, 1988), firm size is expected to be positively related to firm performance.

Liquidity is measured by the ratio of current assets to current liabilities in this research, following prior research (e.g. Vatavu, 2015; Abeywardhana, 2015 and Le & Phan,2017). Liquidity refers to the ability of a firm to fulfill its short-term financial obligations. It is one of the signals of firm performance and prospects. According to Cho (1998), liquidity is positively related to firm performance. Highly liquid firms can support new projects, pay dividends or ease financial distress. Le and Phan (2017) found that the coefficients of the liquidity factor are positively significant at the 1% level in the ROA equation in their research. And Vatavu (2015) show that current assets offer opportunities for more profits, especially when including long term debt ratio as regressor the fixed effects equation returns a significant positive coefficient for liquidity. However, the research from Abeywardhana (2015) report a negative relationship between liquidity ratio and firm performance. The negative effect could be an implication of the past performance. Those less profitable firms may grant their customers incentives or the negative earnings growth decreases profit and increase the stock level. If a company has a lot of cash but no profits, it can go bankrupt. Since available cash will have to be used to cover losses, the company's assets will have to shrink because there will not be enough capital to replace them. Based on the conclusion of the above empirical research, liquidity may have an uncertain impact on firm performance indicators.

Finally, asset growth measures annual growth rate of total asset in this research, following previous research (e.g. Salim & Yadav, 2012; Khodavandloo et al.,2017 and Ramli et al., 2019). Changes in assets can measure a firm’s growth potential. Ramli et al. (2019) argued that greater growth opportunity indicates good business performance and easier access to finance in competitive markets. In the agency theory, when firms have higher growth opportunities, they will use less debt in financing so as to reduce the conflict between debt holders and shareholders. Salim and Yadav (2012) report asset growth has significantly positive relationship with the performance measured by ROA. Khodavandloo et al. (2017) found that asset growth has a positive impact on accounting measure ROE and market measure PE (Price earnings ratio), significant at 5% level. Therefore, asset growth is expected to be positively related to firm performance measure.

4.3 Empirical Model

Multiple regression analysis on the panel data will be undertaken to test the hypotheses developed in chapter 3. In general, OLS, FE and RE estimation methods are common techniques for estimation of panel data. As reviewed in Table 1, this thesis refers to the previous similar studies in which all above three methods were used (e.g. Tian & Zeitun, 2007; Vatavu, 2015; Nwude et al., 2016; Dada & Ghazali, 2016; Le & Phan, 2017).

Le and Phan (2017) stated that when there are unobserved individual effects that are common in non-experimental studies, the FE or RE models are better than the OLS method. After running FEM and REM, they conducted FE estimations in which dummy variables were included to capture industry- or year-specific fix effect in robustness check. Tian and Zeitun (2007) suggested that the FE model does not allow us to control for the influence of the industrial sectors. Because industry dummies do not change over time and they are not reported in the FE model. So the robustness of the results were tested using industry-fixed and time-fixed random effects models. Vatavu (2015) ran both the fixed-effect model and the random-effect model, and the Hausmann test showed that the fixed-effect model was more effective in the research. Then he considered a fixed effect model corrected for time-fixed effects, heteroskedasticity and autocorrelation. Similarly, the outcomes from the above studies did not show important change on major variables.

Therefore, the equation (1) is for both FEM and REM. In addition, if the Hausmann test results show that the fixed effect model is more suitable, fixed effects models corrected for time-fixed effects will be run. Otherwise, industry-fixed and time-fixed random effects models will be conducted.

$$FP_{i,t} = \alpha + \beta_1 X_{i,t} + \beta_2 Z_{i,t} + \alpha_i + e_{i,t} \quad (1)$$

Where i denotes firms and t denotes time. Therefore, i denotes the cross-section dimension and t denotes the time-series dimension. α is a constant value; the βs are variable coefficients; α_i is an individual error component at firm level and $e_{i,t}$ is an idiosyncratic error, which is independent with both $X_{i,t}$ and α_i. If α_i is correlated to $X_{i,t}$, the FE model would give consistent estimators. If α_i is not correlated to $X_{i,t}$, the RE model will be suggested.

$FP_{i,t}$ is performance of firm i at time t and measured by ROE, ROA, Tobin's Q, ROCE and ROIC. $X_{i,t}$ refers to vector of independent variables that are proxies of the debt financing and internal financing of firm i at year t (short term debt ratio, long term debt ratio, total debt ratio, internal financing ratio). Moreover, $Z_{i,t}$ is vector of control variables that are proxies of firm related determinants of performance in firm i at year t (tangibility, size, liquidity and asset growth).

The OLS model is used for robustness check where it is assumed that any heterogeneity across firms has been averaged out. To capture the industry and year specific fixed effects, industry dummies and year dummies are added. Thus the OLS estimation is given as:

$$FP_{i,t} = \alpha + \beta_1 X_{i,t} + \beta_2 Z_{i,t} + i.industry + i.year + \varepsilon_{i,t} \quad (2)$$

$\varepsilon_{i,t}$ is the error term. $i.industry$ and $i.year$ denote industry dummies and year dummies, respectively. Other variables have the same meaning as in equation (1).

4.4 Collinearity and multicollinearity

Collinearity and multicollinearity will be tested before regression is performed. Collinearity is the expression of the relationship between two or more independent variables. If the correlation coefficient of two independent variables is 1, it means complete collinearity; If the correlation coefficient is 0, then it is not collinearity at all (Hair et al.,2014). The common way to identify collinearity is to construct a correlation matrix. The presence of high correlations is an indication of collinearity.

When any independent variable is highly correlated with a set of other independent variables, multicollinearity will occur. Lack of any high correlations does not ensure a lack of multicollinearity. To make sure there is no influence from multicollinearity, the Variance Inflation Factor (VIF) will be calculated. VIF is the inverse of tolerance value which is defined as the variability of the selected independent variable that is not explained by the other independent variables. The common cutoff threshold is a VIF value of 10, but values much lower than the recommended thresholds (VIF values of 3 to 5) can cause interpretation problems, especially if the relationship with dependent measure is weaker (Hair et al., 2014).

4.5 Endogeneity issues

Although FE or RE models can control for unobserved heterogeneity, they don't take endogeneity into account. The basic problem of endogeneity occurs when the explanatory variables (X) may be influenced by the interpreted variables (Y) or both may be jointly influenced by an unmeasured third (Esping-Andersen & Przeworski, 2001). In other words, in this study, debt financing and internal financing can affect firm performance but firm perform can also have impact on debt financing and internal financing.

To deal with this issue, some previous studies (e.g. Tian & Zeitun, 2007) have used instrument variable estimators (IV estimators). However, IV estimates with invalid instruments could not improve OLS estimators. Also dynamic panel GMM is applied by some previous studies (e.g. Le & Phan,2017; Abdullah & Tursoy, 2019). GMM estimator could have instrument variables as exogenous variables in other time periods or lag of variables to use as instruments for endogenous variables in the current time period, which can also solve endogeneity issue for other independent variables (Roodman 2009). A third solution that can help to deal with the endogeneity problem is to use one year lag in the independent variables (e.g. Margaritis & Psillaki, 2010; Fosu, 2013). Margaritis and Psillaki (2010) believe that both the effect of X on Y and the reverse effect from Y on X are not expected to be instantaneous. Fosu (2013) argued that the lagged value of X helps address the possible reverse causality between X and Y. In this research, to control for endogeneity issues, lagged independent variables will be used as a robustness check.

4.6 Robustness check

The following approaches will be used to test robustness of the results. First, the subsample analysis will be run to cross-check the results. Second, the OLS regression with one-period lagged of dependent variables will be run. Next, another two models will be run in order to check the robustness of the initial model. The dependent variables ROIC and ROCE will be adopted. Finally, the mean values of each variable for 303 companies during the 9 years constitute a new data set. The OLS regression will be conducted based on this data set. The results of these tests will be included in the chapter sixth.

5. Data

The data of publicly traded automobile firms are collected from Orbis. The time range of this research is nine years, which covers the time period of 2011-2019.

The US SIC codes were applied in this study. According to Standard Industrial Classification Manual (1987) and definition of automobile industry, financial data of firms which are classified in SIC Codes 3711, 3713, and 3714 are used. Based on the information from SICCODE.com[1], automobile manufacturers are classified under SIC Code 3711. According to the definition of the automobile industry[2] and similar industry classification match, firms under codes 3713 and 3714 are engaged in the production and activities related to automobile manufacturing, including most parts such as engine and body. Finally, the sample consisted of firms whose principal products were passenger cars and light trucks (including pickups, vans and sport-utility vehicles), commercial vehicles (namely delivery trucks and large transport trucks) and related parts. Table 3 shows the examples of the main products of the sample firms.

Table 3 Automobile industry SIC Code description

SIC Code	Description	Examples	Number of firms	%
3711	Motor Vehicles and Passenger Car Bodies	Ambulances, Road oilers, Snowplows, Station wagons, Patrol wagons (motor vehicles), Tractors (highway use)	75	24.75%
3713	Truck and Bus Bodies	Bus bodies, Truck cabs and tops, Van-type bodies	17	5.61%
3714	Motor Vehicle Parts and Accessories	Gasoline engines, Hoods (motor vehicle), Control equipment	211	69.64%
Total			303	100.00%

Since the database is limited to firms classified in SIC Codes 3711, 3713, and 3714, a total of 897 active listed companies were selected. Out of these firms, 304 have been removed because financial data for 2019 are not yet available or operating revenue is 0. Next, Firms that made their initial public offering later than 01/01/2011 were removed for data integrity. Finally, There are 303 firms left that meet the requirements.

The distribution of these firms among the various areas is shown in Table 4 (ranking from high to low). From the regional distribution of samples, Far East and Central Asia accounts for the largest proportion. Western Europe and North America are next. They are also among the top three in terms of operating income in the year of 2019. In Western Europe, the sample firms are mainly in Germany, France and Turkey. In North America, American firms account for the largest proportion. Samples from developed countries make up more than half. Detailed country distribution statistics can be found in Appendix C.

[1] SIC Code 3711 - Motor Vehicles and Passenger Car Bodies https://siccode.com/sic-code/3711/motor-vehicles-passenger-car-bodies

[2] definition of the automobile industry https://www.britannica.com/technology/automotive-industry

Table 4 The regional distribution of the sample firms

Panel A Distribution based on World Region		
	Number of firms	%
Far East and Central Asia	194	64.03%
Western Europe	33	10.89%
North America	32	10.56%
Eastern Europe	20	6.60%
South and Central America	12	3.96%
Oceania	5	1.65%
Middle East	4	1.32%
Africa	3	0.99%
Total	303	100.00%
Panel B Distribution based on development level		
	Number of firms	%
Samples from developed countries	161	53.14%
Samples from developing countries	142	46.86%
Total	303	100%
Panel C Distribution based on operating revenue in 2019		
	Operating revenue ($ Mil)	
Far East and Central Asia	956319.7	48.23%
Western Europe	688429.2	34.72%
North America	319672.2	16.12%
South and Central America	8287.9	0.42%
Eastern Europe	7590.4	0.38%
Africa	1299.4	0.07%
Oceania	655.7	0.03%
Middle East	611.1	0.03%
Total	1982865.7	100%

6. Results and discussion

6.1 Descriptive statistics

Summary statistics of all variables as proxy variables for capital structure, firm performance and control variables are shown in Table 5. According to Heyman et al. (2008), the independent variable outliers are filtered in the following way: (i) the percentage of long term debt over total debt could not exceed 100%; and (ii) the percentage of short term debt over total debt could not exceed 100%. And all dependent variables and control variables except for dummy variables are winsorized at 1% at each tail.

Firm performance indicators are presented by ROE, ROA, Tobin's Q, ROCE and ROIC. ROE indicates the efficiency of management to utilize the investment of stockholders in the form of return. ROA can be seen as a measure of management's efficiency in using all the assets under its control, regardless of source of funds (Ebrati et al., 2013). The average of returns on equity and assets for the sample as a whole are 5.9% and 3.5%, respectively. These two measures of firm performance, ROE and ROA, suggest a large spread in their value. The ROE of those firms ranges from -1.265 to 0.494, and ROA ranges from -1.110 to 0.283. This implies that there is a gap in firm performance among automobile listed firms during this period. The average values of Tobin's Q calculated by the sum of market value of equity and book value of debt to the book value of assets is 0.734, which reveals that the market value of listed firms in automobile industry is lower than their book values. According to Tian and Zeitun (2007), the low ratio of market performance indicators could be as a result of the increase in the real activities performance of the firm without the increase in firms' share price and equity correspondingly. In the section 2.5, previous studies prove that those firms with higher levels of tangible assets are more likely to issue shares at reasonable prices. Tangibles provide good collateral and are easily monitored. As descriptive statistics show, tangible fixed assets only make up 0.306 of the total assets in the sample firms. Tobin's Q ratio can also compare the market value of the firm with the replacement cost of the firm's assets In those firms with Tobin's q value higher than one, management has performed well with the assets under its command. They have better investment opportunities and higher growth potential (Lang, Stulz & Walkling, 1989). In the descriptive statistics, the Tobin's Q values in Q1, Q2 and Q3 are all less than one, which means that the growth expectations of investors are negative and the firms should not reinvest in these assets.

In previous studies, Le and Phan (2017) report that the mean of ROE, ROA and Tobin's Q is 0.1030, 0.0632 and 1.1518, respectively, based on a sample of all Vietnamese non-financial listed firms from 2007 to 2012. Zeitun and Tian (2007) report that the mean of ROE, ROA, and Tobin's Q is -0.142, 0.012 and 1.701, respectively, based on a sample of 167 Jordanian firms during 1989-2003. In the study from Vătavu (2015), the average ratio of ROE and ROA is 0.125 and -0.003 in Romanian manufacturing companies over the 2003 – 2010 periods. In this study, the positive mean values of ROE and ROA indicate that the sample analyzed could generate profit based on their shareholders' investments and total assets. However, the significantly lower Tobin's Q mean value indicates that the sample firms in this study have difficulties in improving their market performance.

ROCE and ROIC are alternative dependent variables used in robustness test. ROCE is measured by earnings before interest and tax to capital employed. In this study, the mean value of ROCE was 0.099. It indicates the amount of profit ($0.099) a firm is generating per $1 of capital employed. According to James (2020), those firms whose ROIC is at a zero level may not be destroying their value but have no excess capital to invest in future growth. The mean value of ROIC in the samples in this study is significantly greater than zero.

The mean ratio of short term debt (STDR) is 44.2% and much higher than long term debt ratio (LTDR), which is only 12.3%. This indicates that theses automobile firms heavily depend on short term debt rather than long term one, which could lead to refinancing and liquidity risk, which has a significant impact on firm performance. The finding that these firms rely more on short-term debt than long-term debt is consistent with previous research (Tian & Zeitun, 2007; Gill et al., 2011; Vătavu, 2015; Le & Phan, 2017). The average internal financing to total assets (IFR) for the sample as a whole is about 29.4% during the period from 2011 to 2019. The sample firms did not show a preference for internal financing over debt financing. Frank and Goyal (2003) found that when managers are overestimating the future returns of projects, they tend to overinvest and as a result they do not always follow the pecking order theory of financing. That is to say, managers' optimism influences their decisions about internal and external financing.

In addition, the average of total debt account for 53.7% during the period from 2011 to 2019 and widely disperses, from 5.2% to 94.8%. This suggests more than 50% of the total assets of these automobile firms are financed through debt. These ratios reveal that sample firms are overleveraged to some extent within the period under review. Specifically, they are higher than the manufacturing firms studied in previous studies: 46.9% observed by Vătavu (2015) for Romanian manufacturing companies during the period 2003-2010; 49.1% reported by Gill et al. (2011) for 342 observations of American manufacturing companies from 2005 to 2007. However, compared with other capital intensive industries, the mean of total debt ratio of the sample firms is not obviously high: 59.76% reported by Jayiddin et al. (2017) for 225 observations of Malaysian construction companies from 2010 to 2014; 52.52% and 68.70% documented by Khodavandloo et al. (2017) for 45 listed companies involved in trading and services sector of the Bursa Malaysia during crisis (2007-2009) and post-crisis recovery (2010-2013), respectively. In a word, capital intensive industries are mainly financed by debt.

Tangibility ratio is on average 0.306, showing that tangible fixed assets such as business premises, equipment and machinery account for about 30.6% of total assets. These firms tend to hold a high degree of cash, accounts receivable, inventory and other liquid assets. Meanwhile, the average liquidity of 1.835 means that the proportion of current assets is large and current liabilities only could cover about 54% of them. In addition, the average asset growth rate is 1.066, indicating that the assets of the auto industry are growing and scale is expanding. SZ (log total assets) is 2.675 on average and widely disperses from 0.04 to 5.378, which suggests a large gap in the scale of the sample firms. Compared with previous studies, the firms in this study are not very large. The mean of size measured by natural log of total assets (in millions) in the study from Zeitun and Tian (2007) is 6.911 on a sample of 167 Jordanian listed companies. Abeywardhana (2015) report the mean size measured by natural log of total assets of non-financial SMEs in the UK for the period of 1998-2008 is 4.75.

In addition, Appendix D gives detailed descriptive statistics by industry classification. These companies in SIC Codes of 3711 (Motor Vehicles and Passenger Car Bodies) and 3713 (Truck and Bus Bodies) are more dependent on debt financing and less dependent on internal financing than those in SIC Code of 3714 (Motor Vehicle Parts and Accessories). Firms in the SIC Code 3713 have the highest average ROE and ROA but the lowest average Tobin's Q.

Appendix D also gives detailed descriptive statistics of subsamples from developing and developed countries respectively. From the perspective of capital structure, the sample from developed countries has higher total debt ratio and internal financing ratio. The sample from developing countries is more dependent on short term debt than the sample from developed countries. While the sample of developed countries has a higher long term debt ratio. Firms from developing countries perform better than those from developed countries during the period from 2011-2019.

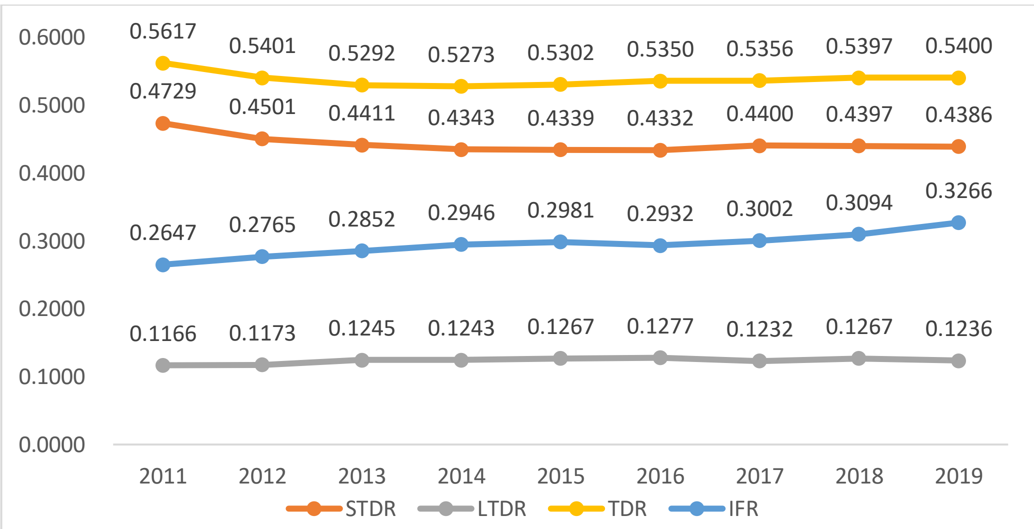
Figure 1 shows the movements in the mean values of debt ratios and internal financing ratios from 2011 to 2019. From Figure 1, the short term debt ratio shows a downward trend, while the long term debt ratio fluctuates. But the dependence on short term debt is still very high. Overall, the total debt level is reduced during the sample period. Furthermore, the sample firms are increasingly dependent on internal financing within the period from 2011 to 2019.

Table 5 Descriptive statistics-full sample

Variables	Observation	Mean	Std Dev	Min	Q1	Median	Q3	Max
Dependent Variables-Firm Performance								
ROE	2544	0.059	0.202	-1.265	0.021	0.076	0.136	0.494
ROA	2654	0.035	0.152	-1.110	0.015	0.048	0.085	0.283
Tobin's Q	2549	0.734	0.834	0.049	0.262	0.481	0.855	5.054
ROCE	2488	0.099	0.128	-0.467	0.048	0.096	0.154	0.542
ROIC	2569	0.063	0.117	-0.676	0.027	0.067	0.113	0.342
Independent Variables-Debt and internal financing								
STDR	2519	0.442	0.182	0.029	0.317	0.431	0.559	0.912
LTDR	2166	0.123	0.110	0.0002	0.032	0.096	0.184	0.515
TDR	2524	0.537	0.201	0.052	0.405	0.551	0.688	0.948
IFR	2145	0.294	0.190	0.007	0.143	0.262	0.417	0.840
Control Variables								
TANG	2632	0.306	0.163	0.004	0.186	0.296	0.415	0.744
SZ (log total assets)	2656	2.675	0.959	0.040	2.045	2.654	3.233	5.378
LIQ	2651	1.835	1.783	0.201	1.029	1.393	1.938	13.602
GRO	2352	1.066	0.225	0.545	0.959	1.035	1.124	2.2802

Note: This table reports the mean, standard deviation (Std Dev), minimum (Min), quartile 1 (Q1), median, quartile 3 (Q3) and maximum (Max) of all variables. Total assets is in $million. All dependent variables and control variables are winsorized at the 1st and 99th percentiles. Variable definitions are given in Table 2.

Figure 1 The movements in mean values of independent variables from 2011 to 2019



6.2 Correlation analysis

The correlation coefficients between variables used in the regression analysis are presented in Table 6. It can be observed that total debt ratio have a high correlation with the other two debt ratios. Because the total debt can be expressed as the sum of the short term debt and the long term debt. In particular, the correlation coefficient between total debt ratio and short term debt ratio is 0.845. And there is a negative correlation between the internal financing ratio and all three debt indicators. Therefore, only one capital structure measurement will be used in every regression in order to avoid multicollinearity problem.

To avoid serious multicollinearity in all models, I check VIF values. The VIF values are shown in Appendix E. According to Hair et al.(2014), a VIF value of 1 means that there is no multicollinearity. The higher multicollinearity is reflected in lower tolerance values and higher VIF values. The common cutoff threshold is the VIF value of 10, but if the value is much lower than the recommended thresholds (VIF values of 3 to 5) it may cause interpretation problems. As is shown in Appendix E, all values are between 1 and 2, suggesting that the risk of bias due to multicollinearity is minimal and the relationships with dependent variables are not very weak.

The total debt ratio (TDR) is found to be negatively related to firm performance (ROE, ROA, Tobin's Q, ROCE and ROIC) because all coefficients of pairwise correlation among these variables are negative and significant at the 1% level. The correlation coefficients between short term debt ratio (STDR) and long term debt ratio (LTDR) and firm performance are also significantly negative on the whole. Furthermore, internal financing ratio (IR) is positively correlated with all firm performance measures and significant at 1% level except for ROCE.

Tangibility (TANG) is positively correlated with the total debt ratio (TDR) and is significant at the 5% level. This indicates that asset tangibility have a positive effect on leverage. In general, firms with more tangible assets have stronger debt security because these assets can be used as collateral (Jensen & Meckling, 1976). The agency cost of debt can be reduced because tangible assets are easily collateralized. Meanwhile, tangibility (TANG) is negatively correlated with firm performance indicators ROE, Tobin's Q, ROCE and ROIC, significant at 1% level.

Size (SZ) is found to be positively related to all three debt ratios at 1% significance level. This indicates that larger firms have a higher tendency to use more debt. Firm size plays a very important role in the negotiation for debt. The likelihood of bankruptcy for larger firms is minimal relative to smaller firms. Size (SZ) is also positively related to ROE and ROA, which means that greater scale enables firms to generate higher returns on equity and assets, which in turn leads to better financial performance through the ability to obtain higher production values.

Meanwhile, the pairwise coefficient between internal financing ratio (IR) and liquidity (LIQ) is 0.438, positive and significant at 1% level. As discussed in literature review, Lipson and Mortal (2009) indicated that more liquid firms could finance by their internal resources, thus less depend on debt. And the significantly negative coefficients between liquidity (LIQ) and all three debt ratios (STDR, LTDR, TDR) are also in line with this finding. Liquidity (LIQ) is also positively related to ROA, Tobin's Q, ROCE and ROIC, significant at 1% level. Firms with high liquidity are expected to have good performances and less financial distress problems.

Finally, asset growth (GRO) show a positive relation with debt ratios but a negative relation with internal financing ratio. Firms with growth potential tend to have higher debt ratios. There is a significant positive correlation between asset growth (GRO) and the dependent and independent variables. Greater growth rate indicates healthy business performance and easier access to finance in competitive markets.

Table 6 Correlation matrix

	ROE	ROA	Tobin's Q	ROCE	ROIC	STDR	LTDR	TDR	IFR	TANG	SZ	LIQ	GRO
ROE	1												
ROA	.722**	1											
Tobin's Q	.063**	-.159**	1										
ROCE	.840**	.739**	.232**	1									
ROIC	.679**	.967**	-.068**	.731**	1								
STDR	-.131**	-.130**	-.204**	-0.03	-.135**	1							
LTDR	0.035	-.049*	-.069**	-0.035	-.044*	-.148**	1						
TDR	-.105**	-.089**	-.280**	-.058**	-.105**	.845**	.398**	1					
IFR	.115**	.204**	.137**	.048*	.179**	-.561**	-.215**	-.620**	1				
TANG	-.086**	-0.037	-.188**	-.137**	-.059**	-0.017	0.033	.046*	-0.003	1			
SZ	.219**	.271**	-.250**	0.03	.224**	.128**	.145**	.250**	-0.008	-.193**	1		
LIQ	0.001	.059**	.156**	.041*	.067**	-.592**	-.043*	-.623**	.438**	-.143**	-.221**	1	
GRO	.215**	.065**	.120**	.211**	.072**	.062**	.052*	.074**	-.100**	-.092**	0.035	-.043*	1

Variable definitions are given in Table 2. ** Correlation is significant at the 1% level (2-tailed). * Correlation is significant at the 5% level (2-tailed).

6.3 Regression analysis

To determine which model is better, the Hausman test for both fixed and random effects models are conducted. The results of chi-square statistics are all significant at the 1% level, indicating that the null hypothesis that unique errors are not correlated with the independent variables is rejected and favoring the FE model over the RE model. Tables 7 to 9 report the regression outcomes using FE models as well as the Hausman tests results. The Wald test for heteroskedasticity (Tian & Zeitun 2007; Vătavu; 2015) and the Wooldridge test for autocorrelation (Le & Phan, 2017) are also conducted. These results show that some models are influenced by heteroscedasticity and autocorrelation. Therefore, to control these problems Table 10 report the outcomes of fixed effects models corrected with time-fixed effects and robust standard errors.

6.3.1 Debt ratios and firm performance

Three debt measurement variables are used, short term debt ratio, long term debt ratio and total debt ratio. In the FE regression results in Table 7, Table 8 and Table 9, columns 1–4 report the results using short term debt ratio as an independent variable, columns 5–8 present the results of regression using long term debt ratio as an independent variable and columns 9–12 report the results of total debt ratio as an independent variable. In general, the coefficients of those variables are significantly and negatively related to both accounting and market firm performance. The results are consistent with the findings of previous studies such as Tian and Zeitun (2007) , Vatavu (2015), Abeywardhana (2015) and Le & Phan (2017).

The coefficients of short term debt ratio in columns 4 from Table 7 to 9 are -0.5737***, -0.0532*** and -0.3134***, which denotes that an increase of 1% in short term debt ratio will lead to a decrease of approximately 0.57% in ROE, 0.05% in ROA and 0.31% in Tobin's Q, holding all other variables constant. The coefficients of long term debt ratio in columns 8 are -0.216***, -0.1312*** and -0.4755***. Thus, the negative effects of long term debt ratio on ROA and Tobin’s Q are stronger than the negative effects of short term debt ratio, and the opposite is true for ROE. Furthermore, the coefficients of total debt ratios in columns 12 are -0.6523***, -0.1387*** and -0.362***, suggesting that when total debt rises 1%, the ROE, ROA and Tobin's Q will fall about 0.65%, 0.13% and 0.36% respectively, all else held equal.

Therefore, Hypothesis 1 is rejected. Those automobile firms with high debt ratios are less efficient at turning assets into profits and utilizing the funds from shareholders. According to Abdullah and Tursoy (2019), the negative effect of debt ratio on a firm’s market performance (Tobin’s Q) could indicate that investors prefer the shares of less risky companies in regard to investment decisions.

6.3.2 Internal financing and firm performance

As shown in Tables 7 to 9, internal financing ratio is positively associated with firm performance because the coefficients estimators for the internal financing ratios are significantly positive at the 1% level. Therefore, it can be assumed that the more internal financing firms employ the more profitable they will be. Specifically, the coefficients of internal financing ratio and Tobin’s Q in columns 13 to 16 are 1.1646***, 1.0185***, 0.9654*** and 0.9386***, higher than in ROE and ROA regressions, implying that the effect of internal financing ratio on Tobin’s Q stronger than on ROE and ROA.

The results indicate that hypothesis 2 is accepted. This positive relationship can explain why some auto firms prioritize internal financing in prior studies (Kirwok et al., 2017; Jani and Bhatt 2015). This shows that internal fund is not only an important source of capital for automobile firms, but also has a significant and positive impact on firm performance.

6.3.3 Control variables

In reference to control variables, the tangibility of business is negatively related to firm performance. Size has a positive effect on ROE and ROA but negative effect on Tobin's Q. Liquidity (LIQ) has a significant and important positive impact on the all three firm performance indicators when the independent variable is long term debt ratio (LTDR). Asset growth (GRO) is always significantly and positively related to firm performance.

The tangibility of business is negatively related to firm performance. This finding is consistent with prior research conducted by Tian and Zeitun (2007) and Vatavu (2015). The earnings decreases when these automobile firms own a large proportion of tangible fixed assets. It implies that these automobile firms invest too much in tangible fixed assets in a way that does not improve their performance, or that they do not use those assets efficiently, so it has a negative impact on their performance.

The size of business is positively related to accounting measures ROE and ROA and negatively related to market performance measure Tobin's Q. Tian and Zeitun (2007) argue that large firms earn higher returns and have larger risk tolerance compared to smaller firms, presumably a result of economies of scale and investment diversification. However, size has a negative effect on improving market performance in this study, which suggests that the financial analysts or investors do not consider firm size to positively affect the firm's market performance (Adetunji & Owolabi, 2016).

The liquidity factor is positively related to all three firm performance measures when the long term debt ratio (LTDR) is independent variable. In other independent variable models, the effect of liquidity (LIQ) is not always significant. The liquidity coefficients show that current assets offer opportunities for more profits. This assumption could be confirmed by the negative tangibility coefficients. These companies perform better when they own less tangible assets. Furthermore, Cho (1998) argued that high liquidity allows firms to invest more and alleviate financial distress, thus improving business performance.

The estimated coefficients of asset growth (GRO) are positive and statistically significant, indicating that firms with higher asset growth rate can enhance their performance measured by ROA, ROE and Tobin's Q. Because greater growth opportunity shows healthy business performance and easier access to finance in market (Ramli et al, 2019).

In above models, overall F-tests have all p-values below 1%. The F-tests of overall significance indicates the linear regression models provide a better fit to the data than a model that contains no independent variables. The hypothesis that the reduction in error obtained by using independent variables to predict firm performance is a chance occur is rejected. Under the condition that the independent variable is unchanged, the addition of the control variables makes F values still statistically significant, indicating that the additional control variable is substantial in adding to the regression model's predictive ability (Hair et al., 2014). With the addition of the control variables, the R-squared (within) value also increases with the independent variables unchanged. Fixed effects models are designed to study the causes of changes within an entity (Torres-Reyna, 2007). R-Squared (within) measures how well the explanatory variables account for changes in dependent variables within each firm over time. In all FE models, R-Squared (within) values range from 3.98% to 18.67%. In ROE regressions model (12) in which total debt ratio is the independent variable, the value of R-Squared (within) is 18.67%, reflecting that the models can explain 18.67% the change of ROE.

Table 7 FE Estimation Results of ROE as a dependent variable

Dependent variable: ROE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-0.4817***	-0.4670***	-0.5119***	-0.5737***												
	(-12.61)	(-12.19)	(-11.31)	(-11.49)												
LTDR					-0.0879	-0.1499**	-0.1955***	-0.216***								
					(-1.50)	(-2.53)	(-3.29)	(-3.26)								
TDR									-0.5275***	-0.5390***	-0.572***	-0.6523***				
									(-14.14)	(-14.56)	(-13.51)	(-13.92)				
IFR													0.3780***	0.3928***	0.4254***	0.4731***
													(11.47)	(11.64)	(12.15)	(12.57)
TANG	-0.3120***	-0.2826***	-0.3155***	-0.2951***	-0.2347***	-0.1737***	-0.0830226	0.0053462	-0.2050***	-0.1588***	-0.1785***	-0.1459**	-0.2309***	-0.2241***	-0.2596***	-0.1555***
	(-5.64)	(-5.06)	(-5.39)	(-4.53)	(-3.77)	(-2.76)	(-1.28)	(0.07)	(-3.75)	(-2.90)	(-3.18)	(-2.35)	(-5.63)	(-5.45)	(-6.13)	(-3.38)
SZ		0.0937***	0.0857***	0.0738**		0.1640***	0.1833***	0.1621***		0.1576***	0.1553***	0.1424***		0.0408**	0.0312	0.0162
		(3.65)	(3.29)	(2.41)		(5.33)	(5.95)	(4.42)		(6.29)	(6.19)	(4.87)		(1.98)	(1.50)	(0.68)
LIQ			-0.0099*	-0.0117**			0.0361***	0.0455***			-0.0081	-0.0104*			-0.0120***	-0.0103***
			(-1.84)	(-2.04)			(5.35)	(5.74)			(-1.59)	(-1.94)			(-3.40)	(-2.81)
GRO				0.1422***				0.133***				0.1568***				0.0947***
				(8.48)				(6.88)				(9.58)				(7.80)
Constant	0.4277***	0.162**	0.2326**	0.1023	0.1919***	-0.2726***	-0.4058***	-0.5720***	0.4660***	0.0403	0.0863	-0.0461	0.0946***	-0.0222	0.027	-0.1061
	(16.39)	(2.10)	(2.71)	(1.04)	(8.47)	(-3.03)	(-4.37)	(-5.22)	(17.23)	(0.55)	(1.11)	(-0.52)	(5.54)	(-0.36)	(0.43)	(-1.46)
N	2481	2481	2477	2195	2107	2107	2107	1869	2506	2506	2502	2218	2141	2141	2141	1901
R-squared(within)	0.1172	0.1226	0.124	0.1581	0.0471	0.0618	0.0764	0.0923	0.1289	0.1443	0.1454	0.1867	0.1454	0.1472	0.1525	0.1814
F-test (overall)	28.93	27.66	25.64	29.62	8.95	10.84	12.48	13.35	32.61	33.77	31.16	36.64	31.65	29.17	27.86	29.92
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test for heteroskedasticity	5.6E+32	5.50E+32	5.50E+32	4.90E+31	9.40E+36	5.00E+37	1.20E+33	6.00E+33	5.60E+32	1.30E+32	5.30E+32	4.60E+30	5.00E+34	1.50E+34	1.80E+34	2.40E+34
Prob > Chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wooldridge test	13.877	14.327	14.543	7.733	2.713	2.939	2.913	1.08	15.787	17.751	17.796	10.296	35.229	39.166	38.938	29.124
Prob > F	0.0002	0.0002	0.0002	0.0058	0.1007	0.0877	0.0891	0.2997	0.0001	0.0000	0.0000	0.0015	0.0000	0.0000	0.0000	0.0000
Hausman test	37.62	32.43	30.94	28.62	70.1	70.12	75.98	67.81	69.17	60.5	58.88	51.6	36.56	42.84	47.74	141.97
Prob > Chi2	0.0000	0.0007	0.0020	0.0045	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Table 8 FE Estimation Results of ROA as a dependent variable

Dependent variable: ROA	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-0.0797***	-0.0709***	-0.0571***	-0.0532***												
	(-5.83)	(-5.17)	(-3.50)	(-2.93)												
LTDR					-0.0925***	-0.119***	-0.1335***	-0.1312***								
					(-4.79)	(-6.14)	(-6.84)	(-6.20)								
TDR									-0.1355***	-0.1398***	-0.133***	-0.1387***				
									(-9.62)	(-10.02)	(-8.40)	(-7.86)				
IFR													0.1514***	0.1540***	0.1702***	0.1876***
													(11.41)	(11.32)	(12.09)	(12.27)
TANG	-0.1344***	-0.1167***	-0.1064***	-0.0767***	-0.0859***	-0.0609***	-0.0338	-0.0114	-0.0516**	-0.032	-0.0278	0.0008	-0.0713***	-0.0701***	-0.0878***	-0.0536***
	(-6.63)	(-5.72)	(-4.98)	(-3.21)	(-4.24)	(-2.99)	(-1.62)	(0.49)	(-2.49)	(-1.55)	(-1.32)	(-0.04)	(-4.31)	(-4.23)	(-5.15)	(-2.87)
SZ		0.0502***	0.0528***	0.0459***		0.0674***	0.0721***	0.0566***		0.0675***	0.0681***	0.0542***		0.0071	0.0023	0.0056
		(5.29)	(5.51)	(4.06)		(6.88)	(7.38)	(4.95)		(7.11)	(7.19)	(4.90)		(0.86)	(0.29)	(0.58)
LIQ			0.0031	0.0023			0.0120***	0.0103***			0.0016	0.0012			-0.0059***	-0.0063***
			(-1.57)	(-1.09)			(5.28)	(3.99)			(-0.86)	(-0.62)			(-4.21)	(-4.26)
GRO				0.0459***				0.0422***				0.0508***				0.0170***
				(7.46)				(6.85)				(8.21)				(3.45)
Constant	0.1424***	-0.0007	-0.0228	-0.073	0.0954***	-0.0941***	-0.132***	-0.1516***	0.1572***	-0.0251	-0.0346	-0.0679**	0.0549***	0.0343	0.0589**	0.0128
	(14.86)	(0.03)	(0.72)	(1.99)	(12.87)	(-3.30)	(-4.54)	(-4.45)	(15.31)	(0.91)	(1.17)	(-2.01)	(7.97)	(-1.38)	(2.32)	(-0.44)
N	2510	2510	2506	2220	2165	2165	2165	1920	2512	2512	2508	2223	2143	2143	2143	1902
R-squared(within)	0.0611	0.0728	0.0746	0.0879	0.046	0.0696	0.0833	0.0881	0.0775	0.0982	0.0994	0.1169	0.1407	0.1411	0.1492	0.1592
F-test (overall)	14.35	15.76	14.78	15.38	8.99	12.68	14.11	13.05	18.58	21.86	20.28	21.18	30.48	27.77	27.16	25.6
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test for heteroskedasticity	4.4E+35	2.00E+35	1.50E+35	1.40E+32	8.50E+33	1.00E+34	6.00E+34	2.00E+34	3.60E+36	5.70E+35	4.80E+05	4.20E+30	1.00E+35	1.20E+05	2.10E+33	2.00E+33
Prob > Chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wooldridge test	7.617	7.741	7.548	4.159	30.075	28.595	25.578	19	4.458	5.257	5.934	3.757	100.084	98.844	99.416	76.579
Prob > F	0.0062	0.0058	0.0064	0.0423	0.0000	0.0000	0.0000	0.0000	0.0356	0.0226	0.0155	0.0536	0.0000	0.0000	0.0000	0.0000
Hausman test	43.05	49.8	51.62	70.4	37.2	31.01	31.43	75.07	119.74	18.95	22.93	91.67	51.8	51.81	58.04	71.06
Prob > Chi2	0.0000	0.0000	0.0000	0.0000	0.0001	0.0011	0.0017	0.0000	0.0000	0.0620	0.0283	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Table 9 FE Estimation Results of Tobin's Q as a dependent variable

Dependent variable: Tobin's Q	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-0.0426	-0.1874*	-0.1915	-0.3134**												
	(-0.39)	(-1.75)	(-1.45)	(-2.12)												
LTDR					-0.773***	-0.4790***	-0.5511***	-0.4755***								
					(-5.11)	(-3.21)	(-3.68)	(-2.90)								
TDR									-0.353***	-0.296***	-0.300**	-0.362**				
									(-3.18)	(-2.75)	(-2.38)	(-2.55)				
IFR													1.164***	1.018***	0.9654***	0.938***
													(8.32)	(7.13)	(6.48)	(5.63)
TANG	-0.2414	-0.5695***	-0.5733***	-0.6680***	0.0652	-0.2957*	-0.1621	-0.1165	-0.122	-0.384**	-0.387**	-0.403**	-0.330*	-0.404**	-0.3422*	-0.225
	(-1.47)	(-3.54)	(-3.37)	(-3.49)	(-0.39)	(-1.79)	(-0.97)	(0.62)	(-0.74)	(-2.37)	(-2.32)	(-2.15)	(-1.86)	(-2.28)	(-1.86)	(-1.08)
SZ		-0.8891***	-0.8902***	-1.025***		-0.819***	-0.7906***	-0.9305***		-0.852***	-0.852***	-0.989**		-0.4061***	-0.383***	-0.434***
		(11.85)	(11.65)	(11.31)		(10.86)	(10.47)	(10.61)		(11.41)	(11.38)	(11.16)		(4.57)	(4.24)	(3.99)
LIQ			-0.001	-0.032*			0.0727***	0.041**			-0.0012	-0.023			0.0209	0.019
			(-0.06)	(-1.70)			(4.09)	(2.02)			(-0.07)	(-1.29)			(-1.26)	(-1.09)
GRO				0.1045**				0.0526				0.1574***				0.1434***
				(2.12)				(1.10)				(3.16)				(2.60)
Constant	0.7353***	3.2872***	3.296***	3.752***	0.6515***	3.002***	2.775***	3.188***	0.8757***	3.202***	3.211***	3.548***	0.3967***	1.569***	1.467***	1.472***
	(9.55)	(14.43)	(12.76)	(12.49)	(10.99)	(-13.40)	(-12.07)	(-12.05)	(10.78)	(14.65)	(13.49)	(-12.86)	(5.40)	(-5.88)	(5.26)	(-4.39)
N	2446	2446	2443	2166	2106	2106	2106	1871	2442	2442	2439	2163	2086	2086	2086	1850
R-squared(within)	0.0398	0.0987	0.0991	0.1041	0.0588	0.1162	0.1243	0.1299	0.045	0.0997	0.1001	0.1064	0.0959	0.1062	0.107	0.1058
F-test (overall)	8.9	21.39	19.66	18.09	11.32	21.67	21.42	19.65	10.11	21.59	19.84	18.51	19.2	19.54	18.05	15.54
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test for heteroskedasticity	1.7E+34	1.00E+30	9.60E+33	3.40E+32	5.50E+33	1.80E+37	6.30E+32	2.20E+33	1.40E+34	6.50E+33	5.20E+31	9.50E+33	9.70E+33	1.30E+33	3.20E+33	6.70E+32
Prob > Chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wooldridge test	48.273	59.047	62.825	77.943	93.014	73.409	75.257	65.323	51.776	59.053	60.572	70.615	60.07	56.873	56.855	66.164
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 0	0.0000	0.0000	0.0000	0.0000
Hausman test	20.26	83.27	85.49	79.46	69.87	61.26	61.99	54.19	21.58	83.00	85.76	84.36	16.15	24.14	24.28	31.57
Prob > Chi2	0.0269	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0174	0.0000	0.0000	0.0000	0.0955	0.0121	0.0186	0.0016

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Table 11 FE regressions with time-fixed effect and robust standard error

	(1) ROE	(2) ROE	(3) ROE	(4) ROE	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) Tobin's Q	(10) Tobin's Q	(11) Tobin's Q	(12) Tobin's Q
STDR	-0.587***				-0.0584*				-0.322***			
	(-4.15)				(-1.92)				(-2.99)			
LTDR		-0.187**				-0.123**				-0.541**		
		(-2.39)				(-2.24)				(-2.11)		
TDR			-0.654***				-0.140***				-0.400**	
			(-4.86)				(-4.52)				(-2.01)	
IFR				0.358***				0.138***				0.816***
				(5.60)				(5.62)				(2.85)
TANG	-0.308***	-0.0226	-0.155	-0.166**	-0.0786	-0.0153	0.000425	-0.0579**	-0.636	-0.0859	-0.377	-0.227
	(-2.92)	(-0.15)	(-1.40)	(-2.44)	(-1.53)	(-0.20)	(0.01)	(-2.12)	(-1.37)	(-0.23)	(-0.91)	(-0.47)
SZ	-0.0387	0.0437	0.0269	-0.126***	0.00910	0.0280	0.0136	-0.0556***	-0.930***	-0.856***	-0.902***	-0.550**
	(-0.89)	(0.65)	(0.64)	(-3.69)	(0.41)	(1.35)	(0.71)	(-3.69)	(-3.39)	(-2.63)	(-3.04)	(-2.33)
LIQ	-0.0137*	0.0420***	-0.0115*	-0.0109**	0.00182	0.00955**	0.000970	-0.00664**	-0.0268	0.0478	-0.0190	0.0271
	(-1.75)	(3.28)	(-1.80)	(-2.39)	(0.39)	(1.98)	(0.23)	(-2.40)	(-0.54)	(1.26)	(-0.37)	(0.89)
GRO	0.164***	0.152***	0.178***	0.111***	0.0525***	0.0462***	0.0593***	0.0263***	0.115	0.0769	0.171**	0.195***
	(6.89)	(6.38)	(8.06)	(7.59)	(4.24)	(4.54)	(4.92)	(4.17)	(1.40)	(1.32)	(1.99)	(3.17)
_cons	0.364**	-0.274	0.211	0.291**	0.0108	-0.0844	0.0195	0.178***	3.590***	3.043***	3.424***	1.850***
	(2.15)	(-1.26)	(1.49)	(2.54)	(0.13)	(-1.15)	(0.23)	(3.86)	(4.91)	(3.35)	(4.86)	(2.68)
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
N	2195	1869	2218	1901	2220	1920	2223	1902	2166	1871	2163	1850
R–squared(within)	0.1269	0.0635	0.1834	0.1865	0.0828	0.089	0.1174	0.1596	0.106	0.1299	0.1092	0.1049
F-test (overall)	17.48	10.57	20.92	18.66	4.79	5.59	11.40	11.32	5.05	5.73	8.38	5.47
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

6.3.4 Comparison between developed economies and developing economies

As discussed in empirical evidence, some studies show that leverage has a positive impact on firm performance in financially or economically developed countries (for instance, Gill et al., 2011; Margaritis and Psillaki, 2010; Nasimi, 2016; Abdullah and Tursoy, 2019). This relationship has been investigated in developing countries and evidence presented that the relationship between debt financing and firm performance is significantly negative (for instance, Tian and Zeitun, 2007; Azhagaiah & Gavoury, 2011; Vatavu, 2015; Nwude et al., 2016; Le and Phan 2017). Constrained by an underdeveloped financial system, in emerging markets, debt does not play a significant role as a monitoring channel for improving performance. A large amount of cash flow generated by debt leads to managers' discretionary behaviors, which has a negative impact on firm performance.

Of the 303 firms in this study, 161 are from developed countries and 142 are from developing countries. In this section, the sample firms in this study are divided into two parts. Consistent with the method used for the total sample, fixed effects model regression is performed on them respectively in order to test whether the impact of debt level on firm performance is consistent. Panel A in Appendix F gives the results from the developing country sample and Panel B in Appendix F gives the developed country sample respectively.

As can be seen from Panel A (samples from developing countries), short term debt ratio and total debt ratio have significant negative impacts on ROE, while long term debt ratio and total debt ratio have significant negative impacts on ROA, all of which are significant at 1% level. However, the influence of debt ratio on Tobin’s Q is insignificant. Focusing on the Panel B (samples from developed countries), the results show that leverage is still negatively associated with firm performance and the coefficients estimators for the debt ratios are significantly negative at the 1% level or 5% level. That is to say, in the auto industry, both in developed and developing markets, a firm’s debt ratio affects its performance negatively. And the positive influence of internal financing rate on firm performance is significant in the above two subsamples.

6.3.5 Comparison between different industry classifications

As the second subsample analysis, FE models with industry-by-industry analysis are conducted. As described in chapter 4, the following three industry groups have been identified: 3711-Motor Vehicles and Passenger Car Bodies; 3713-Truck and Bus Bodies; 3714-Motor Vehicle Parts and Accessories. Panel C to E in Appendix F report the outcomes of FE models using sub-samples by industry classification.

The results show that the effect is not always the same for each industry. In the subsample with an SIC Code of 3711, short term debt ratio and total debt ratio both have significant negative impact on ROE, while long term debt ratio has significant negative impact on ROA and Tobin’s Q. In the subsample with an SIC Code of 3713, the three debt ratios have significant negative effects on market performance measure Tobin’s Q, and no longer have significant effects on ROE and ROA. In the subsample with an SIC Code of 3714, short term debt ratio and total debt ratio have a negative impact on firm performance, significant at the 1% level, while long term debt ratio has no significant impact on ROA and ROE. Furthermore, the positive influence of internal financing ratio on these three firm performance indicators in each industry is still significant at the 1% level, except in ROA fixed effect model in sector 3713.

6.4 Robustness tests

6.4.1 OLS Regression with robust standard error

The results in tables 7 to 9 of Wald test for heteroscedasticity (all Prob > Chi2 = 0.000) report that the heteroskedasticity problem exists in these models. Heteroscedasticity is the difference in the size of the error term of an independent variable. The other problem is autocorrelation, where the standard error for one period is related to the standard error for a subsequent period. The OLS regressions are adopted with robust standard errors to control these two issues. Panel A to C in Appendix G reports the outcomes on the relationship between capital structure and firm performance using ROA, ROE and Tobin's Q as dependent variables, respectively, which are estimated with robust standard error and industry and year fixed effects.

Overall, the results remain similar with the FE model, confirming the negative relationship between debt ratios and firm performance and positive relationship between internal financing ratio and firm performance in automobile firms. The significance of the short term debt and total debt ratio remain unchanged or increase as robust standard errors are used to the models. The negative effects of long term debt on ROE and Tobin's Q become insignificant in some models.

6.4.2 OLS Regression with lagged independent variables

The second robustness test is OLS regressions with lagged independent variables with one year. Panel A to C in Appendix H give the results of OLS regression taking ROE, ROA and Tobin's Q as dependent variables and independent variables with a one-year lag respectively.

The robustness analysis with one-year lagged independent variables for ROE, ROA and Tobin's Q makes long term debt ratio insignificant. In ROE models, the coefficients estimators for the short term debt ratio and total debt ratio are significantly negative at the 10% level. In ROA and Tobin's Q models, the coefficients estimators for the short term debt ratio and total debt ratio are significantly negative at the 1% level. The significance of internal financing ratio to firm performance also remain unchanged, significantly positive at the 1% level.

The results of the above two robustness tests show that debt of different maturities has different effects on firm performance. Short term debt ratio has a significant negative impact on firm performance, but long term debt ratio has no impact on firm performance in some models.

6.4.3 FE Regressions with alternative measurement of dependent variables

Besides the ROE, ROA and Tobin's Q which are common firm performance measures in previous studies, I adopt ROCE (used by Abeywardhana, 2015) and ROIC (used by Nasimi, 2016; Ramli et al., 2019) as two alternative dependent variables. The VIF values are tested again, and the results are in Appendix E. There is no serious multicollinearity problem with the above dependent variables and independent variables. Regression results using FE models as well as Hausman test results are presented in Panel A and B in Appendix I. They show that short term debt ratio, long term debt ratio and total debt ratio have negative effect on ROCE and ROIC, significant at 1% level. And internal financing ratio has a positive and significant impact on ROCE and ROIC, significant at 1% level.

Return on capital employed (ROCE) is measured by earnings before interest and tax to capital employed. Capital employed is found by subtracting current debt from total assets, which ultimately gives shareholders' equity plus long term debt. The higher rate of ROCE indicates how effectively a company is utilizing its funds from shareholders and long term debt.

The three debt ratios shows a significant negative relationship with ROCE, which is consistent with their relationship with ROE. As the proportion of gross profits devoted to debt repayment increases, the proportion distributed to the shareholders and long-term debt creditors shrinks accordingly.

Return on invested capital (ROIC) is measures the return that an investment generates for those who have provided capital for it. It is used to assess the efficiency of a company's allocation of capital to profitable investments under its control. However, one downside of this indicator is that it tells nothing about which segment of the business is generating value. Panel B shows negative significant coefficients of all three debt ratios and positive significant coefficients of internal financing ratio. This suggests that firms with high debt ratios are not making efficient use of their investment capital to generate profits.

Among the control variables, tangibility still maintains a significant negative impact on firm performance. Size has a significant positive effect on the alternative dependent variables ROCE and ROIC. However, the effect of liquidity on ROCE and ROIC is not always consistent. When the independent variable is the long term debt ratio, the positive impact of liquidity on both firm performance is significant at 1% level. But in the total debt ratio and internal financing ratio models, liquidity is negatively correlated with ROCE, but not significantly correlated with ROIC. Asset growth (GRO) is positively correlated with ROCE and ROIC, significant at the 1% level

6.4.4 OLS Regression with yearly mean of all variables

In this robustness test, the mean values of each variable for 303 companies over 9 years constitute a new data set. And the year dummies are excluded from the OLS regression model. Moreover, I checked the VIF values again, and the results are given in Appendix E. These values are between 1 and 2, indicating that there is no severe multicollinearity between independent variables and control variables.

Panel A to C in Appendix J report the results with yearly mean of initial variables in panel data. Short term debt ratio has a negative impact on ROE and Tobin's Q, which is significant at 1% level. It also has a negative effect on ROA, which is significant at the 5% level. However, long term debt ratio no longer has a significant impact on firm performance. Only in ROA regression in Panel B, long term debt ratio has a negative impact on ROA, significant at 10% level. Consistent with previous results, total debt ratio also has a significant negative effect on ROE, ROA and Tobin's Q. Meanwhile, internal financing ratio positively influences all these three firm performance indicators.

In the above robustness test, tangibility maintains a significant negative impact on firm performance ROE and Tobin's Q. size has positive effects on accounting measures ROA and ROE, but has negative effect on market performance measure Tobin's Q, which is consistent with the original results. Next, when the independent variable is the long term debt ratio, the positive impact of liquidity on firm performance ROE is still significant but no longer significant on ROA and Tobin's Q. Moreover, when short-term debt ratio and total debt ratio are independent variables, liquidity has a negative impact on Tobin's Q. Finally, the positive effect of asset growth remain significant in most models. But in ROA regression, the impact of asset growth on ROA is no longer significant.

The drawback of OLS regression is that this method does not control for unobservable individual effects, which is common in most studies using cross-sectional data. Therefore, FE modeling was carried out together with OLS for the unobservable individual effects.

6.5 Discussion

First, consistent with most previous studies (Tian & Zeitun, 2007; Gill et al., 2011; Vătavu, 2015; Le & Phan, 2017), more than half of total assets are financed by debt in sample firms. And the auto industry relies more on short-term debt than long-term debt. As discussed in literature review, Szucs (2015) argued that long-term fund raising is practically the privilege of firms having high market power. Some small firms have limited access to debt for lack of collateral. The negative relationship between debt ratio and firm performance suggests that the role of debt as a monitoring channel to improve firm performance is not considerable in these sample firms. Even under the pressure of paying off debts and threat of liquidation, management fails to use cash flow from debts effectively to improve firm performance. Debt servicing reduces funds available for profitable investments and the problem of underinvestment is exacerbated. The increased costs of debt include higher bankruptcy costs, more serious financial difficulties and more conflicts between shareholders and creditors, thus damaging firm performance.

While a firm's performance could be affected not only by the capital structure choice but by the structure of debt maturity. The negative effects of long term debt on ROE and Tobin's Q become insignificant in OLS regression. However, the coefficients of short term debt ratio are still negative at the 1% significant level in ROE, ROA and Tobin's Q models. Tian and Zeitun (2007) and Le and Phan (2017) state that short-term debt exposes firms to the risk of refinancing, which means the possibility that a company would not be able to replace a debt obligation with new debt at a critical time for the borrower. When refinancing, firms are faced with the risk that changes in market conditions may lead to an increase in refinancing interest rate. Firms are also faced with the risk that lending institutions may underestimate the continuation value of the firm and not allow refinancing, thus leading to inefficient liquidation or selling important firm assets at pretty low prices (Harford, 2014). Ozkan (2002) argued that firms issuing short-term debt do not take advantage of tax benefits as fully as firms with long-term debt, that's because the present value of interest tax shields in early stage from long term debt is larger than that from rolling short term debt, and issuing long term debt could reduce the firm's expected tax liability. Stohs and Mauer (1996) also found that debt maturity is negatively correlated with corporate tax and risk. In other words, the choice of debt structure could have an impact on both refinancing risk and tax shields, thus affect firm performance.

Next, in both developed and developing economies, an increase in debt position is associated with a decrease in firm performance. In this study, there is no evidence to support the findings from some previous studies (Gill et al., 2011; Margaritis and Psillaki, 2010; Nasimi, 2016; Abdullah and Tursoy, 2019) that leverage is positively correlated with firm performance in the context of developed markets. In descriptive statistics, firms from developing countries have higher mean value of short term debt ratio, but lower mean value of total debt ratio. Between 2011 and 2019, they performed better. Van Biesebroeck and Sturgeon (2010) believe that the geographic shift of the sector to from developed countries to emerging markets has been most pronounced in large developing countries such as China, India, and Brazil, especially after 2009 economic crisis.

Moreover, from the change in the average internal financing ratio, between 2011 and 2019, the auto industry shows a growing preference for internal financing. But the ratio of internal financing is still much lower than debt financing. Meanwhile, internal financing has a significant and positive impact on firm performance in both FE models and OLS models. The positive relationship is also significant on the alternative dependent variables in the robustness test. Due to asymmetric information and transaction costs with external financing, some managers tend to choose internal financing and remain cash inside. He et al. (2019) argues that internal financing could improve investment efficiency. Managers who believe their firms are undervalued by outside investors tend to choose internal financing. Under such circumstances, a firm's investment efficiency is higher sensitive to internal funds. As the stock market efficiency could affect a firm's performance and its reliability (Tian & Zeitun, 2007). The mean value of Tobin's Q during 2011 and 2019 is less than 1, which means that the market value is less than the recorded value of the assets of firms in this industry. This suggests that the market may be undervaluing these automobile firms. So companies in the auto industry should follow the pecking order theory that internal financing is preferred when the financial need for investment arises.

Finally, among control variables, there is significantly negative relation between tangibility and the firm performance. While a high proportion of tangible fixed assets can increase debt capacity, because of the reduction in distress costs. Firms with more tangible fixed assets have a greater ability to secure debt as these assets can be used as collateral. In a firm's access to external finance, tangible plays an important role due to its low degree of information asymmetry and high recovery rate. This is also supported by a positive correlation coefficient between the total debt ratio and tangibility. But highly levered firms tend to have lower profitability in these sampled firms. They are not able to utilize their tangible fixed asset composition in the total assets judiciously to impact on their firm performance. They should therefore be cautious in using their tangible fixed assets as a bait for debt financing.

Regarding firm size, in both fixed effects model and OLS regression, it is found that the size is positively correlated with accounting measures ROE, ROA, ROCE and ROIC, and negatively correlated with market measures Tobin's Q. There is no common view on how the firm size is related to firm profitability and market value in previous studies. Size can be a indicator of firm resources and default probability. Larger firms own more organizational resources, which give them the better equipment to achieve their goals (Onder, 2003). Larger firms can devise better ways to combat market risks and uncertainties and have better opportunities to offset losses and perform better. However, Agiomirgiannakis et al. (2006) pointed out that small firms sometimes suffer less from agency problems and more flexible structure to adapt to change. When larger firms come under the control of managers who pursue their own interests, management utility maximization may replace the goal of profit maximization.

The effect of liquidity on firm performance varies with different independent variables. While when long term debt ratio is included as an independent variable, the fixed effects equation and OLS regressions in robustness test all return significant positive coefficients for liquidity. Higher liquidity allows firms to meet their short term obligations easily without any additional cost, which means improved profitability. Goddard et al. (2005) also argued that higher liquidity allows firms to take advantage of profitable investment opportunities.

Asset growth has a significant and positive effect on firm performance, consistent with previous studies from Salim & Yadav (2012), Khodavandloo et al.(2017) and Ramli et al. (2019). Assets are those things we purchase today that will bring future benefits (Peterson, 2002). For a business, no matter how it is funded, it must be converted into assets to bring future benefits to the firm. And asset growth can take a variety of forms (growth in cash, current assets, or long-term assets). Manufacturing firms need to acquire enough raw materials to keep their production line running until the finished goods become cash and/or debts, and then replenish inventories. Firms that increase the amount of assets at their disposal become more competitive, increasing the future flow of benefits (Inyiama et al., 2017).

7. Conclusions

7.1 Summary

This study examines the effect of capital structure on firm performance in automobile industry during 2011 and 2019. Based on the sample of 303 automobile listed firms which are classified in SIC Codes 3711, 3713, and 3714. Using fixed effects models and OLS regression, this study provides evidence of the ratios of short term debt, long term debt and total debt negatively affecting firm accounting performance measured by ROE, ROA, ROCE and ROIC and market performance measured by Tobin's Q.

In the first subsample analysis, both in developed and developing markets, a firm's debt ratio affects its performance negatively. This is consistent with previous studies conducted in the context of emerging markets. However, this paper does not support the previous findings of a positive relationship between debt ratio and performance in the context of developed countries. In the second subsample analysis based on industry classification, the results also confirm that leverage negatively affecting firm performance. But the significance of the negative impact of debt indicators on firm performance vary with the industry.

In addition, structure of debt maturity also affects firm performance. Short term debt exposes firms to refinancing risk, and the negative impact on firm performance is always significant in both FE model and OLS model. But the effect of long term debt ratio on ROE and Tobin's Q is no longer significant in OLS regression.

This study also supports a significant and positive relationship between internal financing ratio and firm performance (ROE, ROA, ROCE, ROIC and Tobin's Q) among these firms, meaning that internal funds help to improve the profitability of the business. Meanwhile, the automobile firms show a growing preference for internal financing. However, it should be noted that internal financing depends on the firm's operating income and the accumulation of its own capital. For those firms with insufficient internal accumulation, they can only obtain funds from the outsiders.

The study confirms the negative effect of tangibility ratio on a firm's performance. The size of a firm is found to be a positive determinant of firm accounting performance measure (ROE, ROA, ROCE and ROIC), but a negative determinants of firm market performance measure (Tobin's Q). The effect of liquidity on firm performance varies with independent variables. And asset growth always positively affect firm performance.

7.2 Limitations and suggestions for future research

First, although capital structure is one of the main factors affecting firm performance, financing decision-making is a rather complex process and existing theories can only explain some aspects of the diversity and complexity of financing choices at best.

Second, the sample includes firms from both developed markets and developing markets. In this study, subsample analysis has been conducted for developed and developing markets respectively, and the negative effect of leverage and positive effect of internal financing did not change. For future research, it will be more accurate to conduct an in-depth study in a particular country or region.

Third, the Wald test for heteroscedasticity report that the heteroskedasticity problem exists in these models. Although robust standard errors were applied in the robustness check, the results may generate biased estimates of parameters. Further research may use other methods to measure variables. Moreover, other solutions can be found in other statistical techniques, like 2SLS and GMM. But previous research provides little information about these models. Different models could be tested to access the consistency of the results.

Fourth, there is no existing benchmark for the marginal impact of leverage or internal financing ratio on firm performance. Since literature on capital structure and firm performance on automobile industry has been limited. When the impact of capital structure on firm performance is quantify, the results related to the financial impact of leverage on performance should be most carefully interpreted.

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APPENDICES

Appendix A Literature review on determinants of capital structure

Author, Year	Dependent variable	Independent variable	Relation	Country, Sample size, Year
Deesomsak et al., 2004	leverage ratio	tangibility profitability firm size growth opportunity non-debt tax shield liquidity risk share price performance	insignificant uncertain + - - - insignificant -	Asian Pacific region, 1527, 1993-2001
Tesfaye & Minga, 2013	leverage ratio	firm size profitability tangibility non-debt tax shield dividend payout	+ - uncertain uncertain uncertain	Africa, 986, 1999-2008
Jani & Bhatt, 2015	debt-equity ratio	return on net worth return on capital employed size	uncertain uncertain +	India, 3, 2009-2013
Sarlija & Harc, 2012	debt ratio short term debt ratio long term debt ratio	liquidity ratio	- - -	Croatia, 1058, 2009
Lipson & Mortal, 2009	leverage ratio	liquidity ratio	-	the U.S., 1986-2006 (46,685 obs.), 1994-2006 (30,668 obs.)
Giambona & Campello, 2013	leverage ratio	overall tangibility	+	the U.S., 10128, 1984-1996
Gharaibeh, 2015	leverage ratio	age growth opportunity liquidity profitability firm size tangibility type of industry ownership dividend policy	+ + + - + + + insignificant insignificant	Kuwait, 49, 2009-2013
Frank & Goyal ,2009	leverage ratio	median industry leverage assets ratio tangibility profits log of assets expected inflation	+ - + - + +	the U.S., 252537, 1950-2003

Chen, 2004	overall leverage long term leverage	profitability size growth opportunities tangibility	- unclear + +	China, 462, 1995-2000
Fan et al., 2010	leverage ratio debt maturity	tangibility ROA log of assets market to book ratio developed economy common law corruption index bankruptcy code tax deposit insurance	+ - + - + - + + + +	Over 50 countries, 36767, 1991-2006
De Jong et al., 2008	leverage ratio	tangibility risk size tax growth profit liquidity bond market structure stock market structure capital formation	+ - uncertain + uncertain - - - insignificant insignificant	42 countries, 11845, 1997-2001
Demirguc-Kunt & Maksimovic, 1996	short term debt to total equity ratio long term debt to total equity ratio total debt to equity ratio	stock market cap total value of shares traded total value of shares traded to market cap	- - -	30 developing countries, 1980-1991

Appendix B Literature review on effects of debt financing

Author, Year	Dependent variable	Independent variable	Control variable	Relation	Country, Sample size, Year
Abor, 2005	ROE	short term debt/total assets (STD) long term debt/total assets (LTD) total debt/total assets (TD)	size, asset growth	+STD, +TD, - LTD	Ghana, 22, 1998-2002
Tian & Zeitun, 2007	ROE ROA Tobin's Q PROF (earnings before interest and tax plus depreciation to total assets) MBVR (market value of equity to the book value of equity) P/E (price per share to the earnings per share) MBVE (market value of equity and book value of liabilities divided by book value of equity)	short term debt/total assets (STD) long term debt/total assets (LTD) total debt/total assets (TD) total debt/total capital (TDTC) total debt/total equity (TDTE)	tax, tangibility, sales growth, size, risk, industry, year	-	Jordan, 167, 1989-2003
Gill et al., 2011	ROE	short term debt/total assets (STD) long term debt/total assets (LTD)	size, sales growth, industry	+	The U.S., 272, 2005-2007
Margaritis & Psillaki, 2010	EFF (firm efficiency)	total debt/total assets (TD)	Profitability, size, tangibility, intangibility, sales growth,	+	France, 1534, 2002-2005

			ownership concentration		
Azhagaiah & Gavoury, 2011	ROA ROCE	total debt/total assets (TD) total debt/total equity (TDTE)	Expense to Income Ratio, liquidity	-	India, 102, 1999-2007
Ebrati et al., 2013	ROE ROA Tobin's Q MBVR EPS (earnings per share)	short term debt/total assets (STD) long term debt/total assets (LTD) total debt/total assets (TD) total debt/total equity (TDTE)		+ROE, Tobin's Q, MBVR -ROA, EPS	Iran, 85, 2006-2011
Vatavu, 2015	ROE ROA	short term debt/total assets (STD) long term debt/total assets (LTD) total debt/total assets (TD) total equity/total assets (TETA)	tangibility, tax, business risk, liquidity, inflation	-	Romania, 196, 2003-2010
Abeywardhana, 2015	ROA ROCE (earnings before interest and tax to capital employed)	short term debt/total assets (STD) long term debt/total assets (LTD)	size, sales growth, liquidity	-	UK, 54183, 1998-2008
Nwude et al., 2016	ROA	short term debt/total assets (STD) long term debt/total assets (LTD) total debt/total assets (TD)	size, age	-	Nigeria, 43, 2001-2012
Nasimi, 2016	ROE ROA ROIC (return on investment capital)	total debt/total assets (TD) total debt/total equity (TDTE) EBIT/Interest Expense (Interest Coverage)		+	UK, 30, 2005-2014

Le &Phan, 2017	ROE ROA Tobin's Q	short term debt/total assets (STD) long term debt/total assets (LTD) total debt/total assets (TD)	sales growth, tangibility, risk, investment, cash flow, profitability, liquidity, dividend	-	Vietnam, 466, 2007-2012.
Jayiddin et al, 2017	ROA	short term debt/total assets (STD) long term debt/total assets (LTD) total debt/total assets (TD)	sales growth, size	-STD Nonsignificant with LTDR	Malaysia, 225, 2010-2014
Khodavandloo et al, 2017	ROE, ROA, GPM, PE ratio, EPS ROA GPM (gross profit to total sales) PE (net income to outstanding shares) EPS (earnings per share)	Leverage ratio, total cash and cash equivalent/total assets total debt/total equity (TDTE)	liquidity, tangibility, size, asset growth	-	Bursa Malaysia, 45, 2004-2006,2007-2009, and 2010-2013
Kashif et al., 2017	ROE ROA	total debt/total assets (TD) total debt/total equity (TDTE) short term debt/total assets (STD) long term debt/total assets (LTD) total debt/total assets (TD)	asset turnover, size	+ & -	Pakistan, 60, 2010-2014
Ramli et al, 2019	ROE ROA ROIC (return on investment capital)	short term debt/total assets (STD) long term debt/total assets (LTD) total debt/total assets (TD)		+ (only in Malaysia)	Malaysia and Indonesia, 7819, 1990-2010

Appendix C Country distribution of sample firms

World Region	Country	Number	%
Africa	South Africa	2	0.66%
	Nigeria	1	0.33%
Total		3	0.99%
Eastern Europe	Bosnia and Herzegovina	4	1.32%
	Hungary	1	0.33%
	Poland	2	0.66%
	Romania	3	0.99%
	Russian Federation	10	3.30%
Total		20	6.60%
Western Europe	Austria	2	0.66%
	France	8	2.64%
	Germany	8	2.64%
	Sweden	3	0.99%
	Turkey	9	2.64%
	United Kingdom	3	0.99%
Total		33	10.56%
Far East and Central Asia	China	45	14.85%
	Hong Kong, SAR	1	0.33%
	India	2	0.66%
	Indonesia	6	1.98%
	Japan	35	11.55%
	Malaysia	6	1.98%
	Pakistan	11	3.63%
	Republic of Korea	62	20.46%
	Sri Lanka	1	0.33%
	Taiwan	19	6.27%
	Thailand	4	1.32%
	Vietnam	2	0.66%
Total		194	64.03%
Middle East	Israel	1	0.33%
	Islamic Republic of Iran	3	0.99%
Total		4	1.32%
North America	Bermuda	1	0.33%
	Canada	4	1.32%
	United States of America	27	8.91%
Total		32	10.56%
South and Central America	Argentina	1	0.33%
	Brazil	7	2.31%
	Cayman Islands	3	0.99%
	Mexico	1	0.33%
Total		12	3.96%
Oceania	Australia	5	1.65%
Total		5	1.65%

Appendix D Subsample descriptive statistics

Panel A Subsample descriptive statistics based on industry classification

Variables	SIC Code	Observation	Mean	Std Dev	Min	Q1	Median	Q3	Max
Independent Variables-Capital Structure									
STDR	3711	632	0.479	0.188	0.029	0.372	0.471	0.596	0.912
LTDR	3711	539	0.124	0.119	0.000	0.025	0.093	0.188	0.515
TDR	3711	640	0.568	0.199	0.052	0.468	0.583	0.722	0.948
IFR	3711	523	0.255	0.163	0.007	0.123	0.241	0.377	0.840
Dependent Variables-Firm Performance									
ROE	3711	635	0.071	0.190	-1.265	0.024	0.081	0.154	0.494
ROA	3711	670	0.026	0.172	-1.110	0.009	0.047	0.086	0.283
Tobin's Q	3711	646	0.760	0.822	0.049	0.276	0.504	0.936	5.054
ROCE	3711	636	0.113	0.123	-0.468	0.040	0.079	0.135	0.542
ROIC	3711	645	0.064	0.161	-0.677	0.015	0.054	0.100	0.343
Control Variables									
TANG	3711	665	0.230	0.132	0.005	0.132	0.214	0.299	0.744
SZ (log total asset)	3711	672	3.149	1.175	0.040	2.238	3.181	3.936	5.379
LIQ	3711	668	1.685	1.623	0.202	1.029	1.348	1.768	13.602
GRO	3711	597	1.073	0.247	0.546	0.960	1.039	1.135	2.280
Independent Variables-Capital Structure									
STDR	3713	133	0.517	0.171	0.222	0.368	0.503	0.663	0.913
LTDR	3713	125	0.111	0.106	0.000	0.027	0.068	0.200	0.406
TDR	3713	133	0.612	0.180	0.222	0.436	0.624	0.750	0.949
IFR	3713	112	0.220	0.181	0.008	0.090	0.165	0.337	0.745
Dependent Variables-Firm Performance									
ROE	3713	133	0.085	0.248	-1.265	0.037	0.084	0.180	0.494
ROA	3713	140	0.047	0.063	-0.196	0.019	0.051	0.082	0.235
Tobin's Q	3713	142	0.681	0.495	0.049	0.368	0.562	0.871	2.660
ROCE	3713	124	0.126	0.120	-0.468	0.051	0.082	0.158	0.542
ROIC	3713	133	0.074	0.069	-0.249	0.027	0.059	0.089	0.265
Control Variables									
TANG	3713	140	0.201	0.107	0.043	0.120	0.169	0.282	0.500
SZ (log total asset)	3713	140	2.791	0.768	0.500	2.454	2.966	3.252	4.086
LIQ	3713	140	1.451	0.596	0.202	1.067	1.316	1.819	3.672
GRO	3713	123	1.069	0.193	0.546	0.955	1.050	1.161	1.664
Independent Variables-Capital Structure									
STDR	3714	1754	0.423	0.178	0.029	0.293	0.405	0.535	0.913
LTDR	3714	1502	0.124	0.108	0.000	0.036	0.101	0.184	0.515
TDR	3714	1751	0.520	0.201	0.053	0.385	0.527	0.673	0.949
IFR	3714	1510	0.313	0.196	0.008	0.153	0.279	0.445	0.841
Dependent Variables-Firm Performance									
ROE	3714	1776	0.053	0.203	-1.265	0.021	0.075	0.129	0.494
ROA	3714	1844	0.038	0.150	-1.110	0.017	0.049	0.086	0.283
Tobin's Q	3714	1761	0.730	0.860	0.049	0.252	0.462	0.825	5.054
ROCE	3714	1728	0.093	0.114	-0.468	0.032	0.070	0.113	0.542
ROIC	3714	1791	0.063	0.174	-0.677	0.020	0.056	0.099	0.343
Control Variables									
TANG	3714	1827	0.342	0.164	0.005	0.228	0.335	0.454	0.744
SZ (log total asset)	3714	1844	2.494	0.815	0.040	1.989	2.553	3.020	5.085
LIQ	3714	1843	1.919	1.890	0.202	1.027	1.423	2.067	13.602
GRO	3714	1632	1.064	0.219	0.546	0.959	1.033	1.119	2.280

Panel B Descriptive statistics (Subsamples from developing countries)								
Variables	Observation	Mean	Std Dev	Min	Q1	Median	Q3	Max
Independent Variables-Capital Structure								
STDR	1161	0.449	0.192	0.029	0.315	0.433	0.573	0.912
LTDR	949	0.107	0.105	0.0002	0.022	0.074	0.163	0.515
TDR	1181	0.529	0.205	0.052	0.394	0.534	0.685	0.948
IFR	949	0.231	0.165	0.007	0.110	0.188	0.318	0.840
Dependent Variables-Firm Performance								
ROE	1194	0.070	0.199	-1.265	0.020	0.0759	0.148	0.494
ROA	1238	0.050	0.097	-1.110	0.014	0.0496	0.088	0.283
Tobin's Q	1143	0.875	0.897	0.049	0.303	0.612	1.077	5.054
ROCE	1178	0.123	0.132	-0.467	0.038	0.0853	0.144	0.463
ROIC	1193	0.084	0.122	-0.676	0.018	0.0567	0.101	0.342
Control Variables								
TANG	1240	0.290	0.163	0.004	0.166	0.269	0.397	0.744
SZ (log total asset)	1240	2.516	0.822	0.500	1.899	2.554	3.138	5.084
LIQ	1240	1.820	1.733	0.201	1.054	1.364	1.895	13.602
GRO	1099	1.070	0.243	0.545	0.943	1.035	1.145	2.280

Panel C Descriptive statistics (Subsamples from developed countries)								
Variables	Observation	Mean	Std Dev	Min	Q1	Median	Q3	Max
Independent Variables-Capital Structure								
STDR	1358	0.436	0.174	0.029	0.320	0.428	0.547	0.912
LTDR	1217	0.136	0.113	0.0002	0.047	0.113	0.198	0.515
TDR	1343	0.544	0.197	0.052	0.417	0.566	0.691	0.948
IFR	1196	0.344	0.193	0.007	0.1912	0.338	0.467	0.840
Dependent Variables-Firm Performance								
ROE	1350	0.049	0.204	-1.265	0.023	0.076	0.129	0.494
ROA	1416	0.021	0.187	-1.110	0.017	0.047	0.084	0.283
Tobin's Q	1406	0.620	0.760	0.049	0.24	0.421	0.674	5.054
ROCE	1310	0.078	0.196	-0.467	0.031	0.064	0.103	0.542
ROIC	1376	0.046	0.162	-0.676	0.020	0.055	0.096	0.342
Control Variables								
TANG	1392	0.320	1.045	0.004	0.204	0.315	0.435	0.744
SZ (log total asset)	1416	2.814	1.045	0.04	2.226	2.740	3.344	5.378
LIQ	1411	1.848	1.827	0.201	1.009	1.419	1.953	13.602
GRO	1253	1.063	0.207	0.545	0.968	1.034	1.112	2.280

Appendix D reports the mean, standard deviation (Std Dev), minimum (Min), quartile 1 (Q1), median, quartile 3 (Q3) and maximum (Max) in subsamples. Total assets is in $million. All dependent variables and control variables are winsorized at the 1st and 99th percentiles. Variable definitions are given in Table 2.

Appendix E Test for multicollinearity

Dependent variable: ROE							
Variable	VIF	**Variable**	VIF	**Variable**	VIF	**Variable**	VIF
LIQ	1.83	**TANG**	1.22	**LIQ**	1.73	**LIQ**	1.49
STDR	1.61	**SZ**	1.22	**TDR**	1.64	**IFR**	1.29
TANG	1.19	**LIQ**	1.13	**SZ**	1.18	**SZ**	1.19
SZ	1.17	**LTDR**	1.03	**TANG**	1.11	**TANG**	1.19
GRO	1.02	**GRO**	1.02	**GRO**	1.02	**GRO**	1.02
Mean VIF	1.36	**Mean VIF**	1.13	**Mean VIF**	1.34	**Mean VIF**	1.24

Dependent variable: ROA							
Variable	VIF	**Variable**	VIF	**Variable**	VIF	**Variable**	VIF
LIQ	1.81	**TANG**	1.2	**LIQ**	1.73	**LIQ**	1.49
STDR	1.61	**SZ**	1.19	**TDR**	1.64	**IFR**	1.29
TANG	1.19	**LIQ**	1.1	**SZ**	1.17	**SZ**	1.19
SZ	1.16	**LTDR**	1.03	**TANG**	1.11	**TANG**	1.19
GRO	1.01	**GRO**	1.02	**GRO**	1.02	**GRO**	1.02
Mean VIF	1.36	**Mean VIF**	1.11	**Mean VIF**	1.33	**Mean VIF**	1.24

Dependent variable: Tobin's Q							
Variable	VIF	**Variable**	VIF	**Variable**	VIF	**Variable**	VIF
LIQ	1.84	**TANG**	1.2	**LIQ**	1.75	**LIQ**	1.51
STDR	1.62	**SZ**	1.18	**TDR**	1.64	**IFR**	1.3
TANG	1.19	**LIQ**	1.11	**SZ**	1.15	**TANG**	1.2
SZ	1.15	**LTDR**	1.03	**TANG**	1.12	**SZ**	1.2
GRO	1.01	**GRO**	1.02	**GRO**	1.02	**GRO**	1.02
Mean VIF	1.36	**Mean VIF**	1.11	**Mean VIF**	1.34	**Mean VIF**	1.25

Dependent variable: ROCE							
Variable	VIF	**Variable**	VIF	**Variable**	VIF	**Variable**	VIF
LIQ	1.79	**TANG**	1.22	**LIQ**	1.7	**LIQ**	1.5
STDR	1.62	**SZ**	1.22	**TDR**	1.62	**IFR**	1.32
TANG	1.2	**LIQ**	1.1	**SZ**	1.16	**TANG**	1.21
SZ	1.17	**LTDR**	1.03	**TANG**	1.13	**SZ**	1.21
GRO	1.01	**GRO**	1.02	**GRO**	1.02	**GRO**	1.02
Mean VIF	1.36	**Mean VIF**	1.12	**Mean VIF**	1.33	**Mean VIF**	1.25

Dependent variable: ROIC							
Variable	VIF	**Variable**	VIF	**Variable**	VIF	**Variable**	VIF
LIQ	1.81	**TANG**	1.22	**LIQ**	1.73	**LIQ**	1.5
STDR	1.6	**SZ**	1.22	**TDR**	1.64	**IFR**	1.29
TANG	1.18	**LIQ**	1.11	**SZ**	1.17	**SZ**	1.19
SZ	1.16	**LTDR**	1.04	**TANG**	1.11	**TANG**	1.19
GRO	1.01	**GRO**	1.01	**GRO**	1.01	**GRO**	1.03
Mean VIF	1.35	**Mean VIF**	1.12	**Mean VIF**	1.33	**Mean VIF**	1.24

Dependent variable: ROE mean value							
Variable	VIF	**Variable**	VIF	**Variable**	VIF	**Variable**	VIF
LIQ	1.85	**SZ**	1.19	**LIQ**	1.84	**LIQ**	1.42
STDR	1.67	**TANG**	1.15	**TDR**	1.75	**SZ**	1.22
SZ	1.17	**LIQ**	1.15	**SZ**	1.16	**IFR**	1.19
TANG	1.12	**LTDR**	1.06	**TANG**	1.1	**TANG**	1.19
GRO	1.02	**GRO**	1.03	**GRO**	1.02	**GRO**	1.03
Mean VIF	1.37	**Mean VIF**	1.12	**Mean VIF**	1.38	**Mean VIF**	1.21

Dependent variable: ROA mean value							
Variable	VIF	**Variable**	VIF	**Variable**	VIF	**Variable**	VIF
LIQ	1.83	**SZ**	1.17	**LIQ**	1.84	**LIQ**	1.42
STDR	1.66	**TANG**	1.13	**TDR**	1.75	**SZ**	1.22
SZ	1.17	**LIQ**	1.13	**SZ**	1.16	**TANG**	1.19
TANG	1.12	**LTDR**	1.06	**TANG**	1.1	**IFR**	1.19
GRO	1.02	**GRO**	1.02	**GRO**	1.02	**GRO**	1.03
Mean VIF	1.36	**Mean VIF**	1.1	**Mean VIF**	1.38	**Mean VIF**	1.21

Dependent variable: Tobin's Q mean value							
Variable	VIF	**Variable**	VIF	**Variable**	VIF	**Variable**	VIF
LIQ	1.82	**SZ**	1.17	**LIQ**	1.83	**LIQ**	1.4
STDR	1.65	**LIQ**	1.13	**TDR**	1.74	**SZ**	1.22
SZ	1.16	**TANG**	1.13	**SZ**	1.16	**TANG**	1.2
TANG	1.11	**LTDR**	1.06	**TANG**	1.09	**IFR**	1.18
GRO	1.02	**GRO**	1.03	**GRO**	1.03	**GRO**	1.03
Mean VIF	1.35	**Mean VIF**	1.1	**Mean VIF**	1.37	**Mean VIF**	1.21

Appendix F FE Estimation Results of subsample analysis

Panel A FE regressions using subsample from developing countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ROE	ROE	ROE	ROE	ROA	ROA	ROA	ROA	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
STDR	-0.304***				-0.0366				-0.0128			
	(-4.48)				(-1.49)				(-0.05)			
LTDR		-0.137				-0.123***				-0.167		
		(-1.35)				(-4.45)				(-0.53)		
TDR			-0.384***				-0.100***				-0.203	
			(-5.81)				(-4.14)				(-0.80)	
IFR				0.439***				0.191***				1.535***
				(9.60)				(8.40)				(4.74)
TANG	-0.377***	-0.0321	-0.319***	-0.181***	-0.0524	0.0900***	-0.048	-0.0456	-0.438	-0.411	-0.466	-0.113
	(-4.07)	(-0.30)	(-3.57)	(-3.08)	(-1.56)	(3.20)	(-1.47)	(-1.56)	(-1.29)	(-1.19)	(-1.41)	(-0.26)
SZ	0.0373	0.116***	0.0566*	-0.0911***	0.0198	0.0524***	0.0206*	-0.0419***	-1.080***	-1.137***	-1.083***	-0.574***
	(1.08)	(2.70)	(1.73)	(-4.25)	(1.57)	(4.60)	(1.71)	(-3.94)	(-8.64)	(-9.05)	(-9.04)	(-3.74)
LIQ	0.000753	0.0284***	-0.00224	-0.0115***	0.00494*	0.00927***	0.00146	-0.00471**	0.00238	0.0115	-0.016	0.0837**
	(0.09)	(2.68)	(-0.29)	(-2.68)	(1.65)	(3.20)	(0.51)	(-2.21)	(0.06)	(0.35)	(-0.44)	(2.26)
GRO	0.161***	0.115***	0.159***	0.0927***	0.0462***	0.0284***	0.0474***	0.0189***	0.134*	0.0163	0.159**	0.251***
	(7.44)	(4.41)	(7.57)	(7.15)	(5.85)	(4.01)	(6.16)	(2.94)	(1.70)	(0.20)	(2.06)	(2.70)
_cons	0.0362	-0.399***	0.0455	0.212***	-0.0263	-0.151***	0.0118	0.131***	3.734***	3.983***	3.846***	1.735***
	(0.31)	(-2.98)	(0.42)	(3.10)	(-0.62)	(-4.34)	(0.30)	(3.88)	(8.31)	(10.06)	(9.24)	(3.44)
N	1021	814	1043	846	1026	839	1045	846	973	791	986	795
R–squared(within)	0.1234	0.0613	0.1358	0.1898	0.0657	0.0796	0.0818	0.1175	0.0901	0.1238	0.0897	0.0861
F-test	24.8	8.87	28.36	33.65	12.44	12.15	16.11	19.12	16.59	18.67	16.78	12.68
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Panel B FE regressions using subsample from developed countries												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ROE	ROE	ROE	ROE	ROA	ROA	ROA	ROA	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
STDR	-1.063***				-0.087***				-0.774***			
	(-13.83)				(-3.09)				(-4.80)			
LTDR		-0.223**				-0.139***				-1.053***		
		(-2.44)				(-4.38)				(-6.38)		
TDR			-0.989***				-0.185***				-0.827***	
			(-14.33)				(-6.82)				(-5.42)	
IFR				0.274***				0.0926***				0.242*
				(4.74)				(4.50)				(1.73)
TANG	-0.188*	0.0846	0.0774	-0.107	-0.114***	-0.160***	0.0720**	-0.0596**	-1.138***	0.0472	-0.673***	-0.396**
	(-1.95)	(0.77)	(0.85)	(-1.43)	(-3.20)	(-4.27)	(2.00)	(-2.24)	(-5.60)	(0.24)	(-3.32)	(-2.19)
SZ	-0.275***	-0.143***	-0.0777	-0.216***	-0.00984	0.00247	-0.0182	-0.0858***	-0.421***	-0.303***	-0.302***	-0.417***
	(-5.51)	(-2.58)	(-1.56)	(-5.37)	(-0.52)	(0.13)	(-0.93)	(-6.00)	(-3.93)	(-3.08)	(-2.73)	(-4.29)
LIQ	-0.028***	0.0751***	-0.0161**	-0.00865	-0.00247	0.0142***	0.00146	-0.0085***	-0.057***	0.0885***	-0.0346**	-0.0145
	(-3.50)	(5.65)	(-2.09)	(-1.36)	(-0.79)	(2.91)	(0.48)	(-3.78)	(-3.24)	(3.47)	(-2.01)	(-0.94)
GRO	0.143***	0.210***	0.206***	0.147***	0.0631***	0.0727***	0.0793***	0.0418***	0.0432	0.159***	0.160***	0.111**
	(5.73)	(7.60)	(8.28)	(6.70)	(6.63)	(7.52)	(8.08)	(5.34)	(0.80)	(3.16)	(2.90)	(2.09)
_cons	1.273***	0.133	0.601***	0.519***	0.0816	-0.000362	0.0862	0.270***	2.587***	1.264***	2.028***	1.743***
	(7.91)	(0.80)	(4.14)	(4.19)	(1.32)	(-0.01)	(1.50)	(6.15)	(7.34)	(4.19)	(6.29)	(5.83)
N	1174	1055	1175	1055	1194	1081	1178	1056	1193	1080	1177	1055
R–squared(within)	0.2053	0.0959	0.2246	0.0924	0.0659	0.1101	0.1106	0.0884	0.0492	0.0739	0.0535	0.035
F-test	52.38	19.05	58.8	18.43	14.58	22.79	25.33	17.58	10.69	14.69	11.5	6.56
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Panel C FE regressions using subsample from SIC Code 3711												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ROE	ROE	ROE	ROE	ROA	ROA	ROA	ROA	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
STDR	-0.0905*				-0.0503				-0.143			
	(-1.67)				(-1.43)				(-0.69)			
LTDR		-0.0859				-0.261***				0.601**		
		(-1.03)				(-4.97)				(-2.09)		
TDR			-0.134***				-0.0399				-0.125	
			(-2.77)				(-1.46)				(-0.66)	
IFR				0.181***				0.0767***				0.619***
				(4.96)				(4.05)				(3.59)
TANG	-0.073	-0.0544	-0.0813	0.0423	-0.126***	-0.128**	-0.0199	0.0457*	0.464*	0.206	0.298	0.197
	(-1.11)	(-0.75)	(-1.27)	(0.87)	(-2.92)	(-2.46)	(-0.55)	(1.82)	(1.83)	(0.71)	(1.19)	(0.91)
SZ	0.0315***	0.0499***	0.0332***	0.00964*	0.0135***	0.0406***	0.00593	-0.0099***	-0.263***	-0.308***	-0.236***	-0.170***
	(-4.12)	(5.67)	(4.50)	(1.82)	(2.67)	(6.60)	(1.43)	(-3.61)	(-8.63)	(-8.96)	(-8.03)	(-6.90)
LIQ	0.0107	0.0290***	0.00694	-0.00421	0.0112**	0.0311***	0.00918**	0.000463	-0.018	-0.0236	-0.00816	0.0407
	(1.38)	(3.67)	(0.95)	(-0.82)	(2.15)	(5.40)	(2.21)	(0.17)	(-0.54)	(-0.74)	(-0.27)	(1.61)
GRO	0.189***	0.171***	0.191***	0.165***	-0.0161	-0.0871***	0.0703***	0.0689***	0.527***	0.566***	0.366**	0.563***
	(4.77)	(3.69)	(5.05)	(5.56)	(-0.65)	(-2.94)	(3.29)	(4.47)	(3.62)	(3.46)	(2.48)	(4.22)
_cons	-0.176**	-0.299***	-0.142**	-0.154***	0.0598	0.0142	-0.033	-0.0103	0.944***	1.005***	1.055***	0.271
	(-2.48)	(-4.13)	(-2.13)	(-3.37)	(1.29)	(0.28)	(-0.87)	(-0.43)	(3.39)	(3.62)	(3.97)	(1.29)
N	543	461	558	465	553	479	561	465	541	474	545	449
R–squared(within)	0.084	0.1362	0.0922	0.0889	0.0707	0.1814	0.0322	0.0843	0.1875	0.1827	0.1384	0.1781
F-test	5.14	5.89	5.71	4.77	3.42	9.83	2.55	4.56	10.15	9.81	8.28	9.09
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Panel D FE regressions using subsample from SIC Code 3713												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ROE	ROE	ROE	ROE	ROA	ROA	ROA	ROA	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
STDR	0.094				0.0317				-1.059***			
	(0.54)				(0.69)				(-3.24)			
LTDR		-0.275				0.0043				-0.611*		
		(-1.19)				(0.07)				(-1.78)		
TDR			-0.008				0.0584				-1.241***	
			(-0.06)				(1.61)				(-5.02)	
IFR				0.178**				-0.0069				0.777***
				(2.17)				(-0.19)				(3.21)
TANG	-0.0507	-0.108	-0.0318	-0.204	0.0996*	0.0866	0.114**	0.135**	-1.857***	-1.805***	-2.224***	-2.749***
	(-0.25)	(-0.47)	(-0.16)	(-1.48)	(1.89)	(1.44)	(2.21)	(2.24)	(-4.90)	(-5.02)	(-6.31)	(-6.82)
SZ	0.0726*	0.0484	0.0591	-0.0576**	-0.00772	-0.00809	-0.00485	-0.0202*	-0.0165	0.0809	-0.0268	0.0104
	(1.73)	(1.30)	(1.52)	(-2.10)	(-0.70)	(-1.00)	(-0.48)	(-1.67)	(-0.21)	-1.52	(-0.39)	(0.13)
LIQ	0.111**	0.175***	0.0923**	-0.021	0.0518***	0.0625***	0.0562***	0.0384***	-0.330***	-0.0142	-0.352***	-0.183**
	(2.22)	(3.41)	(2.03)	(-0.75)	(3.96)	(5.03)	(4.76)	(3.11)	(-3.51)	(-0.19)	(-4.37)	(-2.25)
GRO	0.375***	0.346***	0.374***	0.180**	0.025	0.0491	0.0282	0.0187	0.037	-0.155	-0.0241	-0.19
	(3.15)	(2.77)	(3.13)	(2.02)	(0.80)	(1.52)	(0.91)	(0.48)	(0.16)	(-0.81)	(-0.11)	(-0.73)
_cons	-0.795***	-0.701***	-0.679**	0.143	-0.0763	-0.0888*	-0.117*	0.00144	2.132***	0.968***	2.549***	1.717***
	(-2.85)	(-3.35)	(-2.51)	(0.86)	(-1.04)	(-1.82)	(-1.67)	(0.02)	(4.05)	(3.16)	(5.34)	(3.55)
N	116	104	116	98	116	111	116	98	115	105	115	97
R–squared(within)	0.1071	0.1418	0.1046	0.0599	0.1221	0.1458	0.1395	0.1117	0.2929	0.2051	0.3746	0.4091
F-test	2.15	2.42	2.12	1.52	2.33	2.56	2.55	2.02	4.94	3.24	6.69	6.54
Prob > F	0.0197	0.0091	0.0216	0.1345	0.011	0.0054	0.0054	0.0323	0.0000	0.0007	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Panel E FE regressions using subsample from SIC Code 3714												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ROE	ROE	ROE	ROE	ROA	ROA	ROA	ROA	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
STDR	-0.309***				-0.134***				-1.418***			
	(-8.70)				(-7.26)				(-9.95)			
LTDR		-0.000176				-0.0355				-0.451***		
		(-0.00)				(-1.52)				(-2.75)		
TDR			-0.264***				-0.120***				-1.548***	
			(-8.38)				(-7.28)				(-12.22)	
IFR				0.0898***				0.0873***				0.378***
				(5.02)				(9.16)				(3.00)
TANG	-0.0611*	0.0919***	-0.000577	-0.177***	-0.0254	0.0434**	0.0029	-0.0852***	-1.493***	-0.861***	-1.340***	-1.317***
	(-1.88)	(-2.59)	(-0.02)	(-8.33)	(-1.49)	(-2.54)	(-0.18)	(-7.53)	(-11.27)	(-7.20)	(-10.72)	(-8.78)
SZ	0.0708***	0.0917***	0.0812***	0.00691	0.0299***	0.0390***	0.0341***	-0.00216	-0.223***	-0.096***	-0.170***	-0.185***
	(-10.41)	(-12.36)	(-11.87)	(-1.47)	(-8.38)	(-10.96)	(-9.51)	(-0.86)	(-8.12)	(-3.88)	(-6.26)	(-5.57)
LIQ	-0.0097**	0.0258***	-0.00621*	-0.00302	-0.006***	0.00222	-0.005***	-0.00221*	-0.0267	0.183***	-0.048***	0.0335**
	(-2.52)	(-5.01)	(-1.77)	(-1.24)	(-3.41)	(-0.89)	(-3.19)	(-1.71)	(-1.63)	(-10.48)	(-3.29)	(-1.97)
GRO	0.172***	0.165***	0.190***	0.132***	0.0548***	0.0533***	0.0643***	0.0390***	0.264***	0.293***	0.347***	0.326***
	(7.32)	(6.25)	(8.03)	(7.96)	(4.41)	(4.17)	(5.16)	(4.41)	(2.73)	(3.26)	(3.64)	(2.73)
_cons	-0.115**	-0.421***	-0.182***	-0.0268	0.00599	-0.120***	-0.0209	0.0410***	2.117***	0.558***	2.083***	1.051***
	(-2.56)	(-9.48)	(-4.28)	(-1.00)	(0.25)	(-5.63)	(-0.94)	(2.88)	(11.52)	(3.76)	(12.16)	(5.53)
N	1536	1304	1544	1338	1551	1330	1546	1339	1510	1292	1503	1304
R–squared(within)	0.1551	0.1432	0.157	0.1345	0.0931	0.0973	0.098	0.1272	0.1958	0.1859	0.2129	0.1199
F-test	24.48	19.15	24.95	18.31	14.26	12.93	14.99	17.24	31.62	25.57	34.85	15.79
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Appendix G OLS regression with industry and time dummy variables

Panel A OLS Estimation Results of ROE as a dependent variable

Dependent variable: ROE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-0.155***	-0.189***	-0.231***	-0.234***												
	(-4.29)	(-5.24)	(-5.48)	(-5.25)												
LTDR					-0.0813*	0.00375	-0.00088	-0.0217								
					(-1.72)	(-0.08)	(-0.02)	(-0.45)								
TDR									-0.106***	-0.175***	-0.205***	-0.221***				
									(-3.51)	(-5.47)	(-5.50)	(-5.73)				
IFR													0.0814***	0.0818***	0.0999***	0.108***
													(5.90)	(5.97)	(7.03)	(7.16)
TANG	-0.127***	-0.0661*	-0.0882**	-0.056	-0.112***	-0.0132	0.0249	0.0693	-0.111***	-0.0378	-0.0485	-0.0225	-0.165***	-0.153***	-0.168***	-0.149***
	(-4.12)	(-1.92)	(-2.47)	(-1.46)	(-3.40)	(-0.32)	(-0.60)	(1.54)	(-3.63)	(-1.08)	(-1.38)	(-0.60)	(-9.20)	(-7.68)	(-7.76)	(-6.39)
SZ		0.0524***	0.0490***	0.0492***		0.0573***	0.0640***	0.0666***		0.0592***	0.0572***	0.0568***		0.00971***	0.00690*	0.00604
		(7.19)	(6.91)	(6.70)		(6.74)	(7.54)	(7.60)		(7.65)	(7.57)	(7.29)		(2.64)	(1.69)	(1.42)
LIQ			-0.00803*	-0.00507			0.0183**	0.0261***			-0.00605	-0.00428			-0.00548***	-0.00385**
			(-1.70)	(-0.95)			(-2.29)	(-3.23)			(-1.47)	(-0.94)			(-3.02)	(-1.99)
GRO				0.188***				0.185***				0.199***				0.142***
				(5.11)				(5.17)				(5.24)				(7.38)
Constant	0.208***	0.0642**	0.114***	-0.129*	0.124***	-0.0579	-0.117***	-0.381***	0.190***	0.0471	0.0834**	-0.157**	0.147***	0.116***	0.133***	-0.0491
	(8.88)	(1.97)	(3.09)	(-1.93)	(6.83)	(-1.52)	(-2.90)	(-5.68)	(8.35)	(1.53)	(2.53)	(-2.55)	(13.73)	(-6.58)	(6.63)	(-1.52)
YEAR dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2481	2481	2477	2195	2107	2107	2107	1869	2506	2506	2502	2218	2141	2141	2141	1901
Adj R–squared	0.0377	0.0883	0.0903	0.1237	0.0174	0.0751	0.0838	0.1194	0.0289	0.0900	0.0912	0.1294	0.0734	0.0774	0.0800	0.1187
F-test	5.76	14.40	13.20	12.61	3.94	13.01	12.59	12.26	5.47	15.09	13.86	13.47	18.02	18.57	18.20	19.21
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Panel B OLS Estimation Results of ROA as a dependent variable

Dependent variable: ROA	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-0.082***	-0.092***	-0.112***	-0.121***												
	(-4.53)	(-5.24)	(-5.70)	(-5.29)												
LTDR					-0.0449	-0.0814**	-0.0817**	-0.0901**								
					(-1.35)	(-2.33)	(-2.36)	(-2.41)								
TDR									-0.049***	-0.070***	-0.086***	-0.092***				
									(-3.57)	(-5.71)	(-5.77)	(-5.97)				
IFR													0.0725***	0.0723***	0.0748***	0.0780***
													(9.05)	(8.96)	(8.81)	(8.59)
TANG	-0.045**	-0.0248	-0.0329*	-0.0237	-0.0306	0.0193	0.0378*	0.0449**	-0.0245*	-0.0016	-0.00433	0.00501	-0.0559***	-0.0630***	-0.0652***	-0.0574***
	(-2.58)	(-1.31)	(-1.76)	(-1.06)	(-1.61)	(0.89)	(1.89)	(2.02)	(-1.73)	(-0.09)	(-0.26)	(0.27)	(-6.29)	(-6.29)	(-6.19)	(-4.95)
SZ		0.017***	0.016***	0.018***		0.028***	0.031***	0.032***		0.0185***	0.0177***	0.0180***		-0.00553***	-0.00593***	-0.00612***
		(3.89)	(3.86)	(3.81)		(4.87)	(5.56)	(5.49)		(4.40)	(4.40)	(4.16)		(-3.06)	(-3.19)	(-3.11)
LIQ			-0.00453	-0.0036			0.00940*	0.0108*			-0.00385	-0.00344			-0.000771	-0.000851
			(-1.57)	(-1.11)			(1.72)	(1.78)			(-1.50)	(-1.21)			(-0.51)	(-0.53)
GRO				0.0365				0.0166				0.0647***				0.0449***
				(1.36)				(0.51)				(2.90)				(4.77)
Constant	0.117***	0.067***	0.091***	0.0344	0.072***	-0.0185	-0.0472**	-0.0785**	0.0994***	0.0545***	0.0735***	-0.00616	0.0681***	0.0856***	0.0881***	0.0337**
	(8.82)	(3.45)	(4.75)	(0.77)	(6.59)	(-0.82)	(-2.10)	(-1.99)	(8.38)	(2.90)	(3.87)	(-0.16)	(12.94)	(9.62)	(9.03)	(2.06)
YEAR dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2510	2510	2506	2220	2165	2165	2165	1920	2512	2512	2508	2223	2143	2143	2143	1902
Adj R–squared	0.0263	0.0475	0.0489	0.0507	0.0055	0.0558	0.0689	0.0772	0.0146	0.0387	0.0402	0.05402	0.072	0.077	0.0767	0.0884
F-test	4.36	6.18	5.82	6.4	1.76	4.27	4.58	4.61	3.83	8.52	8.24	9.04	15.9	14.4	14.27	13.45
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0635	0.0000	0.0635	0.0653	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Panel C OLS Estimation Results of Tobin's Q as a dependent variable

Dependent variable: Tobin's Q	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-0.902***	-0.798***	-0.841***	-0.926***												
	(-8.18)	(-7.49)	(-7.28)	(-7.88)												
LTDR					-0.407***	-0.167	-0.176	-0.164								
					(-2.77)	(-1.15)	(-1.19)	(-1.06)								
TDR									-1.070***	-0.895***	-1.032***	-1.117***				
									(-11.05)	(-9.35)	(-9.71)	(-10.09)				
IFR													0.541***	0.548***	0.441***	0.469***
													(6.60)	(6.66)	(4.75)	(4.70)
TANG	-0.895***	-1.138***	-1.175***	-1.146***	-0.778***	-1.087***	-0.839***	-0.827***	-0.850***	-1.050***	-1.116***	-1.093***	-0.939***	-1.166***	-1.072***	-1.095***
	(-9.48)	(-11.40)	(-11.72)	(-10.61)	(-8.21)	(-9.98)	(-8.14)	(-7.66)	(-10.27)	(-11.43)	(-12.40)	(-11.46)	(-11.17)	(-12.21)	(-10.42)	(-9.76)
SZ		-0.216***	-0.221***	-0.230***		-0.188***	-0.151***	-0.164***		-0.166***	-0.176***	-0.183***		-0.176***	-0.159***	-0.173***
		(-9.62)	(-10.12)	(-9.68)		(-7.28)	(-6.27)	(-6.31)		(-7.83)	(-8.47)	(-8.19)		(-8.82)	(-7.81)	(-7.70)
LIQ			-0.0056	-0.00967			0.121***	0.116***			-0.0259*	-0.0310**			0.0319**	0.0329**
			(-0.34)	(-0.59)			(3.73)	(3.51)			(-1.74)	(-2.14)			(2.01)	(2.00)
GRO				0.343***				0.354***				0.319***				0.362***
				(2.99)				(2.62)				(3.11)				(3.33)
Constant	1.341***	1.949***	2.004***	1.721***	0.848***	1.442***	1.069***	0.765***	1.506***	1.915***	2.085***	1.832***	0.734***	1.287***	1.184***	0.882***
	(17.53)	(18.34)	(17.54)	(9.29)	(14.66)	(13.28)	(9.72)	(4.13)	(19.48)	(18.54)	(18.79)	(10.60)	(15.15)	(14.82)	(12.56)	(5.16)
YEAR dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2446	2446	2443	2166	2106	2106	2106	1871	2442	2442	2439	2163	2086	2086	2086	1850
Adj R–squared	0.0804	0.135	0.138	0.1484	0.0437	0.0952	0.1266	0.1278	0.1153	0.1469	0.1517	0.1623	0.0694	0.1094	0.1117	0.1203
F-test	17.12	21.82	23.84	23.46	11.74	13.32	13.1	12.16	24.16	24.56	27.69	27	20.08	20.33	18.37	17.8
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Appendix H OLS regression with one year lagged independent variable

Panel A OLS Estimation Results (one year lagged independent variable) of ROE as a dependent variable

Dependent variable: ROE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
L. STDR	-0.0445*	-0.0792***	-0.0433	-0.0468*												
	(-1.89)	(-3.39)	(-1.53)	(-1.68)												
L. LTDR					-0.107**	0.0391	0.0433	0.0631								
					(2.47)	(0.92)	(1.02)	(1.51)								
L. TDR									-0.0207	-0.0833***	-0.0553**	-0.0492*				
									(-0.98)	(-3.88)	(-2.12)	(-1.92)				
L. IFR													0.0996***	0.0998***	0.0906***	0.0830***
													(5.78)	(5.81)	(4.66)	(4.36)
TANG	-0.129***	-0.0722***	-0.0536*	-0.0342	-0.122***	-0.0286	0.0134	0.032	-0.116***	-0.0496*	-0.0403	-0.0202	-0.167***	-0.149***	-0.142***	-0.121***
	(-4.93)	(-2.76)	(-1.94)	(-1.26)	(-4.24)	(-0.97)	(0.44)	(1.06)	(-4.46)	(-1.90)	(-1.51)	(-0.76)	(-7.98)	(-6.96)	(-6.25)	(-5.43)
SZ		0.0471***	0.0502***	0.0485***		0.0536***	0.0609***	0.0587***		0.0513***	0.0532***	0.0515***		0.0141***	0.0154***	0.0147***
		(9.93)	(10.15)	(9.96)		(10.13)	(11.16)	(10.91)		(10.55)	(10.71)	(10.54)		(3.62)	(3.73)	(3.66)
LIQ			0.00752**	0.00821**			0.0226***	0.0224***			0.00599*	0.00705**			0.00277	0.00502*
			(2.29)	(2.53)			(5.04)	(5.06)			(1.93)	(2.31)			(0.99)	(1.84)
GRO				0.181***				0.186***				0.177***				0.166***
				(8.70)				(7.78)				(8.59)				(9.30)
Constant	0.140***	0.0102	-0.034	-0.233***	0.100***	-0.0727***	-0.143***	-0.348***	0.126***	0.00139	-0.0329	-0.233***	0.119***	0.0735***	0.0654***	-0.124***
	(7.65)	(0.46)	(-1.15)	(-6.29)	(6.01)	(-3.09)	(-5.25)	(-9.26)	(6.83)	(0.06)	(-1.17)	(-6.45)	(9.64)	(4.21)	(3.35)	(-4.44)
YEAR dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2193	2193	2189	2189	1848	1848	1847	1847	2212	2212	2208	2208	1906	1906	1905	1905
Adj R–squared	0.0176	0.0639	0.0615	0.0926	0.0174	0.0689	0.0811	0.11	0.0195	0.0625	0.0636	0.0937	0.0572	0.0632	0.0632	0.1037
F-test	5.37	14.9	14.03	19.6	4.64	14.67	15.81	20.01	4.87	15.73	14.64	20.02	13.84	13.85	12.69	19.35
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level. L. STDR is defined as one-year lagged of STDR (short term debt ratio), L. LTDR is defined as one-year lagged of LTDR (long term debt ratio), L. TDR is defined as one-year lagged of TDR (total debt ratio), L. IFR is defined as one-year lagged of IR (internal financing ratio).

Panel B OLS Estimation Results (one year lagged independent variable) of ROA as a dependent variable

Dependent variable: ROA	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
L. STDR	-0.055***	-0.068***	-0.053***	-0.053***												
	(-4.33)	(-5.40)	(-3.50)	(-3.52)												
L. LTDR					-0.00426	-0.0351	-0.0292	-0.0259								
					(-0.19)	(-1.58)	(-1.33)	(-1.18)								
L. TDR									-0.0258**	-0.051***	-0.038***	-0.035**				
									(-2.23)	(-4.34)	(-2.66)	(-2.46)				
L. IFR													0.0669***	0.0668***	0.0596***	0.0572***
													(8.68)	(8.68)	(6.87)	(6.65)
TANG	-0.038***	-0.0131	-0.00236	0.00451	-0.0215	0.0243	0.0493***	0.0543***	-0.0128	0.015	0.0226	0.0299**	-0.0527***	-0.0580***	-0.0503***	-0.0440***
	(-2.64)	(-0.90)	(-0.15)	(0.29)	(-1.38)	(1.53)	(3.02)	(3.32)	(-0.90)	(1.04)	(1.53)	(2.04)	(-5.64)	(-6.04)	(-4.95)	(-4.36)
SZ		0.0207***	0.0222***	0.0215***		0.0265***	0.0302***	0.0295***		0.0222***	0.0233***	0.0224***		-0.00419**	-0.00286	-0.00303*
		(7.84)	(8.11)	(7.91)		(9.42)	(10.56)	(10.36)		(8.31)	(8.55)	(8.29)		(-2.40)	(-1.55)	(-1.66)
LIQ			0.00246	0.00275			0.0135***	0.0133***			0.00205	0.00245			0.00238*	0.00308**
			(1.34)	(1.50)			(5.60)	(5.55)			(1.19)	(1.43)			(1.91)	(2.50)
GRO				0.0649***				0.0494***				0.0692***				0.0516***
				(5.60)				(3.88)				(6.03)				(6.38)
Constant	0.0960***	0.0382***	0.0194	-0.0524**	0.056***	-0.0291**	-0.069***	-0.123***	0.0770***	0.0223*	0.00614	-0.0720***	0.0623***	0.0757***	0.0673***	0.00865
	(9.52)	(3.09)	(1.18)	(-2.52)	(6.20)	(-2.30)	(-4.83)	(-6.18)	(7.57)	(1.86)	(0.39)	(-3.57)	(11.35)	(9.67)	(7.72)	(0.69)
YEAR dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2224	2224	2220	2220	1901	1901	1900	1900	2228	2228	2224	2224	1909	1909	1908	1908
Adj R–squared	0.0122	0.0385	0.0386	0.0516	0.0003	0.0447	0.0603	0.0672	0.0048	0.0344	0.035	0.0501	0.0577	0.06	0.061	0.0803
F-test	4.05	9.89	9.11	11.07	1.07	9.88	12.07	12.4	2.19	8.93	8.32	10.78	13.98	13.19	12.27	14.88
Prob > F	0.0000	0.0000	0.0000	0.0000	0.3832	0.0000	0.0000	0.0000	0.0199	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level. L. STDR is defined as one-year lagged of STDR (short term debt ratio), L. LTDR is defined as one-year lagged of LTDR (long term debt ratio), L. TDR is defined as one-year lagged of TDR (total debt ratio), L. IFR is defined as one-year lagged of IR (internal financing ratio).

Panel C OLS Estimation Results (one year lagged independent variable) of Tobin's Q as a dependent variable

Dependent variable: Tobin's Q	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
L. STDR	-0.876***	-0.756***	-0.787***	-0.787***												
	(-9.42)	(-8.31)	(-7.14)	(-7.15)												
L. LTDR					-0.287**	-0.0915	-0.0606	-0.0421								
					(-2.05)	(-0.66)	(-0.44)	(-0.31)								
L. TDR									-1.028***	-0.843***	-0.938***	-0.928***				
									(-12.43)	(-10.09)	(-9.23)	(-9.13)				
L. IFR													0.481***	0.493***	0.346***	0.327***
													(5.50)	(5.76)	(3.57)	(3.38)
TANG	-0.901***	-1.150***	-1.182***	-1.150***	-0.818***	-1.092***	-0.897***	-0.862***	-0.888***	-1.102***	-1.155***	-1.128***	-0.953***	-1.186***	-1.069***	-1.022***
	(-8.60)	(-11.03)	(-10.78)	(-10.47)	(-8.36)	(-10.94)	(-8.76)	(-8.43)	(-8.69)	(-10.72)	(-10.98)	(-10.71)	(-8.96)	(-11.09)	(-9.39)	(-8.96)
SZ		-0.210***	-0.215***	-0.217***		-0.169***	-0.141***	-0.144***		-0.175***	-0.183***	-0.185***		-0.182***	-0.161***	-0.161***
		(-11.21)	(-11.00)	(-11.13)		(-9.50)	(-7.86)	(-8.07)		(-9.30)	(-9.52)	(-9.66)		(-9.34)	(-7.79)	(-7.81)
LIQ			-0.00304	-0.00171			0.112***	0.111***			-0.0174	-0.0161			0.0426***	0.0480***
			(-0.22)	(-0.13)			(7.25)	(7.22)			(-1.36)	(-1.25)			(3.11)	(3.50)
GRO				0.291***				0.344***				0.244***				0.362***
				(3.49)				(4.30)				(2.98)				(4.00)
Constant	1.364***	1.959***	2.001***	1.676***	0.858***	1.399***	1.078***	0.701***	1.528***	1.967***	2.089***	1.812***	0.785***	1.364***	1.233***	0.817***
	(18.87)	(22.24)	(16.97)	(11.18)	(15.22)	(17.66)	(11.95)	(5.59)	(21.30)	(23.22)	(18.71)	(12.48)	(12.75)	(15.79)	(12.73)	(5.75)
YEAR dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2165	2165	2162	2162	1847	1847	1846	1846	2166	2166	2163	2163	1863	1863	1862	1862
Adj R–squared	0.077	0.1275	0.1306	0.1351	0.0488	0.0928	0.1184	0.1268	0.1078	0.1418	0.1459	0.149	0.0642	0.1059	0.1106	0.1177
F-test	21.06	32.62	30.51	29.13	11.52	19.89	23.54	23.32	30.06	36.77	34.58	32.55	15.2	23.05	22.04	21.7
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level. L. STDR is defined as one-year lagged of STDR (short term debt ratio), L. LTDR is defined as one-year lagged of LTDR (long term debt ratio), L. TDR is defined as one-year lagged of TDR (total debt ratio), L. IFR is defined as one-year lagged of IR (internal financing ratio).

Appendix I FE regressions with alternative dependent variable

Panel A FE Estimation Results of ROCE as a dependent variable

Dependent variable: ROCE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-0.112***	-0.108***	-0.117***	-0.117***												
	(-5.13)	(-4.91)	(-4.35)	(-3.97)												
LTDR					-0.096***	-0.119***	-0.139***	-0.117***								
					(-2.94)	(-3.58)	(-4.14)	(-3.17)								
TDR									-0.179***	-0.183***	-0.2048***	-0.2188***				
									(-8.41)	(-8.61)	(-8.27)	(-8.04)				
IFR													0.2657***	0.2765***	0.3118***	0.3403***
													(12.17)	(12.37)	(13.47)	(14.43)
TANG	-0.258***	-0.251***	-0.257***	-0.224***	-0.226***	-0.205***	-0.174***	-0.142***	-0.2153***	-0.199***	-0.2105***	-0.1893***	-0.1962***	-0.1902***	-0.2255***	-0.1665***
	(-8.05)	(-7.72)	(-7.55)	(-6.04)	(-6.17)	(-5.54)	(-4.62)	(-3.32)	(-6.91)	(-6.35)	(-6.57)	(-5.46)	(-7.15)	(-6.90)	(-8.01)	(-5.73)
SZ		0.0237	0.0219	0.0009		0.0581***	0.066***	0.0312		0.051***	0.0495***	0.0313*		0.0301**	0.0186	0.0114
		(1.61)	(1.46)	(0.05)		(3.42)	(3.90)	(1.57)		(3.60)	(3.47)	(1.92)		(2.21)	(1.37)	(0.77)
LIQ			-0.002	-0.002			0.01***	0.0200***			-0.0057*	-0.0067*			-0.0141***	-0.0147***
			(-0.57)	(-0.63)			(4.40)	(4.41)			(-1.72)	(-1.94)			(-5.31)	(-5.58)
GRO				0.082***				0.0729***				0.0804***				0.055***
				(8.80)				(6.83)				(8.83)				(7.48)
Constant	0.24***	0.172***	0.185***	0.1254**	0.1895***	0.0243	-0.0334	6.83	0.2742***	0.1343***	0.1644***	0.1121**	0.1025***	0.0155	0.0722*	-0.0081
	(15.66)	(3.82)	(3.63)	(2.18)	(14.42)	(0.49)	(-0.65)	(-0.94)	(17.46)	(3.21)	(3.62)	(2.21)	(9.02)	(0.38)	(1.72)	(-0.18)
N	2435	2435	2431	2152	2110	2110	2110	1872	2441	2441	2437	2159	2087	2087	2087	1852
R-squared(within)	0.0874	0.0885	0.0884	0.113	0.0751	0.081	0.0907	0.0914	0.1064	0.1117	0.1127	0.1399	0.173	0.1752	0.1879	0.2278
F-test (overall)	20.46	18.85	17.21	19.66	14.76	14.56	15.09	13.24	25.51	24.5	22.62	25.21	37.84	34.92	34.85	38.74
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test for heteroskedasticity	9.20E+30	9.90E+31	8.20E+30	5.50E+31	1.70E+34	3.40E+35	7.50E+33	7.50E+33	7.90E+30	3.30E+31	1.50E+31	8.90E+30	3.80E+32	3.60E+34	2.50E+33	9.50E+33
Prob > Chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wooldridge test	20.385	20.4	20.9	11.377	2.203	2.455	2.814	0.752	23.328	24.22	24.404	13.823	80.384	89.62	86.935	91.901
Prob > F	0.0000	0.0000	0.0000	0.0009	0.139	0.1183	0.0947	0.3868	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000
Hausman test	18.41	20.2	59.89	54.33	19.03	63.42	57.31	29.72	38.15	42.49	40.13	86.49	58.58	64.86	71.96	60.34
Prob > Chi2	0.0485	0.0427	0.0000	0.0000	0.0399	0.0000	0.0000	0.0031	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B FE Estimation Results of ROIC as a dependent variable

Dependent variable: ROIC	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-0.103***	-0.096***	-0.104***	-0.086***												
	(-6.27)	(-5.86)	(-5.30)	(-3.95)												
LTDR					-0.112***	-0.134***	-0.156***	-0.16***								
					(-5.22)	(-6.10)	(-7.15)	(-6.83)								
TDR									-0.174***	-0.178***	-0.188***	-0.183***				
									(-10.25)	(-10.56)	(-9.75)	(-8.64)				
IFR													0.214***	0.218***	0.224***	0.244***
													(12.44)	(12.36)	(12.23)	(12.45)
TANG	-0.114***	-0.102***	-0.108***	-0.074***	-0.116***	-0.098***	-0.064***	-0.04	-0.047*	-0.03	-0.036	-0.019	-0.116***	-0.114***	-0.121***	-0.075***
	(-4.69)	(-4.16)	(-4.18)	(-2.60)	(-4.92)	(-4.13)	(-2.69)	(-1.49)	(-1.89)	(-1.21)	(-1.41)	(-0.68)	(-5.42)	(-5.31)	(-5.46)	(-3.14)
SZ		0.03***	0.0343**	0.035***		0.047***	0.054***	0.040***		0.062***	0.061***	0.051***		0.011	0.009	0.0143
		(3.13)	(2.97)	(2.62)		(4.36)	(5.06)	(3.25)		(5.44)	(5.36)	(3.89)		(1.06)	(0.88)	(1.15)
LIQ			-0.001	-0.001			0.018***	0.020***			-0.002	-0.003			-0.002	-0.0028
			(-0.73)	(-0.64)			(7.42)	(7.24)				(-1.37)			(-1.25)	(-1.49)
GRO				0.041***				0.042***				0.05				0.030***
				(5.52)				(6.15)				(6.78)				(4.77)
Constant	0.160***	0.058*	0.070*	0.001	0.117***	-0.016	-0.073**	-0.102***	0.191***	0.023	0.036	-0.006	0.031	0.0334	0.043	-0.027
	(13.97)	(1.70)	(1.85)	(-0.09)	(13.90)	(-0.53)	(-2.27)	(-2.68)	(15.52)	(0.70)	(1.03)	(-0.16)	(1.01)	(1.03)	(1.29)	(-0.73)
N	2472	2472	2471	2189	2110	2110	2110	1871	2473	2473	2472	2191	2129	2129	2129	1890
R-squared(within)	0.0599	0.0641	0.0643	0.0684	0.0526	0.0624	0.09	0.1018	0.0846	0.0969	0.0974	0.1055	0.1483	0.1488	0.1495	0.1631
F-test (overall)	13.82	13.5	12.41	11.54	10.07	10.97	14.94	14.88	20.07	21.18	19.5	18.57	32.17	29.35	27.04	26.15
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test for heteroskedasticity	9.30E+33	9.60E+33	1.50E+34	2.80E+32	2.00E+33	3.40E+33	2.90E+33	2.90E+33	2.30E+34	1.60E+34	1.70E+34	5.10E+30	4.60E+31	2.70E+32	2.80E+33	2.60E+32
Prob > Chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Wooldridge test	9.451	9.598	9.62	6.103	49.682	51.8	51.591	23.934	9.819	10.234	10.224	6.266	66.639	67.123	70.402	61.788
Prob > F	0.0023	0.0021	0.0021	0.0141	0.0000	0.0000	0.0000	0.0000	0.0019	0.0015	0.0015	0.0129	0.0000	0.0000	0.0000	0.0000
Hausman test	55.68	54.42	56.9	77.35	38.37	31.92	37.46	131.91	68.99	70.8	68.42	54.57	61.97	18.35	29.07	69.91
Prob > Chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0739	0.0038	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Appendix J OLS regression with annual mean of variable

Panel A OLS regression Results of ROE as a dependent variable

Dependent variable: ROE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-0.179***	-0.233***	-0.236***	-0.242***												
	(-2.60)	(-3.60)	(-2.84)	(-2.93)												
LTDR					-0.0321	-0.179	-0.159	-0.184								
					(-0.26)	(-1.51)	(-1.35)	(-1.56)								
TDR									-0.105*	-0.211***	-0.211***	-0.214***				
									(-1.70)	(-3.55)	(-2.78)	(-2.84)				
IFR													0.154***	0.150***	0.148***	0.155***
													(4.26)	(4.26)	(3.85)	(4.16)
TANG	-0.127*	-0.035	-0.036	-0.0153	-0.0984	0.0249	0.0665	0.0888	-0.115	-0.00908	-0.00909	0.0119	-0.163***	-0.125***	-0.124***	-0.0965**
	(-1.67)	(-0.48)	(-0.48)	(-0.20)	(-1.24)	(0.33)	(0.86)	(1.14)	(-1.51)	(-0.12)	(-0.12)	(0.16)	(-3.66)	(-2.81)	(-2.62)	(-2.10)
SZ		0.0780***	0.0778***	0.0780***		0.0856***	0.0941***	0.0948***		0.0840***	0.0840***	0.0844***		0.0295***	0.0298***	0.0293***
		(6.44)	(6.12)	(6.18)		(6.79)	(7.20)	(7.29)		(6.74)	(6.60)	(6.68)		(3.79)	(3.55)	(3.62)
LIQ			-0.000469	0.000701			0.0175**	0.0187**			-0.00000733	0.00132			0.00052	0.00226
			(-0.05)	(0.08)			(2.26)	(2.42)			(0.00)	(0.15)			(0.10)	(0.47)
GRO				0.299**				0.278**				0.294**				0.352***
				(2.33)				(2.16)				(2.29)				(4.46)
Constant	0.163***	-0.0503	-0.0474	-0.373**	0.0762**	-0.177***	-0.247***	-0.551***	0.137***	-0.0639	-0.0638	-0.385**	0.0775***	-0.0147	-0.0166	-0.404***
	(4.01)	(-1.00)	(-0.63)	(-2.36)	(2.58)	(-3.82)	(-4.46)	(-3.65)	(3.28)	(-1.30)	(-0.89)	(-2.45)	(4.25)	(-0.49)	(-0.47)	(-4.33)
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	293	293	293	293	287	287	287	287	293	293	293	293	271	271	271	271
Adj R–squared	0.0243	0.1438	0.1409	0.1539	0.0059	0.136	0.1483	0.1593	0.0114	0.1428	0.1398	0.1523	0.0993	0.1421	0.1389	0.196
F-test	4.64	17.35	12.97	11.63	0.84	16.00	13.45	11.84	2.68	17.22	12.87	11.5	15.89	15.91	11.89	14.16
Prob > F	0.0104	0.0000	0.0000	0.0000	0.4327	0.0000	0.0000	0.0000	0.0705	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Panel B OLS regression Results of ROA as a dependent variable

Dependent variable: ROA	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-0.0617	-0.0858**	-0.102**	-0.101**												
	(-1.60)	(-2.27)	(-2.11)	(-2.10)												
LTDR					-0.0413	-0.126*	-0.119*	-0.113								
					(-0.56)	(-1.78)	(-1.68)	(-1.58)								
TDR									-0.02	-0.0631*	-0.0679	-0.0671				
									(-0.57)	(-1.80)	(-1.52)	(-1.50)				
IFR													0.0967***	0.0965***	0.0909***	0.0932***
													(4.69)	(4.67)	(4.03)	(4.21)
TANG	-0.0483	-0.00941	-0.0151	-0.0203	-0.0049	0.0566	0.0723	0.0656	-0.0448	-0.00166	-0.00289	-0.00862	-0.0402	-0.0367	-0.0312	-0.0186
	(-1.12)	(-0.22)	(-0.34)	(-0.46)	(-0.10)	(1.23)	(1.53)	(1.38)	(-1.03)	(-0.04)	(-0.07)	(-0.20)	(-1.57)	(-1.40)	(-1.13)	(-0.68)
SZ		0.0327***	0.0315***	0.0314***		0.0449***	0.0481***	0.0479***		0.0342***	0.0339***	0.0338***		0.00271	0.00382	0.00372
		(4.60)	(4.23)	(4.21)		(5.90)	(6.09)	(6.08)		(4.65)	(4.52)	(4.50)		(0.59)	(0.78)	(0.77)
LIQ			-0.00273	-0.00308			0.00707	0.00675			-0.00089	-0.00125			0.00179	0.00264
			(-0.53)	(-0.60)			(1.49)	(1.42)			(-0.17)	(-0.24)			(0.61)	(0.92)
GRO				-0.0758				-0.0894				-0.0801				0.166***
				(-1.00)				(-1.13)				(-1.05)				(3.54)
Constant	0.0824***	-0.00671	0.0103	0.0933	0.0412**	-0.0896***	-0.116***	-0.0188	0.0647***	-0.0169	-0.0116	0.0759	0.0383***	0.0298*	0.0233	-0.159***
	(3.56)	(-0.23)	(0.24)	(1.00)	(2.32)	(-3.22)	(-3.52)	(-0.20)	(2.73)	(-0.59)	(-0.27)	(0.81)	(3.68)	(1.68)	(1.12)	(-2.88)
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	294	294	294	294	290	290	290	290	293	293	293	293	272	272	272	272
Adj R–squared	0.0056	0.0699	0.0676	0.0676	0.0012	0.1001	0.1039	0.1048	0.0049	0.0644	0.0613	0.0616	0.0766	0.0744	0.0722	0.1107
F-test	1.83	8.34	6.31	5.25	0.17	11.71	9.38	7.77	0.72	7.71	5.77	4.84	12.25	8.26	6.27	7.75
Prob > F	0.1624	0.0000	0.0001	0.0001	0.8457	0.0000	0.0000	0.0000	0.4893	0.0001	0.0002	0.0003	0.0000	0.0000	0.0001	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Panel C OLS regression Results of Tobin's Q as a dependent variable

Dependent variable: Tobin's Q	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
STDR	-1.011***	-0.863***	-1.223***	-1.246***												
	(-4.34)	(-3.83)	(-4.30)	(-4.57)												
LTDR					-0.416	0.0384	0.0525	-0.0987								
					(-1.02)	(0.1)	(0.13)	(-0.26)								
TDR									-1.145***	-0.915***	-1.328***	-1.354***				
									(-5.54)	(-4.42)	(-5.07)	(-5.41)				
IFR													0.422**	0.458**	0.452**	0.463**
													(2.05)	(2.29)	(2.07)	(2.17)
TANG	-1.041***	-1.301***	-1.415***	-1.245***	-0.976***	-1.283***	-1.252***	-1.095***	-0.956***	-1.194***	-1.286***	-1.109***	-0.940***	-1.168***	-1.162***	-1.022***
	(-3.97)	(-5.08)	(-5.43)	(-4.94)	(-3.65)	(-4.96)	(-4.71)	(-4.23)	(-3.71)	(-4.67)	(-5.03)	(-4.49)	(-3.66)	(-4.56)	(-4.29)	(-3.81)
SZ		-0.218***	-0.245***	-0.237***		-0.244***	-0.238***	-0.232***		-0.189***	-0.211***	-0.204***		-0.178***	-0.177***	-0.172***
		(-5.15)	(-5.55)	(-5.60)		(-5.75)	(-5.39)	(-5.44)		(-4.38)	(-4.84)	(-4.87)		(-4.01)	(-3.69)	(-3.67)
LIQ			-0.0619**	-0.0518*			0.0136	0.0218			-0.0762**	-0.0664**			0.00206	0.0111
			(-2.05)	(-1.78)			(0.52)	(0.86)			(-2.54)	(-2.31)			(0.07)	(0.4)
GRO				2.186***				1.981***				2.205***				1.581***
				(5.12)				(4.67)				(5.21)				(3.51)
Constant	1.504***	2.108***	2.494***	0.0801	1.059***	1.767***	1.715***	-0.46	1.650***	2.110***	2.564***	0.134	0.876***	1.433***	1.426***	-0.335
	(10.84)	(11.89)	(9.67)	(0.15)	(10.73)	(11.43)	(9.29)	(-0.92)	(11.81)	(12.31)	(10.39)	(0.26)	(8.52)	(8.37)	(7.10)	(-0.62)
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	288	288	288	288	284	284	284	284	287	287	287	287	266	266	266	266
Adj R–squared	0.0998	0.1738	0.1830	0.2499	0.044	0.1420	0.1397	0.1994	0.1346	0.1866	0.202	0.2696	0.0547	0.1059	0.1025	0.1397
F-test	16.91	21.12	17.07	20.12	7.52	16.61	12.49	15.1	23.25	22.87	19.1	22.12	8.67	11.46	8.56	9.61
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000

Variable definitions are given in Table 2. T-statistics in parentheses. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.