Capital structure revisited. Do crisis and competition matter in a *Keiretsu* corporate structure?

Albert Danso[1]; Samuel Fosu[2]; Samuel Owusu-Agyei[1]; Collins G. Ntim[3]; Emmanuel Adegbite[4,5]

Corresponding author: Albert.danso@dmu.ac.uk

[1]Leicester Castle Business School, De Montfort University, Leicester, LE1 9BH, UK.
[2]Department of Accounting & Finance, College of Business & Economics (CBE), United Arab Emirates University (UAEU), Al Ain, United Arab Emirates.
[3]Centre for Research in Accounting, Accountability and Governance (CRAAG), Department of Accounting, Southampton Business School, University of Southampton, Southampton SO17 1BJ, UK/
[4]Nottingham University Business School, Nottingham NG8 2BB, UK.
[5]James Cook University, Singapore.

Abstract

We investigate firm-level determinants of capital structure using a large sample of 4,284 Japanese firms over a nineteen-year period (i.e., over 61,000 firm-year observations), a hitherto less examined sample for this purpose. We conduct our analysis and interpret our findings predominantly within the pecking order, the trade-off and the agency theoretical frameworks. We uncover three new findings. First, our evidence indicates that insights derived from the extant literature on capital structure are cross-national and are applicable in the context of Japan, despite the unique characteristics of Japanese firms. Second, financial crisis significantly impacts the relationship between leverage and firm-level determinants, particularly accentuating the effect of asset tangibility and growth. Third, product market competition significantly impacts the observed relationship between firm-level determinants and leverage. Our results are robust, controlling for the joint effects of competition and crisis.

JEL classification*:* G01; G30; G31

Key words*:* Capital structure; Agency theory; Competition; Financial Crisis; Keiretsu, Japan

1. Introduction

Within the realm of corporate finance, Modigliani and Miller's (1958, 1963) irrelevance theory forms the basis for empirical and theoretical studies on the financing decisions of firms. The central proposition of the irrelevance theory is that the value of a firm is not driven by its capital structure (Frank and Shen, 2019; Grosse-Rueschkamp et al., 2019). Although based on restrictive assumptions, the irrelevance theory inspired the development of further theories, including the pecking order and the trade-off theories (Antill and Grenadier, 2019; Chen et al., 2019; Nicodano and Regis, 2019). These subsequent theoretical developments suggest that the choice of capital structure is not random (Inderst and Vladimirov, 2019; Ji et al., 2019; Lemmon and Zender, 2019). Whilst this claim has received support from a large body of literature suggesting that firms' characteristics affect their capital structure decisions (e.g., Ahmed and Hla, 2019; Asad et al., 2019; Danso and Adomako, 2014; Fosu, 2013; Muradoğlu & Sivaprasad, 2012; Céspedes *et al.*, 2010; De Jong *et al.* 2008; Ranasinghe, 2019; Wang et al., 2019), it is reasonable to argue that other, unexplored, factors, such as financial crisis and product market characteristics may also influence capital structure (Alexandridis and Hasan, 2019; Elmagrhi et al., 2018; Harris and Roark, 2019). This naturally raises some questions: (i) Would the traditional capital structure determinants remain important in product markets in which firms traditionally enjoy special lending relationships with large major banks; and (ii) Would the traditional capital structure determinants remain important, where firms belong to large industrial groupings and are subject, largely, to effective monitoring? We address these questions through a focus on the capital structure decisions of Japanese firms.

The unique characteristics of Japanese firms that set them apart from their counterparts in other developed countries helps to enrich our paper's perspective. In particular, a considerable number of Japanese firms belong to industrial groupings, known as '*Keiretsu*'. These firms form a special relationship, often led by a major affiliated bank, aimed at their mutual success (Choi et al. 2014; Dakua, 2019; Hatani and McGaughey, 2013; Nakateni, 1984). Further, these firms have cross-ownership of each other, fostering close business ties (Frank and Shen, 2019; Prowse, 1992; Nakateni, 1984). Such cross-ownerships and banking relationships also foster peer-monitoring, thereby minimising information asymmetry, mitigating the associated agency problems, and reducing the cost of financial distress (Ji et al., 2019; Kester, 1986; Nakateni, 1984). Thus, unlike market-based economies, such as the USA and UK, the prevalence of industrial groupings around major affiliated banks has the tendency to shape corporate

financing in a way that defies the traditional capital structure theories. For instance, the agency costs of debt (Jensen and Meckling, 1976), could be lower for several firms, regardless of key firm-specific attributes. Additionally, the ownership structure of Japanese banks permits a culture of over-reliance on bank financing. Major banks, both local and international, tend to be key shareholders, serving as the main providers of funds, and are responsible for monitoring the performance of the client firms (Chen et al., 2019; Kang and Shivdasani, 1995; Aoki, 1990; Sheard, 1989). This mechanism should help in aligning the incentives of a firm's key stakeholders, ensuring that the firm is appropriately leveraged. Since the 1970s, however, the reliance on bank finance is becoming less pronounced, as noted in Ketser (1986), whilst the proportion of finance generated internally has been rising, suggesting that the agency relationship in Japanese firms is changing due to reduced scrutiny by banks. Further, bank loans to Japanese firms tend to be of short maturity and often incorporate covenants, with long-term debt that is either secured on collateral or indentured (Kester, 1986). Such indentures contain a pledge not to secure another long-term debt ahead of it, or to limit the amount of the other long-term debt that can be obtained. As noted by Kester (1986), the short maturity of debt mitigates agency problems and permits firms to have relatively higher levels of leverage. It is also, noteworthy, that the indentures contained in the long-term debts also reduce the monitoring costs of leverage.

Therefore, it could be argued that the ownership structure and the lending relationship with major banks shield Japanese firms from competitive pressure. Traditionally, competitive pressure, or the lack of it, drives corporate capital structure (e.g., Chevalier and Scharfstein, 1996; Chevalier, 1995a, 1995b; Bolton and Scharfstein, 1990; Brander and Lewis, 1986; Fudenberg and Tirole, 1986; Inderst and Vladimirov, 2019). For instance, Brander and Lewis (1986) argue that leverage drives aggressive competition in product markets. Further, leverage creates an opportunity for large incumbent firms in concentrated (or less competitive) industries to predate on their smaller, financially constrained counterparts (see, Ahmed & Hla, 2019; Bolton and Scharfstein, 1990; Fudenberg and Tirole, 1986). For instance, to mitigate agency problems, optimal debt contracting is designed to require periodic payments. However, the likelihood of a leveraged firm's exit following its failure to make repayments attracts incumbent firms to predate on the leveraged firm by undercutting the price of the latter. This would normally not happen, or would be discouraged, in competitive markets, as each firm accounts for only a small proportion of the market. Consistent with this view, Chevalier and Scharfstein (1996) show that leverage limits the ability of firms to invest in their market share.

They show particularly that more leveraged firms charge higher prices during recession than their less leveraged counterparts. Similarly, Fosu (2013) shows that the impact of leverage on firm performance is moderated by competition.

Whilst the foregoing discussions indicate that product market competition influences the capital structure of firms, with the tendency for lower levels of leverage in concentrated or less competitive markets, the ownership structure and the special bank lending relationship enjoyed by Japanese firms make a special case for this study. Further, the interaction of leverage and recession, or economic downturns, makes a study of Japanese firms overdue. For instance, Japan was the worst affected economy in terms of reduced exports during the 2007-2008 global financial crisis and suffered a 6% fall in GDP, resulting in the lowest point of growth since the 1950s (World Bank, 2017). The importance of these crises to this study is from the perspective of corporate behaviour in response to them. A number of studies (e.g., Mar-Malinero et al., 2017; Omrane and Savaşer, 2017) have suggested changes in consumer and corporate behaviour as important factors to consider after recessionary times. For instance, Japanese firms reduced their debts for fear of deflation, which could affect their debt repayments (Nakaso 2001). Although Japanese firms were impacted by the 1997-1998 Asian financial crisis, the 2007-2008 has been by far their worst recession (OECD, 2013). Indeed, our paper differs from previous studies, such as those of Harris and Raviv (1991) and Chevalier (1995), as we focus solely on Japanese firms, which enjoy the unique '*Keiretsu'*-style industrial characteristics. Thus, to the best of our knowledge, our study is the first to examine how crisis indicators interact with competition in order to determine their impact on capital structure decisions of firms.

Overall, our results provide support for the trade-off, pecking order and agency theories. Our findings suggest that firm-level factors that explain capital structure decisions of firms in market-based economies are also applicable in the context of Japan despite the unique characteristics of Japanese firms. More specifically, firm size, asset tangibility and volatility have statistically significant relationships with leverage. Conversely, profitability, liquidity and growth have negative statistical relationships with leverage. These relationships are in line with previous studies (e.g. Chen, 2004; Asad et al., 2019). This suggests that the industrial groupings ('*Keiretsu*'), ownership structure and close business ties experienced by Japanese firms have no significant role in shaping the corporate financing decisions of firms investigated. Our empirical analysis also shows that, generally, the financial crisis affected various determinants

of capital structure in the context of Japan. Specifically, we observe that the crisis and its aftermath impacted on the tangibility–leverage relationship only in less competitive industries. This suggests that major banks do exercise caution regarding the threats of predation in less competitive industries, which compels them to condition lending on collateral. Additionally, in less competitive industries, our empirical analysis shows that firm size does not drive capital structure a period of financial crisis.

Our paper contributes to the existing literature in several ways. First, this paper provides fresh evidence on the firm-level determinants of capital structure decisions of Japanese firms. Second, given the unique characteristics of Japanese firms, our paper provides evidence on the extent to which the recent global financial crisis affected the capital structure decisions of Japanese firms. Third, we assess the extent to which the effects of firm-level determinants of capital structure are moderated by the level of product market competition. Fourth, we forge ahead the adoption of price–cost margin (*PCM*), as a measure of firm-specific competition and then, we assess the extent to which the *PCM* drives various determinants of capital structure. The rest of the paper proceeds as follows: Section 2 examines the relevant literature and its theoretical underpinnings. In Section 3, we discuss the sample, empirical design and measurement of key variables. Regression results are presented in Section 4 and, finally, Section 5 concludes.

2. Literature Review: Theory and Empirics

2.1. Theoretical underpinnings

Capital structure decisions remain one of the essential corporate decisions by executive managers of firms (Ahmed & Hla, 2019; Alexandridis & Hasan, 2019). This stems from the fact that from theoretical standpoints, a wrong capital structure decision can have profound implications for the cost of capital, riskiness and performance of a firm. Within the corporate finance literature, the irrelevance theory of Modigliani and Miller (1958, 1963) is often used as a theoretical basis for explaining the financing decision of firms. This theory advocates that no optimal capital structure exists and rates of return from using debt are offset by the risk incurred by using more debt. Following this, a review of the capital structure literature identifies various theories that that have been at the forefront of the debate on how various

firm-level characteristics affect firms' debt-equity choice decisions (Frank & Shen, 2019; Grosse-Rueschkamp et al., 2019). For example, arising out of discussion of the irrelevance theory is the trade-off theory, which argues that an optimal capital structure is determined by the costs and benefits associated with the use of debt as against equity (Nicodano & Regis, 2019; Ranasinghe, 2019). Thus, there is either an optimal debt-equity ratio, or a range for this ratio, whereby a firm's average cost of capital can be minimised (Brown et al. 2019; Bartholdy, Mateus and Olson, 2015; Scott, 1977).

In contrast, the development of Myers' (1984) pecking order theory has led to the view that capital structure is driven by the existence of information asymmetry and the desire to reduce the transaction cost of finance. In the presence of information asymmetry, Myers (1984) observes a hierarchy in firms' financing behaviour, whereby they first prefer to use internal funds, followed by debt and finally equity. Thus, this theory suggests that more profitable firms will be less leveraged than less profitable ones. The agency theory (Chen et al., 2019; Dakua, 2019; Jensen and Mackling, 1976), however, argues that capital structure is driven by conflicts of interest between shareholders and managers, whereby leverage is used as a disciplining device.

2.2. Empirical literature review and hypotheses development

2.2.1 Firm-level determinants of capital structure

Despite their differences, the afore-mentioned theoretical positions have received significant empirical support, suggesting that various firm-level factors can drive firm financing decisions in both local and international business contexts (Inderst & Vladimirov, 2019; Ji et al., 2019; Lemmon & Zender, 2019; Nicodano & Regis, 2019; Ranasinghe, 2019; Wang et al., 2019). These factors include firm size, profitability, asset tangibility, non-debt tax shield, liquidity, volatility and growth (Antill & Grenadier, 2019; Asad et al., 2019). To start with, theoretical arguments on capital structure suggest that a firm's size affects its debt–equity decision. Arguments put forth by the trade-off theory suggest that large firms are more diversified and thus, tend to have less volatile earnings and less bankruptcy risk (Ji et al., 2019; Lemmon & Zender, 2019). Chen (2004) noted that, large firms may be able to reduce transaction cost during the issuance of long-term debt. Thus, firm size should be positively related to leverage. Degryse et al. (2010) noted that larger firms tend to engage the services of more financial and

administrative staff, and therefore become more knowledgeable about better financing methods. This results in an improved bargaining power with lenders; hence, a positive size–leverage relationship is expected. The above theoretical argument is in line with that of agency theory (Jensen, 1986) that suggests that large firms are more likely to use long-term debt as a disciplining device. In keeping with these theoretical arguments, various studies (e.g., Agyei-Boapeah, 2015; Paligorova & Xu, 2012; Kayo and Kimura, 2011; De Jong, 2008) have documented a positive relationship between firm size and leverage. However, the pecking order theory observes that larger firms have lower asymmetric information between insiders within a firm and the capital market. These attributes permit them to issue informationally sensitive securities like equity. Therefore, one can expect larger firms to have lower leverage, as has been observed empirically in the literature (e.g., Danso and Adomko, 2014; Titman and Wessel, 1998; Wang et al., 2019).

On profitability, the asymmetry of information as observed in the pecking order theory of Myers and Majluf (1984) also suggests that firms prefer internal to external finance. Hence, profitable firms are expected to have lower leverage in their capital structure. Various empirical evidence (e.g., Agyei-Boapeah, 2015; Hall et al., 2004; Fama and French, 2002; Frank & Shen, 2019) offers support for this by showing a negative relationship between profitability and leverage. Within the logic of the trade-off theory, however, profitable firms should borrow more to take advantage of tax shield of debt. Indeed, this tax-effect argument also finds support in the international context (e.g., Asad et al., 2019; Chen et al., 2019; De Jong, 2008). Thus, in this respect, the profitability–leverage relationship remains empirical issue to be investigated.

In the case of asset tangibility, both trade-off and pecking order theories offer support for a positive tangibility–leverage relationship. Their argument emanates from the fact that tangible assets serve as collateral for securing loans, as they have a reduced asset specificity, from the perspective of transaction cost economics (Ahmed & Hla, 2019; Myers, 1977). There is a great deal of empirical evidence that supports this argument. For instance, Kayo and Kimura (2011) noted that, in countries with less developed bond markets, collateral offered by fixed assets is more important to increase leverage. Other empirical extensions (e.g., Kieschnick & Moussawi, 2018; Paligorova & Xu, 2012; De Jong *et al.*, 2008; Chen, 2004) have also found a positive relationship between asset tangibility and leverage.

In relation to non-debt tax shield (NDTS), both the pecking order and the trade-off theories suggest a negative NDTS–leverage relationship. This argument stems from the fact that a larger

NDTS should lead to a reduction in the amount of taxable income. For instance, Fama and French (2002) observe a negative relationship between leverage and NDTS. Likewise, in DeAngelo and Masulis (1980), NDTS is treated as an interest expense and thus, deducted in the calculation of corporate tax. Hence, a greater NDTS should lead to lower leverage (Antill & Grenadier, 2019; Paligorova & Xu, 2012).

Further, the theoretical argument on the liquidity–leverage relationship is mixed within the finance literature. According to the trade-off theory, liquidity should be positively related to leverage. Firms with higher levels of liquidity are able to meet their debt obligations on time and improve their credit rating (Nicodano & Regis, 2019; Ozkan, 2001). Hence, liquidity reduces the threat of default and offers firms the opportunity to leverage up. The pecking order theory, in turn, states a negative relationship between liquidity and leverage. This explanation is based on the suggestion that firms with greater liquid assets may use less debt to protect the interests of shareholders against those of debtholders. Accordingly, Prowse (1990) points out that a firm's level of liquidity shows the extent to which shareholders can manipulate their assets at the expense of bondholders. In an international context, De Jong et al. (2008) examine the capital structure decisions of firms and provide evidence that liquidity is both positively and negatively related to leverage.

Of the empirical studies that evaluate the relationship between firm-level factors and leverage, the majority find evidence that earnings volatility (a proxy for firm risk) and leverage are negatively related (e.g., De Jong, 2008; Chen, 2004; Ranasinghe, 2019). This relationship is based on the logic that firms with volatile earnings have a greater risk of default, which impacts negatively on their ability to secure external finance or makes external financing costly (De Angelo and Masulis, 1980; Ji et al., 2019). Other studies have also shown a positive relationship between earnings volatility and leverage (e.g., Grosse-Rueschkamp et al., 2019; Michaelas et al., 1999). A plausible explanation for this is that earnings volatility may drive firms into acquiring additional debt with the purpose of achieving long-term earnings stability. Thus, the overall effect of volatility on capital structure remains empirical issue that is open to further investigation and depends on the balance between the supply-side and the demand-side effects.

Finally, the relationship between growth opportunities and leverage remains an empirical question in the finance literature. In terms of the pecking order hypothesis of Myers and Majluf (1984), high growth opportunity firms have a greater level of information asymmetry. Thus, one can expect higher growth firms to be more leveraged since debt is less sensitive to adverse

selection cost (e.g., see Chen, 2004; Lemmon & Zender, 2019; Ozkan, 2001). However, both the trade-off and agency theories predict a negative relationship. In the view of the trade-off theory, growth opportunities that are in the form of intangible assets cannot be collateralised. Thus, firms with growth opportunities tend to borrow less and use more equity (Alexandridis & Hasan, 2019; Céspedes *et al.*, 2010; Chen, 2004).

The foregoing discussions have established potential relationships between firm-level factors and leverage, as postulated by various theories and summarised in Table 1. We emphasise, however, that given the unique (e.g., '*Keiretsu'*) characteristics of Japanese firms, these firms could attach less relevance to the hypothesised relationships between firm-level factors and leverage. For instance, the close lending relationship between the majority of Japanese firms and larger multinational banks could make information less asymmetric, thus questioning the logic of the pecking order and agency theories. Likewise, shareholdings by large major banks and belongingness to major industrial groups could minimise the threat of bankruptcy costs. In the light of the above argument, we state our first hypothesis as;

H1: The relationship between firm-level characteristics and capital structure of Japanese firms is less significant.

[Table 1 about here]

2.2.2. Financial crisis and capital structure

The 2007-2008 global economic recession intensified interest in investigating the effects of financial crisis on financing decisions of firms (e.g., Alexandridis & Hasan, 2019; Demirguc-Kunt *et al.*, 2020; Crotty, 2009). Indeed, our interest in the effect of crisis on capital structure of Japanese firms is linked to the theoretical suggestions that the increased uncertainties and risk coupled with decline in returns would make lenders unwilling to commit to long term investments (Dick *et al.*, 2013; Lemmon & Zender, 2019). This is because financial crises are characterised by higher likelihood of defaults, which increases risks and the commensurate interest on credit (Frank & Shen, 2019; Gürkaynak and Wright, 2012). Theoretically, the uncertainty associated with financial crisis could affect long-term leverage from the perspectives of both firms and lenders. A rise in uncertainty makes business prospects oscillate in such a way that firms forgo projects with long-term maturity so as to reduce their leverage levels (Alexandridis & Hasan, 2019; Antill & Grenadier, 2019; Brunnermeier and Oehmke,

2013). That is, the preference for flexibility in finance options associated with volatile economic conditions makes short-term leverage preferable. Similarly, higher bankruptcy risk means that lenders are unwilling to fund long term investments in jurisdictions with high monitoring and bankruptcy costs and where enforcement of contracts are strenuous (see Diamond, 2004; Jensen and Meckling, 1976; Nicodano & Regis, 2019).

Demirguc-Kunt et al., (2020) recently uncovered that firm leverage in general, long-term leverage and debt maturity, all declined during and immediately after the global financial crisis in both developed and developing economies. These findings were particularly pronounced for countries with less efficient legal and information sharing systems, as well as countries with tougher restrictions on bank entry. Thus, their findings suggest that firms use less long-term leverage, more short-term leverage and may resort to capital markets during or immediately after a global financial crisis. Given the unique (Keiretsu) characteristics of Japanese firms, it would be interesting to examine whether the close association of firms to lenders make a significant change to financing decisions during a financial crisis. On this basis, we proceed with our next the hypothesis as:

H2: The 2007-2008 financial crisis is less likely to have a significant impact on the relationship between the firm-level determinants and leverage of Japanese firms.

2.2.3. Product market competition and capital structure

Previous studies (e.g., Dakua, 2019; Elmagrhi et al., 2018; Frank & Shen, 2019; Valta, 2012; Guney et al., 2011; Showalter, 1999) suggest the possible relationships between a firm's product market competition and capital structure. Generally, firms use a level of debt commensurate with the level of competition. Theoretically, the direction of the relationship remains a controversy. While the limited liability approach assumes that equity maximising firms employ debt to affect competition (a positive relationship), the predation model assumes the use of less debt (a negative relationship) to avoid predation from low geared competitors (see Liu et al. 2002; Rathinasamy et al., 2000; Barclay and Smith, 1996; Inderst & Vladimirov, 2019; Ji et al., 2019). Empirical studies (e.g., Cerasi et al., 2017) found that firms in product markets with higher competition employ higher levels of leverage. This is the case especially when there are competitors within the local market who could take over firms with weak performance (Cerasi et al., 2017). Similarly, Fosu (2013) also found a significant positive

relationship between capital structure and product market competition in South African firms. That is, higher competition induces the employment of higher debt levels for varied reasons. These include the risk of competitors winning the market share or acquiring weaker firms (Cerasi et al., 2017; Liu et al., 2002; Lemmon & Zender, 2019; Nicodano & Regis, 2019). Indeed, our interest in product market competition in Japan stems from the possibility that unique industry factors could drive the product market competition and leverage relationship. For example, factors, such as the pricing of financial products relative to product market competition (see Valta, 2012) may stifle leverage levels or firm-lender relations ('*Keiretsu*') may ease pricing and access to leverage. On this basis, we state that;

H3: Product market competition significantly impacts the observed relation between firm-level determinants and leverage.

3. Data and empirical methodology

3.1. Data description

We obtain annual financial data for Japanese firms from the DataStream database for the period 1995-2013. The selection of the firms was guided by the availability of data. We started with 4,482 firms. However, we dropped firms and years with missing key variables from our dataset, resulting in an unbalanced panel data comprising 4,284 firms and 61,000 firm-year observations.

3.2. Measurements of variables

The measures used in this study were chosen in line with the earlier discussed empirical and theoretical literature. This enabled us compare our results with prior research. Following the extant literature (e.g., Fosu et al., 2016; Huyghebaert & Xu, 2016; Dudley, 2012), we winsorised all variables at a 5% level on either tail to mitigate the effect of outliers. Variables used are summarised in Table 2.

[Table 2 about here]

3.3. Descriptive statistics and correlations

In Table 3, we present the summary statistics of the variables used in this study over the whole sample period. The sample shows considerable variance for all variables. A few findings are worth noting. The average value of our main measure of leverage – book leverage (*BLev*) is 0.23. This low figure may reflect the fact that Japanese firms are mainly equity financed. The average value of long-term leverage is 0.10. This shows that a greater portion of the capital structure of most of the firms studied is short-term debt, as noted in Kester (1986). Firm size has a mean value of 17.22 and a standard deviation of 1.46. This shows that there are low levels of variability among the firms examined. The minimum and maximum values of these variables are 14.72 and 20.17, respectively, suggesting a low degree of heterogeneity across firms. There is further evidence that Japanese firms tend to be highly liquid with a mean value of 1.82. This variable also exhibits a low level of variability with a standard deviation of 1.12. Moving beyond this, we investigate whether the independent variables employed are likely to suffer from collinearity problems. We first note that the correlation (but not necessarily causal relationship) between our dependent variables (*BLev* and *LTlev*) is very high. This suggests that both variables are capturing a similar aspect. With regards to the independent variables, the correlation among them (as presented in Table 4) reveals there is no multicollinearity issue. We further probe the relationship between our independent variables and leverage by plotting detrended leverage against the firm-level variables. As shown in Figure 1, the line graphs support the correlation presented in Table 4.

[Table 3 about here]

[Table 4 about here]

[Figure 1 about here]

3.4. Estimation method

Following on from section 2, we show theoretically that firm capital structure is conditioned on firm-level factors of size (*SZ*), profit (*PR*), asset tangibility (*TAN*), non-debt tax shield (*NDTS*), liquidity (*LIQ*), volatility (*VOL*) and growth opportunities (*GR*). Hence, in this section, we formulate the following baseline regression empirical model to test the predicted relationships:

$$_{B}Lev_{i,t} = \alpha + \lambda_t + \beta X_{i,t-1} + \varepsilon_{i,t-1} \quad (1)$$

Where *BLev* is our measure of overall leverage (defined as the ratio of total debt to total assets), *X* is the matrix of the firm-level factors previously referenced and defined in Table 1, and ε is a composite error term, including time-invariant firm-fixed effects and an independently and identically distributed component with mean zero:

$$\varepsilon_{i,t-1} = \mu_i + \upsilon_{t-1} \quad (2)$$

For robustness tests, we modify our baseline model by replacing overall leverage with long-term leverage (LTLev), a relatively stable component of leverage. We then obtain our second model as follows:

$$LTLev_{i,t} = \alpha + \lambda_t + \beta X_{i,t-1} + \varepsilon_{i,t-1} \quad (3)$$

To control for the effect of the recent global financial crisis and industry competition, we estimate Eq. (1) and Eq. (2) for the full sample and separate sub-samples of pre-crisis, crisis and post-crisis periods, as well as for high-competition and low-competition sub-samples. We also interact crisis indicators with competition. To this end, we follow the competition literature (e.g., Haw et al., 2015; Fosu, 2013; Valta, 2012; Datta et al., 2011; Guney et al. 2011) and proxy industry competition with price-cost margin (*PCM*). The *PCM* captures the extent to which firms can exercise higher pricing power in the product market; hence, it is used as an inverse measure of competition in product markets. We follow Haw et al. (2015) and compute our *PCM* as follows:

$$\text{PCM} = \frac{Sales - COGS - SG\&A}{Sales} \quad (4)$$

Where *COGS* is cost of goods sold and *SG&A* is sales, general and administrative expenses.

We did not estimate our models, Eq. (1) and Eq. (2), using OLS, because this estimation approach fails to control for unobserved firm-level heterogeneity, leading to biased and inconsistent estimates (Wooldridge, 2009). Hence, a practical approach is to adopt a panel fixed-effect or random-effect estimation method. We confirm, using the Hausman test, that the fixed-effect models are most appropriate to account for the firm-level heterogeneity. Therefore, we base our analysis on the panel fixed-effect models and use the pooled OLS models for robustness checks.

To control for possible heteroscedasticity and autocorrelation within firms, standard errors of our regression coefficients are adjusted using Huber-White approach and clustering at the firm level. Finally, following the extant literature (e.g., Elmagrhi et al., 2018; Mc Namara, et al., 2017; Bonaimé et al., 2014; Danso & Adomako, 2014; Zou & Xiao, 2006), we lag the explanatory variables by one period to isolate the analysis from the potential reverse causality between our independent and dependent variables. The next section presents our estimated results.

4. Results and discussion

4.1. Firm-level determinants of capital structure across the entire sample period

Our baseline results are presented in Table 5. Two main estimation methods are employed. The Hausman specification test performed provided support for the fixed-effect estimation and therefore we discuss our results using the fixed-effect model estimations. The interpretation of the results are based on our main measure of leverage (i.e., *BLev*) while MLev is used for robustness check.

Therefore, from Model 2, we observe that firm size (*SZ*) and leverage (*BLev*) are positively and significantly related at the 1% level ($\beta = 0.063$). This is consistent with the prediction of the trade-off theory. Intuitively, larger Japanese firms, which could be more diversified and have lower bankruptcy risk, pay less risk premium. Our findings are consistent with prior studies (e.g., Frank & Shen, 2019; Grosse-Rueschkamp et al., 2019; Pan et al., 2015; Chen, 2004; Ozkan, 2001) that find a positive relationship between firm size and leverage.

On the relationship between profitability and leverage, we find that profitability (*PR*) is

negatively related to leverage (*BLev*) of Japanese firms. This is consistent with the pecking order theory that prefers internal to external finance (see also: Boapeah, 2015; Danso & Adomako, 2014; Hall et al., 2004; Ozkan, 2001).

[Table 5 about here]

We also observed that tangibility (*TAN*) and leverage (*BLev*) are positively and significantly related at the 1% level. This underscores the importance of asset base as an added security in reducing a lender's risk (Nicodano & Regis, 2019; Ranasinghe, 2019; Danso & Adomako, 2014; De Jong et al., 2008; Williamson, 1988). This tends to support both the pecking order and the trade-off theories. In addition, non-debt tax shield (*NDTS*) and leverage (*LEV*) are negatively related. This is in line with other empirical studies (e.g., Asad et al., 2019; Chen et al., 2019; Chen, 2004; Fama and French, 2002; Ozkan, 2001) and supports the logic of both the trade-off and pecking order hypotheses.

Liquidity (*LIQ*) and leverage (*BLev*) are negatively and significantly related at the 1% level. This contrasts with the expectation of the trade-off theory that predicts a positive relationship between liquidity and leverage. As noted by Prowse (1990), firm managers could manipulate liquid assets in favour of shareholders, as against debt holders; hence, the negative liquidity-leverage relationship. Our result supports other studies (e.g., Danso & Adomako, 2014; Harris & Roark, 2019; Inderst & Vladimirov, 2019; Ozkan, 2001).

The estimated coefficient of earnings volatility (*VOL*) has a positive sign and is statistically significant at the 10% level. This outcome is in line with the trade-off theory and consistent with prior studies (e.g., Kieschnick & Moussawi, 2018; Danso & Adomako, 2014; De Jong *et al.*, 2008; Hall *et al.*, 1999). This suggests that the demand-side effect on the capital structure of volatility outweighs the supply-side effects. This is not surprising for Japanese firms because of the special relationship between these firms and their banks.

The relationship between growth (*GR*) and leverage is found to be negative and significant at 5%. This is consistent with the argument that a greater growth opportunity leads to flexibility

to engage in suboptimal investment and therefore expropriate wealth from debtholders to shareholders in the form of asset substitution effect (Wang et al., 2019; Chen, 2004; Ozkan, 2001). Our result is in line with the argument of the agency theory. Impliedly, high-growth Japanese firms will still be viewed with an elevated level of scepticism by debt providers, despite their strong relationships with major banks. Also, the results from Model 4 (i.e. *MLev*) confirm the results from Model 2. This suggests that our results are robust to alternative definition of leverage.

The next set of regressions in Models 5 and 6 of Table 5 investigate the relationship between firm-level factors and long-term leverage (*LTLev*). Based on Model 6, Evidence obtained indicates that firm size (*SZ*), asset tangibility (*TAN*) and growth (*GR*) are all positively and significantly related to long-term leverage at the 1% level (see also Chen, 2004). We also observe that profitability (*PR*) shows a negative and significant relationship with long-term leverage at the 1% level. In this case, the prediction of the pecking order theory prevails as an explanation for the lower level of debt at the most profitable companies (Ji et al., 2019; Lemmon & Zender, 2019; Kayo and Kimura, 2011). The relationship between long-term leverage and non-debt tax shield, although negative, remains insignificant. The relationship between liquidity and long-term leverage produces a negative value. But this result is only significant at 10%. We also observe a positive but insignificant relationship between earnings volatility (*VOL*) and long-term leverage. In effect, our results are consistent with those of Models 2 and 4. This stems from the fact that *LTLev* is the most stable component of overall leverage. In sum, contrary to our prediction (i.e., *H1*), we observe that firm-level factors that explain capital structure decisions of firms in market-based economies are also applicable in the context of Japan despite the unique characteristics of Japanese firms.

4.2. Firm-level determinants of capital structure: the role of the crisis

So far, we have shown the role of the various firm-level determinants of capital structure. In this sub-section, we investigate whether the 2007-2008 financial crisis impacted the traditional determinants of the capital structure decisions of Japanese firms. To do this, we split our data into three sample periods (i.e., pre-crisis, crisis and post crisis) and re-estimate the regression models using our two dependent variables. We present the results in Table 6.

[Table 6 about here]

We find that, generally, most of the variables examined seem to have been affected by the recent global financial crisis. However, the contributions of size (*SZ*) and profitability (PR) appear not to have been substantially affected by the financial crisis as their relationship and statistical significance remain similar across the three sample periods. For instance, the coefficient on size remains positive across all sub-samples. Additionally, the coefficients remain statistically significant for all models.

On profitability, we observe that the coefficient remains negative and statistically significant across all models. It is, however, worth noting that the absolute size of the coefficient on profitability is smaller, relative to the pre-crisis period, for both measures of leverage during crisis and – to a lesser extent – in the post-crisis period. This means that profitability *(PR*) is less important to Japanese firms' capital structure decisions during the crisis period. This lower sensitivity of leverage to profitability can be reasonably attributed to the significant support provided by the large affiliated and owner banks.

The effect of asset tangibility on leverage remains consistently positive for both overall and long-term leverage across all sub-samples. The magnitude of these effects is larger during the crisis and post-crisis periods. Further, the role of *TAN* in the pre-crisis period is only significant at the 10% level, but the same effect is significant at the 1% level in the crisis and post-crisis periods. Overall, these findings suggest that the financial crisis and its aftermath imposed some level of financial constraints on Japanese firms, despite the close-knit relationship between these firms and their banks. Thus, *TAN* remains an important determinant of capital structure, especially during crisis and post-crisis periods (see Almeida and Campello, 2007). The findings suggest, unsurprisingly, that the significance of the effect of asset tangibility (*TAN*) on overall leverage and long-term leverage seems to be driven by the crisis.

We note that the effect of non-debt tax shield (*NDTS*) is largely insignificant except for the effect on long-term leverage during the post-crisis period. The effect on overall leverage loses its statistical significance across all sub-samples, whilst the effect on long-term leverage gains significance (at the 5% level) during the post-crisis period. These findings suggest that the post-

crisis experience discourages long-term borrowing where the benefit of the tax shield is minimal. Hence, the effect of *NDTS* on overall leverage is driven by the post-crisis experience.

With respect to liquidity (*LIQ*), its effect on overall leverage remains consistently negative across all sub-samples. However, the effect is statistically significant (at the 1% level) for only the pre- and post-crisis periods. The effect on long-term debt is, however, mixed; although negative for the post-crisis sample, it is positive for the pre-crisis period but statistically significant only at the 10% level. Thus, the evidence suggests that liquidity reduces the leverage levels in periods prior to crisis and after crisis; however, the observed relationship prior to crisis appears to be driven mainly by short-term variations in debt levels. It further suggests, contrary to the pecking order theory, that the global financial crisis makes liquidity irrelevant in capital structure decisions. Perhaps, liquidity crisis associated with crisis increases the marginal value of liquidity to the extent that firms become more inclined to buffer their levels by either maintaining their debt levels or reducing their debt levels only marginally in response to any increase in liquidity.

We also observe that, in almost all the sub-sample periods, the effect of volatility (*VOL*) is negative, but statistically insignificant during the pre-crisis and the crisis periods. This finding can be attributed to the close-knit relationship between Japanese firms and major banks within the country. However, there is a little, albeit weak, evidence in the post-crisis period that volatility impacts negatively on overall leverage, consistent with the predictions of the agency theory and the evidence in Titman and Wessels (1988).

The relationship between growth (*GR*) and leverage is largely negative across the three sample periods but only significant during the pre- and crisis periods. The coefficients on long-term leverage are significant during the crisis period only. Further, it is noteworthy that the coefficients of *GR* for the crisis period are about twice as high as those for the pre-crisis period. Hence, it can be concluded that growth opportunities negatively impact firms' leverage, especially prior to and during crisis periods. This could be attributed to an attempt to minimise the agency cost of debt arising from the expropriation of the debtholder, which is highly likely during crisis.

To conclude, contrary to our prediction (i.e., *H2*), we note some evidence suggesting that the traditional capital structure determinants show varied levels of sensitivity to financial crisis. On the one hand, we note that financial leverage is less sensitive to firm size and profitability

during financial crisis. On the other hand, we observe that the sensitivity of financial leverage to tangibility and growth is higher during financial crisis, compared to that observed in the pre-crisis and post crisis periods. Within this spectrum, we find that financial leverage is insensitive to non-debt tax shield, liquidity and volatility during financial crisis. Whilst these findings point to some mixed attributes of the special relationships amongst Japanese firms and between these firms and their major banks, they do suggest that affiliated Japanese banks help lessen the potential pressure associated with liquidity and volatility during financial crisis.

4.3. Firm-level determinants of capital structure: the role of competition

The previous section documents a substantial amount of variation in the various firm-level determinants of capital structure as a result of the 2007-2008 global financial crisis. Given that firm ownership structure and the lending relationship with major banks may shield Japanese firms from competitive pressure, we extend our baseline model and add a novel dimension by examining the moderating role of competition. The results of this are presented in Tables 7 and 8. The findings in the first set of regressions (columns 1-2) in Table 7 document the role of competition on capital structure decision across all industries. In the second (columns 3-4) and the last (columns 5-6) sets of our regression analysis, we split our firms into high-competition and low-competition industries, respectively, to highlight the moderating role of competition on the traditional capital structure determinants. We split our firms into high- and low-competition by using the median value (50th percentile) of the price-cost margin (*PCM*)[4], where low-competition means *PCM* >50th percentile and high competition means *PCM* <50th percentile.

First, the coefficient on price-cost margin (*PCM*) is negative and statistically significant at the 1% level. This suggests that product market competition increases Japanese firms' overall financial leverage and may enhance the benefits of leverage (Dakua, 2019; Elmagrhi et al., 2018; Fosu 2013; Valta, 2012; Guney et al. 2011). This observation is consistent with the predatory theories of capital structure (see, Ahmed & Hla, 2019; Alexandridis & Hasan, 2019; Bolton and Scharfstein, 1990; Fudenberg and Tirole, 1986). It is also worth noting that, after controlling for the effect of competition, all of the other variables retain their signs. Further,

[4]From Appendix 1, we test the robustness of our results by using *HHI* as an alternative measure of competition and our results are qualitatively similar to what is reported in Table 7.

except for growth (in column 1) and growth and liquidity (column 2), all the other variables retain their statistical significance.

In the next sets of regressions, we find that the effect of firm size for overall leverage and long-term leverage regressions is positive, statistically significant at the 1% level and qualitatively similar to those reported for the full sample. The results suggest that, although product market competition marginally increases the impact of firm size on financial leverage, firm size remains relevant for capital structure decisions for firms in highly competitive industries as well as for those in industries with low levels of competition.

Similarly, the coefficient on profitability remains negative and statistically significant for both overall leverage and long-term leverage across both high-competition and low-competition industries. However, it is apparent that competition moderates this effect, as the magnitude of the coefficients are smaller for the high competition sub-sample relative to those for the low competition sub-sample. These findings suggest that firms in highly competitive industries rely less on internal financing; thus, following a relatively less steep pecking order financing choice.

Additionally, the coefficient of asset tangibility remains positive and statistically significant at the 1% level across sub-samples. This remains the case whether leverage is measured as overall leverage or as long-term leverage. The magnitude of the coefficient is also similar, suggesting no apparent evidence that competition plays an interactive role.

Next, we find evidence that competition drives the relationship between non-debt tax shield and long-term leverage. The coefficient on non-deb tax shield is insignificant across all models apart from in column 6, where the dependent variable is long-term leverage. This observation is in line with both the trade-off and the pecking order theories, but, perhaps to a considerable extent, may be attributed to the firms' attempt to balance the risk of predation with the potential benefits of the tax shield.

Further, the effect of liquidity on leverage remains similar across both sub-samples of high and low competition, suggesting that competition does not significantly moderate the effect of liquidity on leverage. The effect on long-term leverage is, however, mixed as the coefficient in the high-competition sub-sample is positive, albeit at the 10% level. On volatility, we also note that the coefficient across both sub-samples is positive, although significant only for firms in industries with high competition. Thus, the volatility–leverage relationship appears to be driven by the levels of product market competition.

Moreover, the relationship between growth and leverage appears negative and insignificant, when we control for competition in the regression. In addition to this, the impact of growth across both high and low competitive industries should be noted. The coefficient of growth is negative and significant (at the 1% level) for highly competitive industries (in column 2), but insignificant for less competitive industries (column 5). However, the same coefficient is insignificant in column 3, but positive and significant in column 6. Thus, in relation to growth opportunities, the findings suggest that Japanese firms follow the pecking-order financing behaviour when industry competition is high, but a trade-off pattern when it is low.

Our discussion so far suggests that industry-level competition interacts significantly with the traditional firm-level determinants of the capital structure of Japanese firms. Whilst there is no evidence that competition has a systematic moderating role on the effects of tangibility and liquidity on leverage, the evidence so far suggests that competition has a considerable impact on the relationship between the remaining firm-level factors and leverage.

[Table 7 about here]

4.4. Firm-level determinants of capital structure: The moderating role of competition and financial crisis

The next set of results, presented in Table 8, focus on the joint role of competition and crisis on the relationship between firm-level factors and leverage. We do this to purge our results of any confounding effects of the interaction between competition and crisis, which could bias our results.

[Table 8 about here]

Table 8 presents the results of the joint role of competition and crisis on the relationship between firm-level factors and leverage. The estimated firm size (*SZ*) has a positive and significant relationship with leverage across all the sub-sample periods in highly competitive

industries. We find similar results for the less competitive industries, with one exception, where the effect relating to the crisis period is insignificant. Thus, size does not drive the capital structure of Japanese firms in less competitive industries in a period of financial crisis. This observation could be attributed to the combined risk of predation and uncertainty. In addition, we observe that the coefficient of profitability (*PR*) is consistently negatively signed and statistically significant. Again, the coefficients are smaller in magnitude in highly competitive industries for all sub-samples of crisis, pre- and post-crisis periods. This corroborates the earlier finding that suggested that competition moderates the effect of profitability on capital structure decisions.

On asset tangibility (*TAN*) and non-debt tax shield (*NDTS*), we note the significant joint effect of competition and crisis. For firms in highly competitive industries, the effect of *TAN* is significant only in the pre-crisis period. In contrast, for firms in less competitive industries, the effect is significant for both crisis and post-crisis periods. Thus, the crisis and its aftermath impacted on the tangibility–leverage relationship only in low competitive industries. This suggests that the major banks do exercise some caution about the threats of predation in less competitive industries, which compels them to condition lending on collateral availability. Likewise, the coefficient of *NDTS* remains largely insignificant other than during financial crisis in highly competitive industries. Moreover, the results do not show any significant moderating role of competition on the liquidity–leverage relationship. Further, the coefficients on volatility remain largely insignificant, except during the post-crisis period in less competitive industries: the post-crisis effect in less competitive industries turns negative, albeit at the 10% level. Yet again, the effect of growth remains largely negative and significant for highly competitive industries, but only during crisis. Finally, on the marginal effect of competition on leverage, the effect appears to be significant during the pre-crisis period only.

The forgoing analyses suggest that the firm-level determinants of leverage are also relevant to Japanese firm. This notwithstanding, we highlight the significant joint interaction roles of competition and crisis. Controlling for the joint effects of competition and crisis, the evidence suggests a higher sensitivity of the size–leverage relationship jointly to competition and crisis. Additionally, we corroborate the accentuating effect of competition on the profit–leverage relationship in crisis, pre- and post-crisis periods. Also, we show that the global crisis and its aftermath jointly with competition accentuate the sensitivity of leverage to asset tangibility. Finally, we examine the extent to which crisis and competition interact to impact on leverage.

We observe from Table 9 that the interaction between crisis and competition negatively impact on both *BLev* and *LTLev*. The results obtained generally provide support for our prediction (i.e., H3). In general, the evidence obtained indicates that our results do not provide support for any specific theory of capital structure during crisis/non-crisis period or depending on the industry competition.

[Table 9 about here]

5. Conclusion

In this paper, we empirically explore the role of firm-level factors in determining the capital structure decisions of Japanese firms. We also investigate how product market competition impact the observed relation between firm-level determinants and leverage and the extent to which these firm-level factors were influenced by the 2007-2008 global financial crisis. The unique characteristics of Japanese firms provide a strong motivation for this study. Our analysis offers support for existing evidence with respect to the role of firm-level factors in influencing financing decisions of firms. In general, the evidence obtained predominantly supports pecking order, trade-off and agency theories. We also find persuasive evidence that the 2007-2008 financial crisis affected almost all the firm-level determinants of capital structure.

This study offers a number of implications. Theoretically, our findings extend the corporate finance literature in a number of ways. First, while previous studies (e.g., Antill & Grenadier, 2019; Asad et al., 2019; Chen et al., 2019; Danso and Adomako, 2014; Fosu, 2013; Muradoğlu & Sivaprasad, 2012) indicate that firm-level characteristics are important determinants of capital structure, theoretical specification, as well as empirical examination of how the level of product market competition drives the firm level–capital structure relationship remains underexplored. Thus, this study addresses this gap by relying on data from Japanese firms, a hitherto less examined sample for this purpose. In doing so, we add to a growing literature on capital structure decisions of firms (e.g., Dakua, 2019; Elmagrhi et al., 2018; Frank & Shen, 2019; Grosse-Rueschkamp et al., 2019; Kieschnick & Moussawi, 2018; Agyei-Boapeah, 2015; Paligorova & Xu, 2012). Second, we demonstrate the impact of the 2007-2008 financial crisis on the capital structure decisions of firms, showing that Japanese firms were not isolated from

the impacts of the 2007-2008 financial crisis.

Our study also stresses the importance of product market competition in the capital structure decisions of firms in finance research. Thus, in a competitive environment, firm-level characteristics significantly influence the financing behaviour of firms. In other words, firm-level characteristics are extremely important, particularly for firms that operate in a competitive environment. Overall, our contextual research findings helps to extend the theoretical and practical understanding relating to the capital structure decisions of firms. Despite our contributions, as we have concentrated on a single country (Japan), future studies should seek to extend the current research to countries with similar unique characteristics, in order to provide further insights into financing decisions of firms.

Reference

Agyei-Boapeah, H., (2015). Cross-border acquisitions and financial leverage of UK acquirers. *Accounting Forum*, 39 (2), 97-108.

Ahmed, Z. & Hla, D.T. (2019). Stock return volatility and capital structure measures of nonfinancial firms in a dynamic panel model: Evidence from Pakistan. *International Journal of Finance & Economics*, 24(1), 604-628.

Alexandridis, A.K. & Hasan, M.S. (2019). Global financial crisis and multiscale systematic risk: Evidence from selected European stock markets. *International Journal of Finance & Economics*, Forthcoming.

Almeida, H. & Campello, M. (2007). Financial constraints, asset tangibility, and corporate investment. *Review of Financial Studies*, *20*(5), 1429-1460.

Al-Najjar, B. (2013). The financial determinants of corporate cash holdings: Evidence from some emerging markets. *International Business Review*, *22*(1), 77-88.

Antill, S. & Grenadier, S.R. (2019). Optimal capital structure and bankruptcy choice: Dynamic bargaining versus liquidation. *Journal of Financial Economics*, 133(1), 198-224.

Aoki, M. (1990). Toward an economic model of the Japanese firm. *Journal of Economic Literature*, *28*(1), 1-27.

Asad, F., Gulzar, S., Bangassa, K., Khan, M.J. (2019). Capital structure adjustment and market reaction following seasoned equity offerings. *International Journal of Finance & Economics*, Forthcoming.

Bartholdy, J., Mateus, C. & Olson, D. (2015). Do Portuguese private firms follow pecking order financing? *The European Journal of Finance*, *21*(10-11), 848-866.

Barton, S.L., Ned C. H. & Sundaram S., (1989). An empirical test of stakeholder theory predictions of capital. *Financial Management*, 18(1), 36–44.

Bonaimé, A.A., Öztekin, Ö. & Warr, R.S. (2014). Capital structure, equity mispricing, and stock repurchases. *Journal of Corporate Finance, 26*, 182-200.

Bolton, P.& Scharfstein, D.S. (1990). A theory of predation based on agency problems in financial contracting. *The American Economic Review*, 93-106.

Brander, J. A., & Lewis, T. R. (1986). Oligopoly and financial structure: The limited liability effect. *The American Economic Review*, 76, 956–970.

Brown, S., Dutordoir, M., Veld, C. & Veld-Merkoulova, Y., (2019). What is the role of institutional investors in corporate capital structure decisions? A survey analysis. *Journal of Corporate Finance, 58*, 270-286.

Brunnermeier, M., & Oehmke, M. (2013). The maturity rat race. *Journal of Finance* 68 (2), 483–521.

Chen, Z., Harford, J., & Kamara, A. (2019). Operating leverage, profitability, and capital structure. *Journal of Financial and Quantitative Analysis*, 54 (1), 369-392.

Cerasi, V., Fedele, A. & Miniaci, R. (2017). Product market competition and access to credit. *Small Business Economics* 49, 295–318.

Céspedes, J., González, M., & Molina, C. A. (2010). Ownership and capital structure in Latin America. *Journal of Business Research, 63*(3), 248-254.

Chen, J.J. (2004). Determinants of capital structure of Chinese-listed companies. *Journal of Business Research, 57*(12), 1341-1351.

Chen, C. J., & Yu, C. M. J. (2012). Managerial ownership, diversification, and firm performance: Evidence from an emerging market. *International Business Review, 21*(3), 518-534.

Chen, V.Z., Li, J., Shapiro, D.M. & Zhang, X., (2014). Ownership structure and innovation: An emerging market perspective. *Asia Pacific Journal of Management*, 31(1),1-24.

Chevalier, J. A. (1995a). Capital structure and product-market competition: Empirical evidence from the supermarket industry. *The American Economic Review*, 85, 415–435.

Chevalier, J. A. (1995b). Do LBO supermarkets charge more? An empirical analysis of the effects of LBOs on supermarket pricing. *Journal of Finance*, 50, 1095–1112.

Chevalier, J. A., & Scharfstein, D. S. (1996). Capital-market imperfections and countercyclical markups: Theory and evidence. *The American Economic Review*, 86, 703–725.

Choi, J.J., Hiraki, T. & Landi, J.A., (2014). The value of multinationality and business

group for Japanese firms. *Journal of Corporate Finance*, *29*, 88-110.

Crotty, J. (2009). Structural causes of the global financial crisis: a critical assessment of the 'new financial architecture'. *Cambridge Journal of Economics*, 33(4), 563-580.

Dakua, S. (2019). Effect of determinants on financial leverage in Indian steel industry: A study on capital structure. *International Journal of Finance & Economics*, 24(1), 427-436.

Danso, A.& Adomako, S. (2014). The financing behaviour of firms and financial crisis. *Managerial Finance, 40*(12), 1159-1174.

Datta, S., Iskandar-Datta, M. & Sharma, V. (2011). Product market pricing power, industry concentration and analysts' earnings forecasts. *Journal of Banking & Finance*, *35*(6), 1352-1366.

De Angelo, H. & Masulis, R.W. (1980). Optimal capital structure under corporate and personal taxation, *Journal of Financial Economics*, 8 (1), 3-29.

De Jong, A., Kabir, R. & Nguyen, T. T. (2008). Capital structure around the world: The roles of firm- and Country-Specific Determinants. *Journal of Banking and Finance*, 32(9), 1954-1969.

Degryse, H., Goeij, P., & Kappert, P. (2010). The impact of firm and industry characteristics on small firms capital structure, *Small Business Economics* 38, 431-447.

Diamond, D. (2004). Presidential address, committing to commit: short-term debt when enforcement is costly. *The Journal of Finance* 59 (4), 1447–1479.

Dick, Christian, Schmeling, Maik, Schrimpf, Andreas (2013). Macro-expectations, aggregate uncertainty, and expected term premia. *European Economic Review* 58, 58–80.

Dudley, E. (2012). Capital structure and large investment projects. *Journal of Corporate Finance*, *18*(5), 1168-1192.

Elmagrhi, M.H., Ntim, C.G., Malagila, J., Fosu, S., & Tunyi, A.A. (2018). Trustee diversity, governance mechanisms, capital structure and performance in top UK charities. *Corporate Governance*, 18(3), 478–508.

Faccio, M., Lang, L. H., & Young, L. (2010). Pyramiding vs leverage in corporate groups: International evidence. *Journal of International Business Studies*, *41*(1), 88-104.

Fama, E. & French, K. (2002). Testing trade-off and pecking order predictions about dividends and debt. *The Review of Financial Studies*, 15(1), 1-33.

Fosu, S., Danso, A., Ahmad, W. & Coffie, W. (2016). Information asymmetry, leverage and firm value: Do crisis and growth matter? *International Review of Financial Analysis*, *46*, 140-150.

Fosu, S. (2013). Capital structure, product market competition and firm performance:

Evidence from South Africa. *The Quarterly Review of Economics and Finance*, *53*(2), 140-151.

Frank, M.Z. & Shen, T. (2019). Corporate capital structure actions. *Journal of Banking & Finance*, 106, 384-402.

Fudenberg, D., & Tirole, J. (1986). A "signal-jamming" theory of predation. *RAND Journal of Economics*, 17(3), 366–376.

García-Sánchez, I. M., & Noguera-Gámez, L. (2017). Integrated information and the cost of capital. *International Business Review*.

Grosse-Rueschkamp, B., Steffen, S. & Streitz, D. (2019). A capital structure channel of monetary policy. *Journal of Financial Economics*, 133(2), 357-378.

Guney, Y., Li, L. and Fairchild, R., 2011. The relationship between product market competition and capital structure in Chinese listed firms. *International Review of Financial Analysis*, *20*(1), pp.41-51.

Gürkaynak, R.S., Wright, J.H. (2012). Macroeconomics and the term structure. *Journal of Economic Literature* 50 (2), 331–367.

Hall, G.C., Hutchinson, P.J. & Michaelas, N. (2004). Determinants of the capital structures of European SMEs. *Journal of Business Finance and Accounting* 31(5), 711-728.

Harris, C. & Roark, S. (2019). Cash flow risk and capital structure decisions. *Finance Research Letters*, 29, 393-397.

Harris, M., & Raviv, A. (1991). The theory of capital structure. *The Journal of Finance*, *46*(1), 297-355.

Hatani, F. & McGaughey, S.L. (2013) Network cohesion in global expansion: An evolutionary view. *Journal of World Business*, *48*(4), 455-465.

Haw, I.M., Hu, B. & Lee, J.J. (2015). Product market competition and analyst forecasting activity: International evidence. *Journal of Banking & Finance*, *56*, 48-60.

Hsu, W. T., Chen, H. L., & Cheng, C. Y. (2013). Internationalization and firm performance of SMEs: The moderating effects of CEO attributes. *Journal of World Business*, *48*(1), 1-12.

Huyghebaert, N., & Xu, W. (2016). Bias in the post-IPO earnings forecasts of affiliated analysts: Evidence from a Chinese natural experiment. *Journal of Accounting and Economics*, *61*(2), 486-505.

Inderst, R. & Vladimirov, V. (2019). Growth firms and relationship finance: A capital structure perspective. *Management Science*, 65(11), 5411-5426.

Jensen, M.C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, *76*(2), 323-329.

Jensen, M. & Meckling, W. (1976). Theory of the firm: managerial Behavior, Agency costs and Ownership Structure. *Journal of Financial Economics* 3(4), 305-360.

Ji, S., Mauer, D.C., & Zhang, Y. (2019). Managerial entrenchment and capital structure: The effect of diversification. *Journal of Corporate Finance*, Forthcoming.

Kang, J. K., & Shivdasani, A. (1995). Firm performance, corporate governance, and top executive turnover in Japan. *Journal of Financial Economics*, *38*(1), 29-58.

Kayo, E. K. & Kimura, H. (2011). Hierarchical Determinants of Capital Structure. *Journal of Banking and Finance*, 35(2), 358-371.

Kester, W. C. (1986). Capital and ownership structure: A comparison of United States and Japanese manufacturing corporations. *Financial Management*, 5-16.

Kieschnick, R. & Moussawi, R., (2018). Firm age, corporate governance, and capital structure choices. *Journal of Corporate Finance*, *48*, 597-614.

Lang L, Ofek E, Stulz RM. (1996). Leverage, investment and firm growth. *Journal of Financial Economics*, 40, 3– 29.

Lemmon, M.L. & Zender, J.F. (2019). Asymmetric information, debt capacity, and capital structure. *Journal of Financial and Quantitative Analysis*, 54 (1), 31-59.

Li, K., Griffin, D., Yue, H., & Zhao, L. (2011). National culture and capital structure decisions: Evidence from foreign joint ventures in China. *Journal of International Business Studies*, *42*(4), 477-503.

Liu, Z. B., Jiang, F. X., & Lu, E. P. (2003). Capital structure and competition in product market. *Economics Research*, 7, 60−67.

Ma, X., Yiu, D. W., & Zhou, N. (2014). Facing global economic crisis: Foreign sales, ownership groups, and corporate value. *Journal of World Business*, *49*(1), 87-100.

Mar-Molinero, C., Menendez-Plans, C & Orgaz-Guerrero, N (2017). Has the 2008 financial crisis changed the factors determining the systematic risk of shares in the "European Hospitality Industry"? (2003-2013). *Journal of Hospitality and Tourism Management* 31, 59-69.

Mc Namara, A., Murro, P. & O'Donohoe, S. (2017). Countries lending infrastructure and capital structure determination: The case of European SMEs. *Journal of Corporate Finance*, *43*, 122-138.

Michaelas, N., Chittenden F.& Poutziouris P., (1999). Financial Policy and Capital Structure Choice in UK SMEs: Empirical Evidence from Company Panel Data. *Small Business Economics*, *12* (2), 113–130.

Modigliani, F. & Merton, H. M. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, 48(3), 261-297.

Modigliani, F. & Merton, H. M. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *The American Economic Review*, 53(3), 433-443.

Muradoğlu, Y. G., & Sivaprasad, S. (2012). Capital structure and abnormal returns. *International Business Review*, *21*(3), 328-341.

Myers, S.C. (1984). Capital structure puzzle. Journal of Finance, 39 (3), 575-592.

Myers, S.C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, *5*(2), 147-175.

Myers, S.C., and Majluf N.S. (1984). Corporate Financing and Investment Decisions when Firms have Information that Investors do not have. *Journal of Financial Economics*, 13(2), 187–221.

Nakaso, H.(2001). The financial crisis in Japan during the 1990s: How the Bank of Japan responded and the lessons learnt. Available from:http://www.bis.org/publ/bppdf/bispap06.pdf. Accessed 15th April 2017

Nakateni, I. (1984). The economic role of financial corporate groupings. *The Economic Analysis of the Japanese Firm, North-Holland, Amsterdam*, 227-258.

Nicodano, G., & Regis, L. (2019). A trade-off theory of ownership and capital structure. *Journal of Financial Economics*, 131(3), 715-735.

OECD Report (2013) As Japan strives to recover from the financial crisis. Available from: https://www.oecd.org/edu/Japan_EAG2013%20Country%20Note.pdf. Accessed 30th May 2017.

Omrane, W.B. and Savaşer, T., 2017. Exchange rate volatility response to macroeconomic news during the global financial crisis. *International Review of Financial Analysis*, *52*, 130-143.

Omrane, W.B. and Savaşer, T. (2017). Exchange rate volatility response to macroeconomic news during the global financial crisis. *International Review of Financial Analysis, 54,*130-143.

Ozkan, A. (2001). Determinants of capital structure and adjustment to long run target: evidence from UK company panel data. *Journal of Business Finance & Accounting*, *28*(1-2), 175-198.

Paligorova, T., & Xu, Z. (2012). Complex ownership and capital structure. *Journal of Corporate Finance*, *18*(4), 701-716.

Pan L, Lin, C., T, Lee, S & Ho, K. (2015). Information ratings and capital structure. *Journal of Corporate Finance* 31, 17–32.

Prowse, S.D. (1992). The structure of corporate ownership in Japan. *The Journal of Finance*, *47*(3), 1121-1140.

Prowse, S.D. (1990). Institutional investment patterns and corporate financial behavior in the United States and Japan. *Journal of Financial Economics*, 27(1), 43-66.

Ranasinghe, D. (2019). Managerial entrenchment, financial constraints, and investment choice in unlisted firms. *International Journal of Finance & Economics*, Forthcoming.

Rathinasamy, R. S., Krishnaswamy, C. R., & Mantripragada, K. G. (2000). Capital structure and product market interaction: An international perspective. *Global Business and Finance Review*, 5(2), 51−63.

Scott, J. (1977). Bankruptcy, secured debt and optimal capital structure. *Journal of Finance, 32* (1), 1-19.

Sheard, P. (1989). The main bank system and corporate monitoring and control in Japan. *Journal of Economic Behavior & Organization*, 11(3), 399-422.

Showalter, D. M. (1995). Oligopoly and financial structure: Comment. *The American Economic Review*, 85(3), 647−654.

Tian, J.J. & Lau, C.M., (2001). Board composition, leadership structure and performance in Chinese shareholding companies. *Asia Pacific Journal of Management*, 18(2), 245-263.

Titman, S. & Wessels R. (1988). The determinants of capital structure choice. *Journal of Finance*, 43(1), 1–19.

Tan, R.S.K., Chng, P.L. & Tan, T.W. (2001). CEO share ownership and firm value. *Asia Pacific Journal of Management*, 18(3), 355-371.

Valta, P. (2012). Competition and the cost of debt. *Journal of Financial Economics*, *105*(3), 661-682.

Verwijmeren, P. & Derwall, J. (2010). Employee well-being, firm leverage, and bankruptcy risk. *Journal of Banking & Finance*, *34*(5), 956-964.

Wang, X., Manry, D., & Rosa, G. (2019). Ownership structure, economic fluctuation, and capital structure: Evidence from China. *International Journal of Finance & Economics*, 24(2), 841-854.

Williamson, O.E. (1988). Corporate finance and corporate governance. *The Journal of Finance*, 43(3), 567-591.

Wooldridge, J. (2009). *Introductory Econometrics: A Modern Approach*. 4th ed. Cengage Learning.

World Bank Report (2017) Annual GDP growth. Available from: http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG. Accessed 26th May 2017.

Zhu,W. X., Chen, H. M., & Wu, X. (2002). Product market competition and preserved financial behavior: Model and case of Yanjing Beer Ltd Corp. *Economics Research*, 8, 28−36.

Zou, H. & Xiao, J.Z. (2006). The financing behaviour of listed Chinese firms. *The British Accounting Review*, 38, 239-258

Table 1: Firm-level factors and leverage

Variable	Predicted Sign	Theory	Empirical Evidence
Firm Size	+	Trade-off	Barton et al. (1989)
	–	Pecking order	Titman and Wessel (1988)
Profitability	+	Trade-off	De Jong et al. (2008)
	–	Pecking order theory	Dudley (2012)
Asset Tangibility	+	Trade-off pecking order	Dudley (2012).
Non-debt tax shield	-	Trade-off pecking order	Danso and Adomako (2014)
Liquidity	+	Trade-off	De Jong et al. (2008)
	–	Pecking order	Ozkan, (2001)
Earnings Volatility	+	Trade-off	De Jong et al. (2008))
	–	Agency	Titman and Wessels (1988);
Growth	+	Pecking order	Ozkan, (2001)
	–	Agency Trade-off	De Jong et al. (2008)

Table 2: Summary of variables

Variable	Measurement	Literature
Book Leverage (BLev)	Book leverage and Market leverage are analogously defined, except that cash holdings are not subtracted in the numerator (i.e. cash holdings are not subtracted from total debt).	Verwijmeren & Derwall, (2010).
Market Leverage (MLev)	Cash holdings are not subtracted from the numerator - total debt.	Verwijmeren & Derwall, (2010).
Long-Term Leverage (*LTLev*)	Ratio of long-term debt to total assets	Chen (2004)
Size (*SZ*)	Log of total assets	García-Sánchez & Noguera-Gámez, (2017); Ma, (2014); Chen et al., (2014); Faccio, (2010); Chen (2004);Tan et al., (2001); Tian and Lau (2001).
Profitability (*PR*)	Ratio of operating income to total assets	Kayo & Kimura (2011)
Tangibility (*TAN*)	Ratio of fixed assets to total assets	Chen (2004); Kayo & Kimura (2011)
Non-debt tax shield (*NDTS*)	Ratio of depreciation expense to total assets	Danso & Adomako (2014)
Liquidity (*LIQ*)	Ratio of current assets to current liabilities	De Jong et al. (2008)
Volatility (*VOL*)	Ratio of standard deviation of operating income to total assets	De Jong et al. (2008)
Growth (*GR*)	The one-year growth rate of sales	Fosu et al. (2016); Fosu, (2013)

Table 3: Descriptive statistics

	Mean	Std. Dev.	Minimum	Maximum	25th %	50th %	75th%	Obs.
BLev	0.23	0.19	0.00	0.60	0.05	0.20	0.37	61,178
MLev	0.18	0.14	0.00	3.44	0.08	0.14	0.24	57,876
LTLev	0.10	0.10	0.00	0.33	0.01	0.07	0.16	61,147
SZ	17.22	1.46	14.72	20.17	16.17	17.11	18.17	61,343
PR	0.04	0.05	-0.08	0.15	0.02	0.04	0.07	59,665
TAN	0.29	0.17	0.02	0.63	0.16	0.28	0.41	61,207
NDTS	0.03	0.02	0.00	0.08	0.01	0.03	0.04	59,276
LIQ	1.82	1.12	0.60	4.91	1.06	1.46	2.20	60,798
VOL	0.02	0.02	0.00	0.08	0.01	0.01	0.03	52,130
GR	0.03	0.13	-0.20	0.34	-0.05	0.02	0.09	56,883

This table presents the descriptive statistics for the data. The sample comprises Japanese 4,284 firms over the period 1995 to 2013. The variable descriptions are provided in Table 2 above.

Table 4: Correlations matrix

	BLev	MLev	LTLev	SZ	PR	TAN	NDTS	LIQ	VOL	GR
BLev	1.00									
MLev	0.40*	1.00								
LTLev	0.80*	0.29*	1.00							
SZ	0.13*	0.32*	0.19*	1.00						
PR	-0.30*	-0.22*	-0.17*	-0.01*	1.00					
TAN	0.36*	0.47*	0.43*	0.18*	-0.10*	1.00				
NDTS	0.14*	0.16*	0.22*	0.10*	-0.03*	0.42*	1.00			
LIQ	-0.58*	-0.59*	-0.41*	-0.19*	0.19*	-0.38*	-0.14*	1.00		
VOL	-0.05*	-0.30*	-0.06*	-0.35*	-0.10*	-0.22*	0.11*	0.20*	1.00	
GR	-0.07*	-0.10*	-0.01	-0.05*	0.40*	-0.11*	-0.01*	0.01*	0.03*	1.00

This table presents the correlation matrix for the data. The sample and variable definitions are as described in Table 2. * indicates significance at 1% or better

Table 5: Regression results for the full sample period – dependent variable: Overall Leverage & Long-term Leverage

	Book Leverage (BLev)		Market Leverage (MLev)		Long-Term Leverage (LTLev)	
	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)
SZ	0.001	0.063***	0.014***	0.013***	0.008***	0.031***
	(0.002)	(0.004)	(0.001)	(0.003)	(0.001)	(0.003)
PR	-0.648***	-0.466***	-0.274***	-0.050***	-0.208***	-0.155***
	(0.025)	(0.017)	(0.024)	(0.013)	(0.014)	(0.010)
TAN	0.204***	0.071***	0.199***	0.189***	0.177***	0.097***
	(0.014)	(0.018)	(0.008)	(0.012)	(0.008)	(0.012)
NDTS	-0.172*	-0.158**	-0.118**	0.088	0.180***	-0.043
	(0.102)	(0.076)	(0.058)	(0.062)	(0.060)	(0.050)
LIQ	-0.082***	-0.036***	-0.055***	-0.034***	-0.025***	-0.002*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
VOL	0.946***	0.078*	-0.762***	-0.136***	0.433***	0.018
	(0.075)	(0.042)	(0.061)	(0.036)	(0.044)	(0.028)
GR	0.046***	-0.009**	-0.012*	0.025***	0.061***	0.011***
	(0.008)	(0.004)	(0.007)	(0.004)	(0.005)	(0.003)
_cons	0.333***	-0.831***	-0.365***	-0.408***	-0.038**	-0.462***
	(0.027)	(0.066)	(0.018)	(0.048)	(0.016)	(0.046)
N	45648	45648	42548	42548	45624	45624
r2	0.413	0.257	0.474	0.143	0.285	0.084
N_clust	4268.000	4268.000	4222.000	4222.000	4268.000	4268.000

This table presents the OLS and FE estimation results for the overall leverage and Long-term leverage determinants. Standard errors robust to heteroscedasticity and clustering within firm are given in parentheses. The sample and variable definitions are as described in Table 2.

* Indicates significance at 10%.; ** Indicates significance at 5%.; *** Indicates significance at 1%.

Table 6: Regression results for the firm-level determinants of capital structure: The role of the financial crisis

	Pre-crisis		Crisis		Post crisis	
	BLev	**LTLev**	**BLev**	**LTLev**	**BLev**	**LTLev**
	(1)	(2)	(3)	(4)	(5)	(6)
SZ	0.063***	0.025***	0.044***	0.036***	0.059***	0.028***
	(0.006)	(0.004)	(0.012)	(0.008)	(0.009)	(0.005)
PR	-0.366***	-0.140***	-0.126***	-0.037*	-0.176***	-0.052***
	(0.022)	(0.014)	(0.029)	(0.020)	(0.024)	(0.016)
TAN	0.038*	0.062***	0.125***	0.086***	0.092***	0.073***
	(0.022)	(0.014)	(0.045)	(0.027)	(0.025)	(0.019)
NDTS	-0.027	-0.010	0.203	0.045	-0.130	-0.199**
	(0.094)	(0.062)	(0.180)	(0.114)	(0.108)	(0.088)
LIQ	-0.020***	0.003*	-0.005	-0.003	-0.011***	-0.003*
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)
VOL	-0.048	-0.046	0.067	-0.049	-0.092*	-0.028
	(0.064)	(0.041)	(0.093)	(0.063)	(0.051)	(0.037)
GR	-0.012**	0.005	-0.023***	-0.013**	-0.004	-0.004
	(0.006)	(0.004)	(0.008)	(0.006)	(0.006)	(0.004)
_cons	-0.789***	-0.347***	-0.564***	-0.552***	-0.803***	-0.404***
	(0.102)	(0.067)	(0.207)	(0.139)	(0.153)	(0.085)
N	23406	23404	9775	9772	12467	12448
r2	0.215	0.071	0.114	0.051	0.075	0.026
N_clust	3692.000	3692.000	3511.000	3511.000	3426.000	3425.000

This table presents the FE estimation results for the entire sample period. Standard errors robust to heteroscedasticity and clustering within firm are given in parentheses.

The sample and variable definitions are as described in Table 2.

* Indicates significance at 10%; ** Indicates significance at 5%; *** Indicates significance at 1%.

Table 7: Regression results for the full sample period after controlling for competition and its interactions (Using PCM)

	All industries		High Competition		Low competition	
	BLev	**LTLev**	**BLev**	**LTLev**	**BLev**	**LTLev**
	(1)	(2)	(3)	(4)	(5)	(6)
SZ	0.064***	0.032***	0.069***	0.033***	0.057***	0.030***
	(0.004)	(0.003)	(0.006)	(0.004)	(0.005)	(0.004)
PR	-0.436***	-0.157***	-0.304***	-0.088***	-0.501***	-0.227***
	(0.020)	(0.013)	(0.028)	(0.018)	(0.028)	(0.019)
TAN	0.074***	0.098***	0.086***	0.096***	0.058**	0.076***
	(0.018)	(0.012)	(0.026)	(0.016)	(0.023)	(0.016)
NDTS	-0.122	-0.062	0.036	0.061	-0.122	-0.129*
	(0.081)	(0.053)	(0.118)	(0.076)	(0.100)	(0.068)
LIQ	-0.034***	-0.001	-0.038***	0.003*	-0.030***	-0.006***
	(0.002)	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)
VOL	0.073*	0.012	0.167***	0.055	0.056	0.036
	(0.044)	(0.029)	(0.064)	(0.043)	(0.058)	(0.039)
GR	-0.007	0.011***	-0.018***	0.007	0.002	0.015***
	(0.005)	(0.003)	(0.007)	(0.005)	(0.006)	(0.004)
PCM	-0.061***	0.004	-0.002	0.045	-0.031	0.024
	(0.022)	(0.016)	(0.036)	(0.028)	(0.026)	(0.018)
_cons	-0.794***	-0.452***	-0.861***	-0.488***	-0.654***	-0.394***
	(0.067)	(0.047)	(0.098)	(0.065)	(0.097)	(0.069)
N	42120	42096	21479	21464	20641	20632
r2	0.254	0.086	0.227	0.068	0.286	0.112
N_clus	4196.000	4196.00	3282.000	3282.000	3264.000	3264.00
t		0				0

This table presents the FE estimation results for the entire sample period. Standard errors robust to heteroscedasticity and clustering within firm are given in parentheses.
The sample and variable definitions are as described in Table 2.
* Indicates significance at 10%, ** Indicates significance at 5%, *** Indicates significance at 1%.

Table 8: Regression results for the joint role of competition and crisis (Dependent Variable: BLev)

	High Competition			Low competition		
	Pre-crisis	Crisis	Post- crisis	Pre-crisis	Crisis	Post- crisis
	(1)	(2)	(3)	(4)	(5)	(6)
SZ	0.062***	0.039**	0.059***	0.064***	0.014	0.067***
	(0.010)	(0.018)	(0.014)	(0.009)	(0.015)	(0.010)
PR	-0.186***	-0.129***	-0.097**	-0.378***	-0.158***	-0.130***
	(0.043)	(0.040)	(0.040)	(0.033)	(0.055)	(0.034)
TAN	0.068*	0.054	0.060	-0.001	0.243***	0.115***
	(0.041)	(0.069)	(0.039)	(0.028)	(0.053)	(0.031)
NDTS	0.196	0.454*	0.157	0.034	0.020	-0.209
	(0.184)	(0.257)	(0.158)	(0.122)	(0.244)	(0.141)
LIQ	-0.025***	-0.003	-0.013***	-0.012***	-0.006	-0.007***
	(0.006)	(0.005)	(0.004)	(0.003)	(0.004)	(0.002)
VOL	-0.024	-0.054	-0.066	-0.108	0.214	-0.111*
	(0.118)	(0.141)	(0.076)	(0.086)	(0.148)	(0.065)
GR	-0.006	-0.030**	-0.010	-0.005	-0.005	0.007
	(0.011)	(0.012)	(0.010)	(0.008)	(0.012)	(0.006)
PCM	-0.179***	0.093	-0.057	-0.107***	0.004	-0.062*
	(0.060)	(0.065)	(0.043)	(0.032)	(0.059)	(0.036)
_cons	-0.777***	-0.432	-0.790***	-0.846***	-0.121	-0.991***
	(0.170)	(0.308)	(0.238)	(0.167)	(0.260)	(0.182)
N	9561	5467	6451	10441	4245	5955
r2	0.195	0.111	0.052	0.290	0.129	0.114
N_clust	2474.000	2366.000	2265.000	2599.000	1963.000	2113.000

This table presents the FE estimation results for the leverage determinants by considering the joint role of competition and the crisis. Standard errors robust to heteroscedasticity and clustering within firm are given in parentheses. The sample and variable definitions are as described in Table 2.

* Indicates significance at 10%, ** Indicates significance at 5%, *** Indicates significance at 1%.

Table 9: Financial crisis competition interaction

	BLev	LTLev	BLev	LTLev
	(1)	(2)	(3)	(4)
SZ	0.065***	0.032***	0.064***	0.031***
	(0.004)	(0.003)	(0.004)	(0.003)
PR	-0.431***	-0.157***	-0.441***	-0.147***
	(0.020)	(0.013)	(0.017)	(0.011)
TAN	0.080***	0.099***	0.071***	0.097***
	(0.018)	(0.012)	(0.018)	(0.012)
NDTS	-0.121	-0.067	-0.126	-0.033
	(0.080)	(0.053)	(0.077)	(0.050)
LIQ	-0.033***	-0.001	-0.036***	-0.002*
	(0.002)	(0.001)	(0.002)	(0.001)
VOL	0.082*	0.009	0.075*	0.017
	(0.044)	(0.029)	(0.042)	(0.028)
GR	-0.006	0.011***	-0.008*	0.011***
	(0.005)	(0.003)	(0.004)	(0.003)
PCM	-0.054**	-0.007		
	(0.022)	(0.016)		
Crisis	0.007***	0.004***	0.007***	0.004***
	(0.002)	(0.001)	(0.002)	(0.001)
Crisis * PCM	-0.072***	-0.027**		
	(0.018)	(0.012)		
High PCM			-0.006***	-0.001***
			(0.001)	(0.001)
Crisis * High PCM			-0.011***	-0.005***
			(0.002)	(0.001)
_cons	-0.882***	-0.490***	-0.844***	-0.467***
	(0.068)	(0.047)	(0.067)	(0.047)
N	41477	41453	45648	45624
r2	0.255	0.087	0.259	0.084
N_clust	4186.000	4186.000	4268.000	4268.000

This table presents the FE estimation results for crisis competition interraction. Standard errors robust to heteroscedasticity and clustering within firm are given in parentheses. The sample and variable definitions are as described in Table 2. ∗ Indicates significance at 10%, ∗∗ Indicates significance at 5%, ∗∗∗ Indicates significance at 1%.

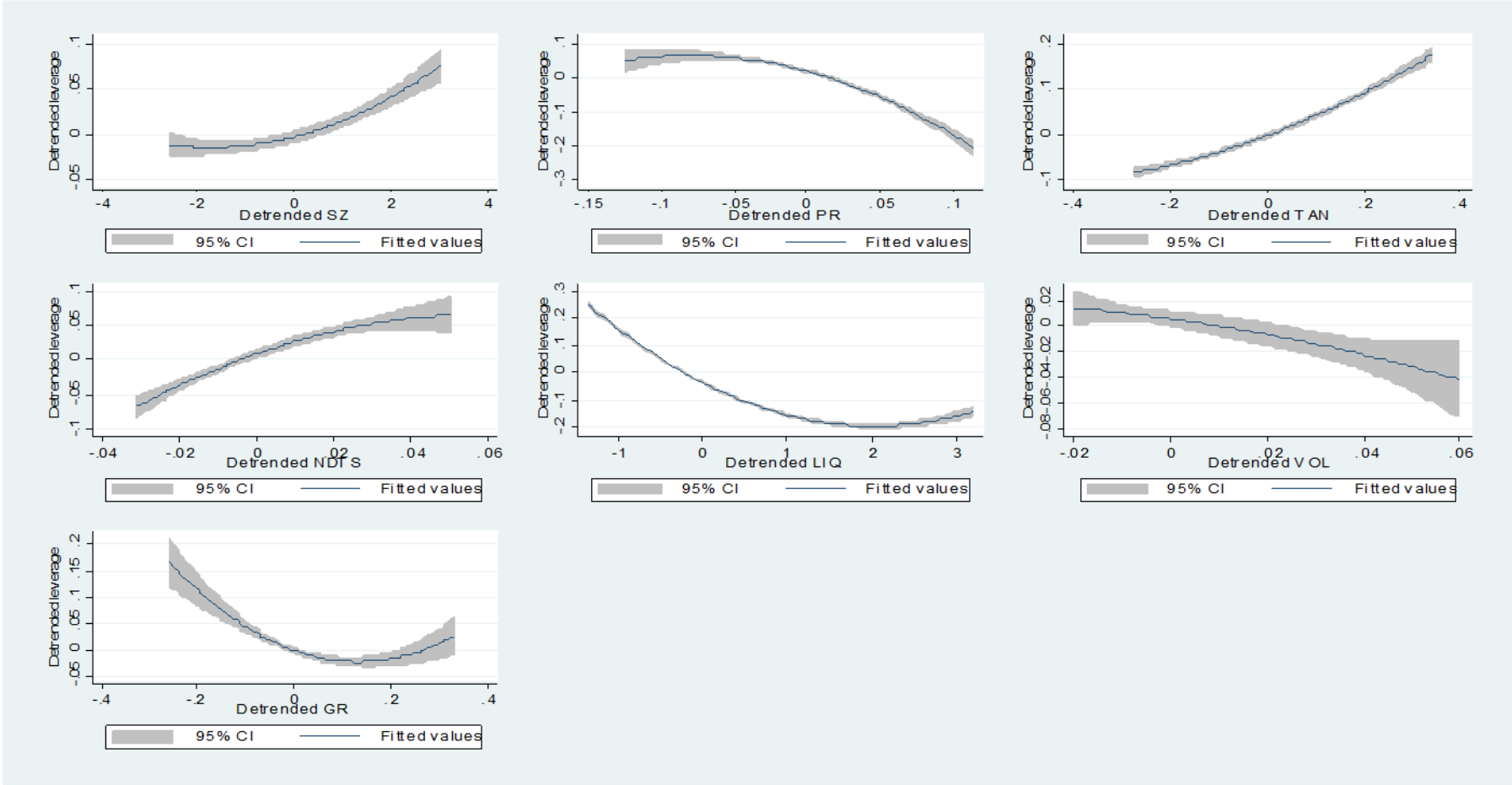

Figure 1: Line fit of detrended leverage and detrended firm-level variables

Appendix 1: Regression results for the full sample period after controlling for competition and its interactions (Using HHI)

	All Industries		High Competition		Low Competition	
	BLev	**LTLev**	**BLev**	**LTLev**	**BLev**	**LTLev**
	(1)	(2)	(3)	(4)	(5)	(6)
SZ	0.063***	0.031***	0.062***	0.030***	0.071***	0.032***
	(0.004)	(0.003)	(0.005)	(0.004)	(0.005)	(0.003)
PR	-0.466***	-0.155***	-0.376***	-0.110***	-0.572***	-0.211***
	(0.017)	(0.010)	(0.023)	(0.014)	(0.023)	(0.015)
TAN	0.071***	0.097***	0.056**	0.091***	0.091***	0.104***
	(0.018)	(0.012)	(0.024)	(0.015)	(0.024)	(0.016)
NDTS	-0.158**	-0.042	-0.191*	-0.091	-0.084	0.021
	(0.076)	(0.050)	(0.100)	(0.067)	(0.111)	(0.070)
LIQ	-0.036***	-0.002	-0.038***	-0.002	-0.033***	-0.002
	(0.002)	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)
VOL	0.078*	0.018	0.168***	0.040	-0.028	-0.012
	(0.042)	(0.028)	(0.055)	(0.036)	(0.065)	(0.045)
GR	-0.009**	0.011***	-0.019***	0.008*	-0.001	0.012***
	(0.004)	(0.003)	(0.006)	(0.004)	(0.006)	(0.004)
HHI	-0.005	-0.006*	-0.008	-0.015**	-0.002	-0.002
	(0.005)	(0.004)	(0.012)	(0.008)	(0.006)	(0.004)
_cons	-0.831***	-0.463***	-0.738***	-0.439***	-1.038***	-0.515***
	(0.066)	(0.046)	(0.087)	(0.062)	(0.094)	(0.064)
N	45648	45624	21984	21969	23664	23655
r2	0.257	0.084	0.224	0.065	0.305	0.110
N_clust	4268.000	4268.000	3155.000	3155.000	3484.000	3483.000

This table presents the FE estimation results for the leverage determinants by considering the joint role of competition and the crisis. Standard errors robust to heteroscedasticity and clustering within firm are given in parentheses. The sample and variable definitions are as described in Table 2.

∗ Indicates significance at 10%, ∗∗ Indicates significance at 5%, ∗∗∗ Indicates significance at 1%.