



Munich Personal RePEc Archive

# **Monetary policy transmission in Morocco: Evidence from borrowers-level data**

Bennouna, Hicham and Chmielewski, Tomasz and Doukali,  
Mohamed

30 November 2019

Online at <https://mpra.ub.uni-muenchen.de/97086/>  
MPRA Paper No. 97086, posted 04 Dec 2019 13:34 UTC

# Monetary policy transmission in Morocco: Evidence from borrowers-level data<sup>1</sup>

Hicham Bennouna<sup>2</sup>, Tomasz Chmielewski<sup>3</sup>, Mohamed Doukali<sup>4</sup>

November 2019

## Abstract

This paper investigates the impact of monetary policy on firms' liability structure depending on their specific characteristics (size, age, profit, and collateral) over the period 2010 to 2016 using firm-level data. Our results provide evidence that firms borrowing tend to decrease after a restrictive monetary policy, in line with the traditional interest rate channel. We confirm that small and medium firms are more significantly affected by tight monetary policy conditions than large firms, suggesting the existence of the balance sheet channel in Morocco.

Keywords: Corporate balance sheets, monetary policy transmission, panel data.  
JEL codes: E44, E52, G20.

---

<sup>1</sup> We are grateful to Bank Al-Maghrib (BAM) for providing the data used in this paper. We would like to thank Saidi Abdessamad, El Othmani Jawad and the participants of the Africa Meeting of the Econometric Society (Rabat, July 10 - 13, 2019) for valuable comments and suggestions. The views expressed in this article are those of the authors and do not reflect the views of BAM and the Narodowy Bank Polski (NBP), their Executive Board or their management Board.

<sup>2</sup> Research Department, Bank Al-Maghrib, [h.bennouna@bkam.ma](mailto:h.bennouna@bkam.ma)

<sup>3</sup> Economic Research Department, Narodowy Bank Polski, [tomasz.chmielewski@nbp.pl](mailto:tomasz.chmielewski@nbp.pl)

<sup>4</sup> Research Department, Bank Al-Maghrib, [m.doukali@bkam.ma](mailto:m.doukali@bkam.ma)

## 1. Introduction

To assess the effectiveness of monetary policy, researchers attribute a prominent role to understanding the process through which central banks' policy actions transmit to the financial and real sectors. Among various channels of monetary transmission, the interest rate pass-through has been studied extensively. In the last decade, intensity of a debate about the role, design, and efficacy of monetary policy significantly increased. An important aspect of this debate, which animated both policymakers and academics, was the spreading awareness of the importance of balance sheet developments in banking and corporate sectors. It seems that there is an emerging consensus that strength and speed of the monetary policy transmission is related to banking and non-financial sectors characteristics. However, the literature on the monetary transmission mechanism for lower middle-income countries is relatively scarce and the balance sheet channel has been, at least for several years, surprisingly underexplored. Indeed, the availability of granular data from bank and borrower-level is certainly a key element to explore the pass-through mechanism at the level of financial and non-financial firms.

This paper is intended to contribute to this debate by using a unique data set for the Moroccan firms. The main objective is to examine the impact of monetary policy on firms' liability structure and investigate whether some determinants such as size, age, profit, and collateral affect their financial decisions. Accordingly, the objective of the present paper is to contribute to the growing literature on the relationship between monetary policy and corporate lending in developing countries. Our analysis will be conducted using big data containing a large panel of Moroccan firms over the last decade. Overall, we would like to answer the following questions: (i) is there any evidence of the effectiveness of the balance sheet channel in Morocco? (ii) regarding monetary policy decisions, do firm-specific factors (size, age, profit, and collateral) influence the monetary transmission mechanism? (iii) in particular, is SME access to bank financing sensitive to the stance of monetary policy actions?

To answer these questions, we analyze the sensitivity of liability structure of 220 000 firm-year observations to changes in the monetary policy instrument, measured by the interbank interest rate, during the period 2010-2016. We study determinants of equity capital to total assets, financial debt to total assets, trade credit to total assets (which may be a substitution for financial debt) and associated debt to total assets. To the best of our knowledge, we provide the first examination of the balance sheet channel based on individual firm-level data in developing countries. A characteristic feature of our analysis is to account for firm-specific behavior using CIFEN<sup>5</sup>. With respect to the modeling framework, we employ the panel data techniques to examine the link between the corporate finance and monetary policy. Our research is closely linked to the existing literature considering the relationship between monetary policy shocks and corporate finance from micro-level perspective<sup>6</sup>. This approach yields valuable information for policymakers as it allows to disentangle between the interest rate channel and the balance sheet

---

<sup>5</sup> CIFEN database contains firms' financial information as reported in the Trade Register. This database constitutes an exhaustive reporting on the financial situation of all the formal sectors of the Moroccan economy, including manufacturing, construction, retail trade firms and services.

<sup>6</sup> See Bougheas et al. (2006) ; Fidrmuc et al. (2010) ; De Haan and Sterken (2006) ; Prasad and Ghosh (2005) and Acharya and Naqvi (2012).

channel and provides evidence on how the liability structure of firms is affected by monetary policy impulses.

In terms of results, our findings are in line with the bulk of evidence in the literature. This study highlights a high degree of heterogeneity in firms' reaction depending on their liability structure. Size is found to be an important determinant of financial debt for both SME and big firms. With more real assets, firms tend to have greater access to financial debt and trade credit. Also, our findings support the evidence that collateral is an important factor in banks' pricing policy of loans granted to VSE as it constitutes a credit risk compensation allowing banks to reduce their exposition to systemic risks. In addition, following the accommodative monetary policy adopted by the Bank Al-Maghrib during the last decade, our estimation results suggest that SME access to banking finance has improved compared to big firms. It is noteworthy that several measures have been recently undertaken in Morocco by the government, the central bank, private banks and international institutions in order to enhance the access of SME to finance: relaxation of creation procedures, reinforcing the role of the Central Guarantee Office to support SME financing at every stage of their life cycle, creation of different schemes to support SME in their process of modernization and improvement of their competitiveness, an incentive taxation scheme, the creation of the Financial Funds Support, unconventional monetary instruments.

The rest of the paper is structured as follows. Section 2 presents an overview of the relevant literature related to the credit view theory. In section 3, we present our empirical framework. Section 4 describes briefly the data and presents some relevant stylized facts underlying the moroccan economic structure. Section 5 reports our results. Concluding remarks and policy lessons are in Section 6.

## **2. Literature review**

According to the Modigliani and Miller (1958) theorem, the value of a firm in a perfect world does not depend on the structure of financing (self-financing or external financing). Several macroeconomic models have been inspired by this theory and incorporate the perfect market assumption which limits any impact of the financing constraints on the real cycle. However, Gertler and Bernanke (1989) have shown that the presence of asymmetric information in the credit market is of particular interest, given that the borrower's balance sheet and creditworthiness are decisive for the investment behavior and can explain macroeconomic fluctuations. In this context, Bernanke et al. (1999) have developed a model that takes into account asymmetries and imperfections in the credit market in order to better understand the transmission of nominal and real shocks of small magnitude to the economy. Following this framework, the spread mechanism, also called the financial accelerator, refers to the link between borrowing costs and the net wealth of firms. Entrepreneurs who are borrowing to finance their investment projects face an external financing premium, defined as the difference between the cost of financing by issuing equity in the capital market and the opportunity cost of mobilizing internal funding. The financing premium is inversely correlated with the net wealth of the firms and increases as the firms' leverage ratios rise.

In the presence of financial frictions, the literature review identifies several channels that contribute to the amplification of interactions between the real and financial spheres, particularly: the financial accelerator channel and the collateral channel. The financial accelerator can be

defined as a catalyst which helps to spread an initial shock to the business and financial cycles. Kiyotaki and Moore (1997) introduced the real estate in the DSGE models as a factor of production and a collateral used in the credit market. The collateral channel, also called the inter-temporal multiplier, stipulates that an increase in asset prices improves the households and firms' wealth, encouraging them to consume and invest more, which contribute to easing the financial condition index. In this case, the dynamic interaction between the financing access conditions and asset prices is considered as a powerful transmission mechanism through which the effects of economic shocks persist, amplify and spread to other sectors.

Viewed from the credit view theory perspective, financial frictions play a key role in amplifying the effects of monetary policy actions. The literature on the lending and the balance sheet channels is extensive<sup>7</sup>. The bank lending channel implies that the effects of monetary policy actions are related to banks financial structure, which emphasises the relevance of banks' financial structure in the transmission mechanism. In contrast, the balance sheet channel is related to the impact of monetary policy on the demand for loans. For instance, monetary policy tightening makes the financing conditions very strict, which imposes very high external financing premium on borrowers to enable banks to hedge against the default risk. In addition, investment and the return on capital decline and therefore reduce the net wealth of firms and increase their debt-to-equity ratio. This reduces the demand for capital, which reinforces the decline in its value.

The empirical literature that examines the role of the financial channels reflecting imperfections in credit markets and balance sheet dynamics in the transmission of monetary policy has been largely explored. While there is a voluminous literature assessing the transmission mechanism via the balance sheet channel using aggregated data<sup>8</sup>, recent studies provide comprehensive and granulated information for policy makers by intensively analyzing micro level data. Bougheas et al. (2006), have examined firms' access to bank and market finance when allowance is made for differences in firm-specific characteristics. Their model is estimated on a large panel of UK manufacturing firms, and their results show that smaller, more risky and younger firms are more affected by monetary tightening. De Haan and Sterken (2006) analyzed the sensitivity of corporate debt structures to changes in the monetary policy and found evidence of the broad channel. Prasad and Ghosh (2005) studied corporate behavior for a sample of manufacturing firms in India. Their findings suggest that a contractionary monetary policy lowers overall debt including bank debt, and increase their short-term bank borrowings.

Fidrmuc et al. (2010) analyzed the determinants of corporate interest rates and the financial accelerator using a panel of Czech firms, and found that selected balance sheet indicators significantly influence the firm' interest rates. They also find that debt structure and cash flow have significant effects on interest rates, whereas collateral plays no significant role, and monetary policy has stronger effects on smaller firms than on medium-size and larger firms. Buera et al. (2018) used the Bank of Portugal's rich credit registry database together with bank and firm balance sheet information to show that highly leveraged firms and firms that had a larger share of short-term debt on their balance sheet contracted more credit in the aftermath of a financial shock. Jiménez et al. (2012) analyzed a Spanish microdataset with information on old and new

---

<sup>7</sup> Bernanke and Gertler (1989, 1995 and 2005) ; Mishkin (1996) ; Gertler and Gilchrist (1993 and 1994) ; Kashyap and Stein (1995) ; Oliner and Rudebusch (1996).

<sup>8</sup> See the survey in Guiso et al. (1999).

loan applications. They find that lower GDP growth or positive short-term interest rate changes reduce loan granting. They also find that a decrease in firm capital reduces loan granting.

### 3. Empirical framework

In this section, we describe our identification and empirical strategy. In particular, we present the relationship between the liability structure of firms and their specific characteristics in our micro-data using a panel regression model that enables us to control for firm specific unobservable effects. Following De Haan and Sterken (2006), and Bougheas et al. (2006), the model is as follows:

$$Y_{i,t} = \gamma_1 + \gamma_2 TMP_t + \beta' X_{i,t} + \gamma' TMP_t * X_{i,t} + \gamma_3 \Delta GDP_{t-1} + \alpha_i + \eta_{i,t}$$

where,  $Y_{i,t}$  denotes one of the following four liability choices of firms : (i) equity capital to total assets, (ii) financial debt to total assets, (iii) trade credit to total assets and (iv) associated debts to total assets.  $TMP_t$  is introduced to capture the monetary policy stance.  $X_{i,t}$  denotes firm-specific characteristics, we introduce “size” measured by logarithm of total assets; the “age” measured by the number of years in existence to quantify the firm’s reputation build-up and relationship with financial institution; the ratio of tangible assets to total assets to measure “collateral” available to support borrowing; the “profit” measured by the ratio of earnings before interest and taxes to total assets, which is a proxy of profitability scaled by capital. Finally, to ensure that we can control for the effects of the business cycle, we use  $\Delta GDP_{t-1}$ , which is the one-year-lagged real GDP growth rate. We are interested in the significance of interactions of firm-specific variables with the monetary policy measure. If the interaction term  $\gamma'$  is significant and the assumption that interest rate supply elasticity is equal across banks maintained, the conclusion is that the given variable systematically influences demand reaction of firms after a monetary policy action.

All of our balance-sheet variables (except for “size”) where normalized by firm’s total assets. As dependent variables, we use the liabilities items with different economic meaning. First, equity determines firm leverage and distribution of risk between shareholders and creditors. Higher equity (lower leverage) improves the risk profile of creditors since equity is first in line to absorb any losses. Therefore, a firm with low credit quality or with poor access to external finance (e.g. due to small size or lack of collateral) would be forced to rely mostly on owner-provided funding. For non-equity external finance, we look at financial debt and trade credit. The financial debt category includes bank loans, bonds issued and other financial liabilities, so it reflects mostly the ability and willingness of the firm to obtaining funds from financial intermediaries (in particular banks). On the other hand, trade credit arises from transactions with non-financial firms and reflects both creditworthiness of the firm and its negotiation power with respect to other cooperating firms. To some extent, these funding sources might be treated by a firm as substitutes. Last, we also look at the role of associated debts that, as instruments provided by owners, might be to some extent interpreted as being substitutes to equity.

On the asset side, we look at a firm’s ability to provide collateral, as this is an important factor decreasing information asymmetries between a lender and a borrower and decreasing risk faced by a creditor. As a proxy for available collateral, we use the sum of tangible fixed assets and financial fixed assets (and normalize it by firm’s total assets). Another variable that is used to

control for creditworthiness and possible information asymmetry is a firm's age. We assume that the firm that is active in the market for a long-enough period is better known to banks and non-financial cooperating firms and therefore should have easier access to external finance (as big firms tend to be better known in the market and might be therefore more transparent than small firms and enjoy additional market power against their competitors, increasing probability of liabilities being repaid). Last, we use "profit" as a proxy for firm efficiency and creditworthiness. This variable is measured as the ratio of earnings before interest and taxes to total assets, scaled by capital. We assume that firms with higher profits might be more efficient and be assessed by potential creditors as characterized by lower risk.

Our model proposes to test whether the liability compositions of Moroccan firms, as reflected in their balance sheet items, are determined by firm-specific characteristics, monetary policy, and the business cycle. Based on the idea of firms' heterogeneity, the choice of a liability structure for different categories: large enterprises (LE), small and medium enterprises (SME) and very small enterprises (VSE) is likely to vary in important ways with the changes in business conditions and the fluctuations in the macroeconomic environment caused by monetary policy shocks. For these reasons, we investigate which type of firms are most sensitive to monetary policy shocks, and how the liability structure predicts heterogeneity in the response of firm specific characteristics.

Generally speaking, there are two main approaches to investigating the differential response of firms to monetary policy. The first one consists in estimating the model for two or more groups of firms depending on the features of interest (age, size, leverage, solvability, liquidity, profit). The second approach aims at including firm-specific characteristics in the regressions as an interaction term with the monetary policy measure. Our methodology consists of estimating the interest rate pass-through coefficients using two approaches and thus serves as a natural robustness check in our analysis. We estimate our model for all firms and also for the different categories (LE, SME, VSE). The firms are classified according to the Central Bank's classification. Firms having a turnover higher than MAD 170 million are reported as large firms (LE), whereas those between MAD 10 million and MAD 170 million are considered to be small and medium firms (SME). Finally, the remaining firms below MAD 10 million are considered to be very small firms (VSE).

To analyze the above-mentioned relationships, we employ the linear panel model. We test for a fixed versus a random effects structure of the model using the Hausman specification test in order to determine the precise structure of the model. The Hausman test rejected the hypothesis of systematic difference between coefficients obtained from the two models. Therefore, we report the fixed effects estimates.

We do not control for specific loan-supply effects, neither for the borrowing cost and the spread applied by commercial banks on top of the lending rates. Our specification does not take into account changes of prudential and debt regulation and taxation/subvention system. Although this is a limitation of our data-set, we believe that further research should shed light on these aspects. Therefore, given the possible endogeneity problem indicated in the literature, which can be also related to the measurement error associated with the profit reported by firms, we considered using the panel GMM estimator suggested by Arellano and Bond (1991), however, the Sargan test of over-identifying restrictions indicated that all the proposed instruments are invalid.

Also, the requirement for instruments under GMM poses a problem for our study. The period when monetary policy was loose occurs only at the very beginning of our sample. If we were to make use of GMM those observations at the beginning of our sample would be lost, and the results would be indicative only of firms' debt under a benign period of monetary policy. This would severely undermine the rationale for our empirical work, and therefore we rely on fixed effects estimates.

## **4. Data**

### **4.1. Database description**

Our database comes from the confidential microdata underlying the Moroccan firms' financial information as registered in the Trade Registry (CIFEN), a survey that collects information on the financial situation of all the formal sectors of the Moroccan economy, including manufacturing, construction, retail trade firms and services. CIFEN contains more than 400 000 firms. All the firms are required to report either a simplified or detailed version of their balance sheet statement each year. The database covers both balance sheet and profit and loss statement items. Our paper is the first research paper to make extensive use of this data-set, allowing us to draw novel conclusions about the Moroccan economy and the monetary transmission process.

We decided to adopt an unbalanced panel for the sake of completeness. In addition, the new comers give valuable information for our analysis. Also, we decided to keep firms who stopped to report their balance sheets and their income statements because some firms bankrupted and some merged. Therefore, the behavior of vulnerable firms could impact indirectly the existing firms' financial structure.

Since the reporting system does not ensure full automatic data validation at the submission stage, we made extensive attempts to clean the data<sup>9</sup>. Our primary goal in this was to eliminate inconsistencies and obvious errors from the estimation sample. First, we ensured that the sample included only observations where total assets equalled total liabilities. Further, we checked whether sub-components of different categories added up properly to higher-level values. Next, we eliminated observations with negative values for non-negative variables (most of balance-sheet items). Finally, we tried to identify observations with erroneously entered values that were not identified in previous steps by looking at excessive volatility of observations over time for a given firm. This procedure left us with almost 220 000 firm-year observations.

### **4.2. Summary statistics**

Our panel consists of a relatively large number of VSE, denoting that the non-financial corporate sector in Morocco is dominated by this firm category. The VSE represented 74% of total firms in 2016, while SME and LE were accounting for respectively 23% and 2%. Figures 1,2,3 and 4 give the liability composition across firms for different time periods and for different size categories (all firms, LE, SME, VSE) at the aggregate level. We observe that there was little variation in the structure of liabilities during 2010-2016. The aggregate data confirms that the share of equity capital and financial debt are larger than that of the other liability components for all firms. In

---

<sup>9</sup> The raw data also contained bankrupted, dissolved, in liquidation, and inactive firms, which may not react to monetary policy changes properly.



addition, SME and VSE tend to have more associated debts than large firms, while large firms have a higher share of financial debt in their current liabilities than SME and VSE.

Figures 5 to 8 provide evidence of heterogeneity in terms of size, collateral, profit and age. The financial debt of LE during the period 2010-2016 represented approximately 62% of the total financial debt. In terms of collateral, large firms have relatively comfortable buffers, compared to SME and VSE. In fact, the share of collateral held by LE represents 57% of the total available collateral. In terms of profitability, LE account for 70% of the profit generated by all firms. Finally, the average age of LE is 25, which is about three times the average age of VSE (9 years old).

The look at structural characteristics confirms observations on the aggregated level that the size of the firm might matter for their financing structure (see Figures 9-18). Although leverage (measured as the equity/total assets ratio) is not very different between the size groups, the sources of external finance differ a lot. Very small firms are in practice cut off from the access to financial debt and rely to a significantly lower extent than larger firms on trade credit. They close this gap by relying on associated debts. On the other hand, large firms have the easiest access to financial debt and use also quite a lot of financing by trade credit.

Before we estimate the model, it is informative to explore the covariation of our core variables a bit further (Tables 1, 2, 7 and 8). First, correlations between equity, financial debts, credit trade, associated debts are all negative by definition. Second, trade credit appears to be negatively correlated with financial, which suggests that financial and trade debt might be substitutes (Mateut et al., 2006). Age and size are positively correlated, indicating that the older a firm becomes, the more assets it tends to accumulate. Collateral is positively correlated with financial debt and equity, and negatively correlated with credit trade.

**Table 1: Correlation matrix for big firms**

	Equity	Ctrade	AssD	FinD	OtherD	Profit	Size	TMP	GDP	Age	Coll
Equity	1	-0.330	-0.167	-0.398	-0.192	0.401	0.036	-0.070	-0.011	0.194	0.27
Ctrade	-0.330	1	-0.132	-0.340	-0.111	-0.032	-0.323	-0.006	-0.002	-0.110	-0.34
AssoD	-0.167	-0.132	1	-0.157	-0.025	-0.039	-0.059	0.0003	-0.004	-0.093	0.02
FinD	-0.398	-0.340	-0.157	1	-0.295	-0.297	0.130	0.058	0.015	-0.020	0.15
OtherD	-0.192	-0.111	-0.025	-0.295	1	0.075	0.057	0.004	0.015	-0.087	-0.21
Profit	0.401	-0.032	-0.039	-0.297	0.075	1	-0.044	-0.004	0.023	0.009	-0.01
Size	0.036	-0.323	-0.059	0.130	0.057	-0.044	1	-0.018	-0.002	0.148	0.29
TMP	-0.070	-0.006	0.0003	0.058	0.004	-0.004	-0.018	1	0.183	-0.027	-0.01
GDP	-0.011	-0.002	-0.004	0.015	0.015	0.023	-0.002	0.183	1	-0.006	-0.01
Age	0.194	-0.110	-0.093	-0.020	-0.087	0.009	0.148	-0.027	-0.006	1	0.06
coll	0.276	-0.345	0.023	0.154	-0.217	-0.015	0.294	-0.019	-0.003	0.064	1

**Table 2: Correlation matrix for SME firms**

	Equity	Ctrade	AssoD	FinD	OtherD	Profit	size	TMP	GDP	Age	coll
Equity	1	-0.324	-0.276	-0.221	-0.149	0.348	-0.101	-0.041	-0.010	0.176	0.228
Ctrade	-0.324	1	-0.312	-0.274	-0.125	-0.039	-0.155	0.020	0.004	-0.080	-0.265
AssoD	-0.276	-0.312	1	-0.238	-0.168	-0.046	-0.116	-0.016	-0.003	-0.135	-0.008
FinD	-0.221	-0.274	-0.238	1	-0.151	-0.195	0.289	0.046	0.010	0.042	0.205
OtherD	-0.149	-0.125	-0.168	-0.151	1	0.063	0.001	-0.005	-0.005	-0.020	-0.147
Profit	0.348	-0.039	-0.046	-0.195	0.063	1	-0.166	0.004	0.004	-0.040	0.011
size	-0.101	-0.155	-0.116	0.289	0.001	-0.166	1	-0.034	-0.010	0.164	0.119
TMP	-0.041	0.020	-0.016	0.046	-0.005	0.004	-0.034	1	0.205	-0.026	0.009
GDP	-0.010	0.004	-0.003	0.010	-0.005	0.004	-0.010	0.205	1	-0.001	-0.002
Age	0.176	-0.080	-0.135	0.042	-0.020	-0.040	0.164	-0.026	-0.001	1	0.003
coll	0.228	-0.265	-0.008	0.205	-0.147	0.011	0.119	0.009	-0.002	0.003	1

## 5. Results

In this section, we analyze the response of firm's liability structure to monetary policy depending on their specific characteristics. We report the results for SME (Table 3), big firms (Table 4), VSE (Table 5) and all firms (Table 6) corresponding to each measure of the financing choice: equity capital to total assets; financial debt to total assets; trade credit to total assets; and associated debts to total assets. We discuss the impact of monetary policy tightening while controlling for firm-specificities, business cycles, and interaction terms between interest rates and firm-specific indicators (age, size, profit and collateral). The latter will allow us to test for the heterogeneity assumption and the possible existence of the balance sheet channel. For the sake of completeness, we provide the estimation results for the analyzed liability categories. As previously mentioned, not all of these variables have similar importance for all the firm size categories<sup>10</sup>. Thus, we estimate our model for all firms and for different categories (LE, SME, VSE).

With respect to the control variables, firms' size and age are found to play a prominent role in determining the leverage and debt ratios, in particular for the case of SME and VSE. Within all size groupings, larger firms tend to be more leveraged (as the estimate of the parameter for the equity capital ratio is consistently negative) than younger firms. For SME and very small firms the higher leverage is financed by all other possible liability categories (i.e. financial debt, trade credit and associated debts). For large firms, however, the parameter for size in the trade credit regression is not significant, suggesting that as a large firm grows, the higher leverage is financed mostly by financial debt. Surprisingly, older SME and VSE tend to have less external debt and more internal funding. We find estimates of the effect of age slightly non-intuitive, as it seems that consistently across size groupings older firms tend to be characterized by lower leverage (higher equity capital ratio). Intuitively, the age variable is quite often assumed to be a proxy for lower opacity of the firm and, therefore, a signal that the firm can have easier and cheaper access

<sup>10</sup> For example, the financial debt is hardly an important category for very small firms, whereas the associated debt plays only very marginal role for large firms.

to external finance as they have a higher reputation and stronger relationships with the banking sector compared to younger firms. Our results suggest another plausible story –older firms have had more time to accumulate profits and owners have preferred to retain profits within these firms rather than to receive dividends. This accumulation of profits decreased the firm’s demand for external funding and results in lower leverage. This interpretation for big and SME firms is supported by a positive and significant relationship between profit and equity as profits are related to more equity finance and less financial debt.

Profit has a negative impact on financial debt and associated debt both for small and large firms, suggesting that LE and SME with higher earning tend to issue less debt in the financial market. Indeed, more profitable firms may rather rely on their own capital, which tends to be less expensive than external financing as compared to less profitable firms. Nevertheless, point estimates suggest that the use of financial debt is determined by the firms’ profit for the case of VSE.

Concerning the collateral, very small firms are typically assumed to suffer most from information asymmetry problems and to alleviate these problems they need to hold more collateral. This effect is clearly supported in our results for very small firms - in this group firms with more collateral can afford higher leverage (less equity) and more external finance in the form of both financial debt and trade credit. Our findings support the evidence that collateral is an important factor in banks’ pricing policy of loans granted to VSE as it constitutes a credit risk compensation allowing banks to reduce their exposition to systemic risks. On the other hand, it is not clear why such a relationship is not visible in the estimation results for SME and large firms, except for a marginally significant effect on trade credit for SME. These findings suggest that SME with higher collateral tend to substitute financial debt by trade credit, however, LE can easily access the financial market independently from holding better guarantees.

We control for the stance of monetary policy and the business cycle in order to determine the interest rate pass-through coefficients and differentiate the transmission mechanism along the boom-bust cycle. Several features are noteworthy. First, we notice that the responses of equity and debt ratios are statistically significant and in line with the traditional interest rate channel of monetary policy transmission for SME and VSE. Second, following a monetary policy contraction, SME and VSE tend to substitute financial lending by trade credit and associated debt. Third, it seems that large firms’ borrowing decision is affected by the market interest rates to a lesser extent.

Regarding the business cycle position, estimation results suggest that SME’s indebtedness is procyclical. In fact, debt ratios are positively correlated with GDP growth rates, meaning that borrowing decisions are driven by better economic perspective and higher profitability of investment perceived by banks and firms. By contrast, debt ratios of VSE and LE appear to be unaffected by the business cycle, suggesting that their indebtedness seems to be rather acyclical.

To assess the heterogeneity determinants stemming from firms’ financial structure, we focus on the interaction terms between firm-specific characteristics and the policy rate. According to the results, for the case of SME and VSE, the reaction of firms to changes in interest rates is different depending on the size, as large firms are affected less in terms of financial debt. Furthermore, collateral appears as a potential factor of heterogeneity for LE, SME and VSE.

During a restrictive monetary policy, more collateralized LE, SME and VSE reduce their financial debt less and their trade credit more than less collateralized firms. Highly collateralized firms, which have better access to financial market, may be more flexible in shifting from financial debt to trade credit. Concerning big firms, we observe that during a monetary tightening, more profitable LE reduce their equity more and their financial debt less than less profitable firms. These results suggest that when the interest rate tightens, LE with more profit have better access to financial sector. Moreover, the age and size do not seem to entail heterogeneity among LE because these factors do not affect the transmission mechanism.

Our estimation results confirm that firms' funding structures and potential reactions to monetary policy shocks depend, to a large extent, on firms' size. We confirm that large firms are relatively less restricted in their financing decisions and their individual characteristics matter less in determining large firms' reactions to monetary policy. On the other hand, SME and very small firms face issues related to their opacity and asymmetric information, resulting in more extensive (compared to big firms) determination of their funding structure by other firm-specific variables, as is demonstrated by statistical significance of interactions of these variables with the monetary policy measure.

In sum, we find heterogeneity in terms of liability composition and thus the sources of external finance. Yet substantial differences exist across firms. The results provide evidence that SME and VSE are more dependent on associated debts than large firms. In addition, the reliance on financial debt and trade credit is more pronounced for LE, while only to a lesser extent for SME and VSE. Our results confirm that firm-specific characteristics are important in determining the variation in the liability structure as monetary policy becomes tighter. Overall, it seems that negotiation power or the competition from the borrower side matters, suggesting the existence of the balance sheet channel. The effect of the tightening of monetary policy is more important for SME than large firms. Thus, following the accommodative monetary policy adopted by Bank Al-Maghrib during the last decade, our estimation results suggest that SME access to banking finance has improved compared to big firms.

**Table 3: Results for SME firms**

	<i>Dependent variable:</i>			
	Equity capital (1)	Financial debts (2)	Trade credit (3)	Associated debts (4)
Size	-0.188*** (0.004)	0.024*** (0.004)	0.060*** (0.005)	0.024*** (0.004)
Age	0.017*** (0.001)	-0.003*** (0.001)	-0.009*** (0.001)	-0.001 (0.001)
Profit	1.567*** (0.044)	-0.309*** (0.041)	-0.205*** (0.055)	-0.276*** (0.048)
Collateral	0.127*** (0.020)	-0.032* (0.018)	0.046* (0.024)	-0.043** (0.022)
TMP	-0.232*** (0.021)	-0.136*** (0.019)	0.126*** (0.026)	0.219*** (0.023)
GDP	0.00001 (0.001)	0.001*** (0.0005)	-0.001 (0.001)	-0.001 (0.001)
TMP*profit	-0.367*** (0.015)	0.066*** (0.014)	0.055*** (0.019)	0.062*** (0.016)
TMP*size	0.013*** (0.001)	0.007*** (0.001)	-0.006*** (0.001)	-0.013*** (0.001)
TMP*age	0.002*** (0.0001)	-0.0003*** (0.0001)	-0.001*** (0.0001)	-0.0005*** (0.0001)
TMP*collateral	-0.013** (0.006)	0.062*** (0.006)	-0.063*** (0.008)	0.024*** (0.007)

*Note:* \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

**Table 4: Results for big firms**

	<i>Dependent variable:</i>			
	Equity capital (1)	Financial debts (2)	Trade credit (3)	Associated debts (4)
Size	-0.108*** (0.011)	0.054*** (0.014)	0.003 (0.014)	0.015** (0.007)
Age	0.006*** (0.002)	0.001 (0.002)	-0.004 (0.003)	-0.001 (0.001)
Profit	1.735*** (0.130)	-0.670*** (0.169)	0.193 (0.177)	-0.185** (0.090)
Collateral	0.143** (0.059)	-0.028 (0.076)	-0.087 (0.080)	-0.023 (0.041)
TMP	0.034 (0.061)	-0.057 (0.079)	-0.051 (0.082)	0.111*** (0.042)
GDP	-0.001 (0.001)	-0.0001 (0.002)	0.001 (0.002)	-0.0003 (0.001)
TMP*profit	-0.416*** (0.042)	0.145*** (0.055)	-0.054 (0.058)	0.050* (0.029)
TMP*size	-0.004 (0.003)	0.004 (0.004)	0.003 (0.004)	-0.006*** (0.002)
TMP*age	0.001*** (0.0001)	-0.0002 (0.0002)	-0.001*** (0.0002)	-0.0002** (0.0001)
TMP*collateral	-0.009 (0.017)	0.054** (0.023)	-0.018 (0.024)	0.011 (0.012)

*Note:* \*p<0.1; \*\*p<0.05; \*\*\*p<0.01



**Table 5: Results for VSE firms**

	<i>Dependent variable:</i>			
	Equity capital (1)	Financial debts (2)	Trade credit (3)	Associated debts (4)
Size	-0.180*** (0.003)	0.007*** (0.002)	0.070*** (0.003)	0.039*** (0.004)
Age	0.026*** (0.001)	-0.003*** (0.0004)	-0.013*** (0.001)	-0.011*** (0.001)
Profit	-0.055*** (0.008)	0.038*** (0.004)	0.015** (0.007)	-0.033*** (0.010)
Collateral	-0.039*** (0.014)	0.035*** (0.008)	0.110*** (0.014)	0.003 (0.018)
TMP	-0.208*** (0.013)	-0.057*** (0.007)	0.156*** (0.012)	0.117*** (0.016)
GDP	-0.0004 (0.0004)	0.0003 (0.0002)	-0.001** (0.0004)	0.001** (0.001)
TMP*profit	0.025*** (0.003)	-0.015*** (0.002)	-0.007** (0.003)	0.013*** (0.004)
TMP*size	0.013*** (0.001)	0.003*** (0.0005)	-0.010*** (0.001)	-0.009*** (0.001)
TMP*age	0.001*** (0.0001)	-0.00003 (0.00005)	-0.001*** (0.0001)	-0.0004*** (0.0001)
TMP*collateral	0.018*** (0.005)	0.020*** (0.002)	-0.060*** (0.004)	0.023*** (0.006)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

**Table 6: Results for all firms**

	<i>Dependent variable:</i>			
	Equity capital (1)	Financial debts (2)	Trade credit (3)	Associated debts (4)
Size	-0.168*** (0.002)	0.016*** (0.001)	0.065*** (0.002)	0.028*** (0.002)
Age	0.022*** (0.001)	-0.003*** (0.0003)	-0.012*** (0.001)	-0.007*** (0.001)
Profit	-0.070*** (0.007)	0.046*** (0.004)	0.014* (0.007)	-0.031*** (0.009)
Collateral	0.015 (0.012)	0.024*** (0.007)	0.097*** (0.012)	-0.022 (0.014)
TMP	-0.200*** (0.008)	-0.036*** (0.005)	0.130*** (0.008)	0.125*** (0.010)
GDP	0.00002 (0.0003)	0.0004* (0.0002)	-0.001** (0.0003)	0.001 (0.0004)
TMP*profit	0.031*** (0.003)	-0.019*** (0.002)	-0.006** (0.003)	0.012*** (0.003)
TMP*size	0.012*** (0.0005)	0.002*** (0.0003)	-0.007*** (0.0005)	-0.009*** (0.001)
TMP*age	0.001*** (0.0001)	-0.0002*** (0.00004)	-0.001*** (0.0001)	-0.0004*** (0.0001)
TMP*collateral	0.005 (0.004)	0.027*** (0.002)	-0.060*** (0.004)	0.029*** (0.005)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## 6. Conclusion

This paper contributes to the existing literature by studying for the first time so extensively the unique micro data-set on Moroccan corporate sector from funding and monetary policy perspectives. We document both the balance sheet structure of Moroccan non-financial firms and its relevance for monetary policy.

Our preliminary data analysis and estimation results confirm that firms' funding structures and potential reactions to monetary policy shocks depend, to a large extent, on firms' size. We confirm that large firms are relatively less restricted in their financing decisions and their individual characteristics matter less in determining large firms' reactions to monetary policy. On the other hand, SME and very small firms face issues related to their opacity and asymmetric information, resulting in more extensive (compared to big firms) determination of their funding structure by other firm-specific variables, as is demonstrated by statistical significance of interactions of this variables with the monetary policy measure.

Differences in funding structure between firms belonging to different size groups point also to the fact that bigger firms might be able to force their smaller business partners to provide finance in the form of trade credit. Given potential problems of smaller firms to secure bank funding (and possibly higher cost of this funding), it might be the factor inhibiting smaller firms' growth prospects and investment volumes. This issue needs to be monitored in order to assess whether the extent of this development warrants introduction of public policies to improve long-term growth prospects of the whole economy.

Additional supportive economic policies aimed at improving the approach to entrepreneurship, simplifying the regulatory and policy environment for SME, and removing the remaining barriers to their development could benefit Morocco, improve the allocation of resources to more productive investment and enhance the effectiveness of macroeconomic policies (improve competition in the banking sector, develop alternative financing mechanisms, in particular business angels and venture capital, enhance the SME governance, strengthen the financial integration, develop credit register). We consider the results obtained so far as an important factor supporting further research in this area. Research using micro-level data related to emerging economies is relatively scarce, so results are clearly of academic interest. However, there is also an important dimension of supporting decision making for public policies in general and the monetary policy in particular, especially in the context of possible adoption of inflation targeting framework.

## References

- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, 58(2), 277-297.
- Bernanke, B. S., Gertler, M., & Gilchrist, S. (1999). The financial accelerator in a quantitative business cycle framework. *Handbook of macroeconomics*, 1, 1341-1393.
- Bougheas, S., Mizen, P., & Yalcin, C. (2006). Access to external finance: Theory and evidence on the impact of monetary policy and firm-specific characteristics. *Journal of Banking & Finance*, 30(1), 199-227.
- Buera, F., & Karmakar, S. (2018). Real effects of financial distress: the role of heterogeneity. Banco de Portugal, Working paper 6.
- De Haan, L., & Sterken, E. (2006). The impact of monetary policy on the financing behaviour of firms in the Euro area and the UK. *European Journal of Finance*, 12(5), 401-420.
- Fidrmuc, J., Horváth, R., & Horváthová, E. (2010). Corporate interest rates and the financial accelerator in the Czech Republic. *Emerging Markets Finance and Trade*, 46(4), 41-54.
- Gertler, M., & Bernanke, B. (1989). Agency costs, net worth and business fluctuations. In *Business Cycle Theory*. Edward Elgar Publishing Ltd.
- Guiso, L., Kashyap, A. K., Panetta, F., & Terlizzese, D. (1999). Will a common European monetary policy have asymmetric effects? *Economic perspectives- Federal Reserve Bank Of Chicago*, 23(4):56-75.
- Jiménez, G., Ongena, S., Peydró, J. L., & Saurina, J. (2012). Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications. *American Economic Review*, 102(5), 2301-26.
- Kashyap, A. K., & Stein, J. C. (1995). The impact of monetary policy on bank balance sheets. In *Carnegie-Rochester Conference Series on Public Policy (Vol. 42, pp. 151-195)*. North-Holland.
- Kiyotaki, N. & Moore, J. (1997). Credit cycles. *Journal of Political Economy*, 105(2).
- Mateut, S., Bougheas, S., & Mizen, P. (2006). Trade credit, bank lending and monetary policy transmission. *European Economic Review*, 50(3), 603-629.
- Mishkin, F. S. (1996). The channels of monetary transmission: lessons for monetary policy (No. w5464). National Bureau of Economic Research.
- Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American*, 1, 3.



Mukherjee, S., & Bhattacharya, R. (2011). Inflation targeting and monetary policy transmission mechanisms in emerging market economies. IMF Working Papers, 1-27.

Oliner, S. D., & Rudebusch, G. D. (1996). Monetary policy and credit conditions: evidence from the composition of external finance: comment. *The American Economic Review*, 86(1), 300-309.

Prasad, A. & Ghosh, S. (2005). Monetary policy and corporate behaviour in India. International Monetary Fund, Working paper 25.

Appendix

Figure 1: Average Structure of finance for all firms

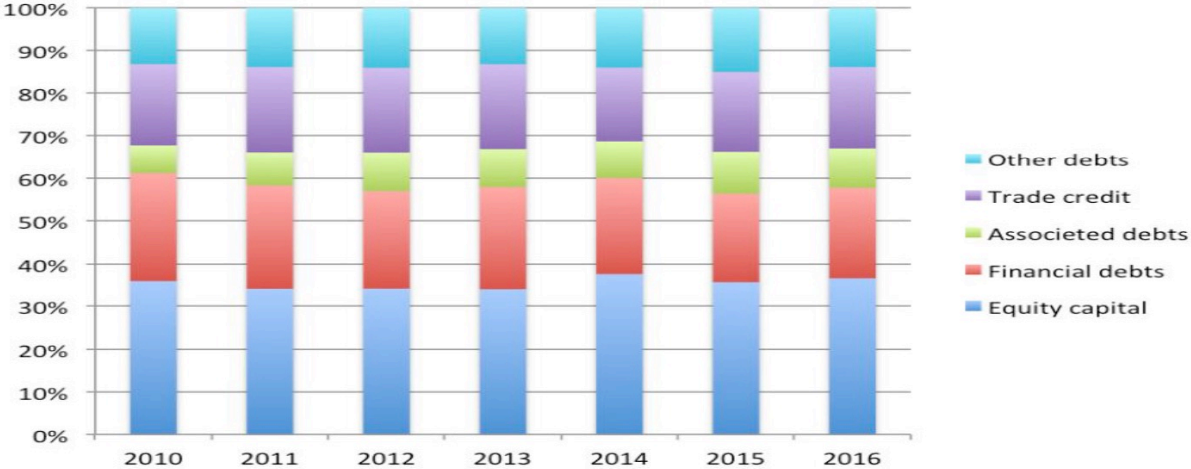


Figure 2: Average Structure of finance for big firms

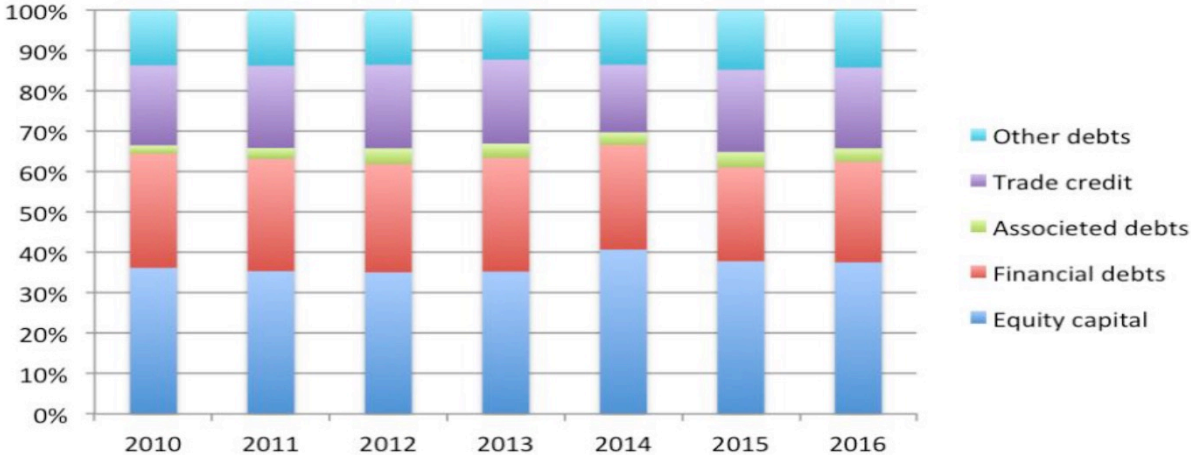


Figure 3: Average Structure of finance for SME firms

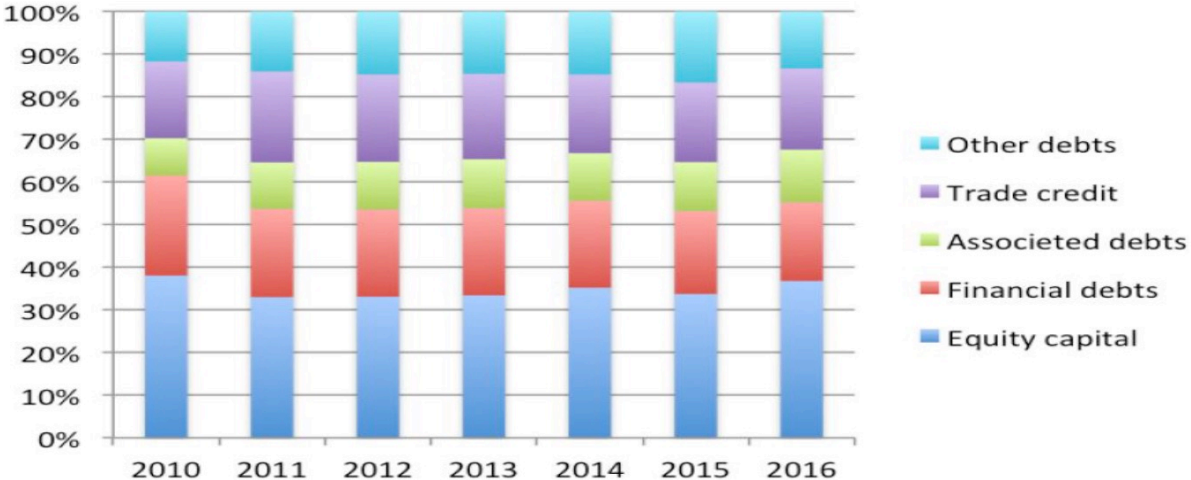


Figure 4: Average Structure of finance for very small firms

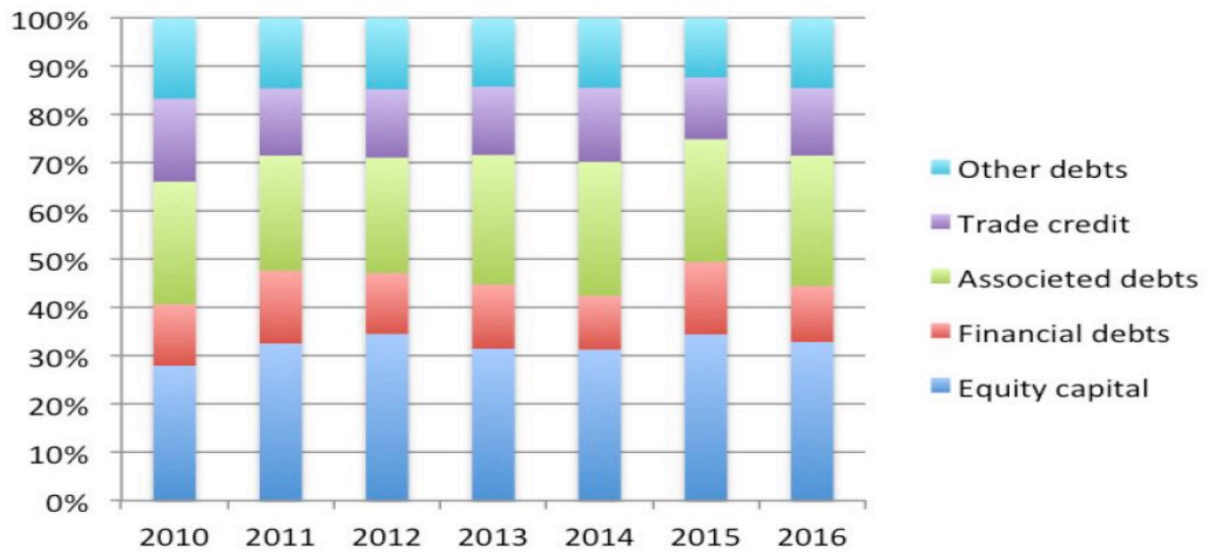


Figure 5: Financial debt issued by firms between 2010-2016

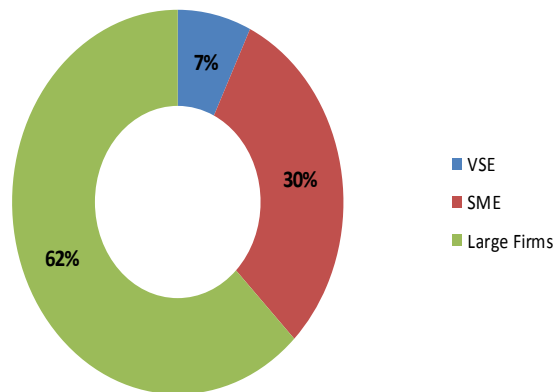


Figure 6: Collateral held by firms between 2010-2016

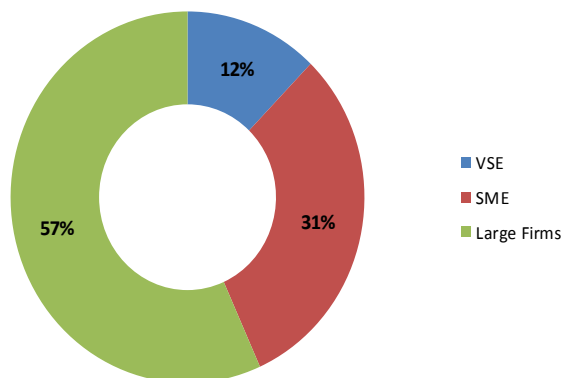


Figure 7: Pofit generated by firms between 2010-2016

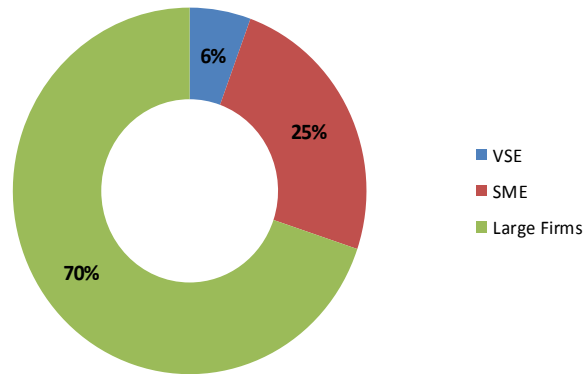


Figure 8: Average age of firms between 2010-2016

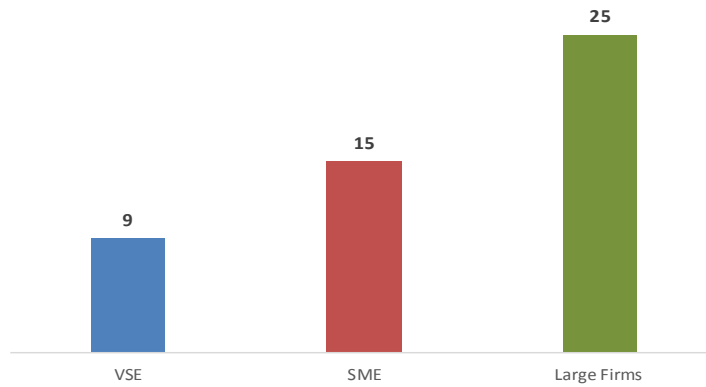


Figure 9: Distribution over time of equity/assets ratio, by size groups

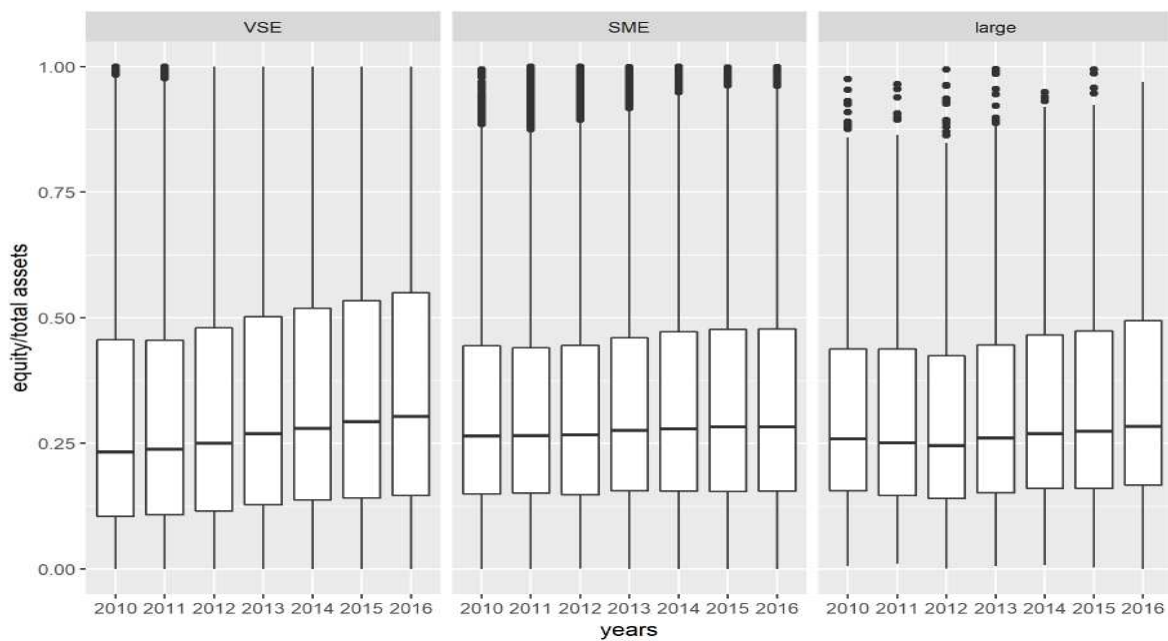


Figure 10: Distribution over time of financial debts/assets ratio, by size groups

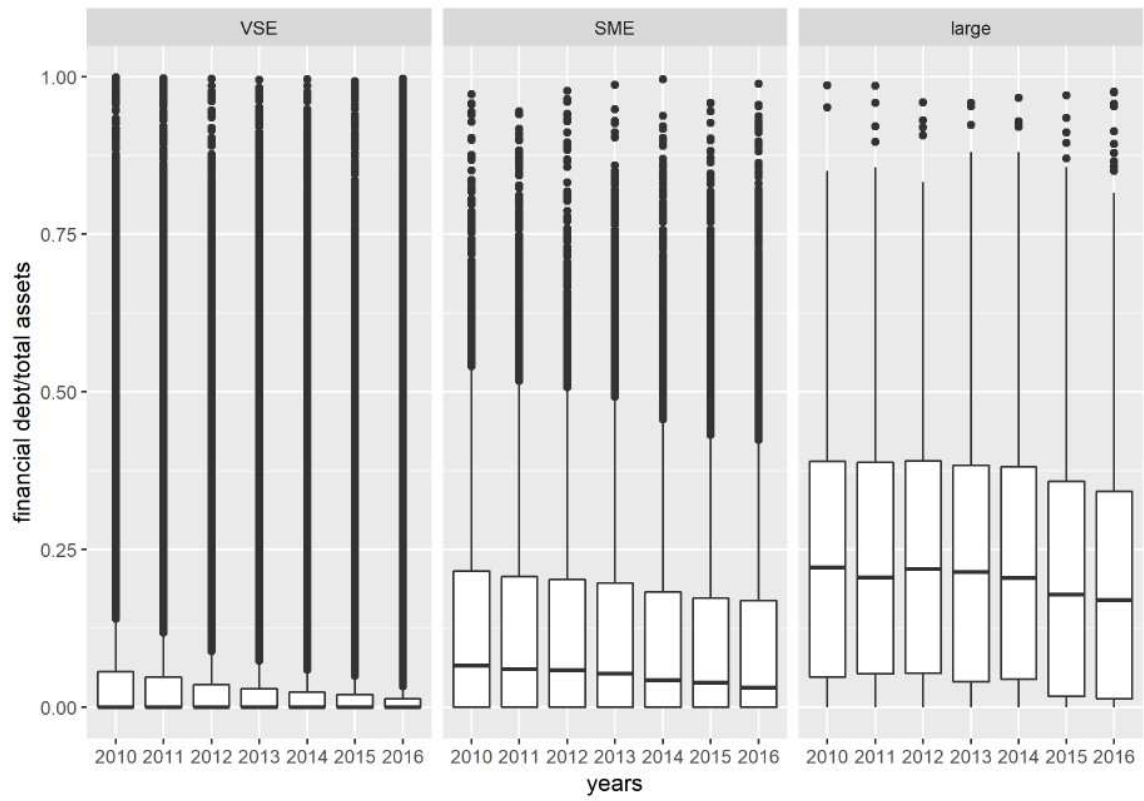


Figure 11: Distribution over time of trade credit/assets ratio, by size groups

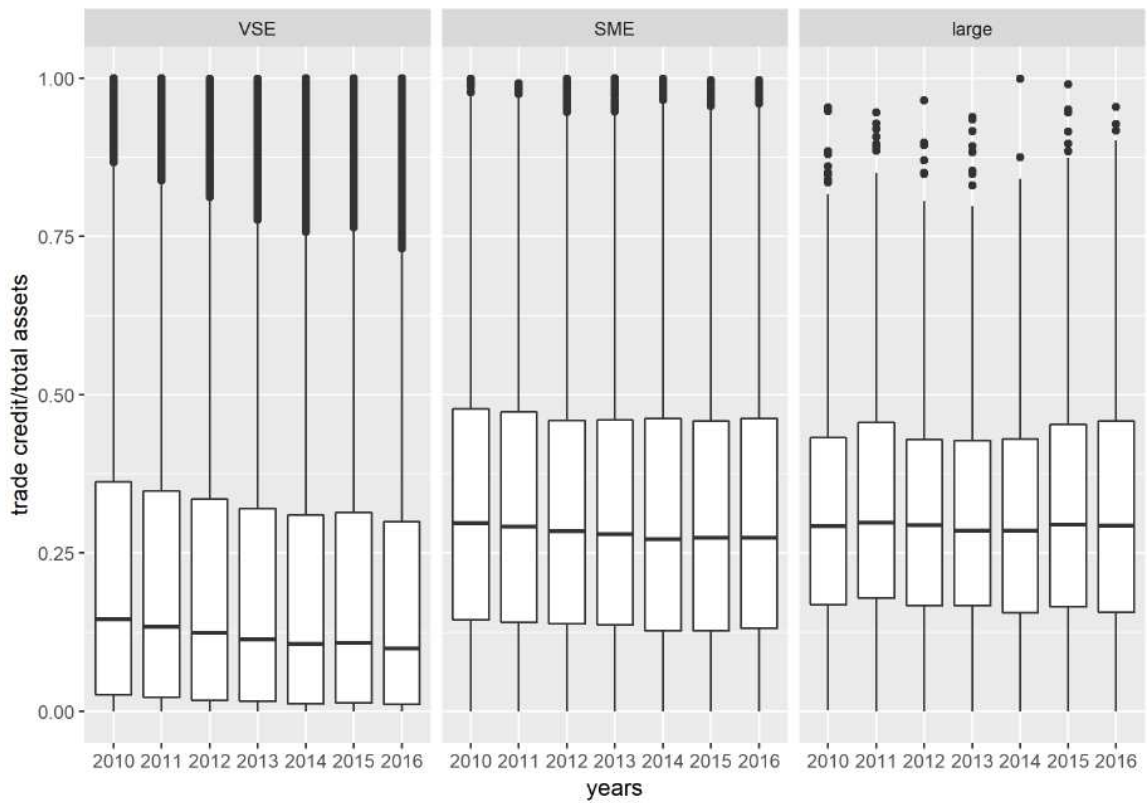


Figure 12: Distribution over time of associated debts/assets ratio, by size groups

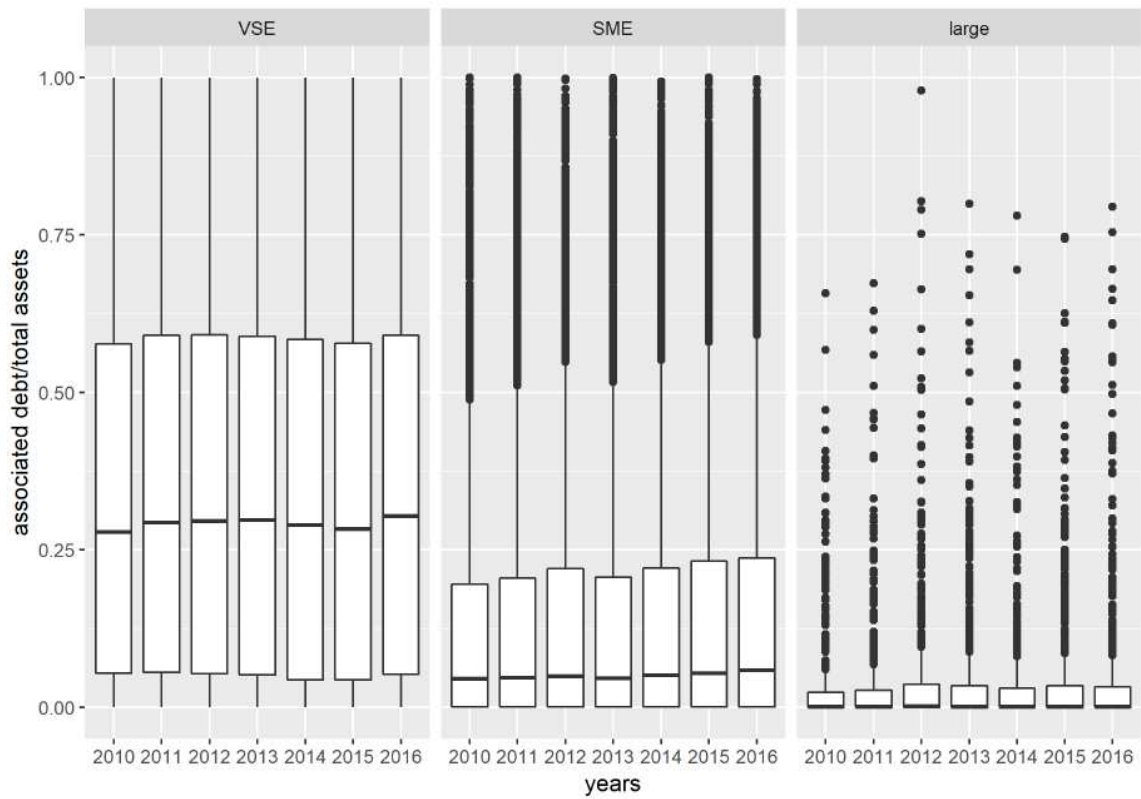


Figure 13: Distribution over time of collateral/assets ratio, by size groups

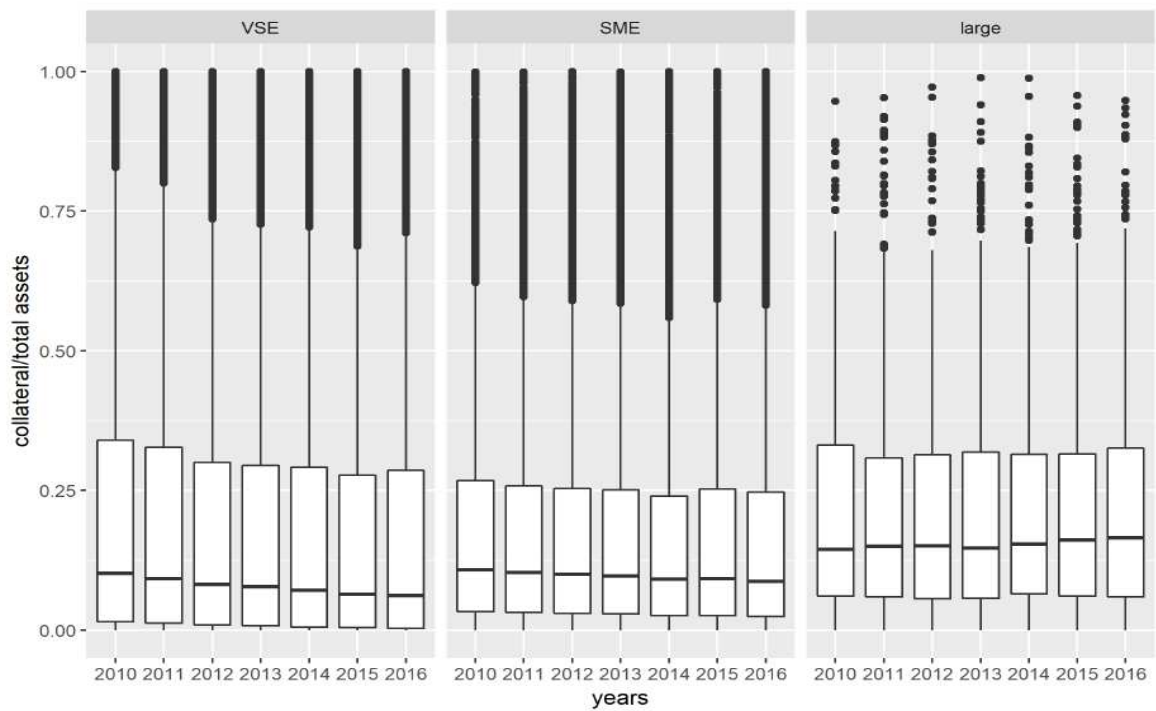


Figure 14: Kernel density of equity/assets ratio for the whole sample, by size groups

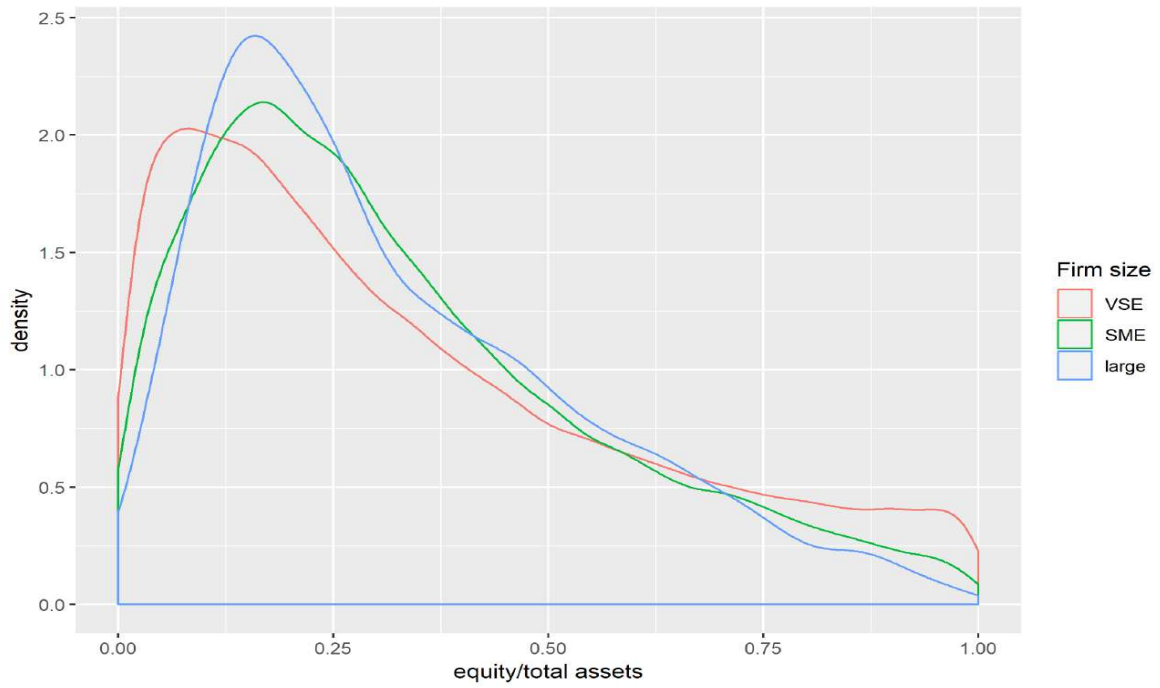


Figure 15: Kernel density of financial debts/assets ratio for the whole sample, by size groups

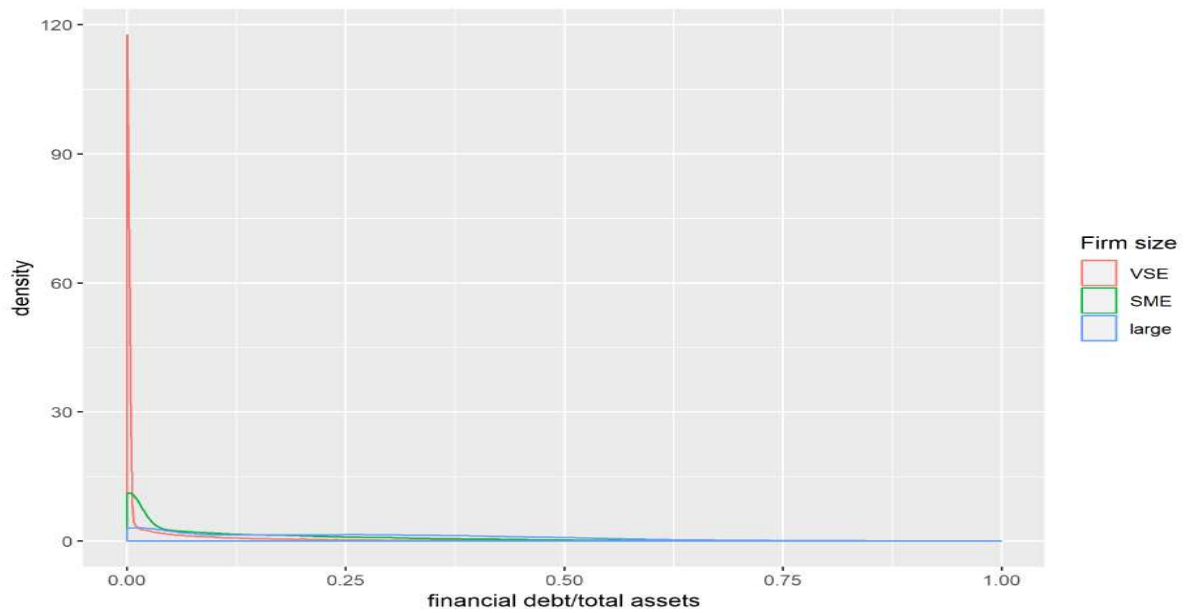


Figure 16: Kernel density of trade credit/assets ratio for the whole sample, by size groups

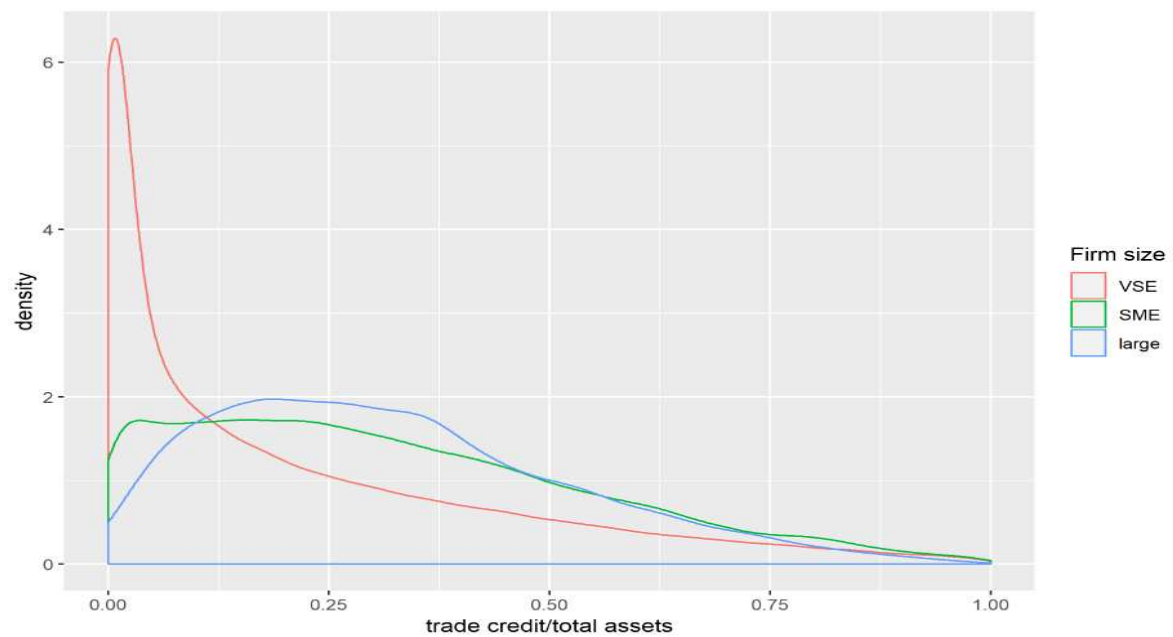


Figure 17: Kernel density of associated debts/assets ratio for the whole sample, by size groups

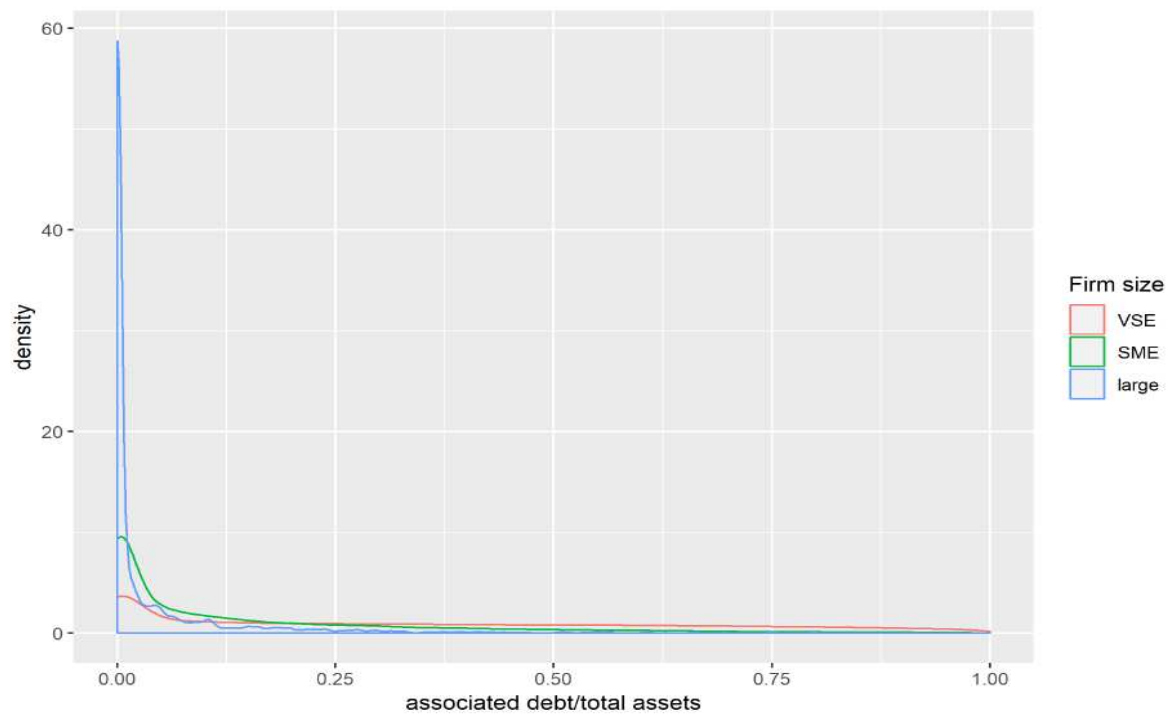




Figure 18: Kernel density of collateral/assets ratio for the whole sample, by size groups

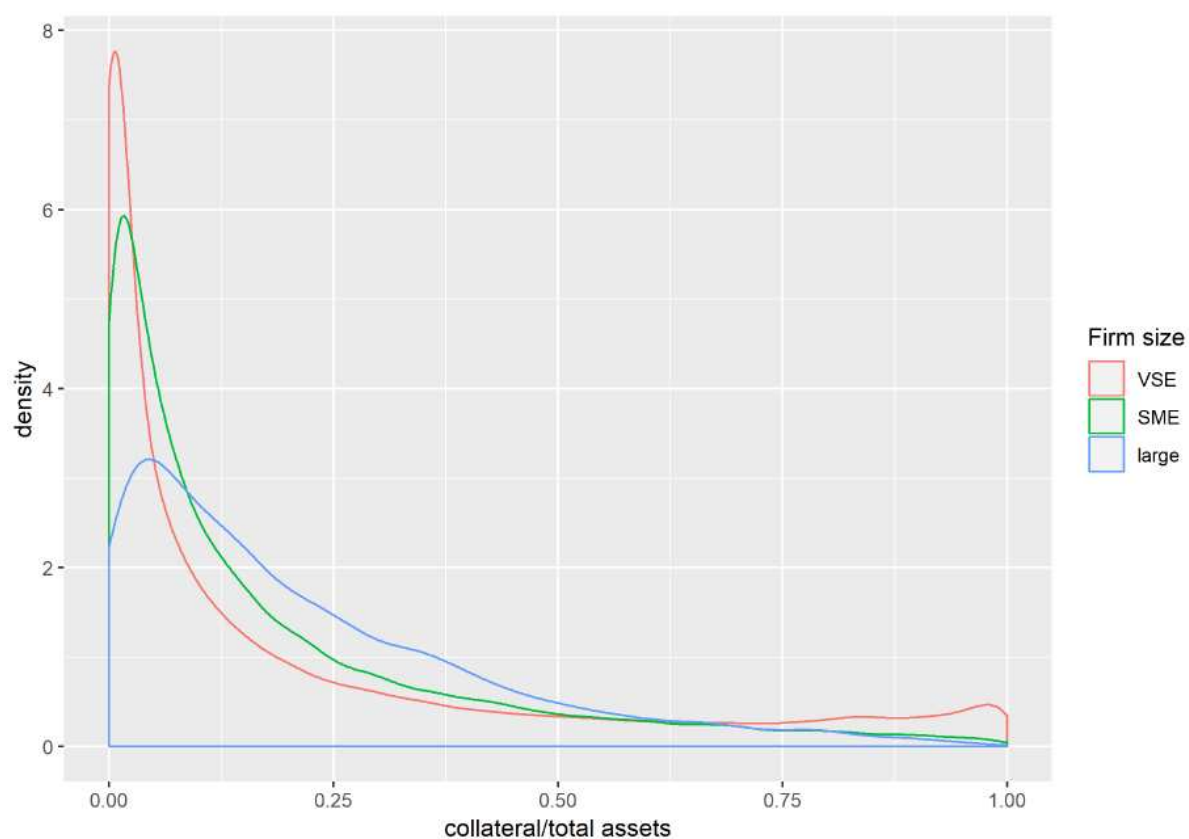


Table 7: Correlation matrix for VSE firms

	Equity	Ctrade	AssoD	FinD	OtherD	Profit	size	TMP	GDP	Age	coll
Equity	1	-0.234	-0.443	-0.123	-0.072	0.028	-0.186	-0.076	-0.016	0.112	0.07
Ctrade	-0.234	1	-0.393	-0.105	-0.038	0.005	0.072	0.043	0.003	-0.062	-0.21
AssoD	-0.443	-0.393	1	-0.218	-0.322	-0.015	-0.105	0.014	0.003	-0.116	0.10
FinD	-0.123	-0.105	-0.218	1	-0.091	-0.013	0.195	0.038	0.009	0.034	0.20
OtherD	-0.072	-0.038	-0.322	-0.091	1	0.012	-0.066	0.013	0.004	0.029	-0.14
Profit	0.028	0.005	-0.015	-0.013	0.012	1	0.028	-0.003	0.006	0.0003	-0.01
Size	-0.186	0.072	-0.105	0.195	-0.066	0.028	1	-0.027	0.006	0.237	-0.03
TMP	-0.076	0.043	0.014	0.038	0.013	-0.003	-0.027	1	0.222	-0.035	0.04
GDP	-0.016	0.003	0.003	0.009	0.004	0.006	0.006	0.222	1	0.004	0.00
Age	0.112	-0.062	-0.116	0.034	0.029	0.0003	0.237	-0.035	0.004	1	-0.04
coll	0.074	-0.218	0.103	0.208	-0.140	-0.014	-0.032	0.044	0.004	-0.04	1

**Table 8: Correlation matrix for all firms**

---

---

	Equity	Ctrade	AssoD	FinD	OtherD	Profit	size	TMP	GDP	Age	coll
Equity	1	-0.252	-0.385	-0.152	-0.088	0.035	-0.136	-0.069	-0.015	0.121	0.104
Ctrade	-0.252	1	-0.412	-0.096	-0.061	0.005	0.158	0.040	0.006	-0.019	-0.230
AssoD	-0.385	-0.412	1	-0.273	-0.271	-0.018	-0.285	0.001	-0.002	-0.175	0.093
FinD	-0.152	-0.096	-0.273	1	-0.113	-0.016	0.325	0.045	0.012	0.092	0.185
OtherD	-0.088	-0.061	-0.271	-0.113	1	0.012	-0.058	0.008	0.002	0.006	-0.142
Profit	0.035	0.005	-0.018	-0.016	0.012	1	0.023	-0.002	0.005	0.001	-0.013
size	-0.136	0.158	-0.285	0.325	-0.058	0.023	1	-0.007	0.010	0.305	-0.025
TMP	-0.069	0.040	0.001	0.045	0.008	-0.002	-0.007	1	0.217	-0.027	0.035
GDP	-0.015	0.006	-0.002	0.012	0.002	0.005	0.010	0.217	1	0.004	0.003
Age	0.121	-0.019	-0.175	0.092	0.006	0.001	0.305	-0.027	0.004	1	-0.038
coll	0.104	-0.230	0.093	0.185	-0.142	-0.013	-0.025	0.035	0.003	-0.038	1

---