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Does state ownership really matter for capital structure in selected G-20 economies?*

Muhammad Yusuf Amin[a,b], Mustafa Besim[a] and Zahoor Ul Haq[c]

[a]Department of Banking and Finance, Eastern Mediterranean University, Famagusta, North Cyprus; [b]Institute of Business and Leadership, Abdul Wali Khan University Mardan (AWKUM), Mardan, Pakistan; [c]Department of Economics, Pakhtunkhwa Economic Policy Research Institute (PEPRI), Faculty of Business and Economics, Abdul Wali Khan University Mardan, Pakistan

ABSTRACT

The effect of state ownership on the capital structure decisions of enterprises in selected G-20 countries is estimated using financial and accounting data of 252 state-owned and 6503 non-state-owned firms for the period 2011–2015. The results indicate that state ownership is positively associated with leverage in all the selected G-20 countries. However, this phenomenon changed when countries were considered according to their income levels because state-owned enterprises in high-income countries carry more debt, while the opposite is true for lower-middle-income countries. The results were also divergent when the effects of various firm-specific variables were compared between state and non-state-owned enterprises across the development spectrum.

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1. Introduction

The idea that private ownership can perform inherently better in terms of profitability, efficiency and constructing optimal debt than public ownership is not new. Rajan and Zingales (1995) showed the link between ownership and capital structure decisions. The study was followed by a stream of literature presenting how a firm can benefit from state ownership.[1] These benefits include easy access of politically connected and state-run enterprises to debt financing (Dinc, 2004; Johnson & Mitton, 2003; Khwaja & Mian, 2005; Le & Tannous, 2016), government contracts (Goldman, Rochall, & So, 2010) and government aid (Faccio, Masulis, & McConnel, 2006). This study extends the existing literature by estimating and comparing the effects of state ownership on the capital structure decisions of firms in selected G-20 economies with respect to their level of economic development measured in terms of per capita income (PCI). Our analysis is motivated by a lack of this evidence for such an

CONTACT Muhammad Yusuf Amin yousafamin@gmail.com; yusuf@awkum.edu.pk
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important group of economies. The group, collectively, not only fall in the top 33 global economies, but their members also form and constitute G-7, BRIC (Brazil, Russia, India and China), G-4 (Brazil, Germany and India) and Next-11[2] (Indonesia, South Korea and Turkey). Hence, understanding the likely effects of state ownership of firms on their capital structure decisions for G-20 is extremely important not only for them but also for other such groups of countries and individual economies at the same stage of economic development.

Data for state-owned enterprises (SOEs) showing their contributions to an economy over a period of time are not available. Random reported instances of their contributions show that SOEs accounted for 20% of global investment and 5% of global employment (Robinett, 2006). The total value of SOEs in Organisation for Economic Cooperation and Development economies, having 11 G-20 countries, is U.S.$1.2 trillion, accounting for their 15% of gross domestic product (GDP) in 2009 (OECD, 2011). With respect to other countries, the contribution of SOEs to GDP was 15% in Africa, 8% in Asia, 6% in Latin America (Robinett, 2006), 50% in Central Asia (Kikeri & Kolo, 2006), and up to 40% in Indonesia (World Bank, 2014). Similarly, their contribution to a particular sector is even more phenomenal and, in some instances, could potentially have monopolistic powers. For example, state banks accounted for more than half of the value of the banking sector in China and India in 2010 while their value in Argentina, Brazil, Indonesia, the Republic of Korea, Poland, Russia and Turkey is between 20 and 50% (World Bank, 2014). In China, India and Russia, about 25% of the top 100 multinational corporations were state-owned in 2006 (UNCTAD, 2007). Finally, SOEs controlled 75% of the global oil reserves and production (Economist, 2010). These statistics show state ownership to be an important economic phenomenon in low-, middle- and high-income countries including emerging economies. The phenomenon of state ownership, instead of shrinking, has expanded over the years and we are unaware of its role in the capital structure decisions of firms. In particular, we do not know the likely effects of state ownership on the capital structure of firms located in lower-middle- and upper-middle-income countries as compared with high-income countries in G-20 economies. This is the main focus of the analysis presented in this study. Investigating the likely effects of state ownership on capital structure in G-20 economies becomes more important since it is a diverse group and includes two lower-middle-, five upper-middle- and 11 high-income economies. We not only estimated but also compared the effects of state ownership on capital structure decisions across the development spectrum among G-20 economies. Specifically, the following questions are raised in this study:

i. Does state ownership of enterprises affect their capital structure decisions?
ii. Is the effect of state ownership of enterprises on capital structure decisions similar across the development spectrum?
iii. Are the effects of other firm-specific variables of SOEs and non-SOEs on capital structure the same across the development spectrum?

While answering these questions, we contribute to the existing literature in the following ways. First, in addition to examining the effects of some common

firm-specific variables on capital structure, we estimate the effect of state ownership on capital structure decisions of selected G-20 countries, a group of diverse economies. Thus, this study provides empirical evidence from a cross-country study in an area that has been inadequately researched. Second, this effect is not only estimated but also compared among lower-middle-, upper-middle- and high-income countries. Third, specific hypotheses are statistically tested about the effects of firm-specific variables of SOEs and non-SOEs on capital structure among lower-middle-, upper-middle- and high-income countries.

The article consists of five sections. An introduction and motivation for this research have already been presented in Section 1. Section 2 presents a literature review. The variables used in the analysis and hypotheses about their effects on capital structure are also presented and defined here. Section 3 presents the methodology and data. It is followed by the results and their discussion in Section 4. Section 5 presents the conclusions and policy implications.

2. Literature review

There are three main theories of capital structure: trade-off, pecking order and agency theory. Modigliani and Miller (1958) presented the irrelevance theory, which evolved to trade-off theory when Myers (1984) violated some of its assumptions. The irrelevance theory assumes no taxes, no bankruptcy risks and no liquidation cost. However, Myers (1984), in his seminal research, added market frictions such as personal income tax and bankruptcy costs to the theory and showed that optimal debt occurs at a point where the benefit of debt offsets its cost for a firm. This relationship is known as trade-off theory. By contrast, due to the existence of information asymmetry, pecking order theory suggests that managers should prefer internal earnings first, followed by outside financing and finally equity issuance (Myers & Majluf, 1984). Following the theoretical exposure of capital structure theories, researchers examined capital structure decisions in both developed (Bauer, 2004; Brounen, Jong, & Koedijk, 2005; Mörec & Rašković, 2011; Rajan & Zingales, 1995) and developing (Achim, Borlea, & Mare, 2016; Bancel & Mittoo, 2004; Pacheco & Tavares, 2016) countries but ignored G-20 economies as a whole.

Next, pecking order theory is based on an assumption of information asymmetry between managers and shareholders. Under this theory, firms prefer to utilise internal financing through retained earnings and are likely to prefer debt over equity financing if internal funds are inadequate (Chang, Chen, & Liao, 2014; Myers & Majluf, 1984). Finally, agency theory of a firm is viewed as a nexus of contract between principle and agent. Jensen (1986) argues that debt financing plays an important role in the effectiveness and growth of an organisation. It reduces the availability of free cash flow, which reduces managers spending on their private benefits and thus shareholders and management are motivated to take part in the organisation affairs to avoid bankruptcy. Jensen's reasoning can be applied to the SOEs, as their managers are found to be more politically connected and can easily engage in corporate perks within a capital structure having low debt. The relevance of capital structure theory for state- and non-state-owned enterprises needs to be evaluated in the light of the

above discussion. This is particularly important for emerging economies, which are shifting from a more central role of government to a more outward role. Hence, the question that how state ownership affects the capital structure of enterprises in these economies with respect to their level of development measured using their per capita income still needs attention, and this is exactly the scope of this study.

There are several firm-specific variables arising from trade-off, agency and information asymmetry theories that help in explaining the capital structure decision of firms (Booth, Aivazian, Demirguc-Kunt, & Maksimovic, 2001). According to trade-off theory, the firm targets a debt-to-asset ratio and moves towards it. Specifically, the movement of a firm's capital structure towards target debt ratio involves a trade-off between tax benefit and bankruptcy costs. We expect that these bankruptcy-related costs have a negative impact on leverage, and one can use the following proxy variables: tangibility and firm size.

According to pecking order or asymmetric information theories, firms follow a specific hierarchy in financing new projects, that is, firms prefer internal over external financing. If internal financing is not sufficient, a firm issues safest security such as debt, then possibly other hybrid securities such as convertible bonds, etc. The agency conflicts between the principal and agent evolve due to asset substitution and underinvestment plans. In order to minimise these conflicts, firms with high growth opportunity prefer equity financing over debt for their new projects. The next sections discuss the expected roles of various variables in capital structure decisions.

2.1. Leverage

Based on the theories of capital structure presented above, this study considers leverage as the dependent variable. Leverage can be defined as the ratio of the book value of a firm's total debts to total assets (Graham & Harvey, 2001) or the market value over book value (Flannery & Rangan, 2006; Frank & Goyal, 2009). This study uses the first definition of leverage as many managers claim that following equity movements to rebalance capital structure has high adjustment costs. The theory also identifies other exogenous variables, including firm size, profitability, tangibility, growth (Öztekin, 2015; Rajan & Zingales, 1995) and state ownership (Dewenter & Malatesta, 2001), that affect capital structure, that is, leverage of a firm.

2.2. State ownership

In a perfect world, ownership of a firm does not matter. The traditional microeconomics theory, under the paradigm of perfect competition, does not consider ownership as an important dimension of a firm for its performance. The absence of transaction costs in perfect competition eliminates the role of ownership and every firm is supposed to maximise profit. However, no market is perfect as information and other asymmetries and externalities, leading to transaction costs, typically exist. The government intervenes to fix these market failures and imperfections and at times becomes a culprit of furthering these. However, irrespective of this philosophical debate, it is observed that government interventions in markets and state

ownership can be witnessed all over the world irrespective of the development level of a country.

In imperfect competition along the decreasing average cost curve, given the demand and marginal revenue functions, economic theory argues against the existence of more than one firm but government intervention in such natural monopolies on efficiency grounds. In such situations, agency theory becomes extremely relevant and important to understand the conflict between principals and agents in the context of a SOE. Wright, Filatotchev, Hoskisson, and Peng (2005) consider it the replacement of a contract between private owners and employees with an agency relationship between the state and employees. The state–employees contract faces incentive issues (Young, Tsai, Wang, Liu, & Ahlstrom, 2014) and a conflict of principal–agent exists in SOEs (Jensen & Meckling, 1976). During this conflict, the state is the majority shareholder while common citizens are the minority shareholders, resulting in the tide swinging in the employees' favour in the form of incentives at the expense of common citizens. *The* Economist (2012) reports that employees of the SOEs feel entitled to help themselves by stealing. There are other avenues where SOEs are favoured as well. For example, Dewenter and Malatesta (2001) and Kornai (1980) reported that SOEs can finance new projects at favourable rates or they can borrow directly from the state without any fear of bankruptcy. If the SOEs fail to make the project successful central government can rescue the firm via the use of taxpayers' money, otherwise the authorities must face a political cost and labour union problems in the case of bankruptcy. Several studies provide empirical evidence that state ownership has more advantages than private ownership in terms of efficiency and optimality of capital structure (Dewenter & Malatesta, 2001; Dong, Liu, Shen, & Sun, 2014; Fraser, Zhang, & Derashid, 2006; Ting & Lean, 2011). However, these studies ignore the development aspect of the country where SOEs are located. Typically, government institutions are strong in high-income countries, making SOEs more responsible and efficient in their performance as governments are considered accountable for the use of taxpayers' money. This may not be the case for low-income countries, where governance as well as other institutions are weak. This study tests the following hypothesis to understand the role of ownership in capital structure decisions:

H_1: State ownership positively determines leverage of a firm.

In this study, this hypothesis is tested for the selected G-20 economies across the development spectrum. In particular, we have raised the question whether the relationship between state ownership and leverage differs across lower-middle-income, upper-middle-income and high-income countries.

2.3. Tangibility

Tangibility is measured as the ratio of net tangible assets to total assets. Tangible assets have lower expected distress cost because outsiders can easily value the tangible assets as compared with intangible assets from an acquisition. Therefore, trade-off theory predicts a positive relationship between leverage and tangibility (Frank & Goyal, 2009). Contrary to this, pecking order theory postulates an inverse relationship between tangibility and leverage, since tangibility lowers information asymmetry. Chang and Wong (2004) find a positive association between tangibility and leverage.

With respect to trade-off theory, we expect a positive effect of tangibility on leverage because firms with higher tangible assets reduce the direct costs of bankruptcy as well as lower the risks of lenders.

2.4. Firm size

The value of assets measures a firm's size. Rajan and Zingales (1995) and Fama and Fench (2002) argue that larger firms have stable cash flows. These firms are also typically more diversified, resulting in lower bankruptcy probability. Therefore, trade-off theory predicts a positive association between size and leverage. This is contrary to the pecking order theory which envisages a negative association between these due to less asymmetric information, which makes the firm prefer equity financing instead of debt. Studies such as Chang et al. (2014), Öztekin (2015) and Rajan and Zingales (1995) favour trade-off theory, and a positive effect of size on leverage is hypothesised in this study as well, given that larger firms are more diversified and have lower financial distress and bankruptcy costs.

2.5. Profitability

The ratio of earnings exclusive of interest and taxes to total assets is considered profitability. Trade-off theory expects that the use of debt by the firm is followed by higher profitability as it provides the opportunity for a firm to shield income from taxation. Agency theory claims that profitable firms can face free cash-flow problems, and as a result use leverage to control their managers (Jensen, 1986). Hence, the finding of Driffield, Mahambare, and Pal (2005) of a positive association between leverage and profitability for Indonesia accords with this theory. On the contrary, pecking order theory suggests that profitable firms have less leverage because they generate higher cash flows and therefore prefer the use of internal funds (retained earnings) over debt or equity financing. Studies such as Chang et al. (2014), Jong, Kabir, and Nguyen (2008) and Pepur, Ćurak, and Poposki (2016) found a negative association between profitability and leverage. With respect to information asymmetry, we expect a negative effect of profitability on leverage, as highly profitable firms will prefer internal financing over external financing.

2.6. Growth

Growth proxies for investment opportunities and is measured by Tobin's Q. It is the ratio of market capitalization to total assets. (Barclay & Smith, 1995). According to Frank and Goyal (2009), growth opportunity reduces free cash problems, increases financial distress cost and pushes a higher value to stakeholder co-investment. Thus, trade-off theory suggests an inverse relationship between growth and leverage; while according to pecking order theory firms having higher growth should hold more debt over time keeping profitability constant, suggesting a positive relationship. However, Lemmon and Zender (2010) supports that firms with higher growth carry less debt

due to a lower debt capacity. With respect to agency and trade-off theory, we expect a negative effect of growth on leverage.

2.7. Hypotheses tested

The expected influence of the variables discussed in Sections 2.2–2.6 on the capital structure decisions is discussed in the light of different but relevant theories. Individual hypotheses for exploring their role in capital structure decisions are omitted. But the study also tests a number of joint hypotheses to highlight differences among the selected G-20 countries given the level of economic development of a country. This is particularly important as G-20 is not a homogeneous group of countries. In order to highlight the difference across the development spectrum, a joint hypothesis similar to the one given below is tested for all the variables:

H_2: The effect of tangibility of SOEs and non-SOEs is the same on leverage.

Similar joint hypotheses are tested for the other three firm-specific variables in selected G-20 countries.

The next section discusses the empirical models used in the analysis and how these models are generated to help test the proposed hypotheses.

3. Methods and data

3.1. Empirical framework

In the light of the discussion presented in the previous section it is postulated that leverage (L) is determined by tangibility (T_{icsy}), size ($\ln A_{icsy}$), profitability(ROA_{icsy}) and growth (TQ_{icsy}) of firm i in country c of sector s in year y. This study focuses on highlighting differences in state- and non-state-owned enterprises, therefore a dummy DO_{ics} equal to one if a firm is state-owned and zero otherwise is also included in the model. The empirical model is given as follows:

$$L_{icsy} = \alpha_{icsy} + \gamma_1 T_{icsy} + \gamma_2 \ln A_{icsy} + \gamma_3 ROA_{icsy} + \gamma_4 TQ_{icsy} + \gamma_5 DO_{ics} + \delta_c + \delta_y + \delta_s + \mu_{icsy} \quad (1)$$

where δ_c, δ_s and δ_y represent country-, sector- and year-specific fixed effects, ln represents natural logarithm and μ_{icsy} represents an error term assumed to be randomly distributed with mean zero and homoscedastic variance. The parameter γ_5 shows the effect of ownership on the capital structure of a firm. In particular, it is the intercept shifter of a state-owned firm as compared with the base case of non-state-owned enterprises. Equation (1) is our base model and statistical significance of γ_5 answers the first question raised in the Introduction and tests the first hypothesis.

In order to answer the rest of the two questions, three steps are carried out. First, dummy variables representing different income-based categories of countries, that is, lower-middle-income (*LMI*), upper-middle-income (*UMI*) and high-income (*HI*), are created. Second, these dummies are then interacted with the state-ownership dummy (DO_{ics}) as follows to create dummies representing SOEs and non-SOEs in *LMI*, *UMI* and *HI*:

$$\begin{aligned} SOELMI_{ics} &= DO_{ics} \times LMI \\ SOEUMI_{ics} &= DO_{ics} \times UMI \\ SOEHI_{ics} &= DO_{ics} \times HI \end{aligned} \tag{2}$$

Hence, $SOELMI_{ics}$ is a dummy equal to unity if an ith firm in s industry in a country c in lower-income countries is state-owned and zero otherwise. Other dummies can be interpreted similarly. These dummies are added to our base model and the resultant equations are:

$$\begin{aligned} L_{icsy} = \alpha_{icsy} + \eta_1 T_{icsy} + \eta_2 \ln A_{icsy} + \eta_3 ROA_{icsy} + \eta_4 TQ_{icsy} + \eta_5 SOEHI_{ics} \\ + \delta_c + \delta_y + \delta_s + \mu_{icsy} \end{aligned} \tag{3}$$

$$\begin{aligned} L_{icsy} = \alpha_{icsy} + \eta_1 T_{icsy} + \eta_2 \ln A_{icsy} + \eta_3 ROA_{icsy} + \eta_4 TQ_{icsy} + \eta_5 SOEUMI_{ics} \\ + \delta_c + \delta_y + \delta_s + \mu_{icsy} \end{aligned} \tag{4}$$

$$\begin{aligned} L_{icsy} = \alpha_{icsy} + \eta_1 T_{icsy} + \eta_2 \ln A_{icsy} + \eta ROA_{icsy} + \eta_4 TQ_{icsy} + \eta_5 SOELMI_{ics} + \delta_c \\ + \delta_y + \delta_s + \mu_{icsy} \end{aligned} \tag{5}$$

Equations (3), (4) and (5) are our Model 1, Model 2 and Model 3, respectively. These models are used to test the effect of state ownership across the developed spectrum, providing a complete test of the first hypothesis.

Third, to test the second set of hypotheses for each of the firm-specific variables in selected G-20 countries and across the development spectrum a further two steps are taken. In the first step the ownership dummy (DO_{ics}) is interacted with each of the firm-specific variables (tangibility (T), size (lA), profitability (ROA) and growth (TQ)) as follows:

$$\begin{aligned} SOET_{icsy} &= T_{icsy} \times DO_{ics} \\ SOEA_{icsy} &= lA_{icsy} \times DO_{ics} \\ SOEROA_{icsy} &= ROA_{icsy} \times DO_{ics} \\ SOETQ_{icsy} &= TQ_{icsy} \times DO_{ics} \end{aligned} \tag{6}$$

where $SOET_{icsy}$, $SOEA_{icsy}$, $SOEROA_{icsy}$ and $SOETQ_{icsy}$ represent tangibility, logarithm of assets, ROA and Tobin's Q of state-owned enterprises. Similarly, slope shifters of the exogenous variables for non-SOEs ($NSOET_{icsy}$, $NSOEA_{icsy}$, $NSOEROA_{icsy}$ and $NSOETQ_{icsy}$) are created and the base model is augmented with these as follows:

$$\begin{aligned} L_{icsy} = \alpha_{icsy} + \pi_1 SOET_{icsy} + \pi_2 NSOET_{icsy} + \pi_3 SOE \ln A_{icsy} + \pi_4 NSOE \ln A_{icsy} \\ + \pi_5 SOEROA_{icsy} + \pi_6 NSOEROA_{icsy} + \pi_7 SOETQ_{icsy} + \pi_8 NSOETQ_{icsy} \\ + \delta_c + \delta_y + \delta_s + \mu_{icsy} \end{aligned} \tag{7}$$

This is our Model 4. In the second step, to test the effect of SOEs' and non-SOEs' firm-specific variables on leverage in lower-, upper- and higher-income-countries, the

dummies of development spectrum ($SOELMI_{ics}$, $SOEUMI_{ics}$ and $SOEHI_{ics}$) are intersected with each of the exogenous variable following the same process as given in Equation (6) to slope shifters of each variable for lower- and upper-middle- and high-income countries. The base model is augmented with these slope shifters and is called Model 5, given as:

$$\begin{aligned} L_{icsy} = {} & \alpha_{icsy} + \lambda_1 SOET_{icsy} + \lambda_2 NSOET_{icsy} + \lambda_3 SOEHT_{icsy} + \lambda_4 NSOEHT_{icsy} \\ & + \lambda_5 SOEUT_{icsy} + \lambda_6 NSOEUT_{icsy} + \lambda_7 SOELT_{icsy} + \lambda_8 NSOELT_{icsy} + \lambda_9 SOE\ln A_{icsy} \\ & + \lambda_{10} NSOE\ln A_{icsy} + \lambda_{11} SOEH\ln A_{icsy} + \lambda_{12} NSOEH\ln A_{icsy} + \lambda_{13} SOEU\ln A_{icsy} \\ & + \lambda_{114} NSOEU\ln A_{icsy} + \lambda_{15} SOEL\ln A_{icsy} + \lambda_{16} NSOEL\ln A_{icsy} + \lambda_{17} SOEROA_{icsy} \\ & + \lambda_{18} NSOEROA_{icsy} + \lambda_{19} SOEHROA_{icsy} + \lambda_{20} NSOEHROA_{icsy} + \lambda_{21} SOEUROA_{icsy} \\ & + \lambda_{22} NSOEUROA_{icsy} + \lambda_{23} SOELROA_{icsy} + \lambda_{24} NSOELROA_{icsy} + \lambda_{25} SOETQ_{icsy} \\ & + \lambda_{26} NSOETQ_{icsy} + \lambda_{27} SOEHTQ_{icsy} + \lambda_{28} NSOEHTQ_{icsy} + \lambda_{29} SOEUTQ_{icsy} \\ & + \lambda_{30} NSOEUTQ_{icsy} + \lambda_{31} SOELTQ_{icsy} + \lambda_{32} NSOELTQ_{icsy} + \delta_c + \delta_y + \delta_s + \mu_{icsy} \end{aligned} \tag{8}$$

3.2. Data

This study includes 12 (Argentina, Brazil, China, France, Germany, Italy, India, Indonesia, Russia, Republic of Korea, Saudi Arabia and Turkey) countries from G-20 countries. We selected publicly listed state-owned and non-state-owned firms in these countries. Other countries in the G-20 (Australia, Canada, Japan, Mexico, South Africa, United Kingdom and the United States) were excluded from the sample because of the unavailability of information on state-owned firms. Annual financial and accounting data of 252 state-owned and 6503 non-state-owned firms were extracted from Orbis. Our sample includes a period of five years from 2011 to 2015, based on the latest available data. Data of the state-owned enterprises before 2011 were only available for a subset of our sample while the data availability of the selected firms after 2015 became random. The period 2011–2015 provides a balances panel for all the selected firms, that is, both state and non-state enterprises. We excluded all the financial enterprise and utility providing firms from our sample because their debt level is driven by regulation. Therefore, Zhengwei (2013) argues that the liabilities of such firms are not comparable to the debt liabilities of other firms. This gets us a sample of 1260 observations of state-owned firms and 32,515 observations of non-state-owned firms.

Following the World Bank, this study classified the selected G-20 countries into high-income (France, Germany, Italy, Republic of Korea and Saudi Arabia), upper-middle income (Argentina, Brazil, China, Russia and Turkey) and lower-middle income (India and Indonesia) countries in order to analyse and compare the impact of ownership on capital structure decisions of firms in these economies. Details of the number of firms selected from each country are given in Table 1.

Table 1. The number of state- and non-state-owned enterprises selected in the sample countries.

Country	World Bank classification	Number of SOEs	Number of non-SOEs
Argentina	*UMI*	1	32
Brazil	*UMI*	3	107
China	*UMI*	167	1567
France	*HI*	3	464
Germany	*HI*	6	374
India	*LMI*	28	1983
Indonesia	*LMI*	13	300
Italy	*HI*	1	138
Republic of Korea	*HI*	2	1210
Russia	*UMI*	18	74
Saudi Arabia	*HI*	9	82
Turkey	*UMI*	1	172
All countries		252	6503

Source: Authors calculations using the data describe in section 3.

Table 2. Comparison of means of the variables for selected G-20 countries.

Ownership	Years	Leverage	Tangibility	Size	Profitability	Growth
SOEs	2011	0.558***	0.958**	14.464***	0.066**	0.827
	2012	0.564***	0.953**	14.576***	0.052*	0.75
	2013	0.559***	0.950**	14.678***	0.049**	0.692**
	2014	0.558***	0.951**	14.743***	0.041	0.827**
	2015	0.563***	0.949**	14.716***	0.027	0.975**
	All	0.560***	0.952***	14.635***	0.047***	0.814***
Non-SOEs	2011	0.484***	0.939**	11.923***	0.050**	0.889
	2012	0.486***	0.936**	12.003***	0.042*	0.911
	2013	0.484***	0.935**	12.048***	0.036**	0.980**
	2014	0.483***	0.933**	12.071***	0.036	1.148**
	2015	0.479***	0.929**	12.067***	0.034	1.391**
	All	0.483***	0.934***	12.022***	0.040***	1.064***

Note: *, ** and *** show significance at the 90, 95 and 99% levels, respectively.
Source: Authors calculations.

4. Results and discussion

Table 2 presents yearly means of leverage, tangibility, profitability, Tobin's Q and size of state- and non-state-owned enterprises in all selected G-20 countries. It shows that on average leverage for all the selected years is significantly higher for state-owned (56%) as compared with non-state owned (48.3%) enterprises. Among the explanatory variables the yearly averages of tangibility, profitability and size are significantly higher for state-owned as compared with non-state-owned enterprises; while the yearly average of Tobin's Q is significantly lower for state-owned as compared with non-state-owned enterprises. On a yearly basis, leverage of state-owned enterprises is statistically significant and higher than non-state-owned enterprises in all years. Tangibility and size of state-owned enterprises are statistically significantly higher than non-state-owned enterprises in all the years while profitability of state-owned enterprises is significantly higher than non-state-owned enterprises in 2011, 2012 and 2013. Size of state-owned enterprises, measured in terms of the value of assets, is significantly higher than non-state-owned enterprises in all years. These results are consistent with and complement results of previous studies; for example, Liu, Tian, and Wang (2011) show that SOEs in China have higher leverage compared with non-SOEs. Table 3 shows the correlation between leverage and other firm-specific variables in the selected G-20 countries. There is a significant correlation between leverage and other firm-specific covariates. The correlation is positive and statistically

Table 3. Correlation matrices, selected G-20 countries.

All selected G-20 countries					
Variables	Leverage	Tangibility	Size	Profitability	Growth
Leverage	1				
Tangibility	−0.037***	1			
Size	0.282***	−0.187***	1		
Profitability	−0.230***	0.049***	0.119***		
Growth	−0.192***	−0.032***	−0.065***	0.129***	1

Note: *** show significance at 99% level, respectively.
Source: Authors calculations.

significant between size and leverage, while tangibility, profitability and Tobin's Q are significantly negatively correlated with leverage. However, the association between leverage and another variable is estimated without controlling for the effect of other variables, a limitation removed in regression analysis, discussed next.

There are three main estimation techniques for analysing panel data: fixed effect, random effect and ordinary least squares (OLS). The typical fixed effect cannot be applied for estimation since it does not account for time-invariant variables such as ownership dummy, the main focus of this study. Since this study tests a number of hypotheses, we use OLS to estimate and compare the effect of ownership on capital structure decisions across the development spectrum. All the regression models in our study reveal a good model fit with significant *F*-statistics and *R*-squared and adjusted *R*-squared.

Each column in Table 4 refers to a different set of regressions. The base model shows the impact of ownership and other explanatory variables on leverage in selected G-20 countries. The regression results show that state ownership has a significant positive effect on leverage. This contrasts with the results in Table 2, where the differences in leverage of state-owned and non-state-owned enterprises are statistically insignificant. Hence, the effect of state ownership on leverage changes when the effect of the other exogenous variables is controlled. The model shows that state-owned enterprises carry 1.3% more debt as compared with non-state-owned enterprises and that the ownership does matter. The base model indicates that SOEs are more levered because of their easy access to loans and other public resources, a finding consistent with other studies (Dewenter & Malatesta, 2001; Li, Yue, & Zhao, 2009). Among firm-specific variables tangibility and size have a statistically significant and positive effect, while profitability and growth have a negative effect on leverage. These results are consistent with the majority of previous studies (Booth et al., 2001; Fan, Huang, & Zhu, 2008; Jong et al., 2008) and we do not accept the null hypothesis in respect of these variables. Therefore, in the case of these variables, trade-off theory stands. Such a positive and statistically significant impact supports the theoretical proposition that higher tangible assets and firm size helps in reducing the bankruptcy cost. The negative effect of profitability on leverage yields support for the information asymmetric theory, implying that a firm prefers internal over external financing. The negative effect of growth on leverage supports the agency theory, suggesting that a firm having higher growth opportunities should keep leverage low so that it does not give up profitable investment opportunities due to wealth transfer from shareholders to creditors.

Table 4. The effect of different variables and ownership on leverage estimated using OLS.

Variables	Base Model G-20 (Selected countries)	Model 1 *HI*	Model 2 *UMI*	Model 3 *LMI*
Tangibility	0.087***	0.003	0.132***	0.146***
	(7.600)	(0.210)	(5.930)	(6.190)
Size	0.044***	0.033***	0.062***	0.044***
	(66.200)	(32.330)	(39.290)	(46.770)
Profitability	−0.617***	−0.498***	−0.955***	−0.519***
	(−38.940)	(−22.740)	(−25.700)	(−20.730)
Growth	−0.010***	−0.032***	−0.002	−0.011***
	(−6.500)	(−7.610)	(−1.960)	(−6.670)
SOEs	0.013*			
	(2.270)			
SOEs of *HI*		0.064***		
		(3.290)		
SOEs of *UMI*			0.007	
			(1.090)	
SOEs of *LMI*				−0.081***
				(−5.920)
Constant	−0.069***	0.185***	−0.430***	−0.078*
	(−3.770)	(7.250)	(−11.770)	(−2.450)
Fixed effects				
Country	216.590***	89.210***	62.950***	171.570***
Industry	24.170***	14.020***	22.510***	25.750***
Year	7.460***	1.070***	19.050***	0.86
Summary statistics				
No. of observations	33775	11445	10710	11620
F-statistics	213.500***	110.900***	102.500***	123.600***
R-squared	0.241	0.275	0.316	0.248
Adj. *R*-squared	0.24	0.272	0.313	0.246
RMSE	0.196	0.179	0.183	0.209

Note: * and *** show significance at 90 and 99% levels, respectively. All standard errors are robust.
Source: Authors calculations.

Countries are further classified into lower- and upper-middle- and high-income countries not only to estimate but also to compare the effect of selected exogenous variables on leverage. Countries are classified according to their per capita income as per World Bank guidelines (Models 1–3, Table 4). The results show that the effect of state ownership on leverage is positive and statistically significant in high-income countries (Model 1), while in lower-middle-income countries its effect is negative and statistically significant (Model 3). These findings are also consistent with other studies (Dewenter & Malatesta, 2001; Firth, Lin, & Wong, 2008; Nhung & Okuda, 2015). In high-income countries, state-owned enterprises carry 6.40% more debt than non-state-owned enterprises, while in lower-middle-income countries, state-owned enterprises carry 8.1% less debt than their counterpart. The effect of state ownership on leverage in upper-middle-income countries is statistically insignificant. The analysis uses more recent data that considers the liberalisation move of the World Bank and International Monetary Fund in developing countries. Countries are encouraged to privatise the state-owned enterprises that have created more inefficiency and losses to these economies rather than benefits. It is argued that privatisation will lead to more efficiency gains through addressing the principal–agent problem associated with state ownership. Hence, over the years governments in the lower-income countries have reduced the leverage of state-owned enterprises to facilitate their privatisation.

Estimated coefficients of the other determinants of the capital structure show that it has been positively and statistically significantly affected by tangibility in upper- and

Table 5. The effect of different variables and ownership on leverage estimated using OLS.

Variables	Model 4 G-20 (selected countries)	Model 5		
		HI	*UMI*	*LMI*
Tangibility of SOEs	0.251***	0.177	0.540***	0.06
	(5.990)	(1.210)	(9.190)	(0.880)
Tangibility of non-SOEs	0.081***	−0.033*	0.107***	0.219***
	(7.040)	(−2.190)	(4.860)	(9.610)
Size of SOEs	0.036***	0.026**	0.039***	0.054***
	(14.170)	(3.040)	(10.920)	(12.030)
Size of non-SOEs	0.044***	0.031***	0.064***	0.046***
	(66.280)	(30.580)	(40.740)	(48.260)
Profitability of SOEs	−1.078***	−0.464*	−1.052***	−1.246***
	(−10.850)	(−2.450)	(−8.130)	(−7.690)
Profitability of non-SOEs	−0.598	−0.492***	−0.918***	−0.516***
	(−37.790)	(−22.450)	(−24.600)	(−20.440)
Growth of SOEs	−0.036***	−0.091***	−0.040***	−0.005
	(−5.000)	(−4.290)	(−4.770)	(−0.720)
Growth of non-SOEs	−0.010***	−0.032***	−0.002*	−0.011***
	(−6.460)	(−7.710)	(−2.010)	(−6.550)
Fixed effects				
Country	216.490***		122.910***	
Industry	23.980***		22.550***	
Year	7.670***		11.550***	
Summary statistics				
No. of observations	33775		33775	
F-statistics	207.420***		169.300***	
R-squared	0.243		0.263	
Adj. *R*-squared	0.243		0.262	
RMSE	0.195		0.193	

Note: *, ** and *** show significance at the 90, 95 and 99% levels, respectively. All standard errors are robust.
Source: Authors calculations.

lower-middle-income countries, while it has been positively affected by size in high-, upper- and lower-middle-income countries. The coefficient of profitability is significantly negative and consistent with asymmetric information theory regardless the level of income of a country, indicating that firms with higher profits will prefer internal financing rather than using debt. The coefficient of growth is negative in all models, supporting the agency theory. Overall, firms with higher future growth opportunity do not give up profitable investment and therefore prefer to have low leverage.

The results for firm-specific determinants of leverage in Table 4 are, however, estimated without the consideration of ownership. An important question arises: do these determinants of leverage differ with respect to ownership (SOEs vs. non-SOEs)? Considering classification of countries according to their level of income, we test the hypothesis that each of these four determinants of leverage for SOEs and NSOEs is equal using the *F*-test. The estimates for firm-specific determinants of SOEs and non-SOEs are provided in Table 5 and the test of the hypotheses is presented in Table 6.

Table 5 shows how the association between firm-specific determinants of capital structure changes when the ownership structure of a firm changes. Model 4 shows no change among firm-specific determinants of SOEs and non-SOEs for all the selected G-20 countries. Size and tangibility of both SOEs and non-SOEs have a statistically significant positive effect, while profitability and growth of SOEs and non-SOES have a negative effect on leverage. As the countries' classification changes according to level of income, the results of Model 5 do not vary much from the results of Model 4, except that the tangibility of non-SOEs in high-income countries has a significant

Table 6. Testing of the joint hypothesis.

Hypothesis	Model 6 G-20 (selected countries)	Model 7		
		HI	*UMI*	*LMI*
The effect of tangibility of SOEs and non-SOEs is the same on leverage	16.810***	2.080	55.190***	5.430**
The effect of size of SOEs and non-SOEs is the same on leverage	8.310***	0.330	50.650***	3.450*
The effect of profitability of SOEs and non-SOEs is the same on leverage	22.900***	0.020	0.990	19.840***
The effect of growth of SOEs and non-SOEs is the same on leverage	12.330***	7.520**	19.830***	0.570

Note: *, ** and *** show significance at the 90, 95 and 99% levels, respectively.
Source: Authors calculations.

negative effect on the leverage. The negative effect in high-income countries for non-SOEs reflects lower asymmetric information.

The results pertaining to joint hypotheses are presented in Table 6. For the selected G-20 countries, the study fails to accept the null hypothesis that the effect of firm-specific coefficients of SOEs and non-SOEs is the same on leverage. However, this result changes when countries are classified according to income level. For example, the effect of all the firm-specific variables on leverage between SOEs and non-SOEs is the same except growth in high-income countries, while the same is exactly opposite for lower-middle-income countries. In the case of upper-middle-income countries, the hypothesis of same effect of exogenous variables on leverage in SOEs and non-SOEs is only accepted for profitability. These hypotheses tests highlight the role of size and tangibility in the light of trade-off theory in mitigating bankruptcy costs. The sample for high-income countries includes four developed countries (France, Germany, Italy and Republic of Korea) having better bond market structure legal enforcement and protection of creditors compared with other developing countries included in upper- and lower-middle income countries. These results reflect that private and public sectors are practising the rule of law in high-income countries, which may not be the case in upper- and lower-middle-income countries.

5. Conclusions and policy implications

This study has investigated the effect of state ownership on the capital structure decisions of firms in selected G-20 economies. We further categorise these economies into high-, upper-middle- and lower-middle-income countries using the World Bank definition. Annual financial and accounting data of 252 state-owned and 6503 non-state-owned firms for the period 2011–2015 were used in the analysis. We employed OLS with country, year and industry as fixed effects to estimate the effect of state

ownership on capital structure. Our results indicate that state ownership is positively associated with leverage in all the selected G-20 countries. These results are in line with Dewenter and Malatesta (2001) and Kornai (1980).

The study also investigated differences between SOEs and non-SOEs across the development spectrum due to institutional differences in the countries. We conclude that SOEs in high-income countries carry more debt and in lower-middle-income countries carry less debt compared with non-SOEs. Dewneter and Maltesta (2001) and Konrai (1980) found the same trend for high-income countries. We argue that SOEs' debt levels should be higher compared with non-SOEs in high-income countries, as these countries are developed, have strong governance and economic conditions, and provide soft budget constraints to their public enterprises, which may not be the case in lower-middle-income countries. We also conclude that the effect of firm-specific variables on capital structure of SOEs and non-SOEs is not the same across the development spectrum. For example, the effect of tangibility of a SOE on leverage is different from a non-SOE. Hence, firm-specific variables of SOEs are inherently different from non-SOEs and their financial behaviour is also different. Their financial behaviour is more consistent with trade-off and pecking order theories, but further research is needed to develop a unified theory of SOEs.

Our results provide a number of policy and managerial implications. Similar to Dewneter and Maltesta (2001) and Konrai (1980), we have shown and learnt that state ownership is a significant factor affecting a company's capital structure decision. However, this association of state ownership with capital structure decision is not the same across the development spectrum. We observe that state ownership is positively associated with leverage in high-income countries and the opposite is true for lower-middle-income countries. The implication is that in countries with a better legal environment and more stable economic conditions, state-owned enterprises are likely to take more debt. On the other hand, the negative influence of state ownership in lower-middle-income countries implies that governance in these economies is poor and state institutions carry less debt. These institutions could potentially be used for political purposes and influenced by corrupt practices (Faccio, 2010). Unlike other studies, we provide evidence that the effect of firm-specific factors on capital structure decision of state-owned and non-state-owned is not the same. Also, non-state-owned enterprises lack an incentive to use a debt tax shield to maximise the benefit to shareholders and therefore a more active financial leverage strategy can be used to maximise their market value. Hence, one policy model will not cure all the evils, and separate policy programmes need to be developed for state and non-state enterprises. While this study has used the available data of all the state-owned enterprises, not all data are available for all state-owned firms. Data availability can improve our understanding of the capital structure decisions of state-owned enterprises.

Notes

1. In this study, an enterprise is considered to be state-owned when the state owns more than half of the shares of the firm.

2. Next-11 countries constitute a diverse group of emerging economies including Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, the Philippines, South Korea, Turkey and Vietnam.

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No potential conflict of interest was reported by the authors.

ORCID

Muhammad Yusuf Amin http://orcid.org/0000-0003-1569-9881
Zahoor Ul Haq http://orcid.org/0000-0001-6813-6746

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