Firm age and capital structure dynamics: Evidence from a transitional economy

Abstract

Prior literature supports the view that as firms get older, some firm characteristics change. However, it remains unclear whether an increase in firm age encourages firms to revert to target leverage. Using a sample of 684 listed firms from Vietnam over the period 2000 to 2019, we investigate the impact of firm age on the speed of adjustment of capital structure (SOA). Our results suggest that agency costs increase when firms become older which results in greater adjustment costs and a decrease in SOA. The negative effects are true for small firms but change into positive effects for larger firms. The role of state ownership is pronounced in the transitional economy in which the influence of firm age on SOA is insignificant for firms with low state ownership, and negative for firms with high state ownership. Interestingly, we find that when under-levered firms become older, they tend to quickly adjust their leverage to the desired leverage while over-levered firms are slow in adjusting their leverage. The adverse influence of firm age on SOA is also consistent for the different measurements of leverage, for the non-zero debt issuance firms, and for the sub-sampling of two stock exchanges in Vietnam.

Keywords: Speed of adjustment of capital structure, Vietnam, firm age, leverage
JEL Classification: G3; G0; C5

1. Introduction

According to trade-off theory, a firm with an optimal capital structure will adjust its debt to the target level in order to maximise firm value. However, with the presence of adjustment costs, firms only rebalance when the benefits of adjustment exceed its costs. The agency costs stemming from the disputes between managers and shareholders are a part of adjustment costs because self-interested managers may distort company policies to maximise their wealth rather than shareholders' interests (Chang, Chou, & Huang, 2014a). Therefore, the factors associated with agency problems could have a potential impact on the speed of adjustment of capital structure (SOA).

In this paper, we explore the effect of firm age on SOA. Indeed, firm age has significant influence on a number of firm characteristics. For example, Balasubramanian and Lee (2008) suggest that older firms are less innovative compared to new firms. Coad, Holm, Krafft, and Quatraro (2017) argue that young firms perform better and are more innovative than older firms because they spend a significant amount on research and development (R&D). Empirical

evidence suggests that older firms are likely to have poor corporate governance and bear great agency costs[1] due to several factors. First, managers in the aging corporation employ debt as a defence tool to prevent outsiders from taking over the company (Johnson, Karpoff, & Yi, 2021), which indicates that financial decisions are not always made to maximise the interests of shareholders but instead, are directed towards the managers' own benefits. Second, older firms are less likely to take risk in their investment and innovation activities (Chang, Ding, Lou, Li, & Yang, 2021; Chincarini, Kim, & Moneta, 2020), resulting in poorer performance compared to younger firms (Coad et al., 2017). Third, managers in aging firms tend to be more rigid in their retention of organisational structures and practices, which can lead to a deterioration in the quality of corporate governance owing to ever-growing board sizes and high CEO compensations (Loderer & Waelchli, 2010). Generally, the older the firm, the more serious its agency issues. We therefore treat firm age as a proxy for agency problems in a firm, which in turn, exert an influence on SOA.

Although researchers have widely discussed the relationship between firm age, innovation, and firm performance (Balasubramanian & Lee, 2008; Coad, Segarra, & Teruel, 2016), the literature has remained largely silent on the effect of firm age on financial decisions. Hovakimian, Opler, and Titman (2001) argue that older firms with more assets and limited growth opportunities tend to incur more debt. Additionally, as managers allow their risk preference to drive capital structure decisions, firm age is negatively associated with the amount of debt that they employ (Kieschnick & Moussawi, 2018). Since any deviation of the observed leverage away from the optimal level decreases the firm's value, the research direction on financial decision has shifted from the extent to which firms use debt to the speed

[1] Strong corporate governance is related to the enhancement of accountability, trust, and transparency of firms which can alleviate agency costs; firms with weak corporate governance are more likely to bear high agency costs.

with which firms adjust debt to the target degree (Dang, Kim, & Shin, 2014; Ramjee and Gwatidzo, 2012; Hovakimian & Li, 2011). To the best of our knowledge, no study has yet to investigate the impact of firm age on speed of leverage adjustment.

By investigating the impact of firm age on the speed of adjustment of capital structure in Vietnam, a developing and transitional economy during 2000 to 2019, our paper extends the literature in three main ways. First, we reveal the influence of firm age on SOA, which has been unexplored in the literature. Although certain firm-specific characteristics, such as tangibility, firm size, growth and profitability as well as macroeconomic factors (term spread, growth in GDP and inflation) have been identified as determinants of SOA (Antoniou, Guney, & Paudyal, 2008; Viet Anh Dang, Kim, & Shin, 2015; Kurshev et al. 2015), the potential impact of firm age on SOA has, so far, been overlooked.

Second, we have made first attempt to demonstrate the linkage between firm age and SOA in Vietnam. In a developing country, where the legal system and investor protection are not as effective as in developed countries (Nguyen, Locke, & Reddy, 2015), factors associated with agency costs are important to enhance the accountability, trust and transparency of firms. Indeed, the effect of firm age in Vietnam is inconsistent in the literature. Some studies reveal the negative impact of firm age on performance due to technical inefficiencies, and high management[2] and agency costs[3] (Nguyen, 2020; Nguyen, 2020; Tran, Grafton, & Kompas, 2008). Conversely, other studies contend that an ageing firm is more experienced in managing business operations and is better placed to mitigate risks, in addition to leveraging on a well-

[2] Firms with a long operating history are generally linked with complicated organisational structures which, in turn, increase management costs.

[3] Nguyen (2020) concluded that when firm age increases by 1%, the ROA and ROE will decrease by 0.649% and 0.15%, respectively in Vietnam.

established reputation that enables borrowing to be carried out at lower costs (Hoang Thi Mai & Nguyen Vinh, 2018; Le, Mai, & Nguyen, 2020). This paper is novel in its investigation of whether firm age has positive or negative effects on financial decisions.

Third, we consider the mediating effect of firm size, state ownership and optimal capital structure on the relationship between firm age and SOA. Although the influence of firm size, state ownership and optimal capital structure on SOA has been well-defined in the literature (Dang et al., 2014; Drobetz & Wanzenried, 2006; Zhu, 2012), how it may affect the inverse correlation between firm age and SOA has not been examined. We find that the negative effect of firm age on SOA is not consistent for firms that are larger in size, have low state ownership, and which are under-levered.

Our results suggest a negative relationship between firm age and SOA. Our findings also suggest that an increase in firm age leads to an increase in adjustment costs which discourages firms to revert to target leverage. We further find that the impact of firm age on SOA varies across the size of firms and across under-levered firms and over-levered firms. We find a negative impact of firm age and SOA on small firms whilst revealing a positive impact of firm age and SOA on large firms. In the case of under-levered and over-levered firms, we find that when under-levered firms become older, they tend to quickly adjust their leverage to their desired leverage while over-levered firms are slow in adjusting their leverage. We also use alternative measures of leverage, such as book leverage and non-zero debt issuance firms, and generate consistent results.

The remainder of the paper is organised as follows. Section 2 reviews the literature before Section 3 describes the data and research method. Section 4 reveals the empirical results. Section 5 presents the findings of the robustness tests. Section 6 discusses the role of firm size,

state ownership and optimal capital structure. Finally, Section 7 summarises the study, offering conclusions and policy implications.

2. Literature Review

Researchers have shown that as a firm gets older, many of its characteristics change, leading to different behaviours, which can be seen from a range of perspectives (Coad et al., 2017; Coad, Segarra, & Teruel, 2013). For example, Ouimet and Zarutskie (2014) investigated the relationship among firm age, employee age, and growth and concluded that young businesses are linked with high volatility which translates in high rates of failure. However, the young firms that do survive have a faster growth rate compared to older firms. This is partly owing to the characteristics of the employees in young firms -- they tend to earn a better salary and have greater innovation potential and a higher risk tolerance. Similarly, Pellegrino (2017) finds that a lack of qualified personnel leads to difficulties for mature firms to engage in innovation. Balasubramanian and Lee (2008) also found a negative relationship between firm age and innovation, indicating that experienced firms generally choose innovations involving relatively lower technical quality.[4] While young firms concentrate on being competitive in innovation activities, older firms generally focus on improving their operational efficiencies. Huergo and Jaumandreu (2004) also find that older firms demonstrate a lower probability for innovation compared to young firms. Cucculelli (2017) links lower innovation activity in older firms with the characteristics of the product lifecycle and the tenure of the CEO.

Coad et al. (2017) argue that younger firms are likely to engage in riskier innovation activities; when they are successful in these, they achieve greater benefits. Moreover, young firms spend more financial sources on research and development (R&D), which leads to better

[4] Technical quality is measured by the number of citations made to a patent.

performance. Likewise, Chang et al. (2021) suggest that while young firms are eager to enhance investment activities, older firms are inclined to hinder investment activities. The poorer performance of aging firms is also revealed by a slower growth rate in sales, less profitability, and less productivity (Coad et al., 2013). The risk-taking features of older firms are also highlighted by Chincarini et al. (2020) while investigating the relationship between beta and firm age. There is a downward trend of the beta pattern when firms become older, implying that ageing firms adopt risk-averse behaviours.

Although firm age has drawn significant attention from scholars in the context of innovation and performance, little research has been conducted on the relationship between firm age and capital structure.[5] Measuring firm age as the time from the firm going public to the present time, Kieschnick and Moussawi (2018) were the first to explore the impact of firm age on capital structure. They found a negative association between an aging firm and the use of debt, observing that the adverse effect is largely due to corporate governance features as firms age.

Given that there is an existence of an optimal leverage level[6], recent studies have examined how fast firms adjust their leverage to the desired level of capital structure by estimating the speed of adjustment of capital structure. Due to the presence of adjustment costs, firms may temporarily deviate from the optimal capital structure and only change their leverage to the target level when the advantages outweigh the costs of adjustment. Although many attempts

[5] Capital structure, which refers to different combinations of debt and equity, is one of the most important financial decisions that firms make. Modigliani and Miller (M&M) offer the first theory of capital structure, including two provisions: M&M theory without taxes (1958) and M&M theory with corporate and personal taxes (1963).

[6] According to trade-off theory (Myers, 1984), firms can achieve their target capital structure when they strike a balance between the benefits and drawbacks of issuing debt. In a qualitative study, Graham and Harvey (2001) find support for this contention and document that 81% of firms in their survey sample aim to achieve a target debt ratio.

have been made to empirically investigate the determinant of SOA[7], to the best of our knowledge, we are the first to explore the potential relationship between firm age and SOA.

The relationship between firm age and SOA of capital structure can be explained by a number of theories. In this paper, we focus on two key theories: agency theory and trade-off theory. Firms with strong corporate governance can reduce agency costs[8], and agency costs are one part of adjustment costs, which in turn increase the speed of leverage adjustment. Evidence suggests that older firms are likely to have poor corporate governance and greater agency costs compared to younger firms, resulting in the slow pace of leverage adjustment. The various reasons for this have already been discussed and they include the employment of debt by managers of older firms to prevent takeovers, a reluctance to take on risk in innovation activities, and a rigid maintenance of organisational structures and practices. Trade-off theory suggests that firms make significant efforts to achieve their target capital structure to maximise firm value (Myers, 1984), but due to adjustment costs, firms are also reluctant to revert to their capital structure. The findings of Graham and Harvey (2001) support this argument and suggest that 81% of firms aim to achieve a target debt ratio.

Most of the empirical literature regarding firm age focuses on developed markets, while little research has been conducted on emerging and transitional economies like Vietnam. It is worth noting that the corporate governance system in Vietnam is at the initial stage of

[7] The factors linked to the costs and benefits, if adjustments have been disclosed as the determinants of SOA, include tangibility, firm size, growth opportunity, profitability, distance between observed and target leverage as well as macroeconomic factors (term spread, growth in GDP, inflation) (Antoniou et al., 2008; Viet Anh Dang et al., 2015; Drobetz & Wanzenried, 2006; Öztekin & Flannery, 2012).

[8] Since self-interested managers may distort firm policies to maximise their own benefits rather than the wealth of shareholders, agency costs resulting from conflicts between managers and shareholders are a part of adjustment costs.

development and remains underdeveloped.[9] According to the World Bank (2019)[10], Vietnam was ranked 104th out of 183 nations, revealing its weak protection rights for shareholders and investors. Following its transformation from a planned economy to a market economy, the Vietnamese economy has made a degree of progress. However, the average debt ratio of listed firms is more than 0.5, which implies a high probability of bankruptcy (Deangelo & Roll, 2015).

In Vietnam, the effect of firm age can be positive or negative, depending on the perspective undertaken. As already discussed, some studies suggest a negative relationship between firm age and business performance because of high management and agency costs and technical inefficiencies (Bach, Le, & Bui, 2021; Tran et al., 2008). Others, however, assert that corporate governance in firms with a long history are more robust and better placed to avoid risk and to exploit the firm's well established reputation to access financing sources at lower costs. However, the impact of firm age on financial decisions, in the form of speed of adjustment of capital structure, has been ignored thus far. This knowledge gap is something we seek to address in our study.

3. Data and Methods

3.1. Data

We focused on publicly listed companies on the Ho Chi Minh (HOSE) and Hanoi (HNX) stock exchanges over the period of 2000 to 2019. We selected this period because of the availability of the data and the date of establishment of these stock markets. In line with Bauer, Frijns, Otten, and Tourani-Rad (2008) and Laing and Weir (1999), we excluded firms in the financial industries and regulated utilities because of their different financial features. In our

[9] Vietnam had a corporate governance global score of 42.5% in 2011, which was much lower than Thailand (77%) and the Philippines (72%).

[10] https://govdata360.worldbank.org/indicators/h2cfbc48e?country=BRA&indicator=41501&viz=line_chart&years=2017,2019

sample, each firm has at least two consecutive years of trading. We also excluded companies if large amounts of data were missing, or observations included an extreme value. Our final sample included 684 firms with 6,218 firm-year observations.

3.2. Dependent and independent variables

In line with the literature (Buvanendra, Sridharan, and Thiyagarajan (2018), we have used Leverage (LEV) as the dependent variable. Our key independent variables are Firm age (F_AGE) and Firm foundation (F_FOUND). Although some studies have explored the impact of age on other firm characteristics (Balasubramanian & Lee, 2008; Coad et al., 2017; Kieschnick & Moussawi, 2018), this is the first to investigate the impact of firm age on SOA. Other control variables are also taken from the literature. For example, Nguyen, Bai, Hou, and Vu (2021) and Aybar-Arias et al. (2012) used Tangibility (TANG), Depreciation (DEP) and Profitability (PROFIT) in their studies. Similarly, Industry median debt ratio (MED) and Market-to-book ratio (M/B) are used as independent variables by Kieschnick and Moussawi (2018) in their study. Table 1 lists the definitions of the variables we have used.

[Please insert Table 1 here]

3.2. Econometric Model

Following Liao et al. (2015) and Chang et al. (2014), we use a partial adjustment model for leverage,

$$LEV_{i,t+1} - LEV_{i,t} = \alpha + \delta\left(LEV^{*}_{i,t+1} - LEV_{i,t}\right) + \varepsilon_{i,t}{}^{11}, \quad (1)$$

where $LEV_{i,t}$, and $LEV^{*}_{i,t+1}$ are the observed leverage and the optimal leverage respectively. δ refers to the adjustment speed of capital structure; when $\delta = 1$, the firm has fully changed its debt to the target leverage, whereas SOA <1 represents the presence of adjustment costs.[12] Following Faulkender, Flannery, Hankins, and Smith (2012), we first define the target leverage

[12] The adjustment costs may come from financial distress and other costs of debt (Hovakimian & Li, 2011).

as the regression of a firm's characteristics $LEV^{*}_{i,t+1} = \beta X_{i,t}$ and then obtain a reduced-form dynamic adjustment model:

$$LEV_{i,t+1} = \alpha + \beta\delta X_{i,t} + (1-\delta)\, LEV_{i,t} + \varepsilon_{i,t+1}\,, \quad (2)$$

where β is a vector of coefficients to be calculated at the same time as δ, and $X_{i,t}$ is a set of firm-characteristic variables including tangibility *(TANG)*, depreciation and amortisation *(DEP),* industry median debt ratio *(MED),* market to book ratio (*M/B*), and profitability *(PROFIT)*.

According to Öztekin and Flannery (2012), firm characteristics clearly affect both target leverage and SOA. Therefore, we adopt the same control variables in the model to investigate the influences of firm age on SOA:

$$\delta_{i,t} = \partial_0 + \partial_1 Firm\_Age_{i,t} + \partial_2 X_{i,t}\,, \quad (3)$$

Firm_Age is measured by the time between a firm going public and the present time (*F_Age)* and the time between the initial creation of a firm and the present time *(F_FOUND),* and $X_{i,t}$ is a vector of the same control variables as in Equation (2).

Now, we merge Equation (3) with Equation (4) to achieve the model below:

$$LEV_{i,t+1} = \alpha + \beta\delta X_{i,t} + \left[1 - (\partial_0 + \partial_1 Firm\_Age_{i,t} + \partial_2 X_{i,t}\right] LEV_{i,t} + \varepsilon_{i,t+1}\,. \quad (4)$$

Partly multiplying Equation (4) out, we obtain

$$LEV_{i,t+1} = \alpha + \partial_1'(Firm\_Age_{i,t} * LEV_{i,t}) + \partial_2'\left(X_{i,t} * LEV_{i,t}\right) + (1-\partial_0)LEV_{i,t} + \beta\delta X_{i,t} + \varepsilon_{i,t+1}\,, \quad (5)$$

where $\partial_1' = -\partial_1, \partial_2' = -\partial_2$. In Equation (5), the impacts of firm age on SOA are represented in the interaction terms of corporate governance and leverage, with the same magnitudes but opposite signs. As a system, generalised method of moments (GMM) can control for firm fixed effects and the potential endogeneity of independent variables (Blendell & Bond, 1998; Liao et al., 2015; Paudyal, Guney, & Antonious, 2002), and we apply this to Equation (5).

4. Empirical results

4.1. Descriptive statistics

Table 2 shows the descriptive statistics of dependent and independent variables. It includes the mean, standard deviation, minimum and maximum values. We have used LEV as the dependent variable. Our key independent variables are F_AGE and F_Found while other independent variables are control variables. The minimum value of LEV is 0 while the maximum value is 0.994. This shows that there are some firms with no debt while other firms are highly leveraged. The average value of LEV is 0.508, indicating that, on average, firm leverage is approximately 51%. F_AGE is the time, shown in years, between a firm going public and the present time. The age of the youngest firm is 2 years while the oldest firm is 21 years. The average age of firms in our sample is 12.362 years. F_Found is the time between the initial creation of a firm and the present time, which is also shown in years. There is a big difference between the minimum value (5 years) and the maximum value (131 years) with a noticeable standard deviation of 14.382.

In terms of control variables, the average value of TANG and DEP is 0.257 and 0.209, respectively. It is important to note that some firms do not have any depreciation expenses. The average value of MED is 0.174 with a minimum value of 0 and a maximum value of 0.890. Finally, the average value of M/B and PROFIT is 1.158 and 0.075, respectively. It is important to note that some firms have negative profits as the minimum value of PROFIT is -1.575.

[Please insert Table 2 here]

4.2. Correlation Matrix

In order to test for multicollinearity among independent variables, we measure the correlation. Table 3 shows the correlation matrix among the variables. A correlation matrix

focuses on two aspects: direction, and strength of connection between independent variables. As Gujarati and Porter (2009) note, multicollinearity is a concern when the value of correlation coefficients is more than 0.8. Our results show that all the values are significantly lower than 0.8, indicating that multicollinearity is not a concern in this study.

[Please insert Table 3 here]

4.3. The impact of firm age on adjustment speed of capital structure

We represent the effect of firm age on the adjustment speed of capital structure by two models of Equation (5) in Table 4. We include the year dummy to control for time fixed effects in our regressions. From Equation (5), the impact of firm age on SOA is shown in the interaction terms between firm age and leverage with the same magnitude but with the opposite sign; we present the findings to demonstrate the true impact of firm age and other variables on SOA in Table 4.

[Please insert Table 4 here]

It can be seen from Table 4 that the coefficient on the interaction term between leverage and firm age is negative. This implies an adverse influence of firm age on the adjustment speed of capital structure. The coefficients of the interaction terms for both measurements of firm age (*F_AGE* and *F_FOUND*)[13] by the GMM approach are -0.065 and -0.062 respectively and these coefficients are significant at the 1% level. Our results indicate that as firm age increases the adjustment costs, this in turn reduces the speed at which leverage reverts to its target.

As firm age is closely associated with weak corporate governance and poor performance, older firms have higher agency costs, which in turn increase the adjustment costs and decrease the speed of adjustment of capital structure. Poor corporate governance can be explained by three key reasons which have already been discussed: managerial use of debt to

[13] Firm age *(F_AGE)* is measured by the time between a firm going public and the present time. Comparatively, Firm foundation *(F_FOUND)* is measured by the time between the initial creation of a firm and the present time.

circumvent takeovers, a disinclination to invest in risky innovation activities, and a stubborn retention of traditional organisational structures and practices.

Our results support both agency theory and trade-off theory. As takeover defense costs increase with firm age (Johnson et al., 2021), and takeover defense costs[14] are one part of adjustment costs (Chang, Chou, & Huang, 2014b), firm age indirectly increases the adjustment costs, which in turn reduces SOA. Moreover, older firms are generally linked with weak corporate governance, larger boards and higher CEO salaries (Loderer & Waelchli, 2010), resulting in greater agency costs for firms. As agency costs belong to adjustment costs, the adjustment speed of leverage reduces as firms get older. Additionally, in aging firms, managers are more likely for their capital structure decisions to be guided by their risk preferences rather than adjusting the leverage to the optimal level to maximise firm value (Kieschnick & Moussawi, 2018). Ultimately, this prevents firms from achieving their target leverage level.

Our results also support trade-off theory (Myers, 1984) which holds that firms change their capital structure to the optimal level to maximise the firm's value. However, because of adjustment costs, firms are also reluctant to rebalance their capital structure. In this case, adjustment costs mainly come from agency costs as a firm age. Our findings also support the empirical studies in Vietnam that suggest that managers in older Vietnamese firms are more conservative and their decisions lead to poor performance (Hoang Thi Mai & Nguyen Vinh, 2018; Tran et al., 2008). These older firms have high agency costs, which prevent them from achieving the optimal capital structure.

[14] To take advantage of debt as a takeover defence tool, managers are likely to use more leverage than the value-maximising level to deter outside raiders.

5. Robustness tests

5.1. Alternative measures of leverage

In this section, we re-examine the findings by applying the book value measure of leverage – total debt leverage (total debt/book value of total assets) and re-run Equation (5). We review the impact of firm age on the adjustment speed of capital structure by adopting two measurements of firm age: *F_AGE* and *F_FOUND.*

[Please insert Table 5 here]

Table 5 illustrates the impact of firm age on the speed of adjustment of capital structure. Consistent with our main findings, the signs of interaction terms between firm age and leverage are negative, which indicates an inverse correlation between firm age and SOA. More specifically, the coefficients of the interaction terms for both firm age variables *(F_AGE* and *F_FOUND)* are -0.074 and -0.026 and are significant at the 1% level.

5.2. Non-zero debt issuance firms

Questions around how much debt firms should employ and whether firms should choose debt or equity have been raised by Cook, Kieschnick, and McCullough (2008). A discrepancy exists between zero-leverage firms and non-zero leverage firms with respect to their financial constraints, financial flexibility, and their external financing needs. Chang et al. (2014b) and Nguyen, Bai, Hou, Truong (2021) also indicate the potential bias for the inclusion of zero debt issuance firms in estimating the speed of adjustment of capital structure. Therefore, to review the robustness of the results in Section 4, we remove the zero-leverage firms and re-estimate Equation (5).

[Please insert Table 6 here]

Table 6 presents the findings with non-zero leverage firms. The results are consistent with our findings in Section 4: that the adverse effect of firm age on SOA is negative. In particular, the interaction terms between two firm age variables are negative and significant at 1%.

5.3. Ho Chi Minh Stock Exchange (HOSE) vs the Hanoi Stock Exchange (HNX)

In this section, we divide our sample into two groups with firms listed in the Ho Chi Minh Stock Exchange (HOSE) and firms listed in the Hanoi Stock Exchange (HNX). We then re-estimated Equation (5). HOSE and HNX are the two stock exchanges for publicly listed firms in Vietnam. According to Hoang, Pham, Ramiah, Moosa, and Le (2020), there is a difference between these two stock exchanges regarding market interactions.

[Please insert Table 7 here]

Table 7 compares the impact of firm age on speed of leverage adjustment between HOSE and HNX. The results are consistent between the two stock exchanges and the outcomes in Section 4. That is, the influence of firm age on SOA is negative and significant at the 1% level.

6. Additional tests

6.1. Firm age, capital structure dynamics, and the role firm size

In this section, we explore the role of firm size on the relationship between firm age and SOA. We expect that large firms with lower asymmetry information and transaction costs can reduce or lower the negative impact of firm age on SOA.

Empirical studies have revealed a positive impact of firm size on SOA. According to Drobetz and Wanzenried (2006), large firms with great collateral guarantees can reduce the risk to lenders, enabling them to access the financial market at lower transaction costs, which in turn increases the speed of leverage adjustment. Moreover, large firms are generally linked

with better analyst coverage information, which decreases information asymmetry and increases the reversion rate of the leverage.

To check the impact of firm age on SOA with different firm sizes, we divide our sample into two groups depending on the firm size distributions. Small size and large size are defined as the first and the second quantile of firm size distribution respectively. Then we re-run Equation (5) for our two sub-samples. The results are presented in Table 8.

[Please insert Table 8 here]

Table 8 shows how the impact of firm age on SOA varies across small and large firms. Our results suggest that firm age has a negative impact on the SOA of small firms but a positive impact for larger firms. One possible explanation is that a large firm can potentially borrow from the banks at lower transactions costs, which reduces adjustment costs. The decrease in transaction costs outweighs the agency costs for older firms, which increases SOA.

6.2. Firm age, capital structure dynamics, and the role of state ownership

In this section, we take into consideration the role of state ownership on the impact of firm age on the speed of adjustment of capital structure. Empirical studies have concluded that state-owned enterprises generally carry high agency costs[15]. Moreover, in the circumstances of Vietnam, a transitional economy, most old firms are originally state-owned enterprises. Following a privatisation process[16], they are partly owned by the government. We divide our sample into two groups depending on the state ownership distributions. Low (or high) state-

[15] First, state-owned firms are bailed out by the state-controlled banks under government support, which results in "soft budget" limits. The flexibility of this budget has an adverse influence on the managers' motivation in state-owned enterprises (Zhu, 2012). Second, government shareholders with voting rights but who lack cash flow rights can create a discrepancy between voting rights and cash flow rights in state-owned firms. Third, the goal of state-owned firms is to fulfil political objectives rather than maximise the shareholders' interests.

16 This is the process that occurs when state-owned firms transform into private firms.

ownership firms are determined by the first and the second quantile of state ownership distributions, and Equation (5) is then re-run.

[Please insert Table 9 here]

Table 9 shows how the impact of firm age on SOA varies across firms with low state ownership and firms with high state ownership. Firm age has a negative impact on SOA for the high state-ownership firms which is consistent with our main results. The negative impact of firm age on SOA is true for enterprises with high state ownership but it is insignificant for firms with low state ownership. Aging corporations with a substantial state ownership structure are more likely to bear heavy agency costs, which reduces SOA. Conversely, firms with low state ownership can attenuate the agency costs and alleviate the negative impact of firm age on SOA.

6.3. Firm age, capital structure dynamics, un-levered and over-levered firms

In this section, we examine the impact of firm age on the speed of adjustment of capital structure under two scenarios: when the leverage is less than the optimal level (under-levered firms) and when the leverage is more than the optimal level (over-levered firms). We divide our sample into two groups -- under-levered firms and over-levered firms -- and re-run Equation (5). The results are presented in Table 10.

[Please insert Table 10 here]

It can be seen from Table 10 that the impact of firm age on SOA is positive for under-levered firms but the impact is negative for over-levered firms. This indicates that the older firms that are under-levered tend to quickly adjust their leverage to the target level, because the benefits of using debt as a takeover tool outweigh the disciplinary cost of debt. However, managers in older firms that are over-levered adjust the leverage slowly because they are

reluctant to reduce the leverage to meet the optimal level. In this case, the defense costs of debt increase to prevent outsiders from taking over the company.

7. Conclusions

Although there is substantial empirical research on firm age with respect to innovation and performance, the impact of firm age on financial decisions, in the form of speed of adjustment of capital structure, has been left unexplored in the literature. Our paper fills this gap by investigating the effect of firm age on the speed at which firms revert to their target level of leverage in Vietnam from 2000 to 2019.

Overall, we find that older firms are slow in converging to the target optimal capital structure due to adjustment costs. Our findings suggest that an increase in firm age leads to a raise in adjustment costs which prevents firms from achieving the optimal level. Our results support both agency theory and trade-off theory. Older firms are generally associated with weak corporate governance, larger board sizes and higher remunerations for their CEOs (Loderer & Waelchli, 2010). These all lead to greater agency costs for firms. Due to increased agency costs, the speed of adjustment of capital structure is slow in the case of older companies. Our results also support trade-off theory in demonstrating that firms are reluctant to rebalance their capital structure due to the costs of adjustment outweighing its benefits. Our findings are also consistent with the negative impact of firm age in the Vietnamese market, demonstrating that firm age is associated with technical inefficiency, and high management and agency costs (D. T. Nguyen, 2020; Tran et al., 2008).

We also implemented additional tests to examine the role of firm size, state ownership, and optimal capital structure on the relationship between firm age and SOA. We find a negative impact of firm age and SOA on small firms and a positive impact of firm age on the SOA of large firms. With respect to state ownership, our results suggest that firm age has a negative

impact on SOA for firms with high levels of state-ownership, which is consistent with our main results, but firm age is insignificant for firms with low levels of state-ownership. Ageing corporations which involve substantial state ownership structures are more likely to bear high agency costs, which reduce SOA. Comparatively, firms with low levels of state ownership can attenuate the agency costs and alleviate the negative impact of firm age on SOA. Notably, the impact of firm age on under-levered firms and over-levered firms are opposite. We find a positive relationship between firm age and SOA for under-levered firms and a negative relationship between firm age and SOA for over-levered firms. It appears that as under-levered firms become older, they tend to quickly adjust their leverage to the desired capital structure while over-levered firms are slow in adjusting their leverage.

The findings of this study are useful for firms in Vietnam. Evidence suggests that older firms are reluctant to achieve the target leverage due to high adjustment costs. This study aims to assist firms in developing their corporate policies associated with capital structure. We offer some recommendations to alleviate the negative effects of firm age on financial decisions. Ageing corporations would do well to focus on enhancing their corporate governance quality to reduce agency costs. Such firms should also consider decreasing their leverage and levels of state ownership. Meanwhile, investors need to consider the negative aspects of older firms when making their investment decisions. These negative aspects are reduced when it comes to large firms with low levels of state ownership and less debt.

References

Antoniou, A., Guney, Y., and K. Paudyal (2008). The determinants of capital structure: capital market-oriented versus bank-oriented institutions, *Journal of Financial and Quantitative Analysis,* 43, 59-92. doi:10.1017/S0022109000002751

Aybar-Arias, C., A. Casino-Martínez, and J. López-Gracia (2012). On the adjustment speed of SMEs to their optimal capital structure, *Small Business Economics,* 39, 977-996.

Bach, T., T. Le, and Y. Bui (2021). Informal Short-term Borrowings and Small and Medium Enterprises' Performance in a Credit Crunch: Evidence from Vietnam, *The Journal of Development Studies,* 57, 1321-1335. doi:10.1080/00220388.2020.1862798

Balasubramanian, N., and J. Lee (2008). Firm age and innovation, *Industrial and Corporate Change,* 17, 1019-1047. doi:10.1093/icc/dtn028

Buvanendra, S., P. Sridharan, and S. Thiyagarajan (2018). Determinants of speed of adjustment (SOA) toward optimum capital structure: Evidence from listed firms in Sri Lanka, *Journal of Asia-Pacific Business,* 19, 46-71.

Chang, K., J. Ding, Q. Lou, Z. Li, and J. Yang (2021). The impact of capital leverage on green firms' investment: New evidence regarding the size and age effects of Chinese green industries, *Finance Research Letters, 38,* 101529. doi:10.1016/j.frl.2020.101529

Chang, Y. K., R.K. Chou and T.H. Huang (2014a). Corporate governance and the dynamics of capital structure: New evidence, *Journal of Banking & Finance,* 48, 374-385.

Chang, Y. K., R.K.Chou and T.H. Huang (2014b). Corporate governance and the dynamics of capital structure: New evidence, *Journal of Banking and Finance, 48,* 374-385. doi:10.1016/j.jbankfin.2014.04.026

Chincarini, L. B., D. Kim and F. Moneta (2020). Beta and firm age, *Journal of Empirical Finance,* 58, 50-74. doi:10.1016/j.jempfin.2020.05.003

Coad, A., J.R. Holm, J. Krafft and F. Quatraro (2017). Firm age and performance, *Journal of Evolutionary Economics,* 28, 1-11. doi:10.1007/s00191-017-0532-6

Coad, A., A. Segarra, and M. Teruel (2013). Like milk or wine: Does firm performance improve with age?, *Structural Change and Economic Dynamics,* 24, 173-189. doi:10.1016/j.strueco.2012.07.002

Coad, A., A. Segarra and M. Teruel (2016). Innovation and firm growth: Does firm age play a role?, *Research Policy,* 45, 387-400. doi:10.1016/j.respol.2015.10.015

Cook, D. O., R. Kieschnick and B.D.McCullough (2008). Regression analysis of proportions in finance with self selection, *Journal of Empirical Finance,* 15, 860-867.

Cucculelli, M (2017). Firm age and the probability of product innovation. Do CEO tenure and product tenure matter?, *Journal of Evolutionary Economics,* 28, 153-179. doi:10.1007/s00191-017-0542-4

Dang, V. A., M. Kim and Y. Shin (2014). Asymmetric adjustment toward optimal capital structure: Evidence from a crisis, *International Review of Financial Analysis,* 33, 226-242. doi:10.1016/j.irfa.2014.02.013

Dang, V. A., M. Kim and Y. Shin (2015). In search of robust methods for dynamic panel data models in empirical corporate finance, *Journal of Banking & Finance,* 53, 84-98.

Deangelo, H., R.Roll (2015). How Stable Are Corporate Capital Structures?, *Journal of Finance, 70*(1), 373-418. doi:10.1111/jofi.12163

Dlugosz, J., R. Fahlenbrach, P. Gompers and A. Metrick (2006). Large blocks of stock: Prevalence, size, and measurement, *Journal of Corporate Finance,* 12, 594-618. doi:10.1016/j.jcorpfin.2005.04.002

Drobetz, W., and G. Wanzenried (2006). What determines the speed of adjustment to the target capital structure?, *Applied Financial Economics,* 16, 941-958. doi:10.1080/09603100500426358

Graham, J. R., and C.R. Harvey (2001). The theory and practice of corporate finance: evidence from the field, *Journal of Financial Economics,* 60, 187-243. doi:10.1016/S0304-405X(01)00044-7

Gujarati, D., and D. Porter, (2009). Basic Econometrics, 5th edition, ed. *Anne Hilbert*.

Hoang, T. C., H. Pham, V. Ramiah, I. Moosa, and D.V. Le (2020). The effects of information disclosure regulation on stock markets: Evidence from Vietnam, *Research in International Business and Finance,* 51, 101082. doi:10.1016/j.ribaf.2019.101082

Hoang Thi Mai, K., and K. Nguyen Vinh (2018). Audit Quality, Firm Characteristics and Real Earnings Management: The Case of Listed Vietnamese Firms, *International Journal of Economics and Financial Issues,* 8, 243-249.

Hovakimian, A., and G. Li (2011). In search of conclusive evidence: How to test for adjustment to target capital structure, *Journal of Corporate Finance,* 17, 33-44. doi:10.1016/j.jcorpfin.2010.07.004

Hovakimian, A., T. Opler, and S. Titman (2001). The debt-equity choice, *Journal of Financial and Quantitative Analysis, 36*(1), 1-24. doi:10.2307/2676195

Huergo, E., and J. Jaumandreu (2004). How Does Probability of Innovation Change with Firm Age?, *Small Business Economics,* 22, 193-207. doi:10.1023/B:SBEJ.0000022220.07366.b5

Johnson, W. C., J.M. Karpoff and S.J.A. Yi (2021). The Lifecycle Effects of Corporate Takeover Defenses.

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

Kurshev, A., and I.A. Strebulaev (2015). Firm size and capital structure, *Quarterly Journal of Finance*, 5(03), 1550008.

Le, T., V. Mai, and V. Nguyen (2020). Determinants of profitability: Evidence from construction companies listed on Vietnam Securities Market, *Management Science Letters,* 10, 523-530.

Loderer, C. F., & Waelchli, U. (2010). Firm age and performance. Available at SSRN 1342248.

Myers, S. C. (1984). The capital structure puzzle, *Journal of Finance*, 39, 575-592. doi:10.1111/j.1540-6261.1984.tb03646.x

Nguyen, D. (2020). The effect of financial structure on business performance of industrial enterprises listed in Vietnam. Accounting, 6(7), 1297-1304.

Nguyen, T., Bai, M., Hou, G., & Truong, C. (2021). Speed of adjustment towards target leverage: evidence from a quantile regression analysis. *Accounting & Finance*, *61*(4), 5073-5109.

Nguyen, T., M. Bai, Y. Hou, and M.C. Vu, (2021). Corporate governance and dynamics capital structure: evidence from Vietnam, *Global Finance Journal, 48,* 100554.

Nguyen, T., S. Locke and K. Reddy (2015). Ownership concentration and corporate performance from a dynamic perspective: Does national governance quality matter?, *International Review of Financial Analysis,* 41, 148-161. doi:10.1016/j.irfa.2015.06.005

Nguyen, T. N. (2020). Does Bribery Sand the Wheels? New Evidence from Small and Medium Firms in Vietnam, *Journal of Asian Finance, Economics and Business,* 7, 309-316.

Ouimet, P., and R. Zarutskie (2014). Who works for startups? The relation between firm age, employee age, and growth, *Journal of Financial Economics,* 112, 386-407. doi:10.1016/j.jfineco.2014.03.003

Öztekin, Ö. And M.J. Flannery (2012). Institutional determinants of capital structure adjustment speeds, *Journal of Financial Economics,* 103, 88-112. doi:10.1016/j.jfineco.2011.08.014

Pellegrino, G (2017). Barriers to innovation in young and mature firms, *Journal of Evolutionary Economics*, 28, 181-206. doi:10.1007/s00191-017-0538-0

Ramjee, A. and Gwatidzo, T. (2012). Dynamics in capital structure determinants in South Africa, *Meditari Accountancy Research*, Vol. 20 No. 1, pp. 52-67.

Tran, T. B., R.Q. Grafton and T. Kompas (2008). Firm Efficiency in a Transitional Economy: Evidence from Vietnam, *Asian Economic Journal,* 22, 47-66. doi:10.1111/j.1467-8381.2008.00268.x

Zhu, X. (2012). Understanding China's growth: Past, present, and future. *Journal of Economic Perspectives*, 26(4), 103-124.