Asian Economic and Financial Review
ISSN(e): 2222-6737
ISSN(p): 2305-2147
DOI: 10.18488/journal.aefr.2020.109.1028.1036
Vol. 10, No. 9, 1028-1036.

URL: www.aessweb.com

THE IMPACT OF FINANCIAL STRUCTURE ON PROFITABILITY: EMPIRICAL EVIDENCE FROM VIETNAM'S CONSTRUCTION SECTOR

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Article History
Received: 2 July 2020
Revised: 10 August 2020
Accepted: 14 September 2020
Published: 22 September 2020

Keywords
Financial structure
Trade-off theory
Pecking order theory
Agency theory
Firm's profitability
Construction sector
Vietnamese economy
Statistical modelling.

JEL Classification:
G32; C15; M21.

ABSTRACT

The purpose of this study is to empirically investigate the impact of financial structure—the balance between a firm's liabilities and equities—on profitability, based on a sample of listed construction companies in Vietnam. Following a literature review, the hypothesis that there is a positive relationship between financial structure and profitability was formulated and tested through pooled ordinary least square, fixed effects, and random effects models. The empirical results revealed that the total, short-term, and long-term debt ratios exert a negative impact on profitability, while asset tangibility, inventory ratios, and growth rate, as well as size and age of firm all positively affect profitability; however, short-term receivable ratios had no effect. These findings contribute empirical evidence, in the context of emerging economies, to the existing body of literature.

Contribution/Originality: This study is one of very few that investigate the relationship between financial structure and profitability, focusing on Vietnamese construction companies. The findings contribute empirical evidence, in the context of emerging economies, to the current literature.

1. OPTIMAL FINANCIAL STRUCTURE THEORY

1.1. Trade-Off Theory

Myers (1984) and Myers and Maijluf (1984) developed the concept of optimal financial structure based on asymmetric information. Information asymmetry between firms and financial providers and creditors means financial costs are likely vary according to the source of funding. For instance, a firm that relies on its own internal capital obviously possesses comprehensive information about itself; therefore, a higher rate of return on investments is expected, while the costs incurred will be lower than issuing equity shares.

Modigliani and Miller (1958) developed the financial structure theory from which a range of future theories would emerge, proposing the well-known theory of financial structure irrelevancy: a firm's market value is not affected by its source of funding but by its operating profits. However, their theory is based on non-existent assumptions: efficient capital markets, uniform expectations, no taxes, and no transaction costs. In the real world, though, where tax benefits on interest payments can be accrued and costs of distress, such as bankruptcy costs,

exceed those accruals, the concept of financial structure optimization is significant in maximizing a firm's value, or minimizing the total cost of capital.

The trade-off theory acknowledges bankruptcy costs and refers to cost–benefit analysis that firm use in deciding how much debt to carry and how much capital to use. According to this theory, there are advantages to debt as a funding source, tax benefits despite debt financing costs and bankruptcy costs. However, as the amount of debt increases, the marginal benefit decreases while marginal costs increase; therefore, to optimize overall value a firm focuses on the trade-off between costs and benefits when determining the debt-to-equity ratio. Although this explains the difference in debt-to-equity ratios between sectors, it does not account for the variation within the same sector.

1.2. Pecking Order Theory

The pecking order, or classification order, theory was first proposed by Donaldson (1961) and later modified by Myers and Maijluf (1984). This theory posits that firms prioritize their funding options according to the principle of least effort/resistance: initially, they rely on internal capital (e.g., retained earnings), where no information asymmetry exists; then, if more funding is required, debt is considered; eventually, equity shares are issued to meet all remaining capital requirements (Abor, 2005). Thus, the form of debt that a firm selects can indicate its external financial needs.

It is also argued that firms are willing to issue equity when the market is overvalued (Chittenden, Hall, & Hutchinson, 1996; Myers & Maijluf, 1984) based on the assumption that managers act in the interests of current shareholders. Therefore, undervalued shares are not issued, unless the gradual transfer of value from existing to new shareholders is more than offset by the net present value of growth opportunities; investors thus conclude that stock is only issued at a price higher than the real market value of the firm. Myers and Maijluf (1984) maintain that firms prefer internal rather than costly external funding sources, while (Abor, 2005) state that if external finance is inevitable, a firm will select secured rather than risky debt and only issue common shares as a last resort. Consequently, under the pecking order, or classification order, theory, high-income firms are expected to carry less debt than lower-income firms.

1.3. Agency Theory

The agency theory refers to the relationship, or contract, between a firm's principals, the owners or shareholders, and their agents, board of directors, whose responsibility it is to maximize the shareholders' benefits. Specifically, the directors are responsible for running the firm in a way that maximizes not only the long-term returns for shareholders but also the firm's profits and cash flow.

Problems arise, though, from the disparate interests of principals and agents: the agents, who are the decision-makers, tend to pursue their own interests instead of those of the principals, using the free cash flow to meet his for their own self-aggrandizement rather than to shareholders by dividend payments (Jensen & Ruback, 1983). Therefore, the main challenge faced by shareholders is ensuring directors pay out free cash flow as returns, such as dividend payments, instead of investing in projects promising below average returns (Jensen, 1986). To ensure agents act the benefit of shareholders, the latter must be willing to bear some agency costs, such as hiring an external controller; however, the more control principals exercise over agents' decisions, the higher the agency costs incurred.

However, later research found that financial structure can help resolve this issue without significantly increasing agency costs by simply exchanging equity for debt (Pinegar & Wilbricht, 1989). Lubatkin and Chatterjee (1994) also argued that increasing the debt-to-equity ratio can lead to more effective operations: a high level of financial leverage results in high interest costs that compels directors to focus only on those activities that fulfill firm's financial liabilities. Financial leverage, or debt, thus acts as a control mechanism, in which lenders and

shareholders become key actors in the corporate governance structure, while directors cannot afford to waste the firm's resources on worthless activities. As a result, debt creation transfers wealth from the firm and its directors to investors, or shareholders (Jensen.. & Ruback, 1983).

Although it appears that debt-financed firms are always better for investors than those backed by equity, not all are financed by debt. This is because debt increases capital and other costs, raising the likelihood of cash flow problems and potential bankruptcy, as well as its related costs. Moreover, companies with a high level of financial leverage tend to be assigned lower credit ratings by credit rating agencies, which increases overall capital costs, due to higher interest rates, or dividends to attract investors.

1.4. Empirical Evidence of Relationship between Financial Structure and Profitability

Abor (2005) studied 22 Ghanaian companies between 1998 and 2002 and found not only positive relationships between firm size (SIZE) and profit, and revenue and profit growth (GROW) but also a significant correlation between short-term debt (STD) and return on equity (ROE). STD is an important source of finance for Ghanaian companies, accounting for 85% of total financial leverage, and the study results revealed: i) a positive relationship between STD-to-total-assets ratio and ROE; ii) a negative relationship between long-term debt (LTD)-to-total-assets ratio and ROE; and iii) a positive relationship between total-debt-to-total-assets ratio (TDA) and ROE.

Gill, Biger, and Mathur (2011) expanded Abor (2005) study by examining the impact of financial structure on the profitability (i.e., ROE) of a sample of 272 US manufacturing and service companies listed on the New York Stock Exchange between 2005 and 2007. Following correlation and regression analyses, the experimental results showed a positive relationship between: i) STD-to-total-assets ratio and profits; ii) LTD-to-total-assets ratio and profits; and iii) TDA and profits in both manufacturing and service companies.

Mohamed and Inunjariya (2015) further studied the same impact in 14 Sri Lankan companies from the beverage, food, and tobacco sector, concluding that financial leverage exerted a negative impact on profitability. Their findings showed that both financial leverage measurement tools, TDA and total-debt-to-equity ratio (TDE), negatively affected both profitability measurement tools, ROE and return on capital employed (ROCE), with the TDA relationship at a 0.05 level of significance while the TDE relationship was insignificant.

Habib, Hamelin, and Wenzel (2016) undertook a similar study of 340 Pakistani non-financial listed on the KSE. The financial statements of all the companies were analyzed and revealed a significant negative relationship between debt and profitability.

2. DATA SOURCE AND STUDY METHODOLOGY

For this study, data was collected from financial statements published in the annual reports of construction companies listed on both the Ho Chi Minh City Stock Exchange (HOSE) and Hanoi Stock Exchange (HNX) and quantitative analysis was conducted on EViews using panel. In line with other research studies, the current study defines profitability, or return on sales (ROS), as follows:

$$ROS = f(TD, STD, LTD, TANG, INVE, RECE, SIZE, GROW, TURN, AGE)$$

Where:

- ROS: Profit after tax / Net revenue.
- TD (debt-to-capital ratio): Liabilities / Total capital.
- STD: Short-term debt / Total capital.
- LTD: Long-term debt / Total capital.
- TANG (asset tangibility): Fixed assets / Total assets.
- INVE (inventory-to-total-assets ratio): Inventory / Total assets.
- RECE (short-term-receivables-to-total-assets ratio): Short-term receivables / Total assets.
- SIZE: Logarithm of total assets.

- GROW (revenue growth rate): Net revenue for year minus that for previous year / Net revenue for previous year.
- TURN (asset turnover ratio): Net revenue / Average total assets.
- AGE: Number of years between firm's equitization and time of study.

Based on earlier studies, this study investigates the following hypotheses:

- *H1: Financial structure (TD, STD, LTD) exerts a negative impact on the profitability of listed construction companies in Vietnam.*
- *H2: Target TANG is positively related to the profitability of listed construction companies in Vietnam.*
- *H3: INVE is negatively related to the profitability of listed construction companies in Vietnam.*
- *H4: RECE is negatively related to the profitability of listed construction companies in Vietnam.*
- *H5: Target SIZE is positively related to the profitability of listed construction companies in Vietnam.*
- *H6: GROW targets are positively related to the profitability of listed construction companies in Vietnam.*
- *H7: AGE is positively related to the profitability of listed construction companies in Vietnam.*

The profitability of the selected Vietnamese companies is calculated by:

$$ROS_{it} = \alpha + \beta_1 * TD_{it} + \beta_2 * STD_{it} + \beta_3 * LTD_{it} + \beta_4 * TANG_{it} + \beta_5 * INVE_{it} + \beta_6 * RECE_{it} + \beta_7 * SIZE_{it} + \beta_8 * GROW_{it} + \beta_9 * AGE_{it} + U_{it}$$

Table 1 shows the variables in the model used and their anticipated impact on profitability.

Table-1. Variables identified and anticipated impact.

Variable	Symbol	Author	Calculation Formula	Anticipated Impact
Profitability	ROS	Berzkalne (2014); Javed, Younas, and Imran (2014)	Profit after tax / Net revenue	
Debt-to-capital ratio	TD	Abor (2005); Gill et al. (2011); Sheikh and Wang (2013); Berzkalne (2014)	Liabilities / Total capital	(-)
Short-term debt ratio	STD	Abor (2005); Gill et al. (2011); Salim and Yadav (2012); Sheikh and Wang (2013); Berzkalne (2014)	Short-term debt / Total capital	(-)
Long-term debt ratio	LTD	Abor (2005); Gill et al. (2011); Salim and Yadav (2012); Sheikh and Wang (2013); Berzkalne (2014)	Long-term debt / Total capital	(-)
Asset tangibility	TANG	Zeitun and Tian (2007); Sheikh.. and Wang (2013); Dawar (2014)	Net revenue / Average assets	(+)
Inventory-to-total-assets ratio	INVE		Inventory/ Total assets	(-)
Short-term-receivables-to-total assets ratio	RECE		Short-term receivables / Total assets	(-)
Size of firm	SIZE	Abor (2005); Zeitun and Tian (2007); Onaolapo and Kajola (2010); Salim and Yadav (2012); Sheikh and Wang (2013); Berzkalne (2014)	Logarithm of total assets	(+)
Revenue growth rate	GROW	Abor (2005); Zeitun and Tian (2007); Onaolapo and Kajola (2010); Gill et al. (2011); Sheikh and Wang (2013); Dawar (2014)	Net revenue for year minus that for previous year / Net revenue for previous year	(+)
Asset turnover ratio	TURN	Onaolapo and Kajola (2010); Muritala (2012)	Net revenue / Average assets	(+)
Age of firm	AGE	Onaolapo and Kajola (2010); Muritala (2012); Pouraghajan, Malekian, Emamgholipour, Lotfollahpour, and Bagheri (2012); Dawar (2014)	Number of years between of firm's equitization and time of study	(+)

3. EMPIRICAL RESULTS AND MODEL VERIFICATION

3.1. Descriptive Statistics

A sample of 70 construction companies were examined from 2014 to 2017, producing a total of 280 observations for this study. The descriptive statistics are presented in Table 2.

Table-2: Descriptive statistics for variables.

Variable	Observations	Mean	Std. Dev.	Min	Max
ROS	280	0.05453	0.26597	-1.70377	2.64281
TD	280	0.64215	0.20120	0.04965	1.18881
STD	280	0.55511	0.18653	0.04904	1.09433
LTD	280	0.25331	0.12659	0	0.65429
TANG	280	0.23878	0.24457	0	0.83710
INVE	280	0.12544	0.30215	0	0.85887
RECE	280	0.45529	0.23652	0.01995	0.76908
SIZE	280	12.5324	1.41423	7.16858	16.5277
GROW	280	0.31136	0.55896	-0.6026	7.31180
AGE	280	8.52684	3.17436	1	15

3.2. Self-Correlation Matrix

From the correlation matrix shown in Table 3, it is evident that no strict relationship exists between the independent variables: all the correlation coefficients are less than 0.63, indicating that there is no autocorrelation between any variable pairs (Gujarati, 2004). However, exercising caution, the Durbin–Watson test was performed for autocorrelation. In addition, as any autocorrelation could lead to multicollinearity in the regression model, the variance inflation factor (VIF) was calculated.

Table-3. Correlation matrix.

Variable	ROS	TD	STD	LTD	TANG	INVE	RECE	SIZE	GROW	AGE
ROS	1									
TD	-0.1752	1								
STD	-0.1999	0.4993	1							
LTD	0.1426	0.6245	0.5244	1						
TANG	0.0225	-0.0398	0.1426	-0.0025	1					
INVE	-0.355	0.2453	0.0064	0.4586	-0.2454	1				
RECE	-0.3379	0.0569	0.0936	0.0512	-0.2852	-0.2955	1			
SIZE	-0.0346	0.4723	-0.3105	0.4588	-0.0235	0.1426	-0.1527	1		
GROW	0.2107	-0.0019	-0.3256	-0.2955	0.0624	-0.1699	-0.0435	-0.0025	1	
AGE	0.0456	-0.0523	-0.0568	0.0599	-0.2213	-0.1463	-0.0096	0.0322	-0.0865	1

3.3. Panel Data Regression Model Selection

Table 4 presents the correlation coefficients and p-values for three models: pooled ordinary least square (OLS), fixed effects model (FEM), and random effects model (REM).

First, the Hausman test was used to select whether the FEM or REM was more suitable. Based on the results presented in Table 5, where the p-value = 0 < 5%, the FEM is the most appropriate.

Table-4. Three panel data regression models.

Variable	Pooled OLS		FEM		REM	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	-0.028118	0.324500	-0.232442	0.024100	-0.026517	0.001700
TD	-0.000007	0.000000	-0.000008	0.000100	-0.000007	0.000000
STD	-0.003313	0.148500	-0.025485	0.000100	-0.007403	0.000000
LTD	-0.015996	0.000000	-0.004750	0.036400	0.005171	0.000000
TANG	0.048186	0.007000	0.136500	0.000000	0.106989	0.000000
INVE	0.018486	0.000000	0.010083	0.044900	0.014447	0.000000
RECE	-0.000496	0.000300	-0.000187	0.122800	-0.000314	0.000000
SIZE	0.115508	0.000500	0.072690	0.039900	0.085557	0.000000
GROW	0.356502	0.000000	0.275052	0.000100	0.298733	0.000000
AGE	0.123556	0.000122	0.125481	0.000569	0.122250	0.000000

Table-5. Hausman test results.

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random effects	75.64503	8	0

Next, the F-test, or likelihood test, was used to select whether the FEM or pooled OLS was more suitable. Based on the results shown in Table 6, where the p-value = 0 <5%, the FEM model is again the most appropriate.

Table-6. Likelihood test results.

Effects Test	Statistic	d.f.	Prob.
Cross-section F	5.070357	-209.622	0
Cross-section Chi-square	835.483413	209	0

Consequently, the FEM is the best fit for the research data.

3.4. Regression Analysis

Table 7 shows the full regression results for the selected FEM, including the Durbin–Watson coefficient of 2.2. There is thus no autocorrelation between the variables in the regression model.

Table-7. Regression analysis of FEM model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.232442	0.102837	-2.260284	0.024100
TD	-0.000008	0.000002	-3.915100	0.000100
STD	-0.025485	0.007682	3.317463	0.001000
LTD	-0.004750	0.002265	-2.096927	0.036400
TANG	0.136500	0.032694	-4.175117	0.000000
INVE	0.010083	0.005017	2.00994	0.044900
RECE	-0.000187	0.000121	-1.545204	0.122800
SIZE	0.072690	0.035302	2.059093	0.039900
GROW	0.275052	0.067729	4.061098	0.000100
AGE	0.125481	0.054882	4.195862	0.000569
Specification of Random Effects				
Cross-sectional fixed dummy variables				
R-squared	0.726867	Mean dependent variable		0.047335
Adjusted R-squared	0.631578	Std. dev. dependent variable		0.090349
Std. error of regression	0.05484	Akaike info criterion		-2.750206
Sum of squared residuals	1.870622	Schwarz info criterion		-1.521776
Log likelihood	1373.087	Hannan–Quinn info criterion		-2.279388
F-statistic	7.628008	Durbin–Watson statistic		2.265944
Prob. (F-statistic)	0			

The VIF values for each variable in the FEM are presented in Table 8.

Table-8. VIF values for variables.

Variable	TD	STD	LTD	TANG	INVE	RECE	SIZE	GROW	AGE
VIF	3.028367	1.379069	1.539585	1.9208	1.560049	1.077062	2.664748	1.222201	3.452298

According to Gujarati (2004), a VIF value of approximately 10 indicates serious multicollinearity; as the values shown in Table 8 are much lower, it can be concluded that no multicollinearity exists in the regression model.

4. DISCUSSION

- ***Hypothesis H1:*** *Financial structure (TD, STD, LTD) exerts a negative impact on the profitability of listed construction companies in Vietnam.*

In Table 7, the regression results for the debt-to-capital ratio show a beta coefficient of −0.000008, which, at a 1% level of significance, indicates a negative correlation between financial leverage and profitability: the higher the debt, the lower the profitability, and vice versa. Thus, this study supports H1, which is also consistent with the findings of Abor (2005), Gill et al. (2011), Sheikh and Wang (2013), and Berzkalne (2014).

Likewise, the beta coefficients for the short-term and long-term debt ratios are −0.025(1% significance level) and −0.005 (5% significance level), respectively, reveal an inverse relationship between both forms of debt and profitability. This reinforces the finding that, regardless of the duration, the higher the debt, the lower the profitability, and vice versa, which confirms H1, as well as studies by Abor (2005), Gill et al. (2011), Salim and Yadav (2012), Sheikh and Wang (2013), and Berzkalne (2014).

- ***Hypothesis H2:*** *Target TANG is a positively related to the profitability of listed construction companies in Vietnam.*

With a beta coefficient of 0.137 shown in Table 7, at a 1% level of significance, a positive relationship is evident between asset tangibility and profitability: higher tangibility leads to greater profitability, and vice versa. This result not only supports H2 but also those of Zeitun and Tian (2007), Sheikh and Wang (2013), and Dawar (2014).

- ***Hypothesis H3:*** *INVE is negatively related to the profitability of listed construction companies in Vietnam.*

In terms of the inventory-to-total-assets ratio, the beta coefficient in Table 7 of 0.01 at a 5% level of significance indicates a positive relationship between inventory ratios and profitability. This result contradicts H3 that higher inventory rates lead to greater profitability, and vice versa; however, this study agrees with those by Salim and Yadav (2012), Sheikh and Wang (2013), and Dawar (2014).

- ***Hypothesis H4:*** *RECE is negatively related to the profitability of listed construction companies in Vietnam.*

The beta coefficient of −0.000187 in Table 7, though not statistically significant, reveals no correlation between short-term receivable ratios and profitability. Thus, contrary to H4, short-term receivables do not affect profitability, which also contradicts the findings of Onaolapo and Kajola (2010) Gill et al. (2011), Sheikh and Wang (2013) and Dawar (2014)

- ***Hypothesis H5:*** *The target SIZE is positively related to the profitability of listed construction companies in Vietnam.*

According to the result for size of firm in Table 7—beta coefficient of 0.073 at a 5% level of significance—it is positively related to profitability. H5 is thus supported, meaning that larger companies have higher profitability, and vice versa. Furthermore, the findings of this study agrees with those by Abor (2005), Zeitun and Tian (2007), Onaolapo and Kajola (2010), Gill et al. (2011), Sheikh and Wang (2013), and Dawar (2014).

- ***Hypothesis H6:*** *GROW targets are positively related to the profitability of listed construction companies in Vietnam.*

Table 7 shows the beta coefficient for the revenue growth rate to be 0.275 at a 1% level of significance, meaning a positive relationship exists between growth rate and profitability: the greater the growth rate, the higher the profitability, and vice versa. This result supports H6 as well as those of Abor (2005), Zeitun and Tian (2007), Onaolapo and Kajola (2010), Gill et al. (2011), Sheikh and Wang (2013), and Dawar (2014).

- ***Hypothesis H7:*** *AGE is positively related to the profitability of listed construction companies in Vietnam.*

Due to the beta coefficient for age of firm shown in Table 7 being 0.125 at a 1% level of significance, it is evident that there is a positive relationship between age and profitability: older firms tend to be more profitable, and

vice versa. Therefore, both H7 and the results of Onaolapo and Kajola (2010), Muritala (2012), Pouraghajan et al. (2012), and Dawar (2014) are confirmed.

5. CONCLUSIONS AND IMPLICATIONS

The current study investigated the impact of financial structure on the profitability of Vietnamese construction companies listed on the HOSE and HNX. The results revealed that all the variables exert a positive impact on profitability, except financial structure (TD, STD, LTD) negatively affects and short-term receivable ratios (RECE) do not affect profitability (ROS).

To create favorable conditions in which businesses can arrange their capital resources and financial structure in preparation for selecting and bidding for suitable projects, authorities and leading agencies should publish annual construction progress reports, and working capital and disbursement schedules. One of the main difficulties faced by construction companies in increasing profits is the lack of transparency on plans and capital requirements for construction projects. Access to information enables companies to create a roadmap encompassing equipment, supplies, and manpower, as well as the selection of capable contractors at competitive prices, all in the best interests of their shareholders/investors. When the state is a shareholder/investor in firms submitting bids, it is crucial to identify those with appropriate financial structures to guarantee profitability.

In fact, all investors should consider becoming involved in construction companies carrying substantial debts carefully, due to not only the risks but also the potential decline in profits and as a result, in the value of their investment. With regard to other factors to consider, investors should examine firms' size, age, asset tangibility, inventory ratios, and, especially, growth rate, because the higher these values, the higher the firms' profitability. Short-term receivable ratios, though, are not as important to review, since profitability is not affected.

Funding: This study received no specific financial support.
Competing Interests: The authors declare that they have no competing interests.
Acknowledgement: Both authors contributed equally to the conception and design of the study.

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