

Profitability of real estate firms: Evidence using GMM estimation

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ABSTRACT

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This paper investigates factors affecting the profitability of real estate firms in Vietnam by using data of 55 real estate firms listed on Hochiminh and Hanoi stock exchanges over the period 2010-2018. The study applies estimation using panel data which consists of Pooled Regression model (POLS), Fixed Effects model (FEM) and Random effects model (REM). Generalized Method of Moment (GMM) is also implemented to resolve some problems such as autocorrelation among the residuals, heteroscedasticity and other potential endogenous problems. In this study, firm profitability is measured by return on assets. Like earlier studies, the findings indicate that the factors determining firm profitability were leverage, age of the firm, current ratio and inflation rate. Moreover, the results also show the impact of economic growth rate on firm profitability. The paper offers strong implications for the authorities, real estate firms as well as investors.

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1. Introduction

After the global financial crisis, Vietnam has made an impressive recovery which is beneficial to real estate industry. That brings many opportunities for Vietnam's real estate firms to extend their market. However, this recovery also brings them big challenges, especially to their limited management skills, so it is inevitable to adjust their business operations and management skills in order to follow the current trend. When facing the challenges, it is important for the management to identify factors affecting the firm profitability, which helps firms improve their profitability. Up to now, there have been many empirical studies on factors affecting the firm profitability but few of them have been examined in specific fields. In this study, we examine the impact of factors on profitability of 55 real estate firms listed in Vietnam from 2010 to 2018. Based on the results, real estate firms can have a clear view on factors affecting their profitability.

2. Literature review

Research on identifying factors affecting the firm profitability have been conducted in different economies and regions. Safarova (2010) investigated determinants affecting profitability of 76 listed firms on New Zealand Stock Exchange over the period 1996-2007. According to the results, the firm profitability was affected concurrently by firm growth which was measured by sales growth and inversely by leverage. By using financial statements of a Rumanian chemical firm from 1999 to 2009, Burja (2011) confirmed the positive relationship between the financial leverage and profitability, measured by return on assets (ROA). In the United States, the correlation between growth and profitability of restaurant firms was examined by Janga and Park (2011) during the period 1978-2007 and it was found that the growth had inverse influence on profitability. Malik (2011) conducted a study on 34 insurance firms in Pakistan from 2005 to 2009 and indicated that there was no relationship between profitability and firm age. In addition, ROA was affected positively by firm size and financial leverage. With the research on data of 70 non-financial firms listed on Karachi Stock Exchange, Pakistan during the period from 2001 to

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2010, Kouser (2012) stated that firm size and growth rate were correlated with profitability (ROA). Soumadi and Hayajneh (2012) analyzed the impact of debt on profitability of 76 firms which include 53 industrial and 23 service ones listed on Amman Jordan Stock Exchange in the period from 2001 to 2006. Based on the results, they asserted that debt inversely affected profitability. Also, they identified the concurrent effects of firm size and growth rate on profitability. Profitability of 83 Pakistani firms from 2006 to 2009 was investigated by Mumtaz et al. (2013) and they noticed the inverse impact of debt on profitability. Furthermore, their results confirmed the concurrent relationship between firm size (logarithm of total assets) and profitability. Sivathaasan et al. (2013) researched 11 firms listed on Colombo Stock Exchange (CSE) and identified that factors which influence the firm profitability were financial leverage, firm size and sales growth. In another research, Xu and Banchuenvijit (2014) collected data of 28 firms which excluded financial ones listed on SSE 50 in the 2008-2012 period. Accordingly, they asserted that leverage and firm size were inversely associated with profitability. In Malaysia, by examining profitability of 92 firms in the period from 2009 to 2011, Hamid et al. (2015) concluded that leverage had an inverse impact on the firm profitability. Kaya (2015) analyzed data of 24 non-insurance firms in Turkey from 2006 to 2013 and confirmed that profitability of a firm was affected by its size, age, current ratio and premium growth rate. Meanwhile, Tauseef et al. (2015) identified factors affecting profitability of 96 textile firms from 2002 to 2007. Their findings claimed that there was an inverse relationship between debt and the firm profitability but a concurrent correlation between the firm growth rate and its profitability. However, the statistically significant impact of controlled variable of firm size (logarithm of total assets) on profitability has not been found yet. Another similar research was conducted by Odusanya et al. (2018) on the impact of several factors which are financial leverage, firm size, firm age and inflation rate on the firm profitability (ROA). It used data of 114 non-financial firms listed on Nigeria Stock Exchange over the 1998-2012 period and Generalized Method of Moments (GMM). Seissian et al. (2018) investigated 94 firms listed on New York Stock Exchange with credit ratings by Morningstar from 2014 to 2015. The paper reveals that firm profitability measured by return on assets was determined by liquidity, financial leverage, sales growth and firm size.

Based on earlier research findings, a quantitative research model is developed to analyze factors influencing profitability of real estate firms in Vietnam.

3. Model, data and methodology

3.1. Research model

According to the previous research, as an indicator of profitability, return on assets (ROA) has been mostly used. Further, profitability of a firm is influenced by several factors which are growth, size, age, leverage, current ratio and inflation rate. Moreover, variable of economic growth rate is added as an indicator of macroeconomic situations and anticipated to affect profitability of real estate firms in Vietnam.

Therefore, the research model is estimated using the following equation:

$$ROA_{it} = \beta_0 + \beta_1 GROWTH_{it} + \beta_2 LEV_{it} + \beta_3 SIZE_{it} + \beta_4 AGE_{it} + \beta_5 CR_{it} + \beta_6 GDP_t + \beta_7 INF_t + \varepsilon_{it}$$

In which:

Dependent variable: Firm profitability (ROA).

Independent variables include firm growth (GROWTH), leverage (LEV), firm size (SIZE), firm age (AGE), current ratio (CR), economic growth (GDP) and inflation rate (INF).

Table 1

Variables used in the research model

Variables	Variable measures	Previous research
Dependent variables		
Firm profitability (ROA)	Net profit / Total assets	Safarova (2010); Burja (2011); Janga and Park (2011); Malik (2011); Kouser (2012); Soumadi and Hayajneh (2012); Mumtaz et al. (2013); Sivathaasan et al. (2013); Xu and Banchuenvijit (2014); Hamid et al. (2015); Kaya (2015); Tauseef et al. (2015); Odusanya et al. (2018); Seissian et al. (2018).
Independent variables		
Firm growth (GROWTH)	[Sales of year t - Sales of year (t-1)] / Sales of year (t-1)	Safarova (2010); Janga and Park (2011); Kouser (2012); Soumadi and Hayajneh (2012); Sivathaasan et al. (2013); Kaya (2015); Tauseef et al. (2015); Seissian et al. (2018).
leverage (LEV)	Total debt / Total assets	Safarova (2010); Burja (2011); Malik (2011); Soumadi and Hayajneh (2012); Mumtaz et al. (2013); Sivathaasan et al. (2013); Xu and Banchuenvijit (2014); Hamid et al. (2015); Tauseef et al. (2015); Odusanya et al. (2018); Seissian et al. (2018).
Firm size (SIZE)	Natural logarithm of total assets	Malik (2011); Kouser (2012); Soumadi and Hayajneh (2012); Mumtaz et al. (2013); Sivathaasan et al. (2013); Xu and Banchuenvijit (2014); Kaya (2015); Odusanya et al. (2018); Seissian et al. (2018).
Firm age (AGE)	Year of research - Year of establishment	Malik (2011); Kaya (2015); Odusanya et al. (2018)
Current ratio (CR)	Short-term assets / Short-term debt	Kaya (2015); Seissian et al. (2018).
Economic growth (GDP)	Data from World Bank	Newly developed
Inflation rate (INF)	Data from World Bank	Odusanya et al. (2018)

Source: Compiled by the author

3.2. Data Collection

The paper uses data from the audited financial statements which are publicized on websites of 55 real estate firms listed on Hochiminh and Hanoi stock exchanges from 2010 to 2018. Based on the data collected, the author calculated different variables. Also, data of gross domestic product (GDP) and inflation rate (INF) were collected from World Bank.

3.3. Research methodology

The paper employs the quantitative method using panel data through multiple linear regression techniques to estimate the impact of independent variables on dependent variables in the model. First, three popular methods using panel data which are Pooled Ordinary Least Square (POLS), Fixed Effects model (FEM) and Random Effects Method (REM) are used in this research. F-test and multiplier test suggested Breusch & Pagan Lagrangian (Breusch & Pagan, 1979) are also applied to select the most appropriate model. F-test is for choosing between POLS and FEM model. Meanwhile, Hausman test is for choosing between FEM and REM model. After that, problems of autocorrelation and heteroscedasticity are also examined. Then, Generalized Method of Moment (GMM) is applied to resolve potential endogenous problems and autocorrelation among the errors (Doytch & Uctum, 2011). According to Driffill et al. (1998), GMM is better than other regression methods using panel data for testing motion of financial variables. In this section, Sargan test is utilized in order to identify appropriateness of instrumental variables in GMM estimation. The hypothesis H_0 in Sargan test is suggested as follows: instrumental variables are exogenous. In other words, instrumental variables are not correlated with errors in the model. To examine autocorrelation, Arellano-Bond test is also employed with the hypothesis H_0 : there is no autocorrelation.

4. Results and Discussion

4.1. Descriptive statistics

Data of 55 real estate firms listed on Hochiminh and Hanoi Stock Exchanges in the 2010-2018 period are shown with the following variables in Table 2:

Table 2
Descriptive statistics of variables

Variables	Obs.	Median	Std. Dev.	Min	Max
ROA	495	0.0387	0.0598	-0.2489	0.4528
GROWTH	495	1.4606	9.1170	-0.9979	175.1255
LEV	495	0.5297	0.1824	0.0110	0.8910
Total assets (million VND)	495	4,045,555	12,905,093	3,159	180,450,850
AGE	495	12.2267	7.7130	1.0000	39.0000
CR	495	2.4987	3.8574	0.0100	53.6545
GDP	495	0.0623	0.0057	0.0525	0.0707
INF	495	0.0623	0.0509	0.0063	0.1868

Source: Compiled by the author

4.2. Correlation Matrix

Correlation coefficients among variables are shown in Table 3:

Table 3
Correlation coefficients among variables

	ROA	GROWTH	LEV	SIZE	AGE	CR	GDP	INF
ROA	1.0000							
GROWTH	0.0111	1.0000						
LEV	-0.1462	0.0382	1.0000					
SIZE	-0.1194	-0.0684	0.1480	1.0000				
AGE	0.1176	-0.0979	-0.1049	0.1487	1.0000			
CR	0.0707	-0.0132	-0.1631	0.0295	-0.0326	1.0000		
GDP	0.0455	0.0227	-0.0384	0.1087	0.1140	0.0154	1.0000	
INF	0.0828	-0.0260	0.0604	-0.1899	-0.2344	-0.0208	-0.2277	1.0000

Source: Compiled by the author

As can be seen from Table 3, independent variables of LEV and AGE have inverse impacts on ROA. Meanwhile, the other independent variables have concurrent impacts on ROA.

No serious problem of multicollinearity exists (autocorrelation between independent variables) because correlation coefficients reach low value (the maximum is 0.2344 compared with the standard suggested by Farrar and Glauber (1967) which is 0.8). The results of correlation analysis are in line with previous studies in the world and what is previously anticipated during the research time in Vietnam.

4.3. Hypothesis testing

Test on multicollinearity using variance inflation factor (VIF) yields $VIF < 10$. Thus, multicollinearity is not considered to be serious. White test indicates that heteroscedasticity of the model has significance at the 5% level. Meanwhile, Wooldridge test shows that autocorrelation among the errors has significance at the 1% level.

Table 4
Results of VIF, heteroscedasticity and autocorrelation tests

Variables	VIF test		Heteroscedasticity test	Autocorrelation test
	VIF	1/VIF	White's test	Wooldridge test
INF	1.14	0.8791	Chi2 (35) = 54.58	F (1, 53) = 31.940
AGE	1.10	0.9071		
SIZE	1.10	0.9112		
LEV	1.08	0.9259		
GDP	1.07	0.9389		
CR	1.03	0.9666		
GROWTH	1.02	0.9812		
Median = 1.08				

Note: ** and *** indicate significance at the 5% and 1% level, respectively

Source: Results of the author's analysis

4.4. Regression result

Next, the researcher employs regression methods using panel data including Pooled Regression (POLS), Fixed Effects model (FEM) and Random Effects model (REM). The results show that Fixed Effects Model (FEM) is more appropriate because the result of Financial development test with $F(54, 403) = 4.83$ has significance at the 1% level and that of Hausman with $\text{Chi}^2(7) = 105.02$ is significant at the 1% level. However, this model may cause problems of autocorrelation of the errors and heteroscedasticity which can be controlled by Generalized Method of Moment (GMM) in order to assure a strong and effective estimation. Additionally, this method can resolve potential endogenous problems (Doytch & Uctum, 2011). The results are shown in the following table:

Table 5
Results of research models

ROA	Regression coefficients			
	POLS	FEM	REM	GMM
Constant	0.0577	0.2097***	0.1114**	-0.0045
GROWTH	0.0002	-0.0002	0.0001	0.0026
LEV	-0.0377**	-0.0877***	-0.0567***	-0.0531***
SIZE	-0.0050**	-0.0049	-0.0074**	-0.0027**
AGE	0.0012***	-0.0136***	0.0002	0.0015***
CR	0.0010	0.0011	0.0012*	0.0037***
GDP	0.7815	2.3370***	0.8748	0.9919***
INF	0.1035**	-0.2818***	0.0704*	0.0527*
R ²	6.39%	23.83%	7.87%	
Significance level	F(7, 457) = 4.46 Prob > F = 0.0000***	F(7, 403) = 18.01 Prob > F = 0.0000***	Wald chi2(7) = 30.52 Prob > chi2 = 0.0001***	Wald chi2(6) = 151.11 Prob > chi2 = 0.0000*** Pr > z = 0.168
Arellano-Bond test for AR(2)				Prob > chi2 = 0.563
Sargan test				

Note: *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively

Source: Results of the author's analysis

By choosing ROA as a dependent variable, the application of GMM to resolve potential endogenous problems, autocorrelation of the errors and heteroscedasticity gives the following results:

- Hansen test on these models assert that instruments are valid due to accepting hypothesis H_0 (H_0 : instrumental variables are not correlated with errors of model). And Arellano-Bond test indicates that accepting hypothesis H_0 confirms that the model is effective because there is no autocorrelation among the errors.

- The results state that variables of leverage (LEV) and firm age (AGE) inversely affect profitability (ROA). Furthermore, the study finds out the concurrent impact of firm age (AGE), current ratio (CR), economic growth (GDP) and inflation (INF) on profitability (ROA). However, with collected data, the statistical significance of firm growth (GROWTH) on profitability (ROA) cannot be found.

These results can be explained as follows:

- Variable of economic growth (GDP) has the most significant concurrent impact (0.9919) on profitability (ROA) of real estate firms and it is significant at the 1% level. It means that the economic growth well creates a good condition for real estate firms to improve their profit. This finding suits the reality of real estate. Because spectacular economic growth builds trust of investors in real estate market and concerned firms. That will encourage the firms to solve their inventory and then

improves profitability. This variable has statistical significance indicating the author's expectations when building research model and the novelty of the research in comparison with previous ones.

- Variable of inflation rate (INF) has a concurrent relationship (0.0527) with profitability (ROA) of real estate firms and significance at the 10% level. This is contrary to findings from Odusanya et al. (2018) which confirms that inflation exerts inversely on the firm profitability at 5% level of significance. The hyperinflation in Nigeria in the research time (72.253% on average) is a plausible explanation for this impact. In the same vein, this paper reveals the inflation rate in Vietnam from 2010 to 2018 is vividly mild (one-digit inflation). This result reflects that mid inflation can stimulate real estate firms to operate and increase their profit.

- Variable of leverage (LEV) exerts inversely (-0.0531) on profitability (ROA) of real estate firms and has significance at the 1% level. This result corroborates those of Safarova (2010), Malik (2011), Soumadi and Hayajneh (2012), Mumtaz et al. (2013), Xu and Banchuenvijit (2014), Hamid et al. (2015), Tauseef et al. (2015), and Odusanya et al. (2018). This finding asserts that typically high leverage of real estate firms and frozen real estate industry in the 2009-2012 period make it hard to use loans effectively and consequently decrease their profit. Therefore, it is necessary for them to use loans effectively in order to improve profitability. However, findings of Burja (2011), Sivathaasan et al. (2013), and Seissian et al. (2018) interestingly identify the concurrent correlation between leverage and firm profitability.

- Variable of current ratio (CR) is concurrently correlated (0.0037) with profitability (ROA) of real estate firms and significant at the 1% level. This is intriguingly in line with earlier findings of Kaya (2015) and Seissian et al. (2018). This reveals that real estate firms with high liquidity shows their high possibility to clear their current debt, their great financial capacity and are highly active in their business operations to gain profits. Consequently, current ratio is an indicator which credit institution have paid lots of attention on to assure that their loans will be paid timely.

- Variable of firm size (SIZE) is inversely related (-0.0027) to profitability (ROA) of real estate firms and has significance at the 1% level. This is consistent with the results reported by Kouser (2012), Soumadi and Hayajneh (2012), Mumtaz et al. (2013), Xu and Banchuenvijit (2014), Kaya (2015), and Seissian et al. (2018). According to this finding, large firms do not tend to gain big profits. It is plausible to explain for the recent time when many real estate firms have spreading their investment without focusing on a market segment with actual needs and consequently make modest profits. However, Malik (2011), Mumtaz et al. (2013), and Odusanya et al. (2018) reported a positive association between firm size and its profits.

- Variable of firm age (AGE) has concurrent effects (0.0015) on profitability (ROA) of real estate firms and has significance at the 1% level. This supports what were reported by Kaya (2015) and Odusanya et al. (2018). It can be explained because the longer a real estate firm operates, the higher the reputation, mark, mobilization and competitiveness are and then their profits will be raised. Especially, Malik (2011) asserted that firm age is not correlated with profitability.

5. Conclusions

The study has examined factors influencing profitability of 55 real estate firms listed on Hochiminh and Hanoi Stock Exchanges in the 2010-2018 period. Pooled Regression model (POLS), Fixed effects model (FEM), Random effects model (REM) were employed in the research and then Generalized Method of Moment (GMM) was also used to assure strong and effective estimation. According to the results, factors affecting firm profitability were leverage, firm age, current ratio, economic growth and inflation rate.

These findings bring the authorities, real estate firms, investors and researchers a comprehensive perspective on profitability and factors associated with profitability of real estate firms in Vietnam. These findings also have strong implications for the authorities, managers of real estate firms and investors in making specific plans in order to improve profitability as well as stable and steady development. Some of implications are suggested as follows:

- *To the authorities:* The results reveal that macroeconomic factors have significant effects on profitability of real estate firms, so the authorities should develop suitable policies to stabilize and improve macroeconomic situations which are economic growth and inflation rate in specific.

- *To the management:* They are advised to pay more attention on firm-specific problems such as leverage and current ratio and specially on macroeconomic factors such as economic growth and inflation rate.

- *To investors:* Before planning investing in a real estate firm, investors should consider profitability and specifically determinants affecting it such as firm-specific and macroeconomic factors.

By its objectives which are factors influencing profitability of real estate firms, quantitative research method is used to clarify the research problem and gain its objectives. Based on its results, the paper suggests the authorities, management and investors some implications. However, it has some limitations when other indicators of firm profitability such as ROE, ROS, ROI and other factors which may have associated with profitability like market share, management capacities are still not analyzed. That will be an interesting trend for future studies.

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