

Impact of Irrational Investment on the Performance: The Case of Non-financial Companies in Vietnam

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Abstract

The aim of this study was to investigate the effect of irrational investment on the performance of non-financial firms in Vietnam. A panel data of 184 non-financial companies listed on Ho Chi Minh Stock Exchange was collected over the period from the year 2013 to the year 2017. With the aim of assessing irrational investment status, Richardson's theoretical model of investment was adopted to separate irrational investment into over-investment and under-investment. This study employed panel data regression with the fixed effects model to test the proposed hypothesis. The estimated results showed that over-investment negatively affected firm performance while proper investment had a positive influence on firm performance. Meanwhile, the impact of under-investment on the performance of enterprises was different according to industry. Based on the empirical findings, the study provided some policy implications for the corporate governance.

Keywords: Over-investment, Under-investment, Performance, Non-financial Firm, Fixed effects model

JEL Classification Code: L25, D25, G11

1. Introduction

The development and expansion of domestic companies plays an important role in the economy, having a great influence on the national economic development. Many researchers as well as managers concern about how to improve the efficiency of the company's operations, thereby increasing profits and expanding the business scale. Especially, in the era of globalization,

international economic integration, trade liberalization and stock market development, that mission becomes more urgent.

Companies operating in service industry or manufacturing companies have the desire to maximize profits. Regardless of the field of operation, companies are subject to one of two investment statuses: rational investment or irrational investment. In which, reasonable investment is always the best investment status for the company, while irrational investment manifests itself in the form of over-investment or under-investment, often negatively affecting firm performance. The first concept of irrational investment in form of under-investment was initiated by Myers (1977). He argued that the conflict between the agent and the bondholders and shareholders constitutes a lever that includes capital structure. Managers will ignore investing in profitable projects because from the shareholders' point of view, although the projects are profitable, after paying debts to bondholders, the projects will not be profitable to shareholders. This investment will not bring the expected return to shareholders. As a result, managers will ignore such projects and this will be interpreted as irrational investment projects in the form of under-investment. In 1986, Jensen was the first researcher to introduce the concept of irrational investment in terms of over-investment. In the study of free cash flow, Jensen (1986) said that the enterprise owning large free cash flow will cause conflicts within the company. These conflicts of interest occurs among managers and shareholders, which negatively influences firm performance. When companies generate large free cash flows but do not have profitable investment opportunities, the managers of these companies tend to abuse the available cash flow to invest in projects with low profitability or in projects which may cause losses to the companies. The act of investing in such projects is called irrational investment in the form of over-investment.

In Vietnam, empirical studies on the effects of irrational investment on the performance of enterprises are quite a few. Testing irrational investment theory is not only important for investors, but also meaningful for firm administrators since it may provide useful recommendations to help firm managers make more effective management policies in the future. Therefore, the study investigates the impact of irrational investment status on the performance of non-financial companies listed on Ho Chi Minh Stock Exchange, in order to verify more fully the influence of irrational investment on the performance of non-financial companies in Vietnam. More specifically, through the analysis of panel data of non-financial joint stock companies listed on Ho Chi Minh Stock Exchange in the period from the year 2013 to the year 2017, the study examines the effect of improper investment on firm performance. Research results of the study will contribute to supplement the theoretical basis and provide empirical evidence for future studies.

2. Literature Review

Financial and non-financial companies have always understood that the right investment at the right time will bring great benefits, helping the company achieve its financial goals. The ultimate goal of these companies is to maximize shareholder benefits because shareholders are the actual owners of the company. The managers and executives are actually just representatives of the shareholders, acting on behalf of the shareholders to implement investment policies or manage

the company to achieve the best efficiency. Thus, building relationship between two parties is called an agency relationship. Jensen and Mecklings (1976) stressed that this agency relationship exists when the real owner of the company who is a shareholder authorizes a manager to act on his/her behalf. In fact, even if both parties have the main goal of maximizing the company's profits, there will be differences in the benefits received. Shareholders want the most optimal profit, and managers will sometimes implement investment projects that do not bring optimal results for the company, such as unreasonable investment in a project. Agency theory suggests that managers tend to invest irrationally in the form of over-investment for personal gain, whose goals will to some extent be limited by external capital market. Therefore, the directors will make the investment based on the company's excess cash. Managers can then invest this excess cash flow in projects that may reduce the efficiency of the business, also known as the problem of over-investment.

The concept of irrational investment in form of over-investment was explained by Jensen (1986) in his survey of the US oil industry which always had a surplus in free cash flow in the 1970s and 1980s. Jensen (1986) noticed that managers did not return this excess cash flow to shareholders, but instead invested heavily in mining operations, even though the average return was lower than the cost of capital. Besides that, the study of Jensen (1986) concluded that if a company has high free cash flow and few investment opportunities, managers will be more inclined to invest in poor projects with low or even negative net present values (NPVs). As consequences, the performance of companies tend to decrease. The act of investing in such kinds of projects is called irrational investment in form of over-investment. Unreasonable investment behavior in the form of over-investment was also explained by Brealey et al. (2008) that this behavior comes from the company's managers who want to build their power position, so they invest recklessly into unprofitable projects, they wish to expand the size of the company to increase their position of power. However, Lyandres and Zhdanov (2005) provided a new hypothesis of irrational investment in the form of over-investment which is completely different from what Jensen (1986) mentioned in his famous free cash flow hypothesis. Lyandres and Zhdanov (2005) called this type of investment as "debt over-investment", in which they predict that over-investment will occur when there is a positive relationship between investment and debt. The motive behind over-investment is debt, which is based on the principle of a trade-off between the cash flows received through an investment and the loss on the future option. As the debt level increases, the value of the option decreases. So the manager decides to exercise the option by making investment decisions that lead to irrational investment in the form of over-investment.

Listed companies often face the problem of irrational investment in the form of over-investment as these companies are often not obligated to pay dividends. Dividend payments will significantly reduce free cash flow, while a reduction in free cash flow will prevent managers from investing in non-profitable projects. Based on these arguments, it is true that over-investment is clearly a sign of the agency problem since it is completely against managers' desire to strengthen their power while shareholders expect to receive positive return on investment. Debts are beneficial because debts help reduce agency costs that arise from over-investment (Jensen, 1986). In other words, issuing debt can prevent companies from irrationally

overinvesting. When issuing debt, firms must commit to paying interest and principal amount after a fixed period of time. Firms are also obligated to repay their debt regardless of their financial ability, as opposed to paying dividends when companies are not bound to pay them. The trade-off theory of capital structure suggests that the risk of bankruptcy of the company is related to the formation of debt in the capital structure. Bankruptcy risk tends to make managers more cautious in their investment decisions. Issuing debt makes the lender's supervision of the business more stringent if the lenders are banks. Thus, debt will reduce the agency cost problem arising from over-investment (Jensen, 1986). Over-investment is much worse than under-investment as over-invested firms face higher level of bankruptcy risk in the future (Degryse and De Jong, 2006). Due to the defense mechanism of debt, there exists a negative correlation between debt and investment.

In addition to irrational investment in the form of over-investment, irrational investment also appears in the form of under-investment. This happens for projects with positive NPV, that is, when the project is profitable but managers have not invested in this project. Brealey et al. (2008) stated that passive managers lack efforts to find opportunities and deploy investments for their companies, they do not want to take high risk when investing in projects, so the investment level is lower than necessary, thereby creating unreasonable investment in the form of under-investment. Myers (1977) correctly explained the irrational investment theory of under-investment. He argued that the conflict between agents and creditors and shareholders constitutes a lever that includes capital structure. Managers will skip investing in projects with positive NPV because the creditors will have the right to be the first party to receive the loans and get an additional part of the benefits from investing in these projects. Therefore, projects with positive NPV are considered as negative NPV projects based on the analysis from shareholders' point of view, so ignoring these projects is considered under-investment. Myers and Majluf (1984) stressed that information asymmetry also leads to the problem of irrational investment in the form of under-investment. Managers know more about the company's situation and investment opportunities while shareholders and bondholders have little information. Managers may ignore many investment projects with positive NPV that have been financed by the issuance of shares. Voicu (2013) stressed that a passive manager who does not actively work to identify valuable investment opportunities and worthless investment opportunities will go against an active manager. These passive managers are not active because they want to avoid uncertainty and avoid mistakes in making investment decisions. When the interests of managers do not match the interests of shareholders and when they feel that they are not trusted as insiders, managers will have avoidance behavior by foregoing investment in high-risk projects that also have positive NPVs but are risky. Due to the risk, they will likely lose their jobs if the investment projects fail (Brealey et al., 2008). The fact that the company has an investment opportunity but does not take these opportunities also eliminates some of the benefits that the company could receive if it invested in such projects. This also represents irrational investment in the form of under-investment, which mainly occurs in firms with high growth opportunities (McConnell and Muscarella, 1985).

Richardson (2006) was the first researcher to separate irrational investment in form of over-investment and under-investment. Richardson (2006) used an accounting method to measure

over-investment and free cash flow. The research results of Richardson (2006) have reinforced the agency theory. The author argued that based on the regression line showing the estimated investment and the actual investment of the company, the residual which is the difference between the estimated investment and the actual investment is found. This residual, if it has a positive value, is called irrational investment in the form of over-investment, and if it has a negative value, it is called irrational investment in the form of under-investment. If the forecast value is equal to the actual value, this is called a reasonable investment. Liu and Bredin (2010) analyzed the impact of over-investment on the performance of Chinese companies. The authors have found the negative relationship between over-investment and firm performance. McConnell and Muscarella (1985) studied the company's capital expansion decision and market value with a sample of 658 firms. Research results showed that when announcing investment decisions with large value, the market value of the company tends to increase. But this increase in market value is likely to be a short-term price reaction to investment announcements and only temporary. Another study conducted by Yang (2005) opposed the positive relationship between investment and firm performance. The research results of Yang (2005) showed that both over-investment and under-investment have a negative impact on firm performance and an unreasonable investment decisions will negatively influence the business activities of the enterprise in the following 5 years. Farooq et al. (2015) studied the effects of over-investment and under-investment of 360 non-financial companies on the stock market in Singapore during the period from 2005 to 2011. The study of Farooq et al. (2015) combined the research model of Richardson (2006) and the classification of investment status to classify investment positions and used Tobin's Q, ROE, ROA as the dependent variables in the model. Research results of Farooq et al. (2015) pointed out that over-investment and under-investment have a negative impact on firm performance, while proper investment has a positive effect on firm performance.

Titman et al. (2004) determined the relationship between over-investment and stock returns. The results showed that over-investment negatively impacts firm profitability and this negative relationship is more pronounced in firms with high cash flow and low leverage. Besides, these companies will continue to have low profits in the next 5 years, which increases the investment to the highest level. The study of Heydari et al. (2014) examined the influence of free cash flow on firm performance in Tehran - Iran. The study employed 4 dependent variables, including ROA, ROE, Tobin's Q and stock return to evaluate firm efficiency. In addition to free cash flow, the authors also used firm size and financial leverage ratio as two control variables in the model. The research results of Heydari et al. (2014) found a statistically significant negative relationship between free cash flow with all four variables ROA, ROE, Tobin's Q and stock return. This finding supported the free cash flow theory of Jensen (1986). Additionally, the research results showed that company size and financial leverage have a positive correlation with firm performance. Lang et al. (1989) tested the free cash flow theory when studying the profits of auctioneers. The article applied Tobin's Q index as an indicator to measure investment opportunities of enterprises or in other words, this index shows whether enterprises have profitable investment projects or not. If this index is greater than 1 ($Q > 1$), the market value of the company is higher than its book value, which is usually attractive to investors and has good competitiveness. The company has many investment opportunities since it can take advantage of

cheap capital. If this index is less than 1 ($Q < 1$), the company's value is under-estimated compared to its actual value, the enterprise is unlikely to have positive NPV investment opportunities. The results showed that, in companies with low Tobin's Q, profitability will have a negative relationship with the cash flow in the company. In other words, the relationship between profitability and cash flow will vary depending on the company's investment opportunities.

In Vietnam, Vo and Doan (2014) found a link between free cash flow and corporate performance as measured by ROA. Using data collected from companies listed on Ho Chi Minh Stock Exchange from 2007 to 2011, the study conducted regression for the entire sample and regression by industry. The results of the regression models in the study showed a negative relationship between free cash flow and business performance both in the entire sample and by each survey industry. Le and Quach (2017) investigated the relationship between free cash flow and the performance of 90 firms listed on Ho Chi Minh Stock Exchange. The empirical findings of Le and Quach (2017) clarified that cash flow has a positive correlation with the performance of companies, while an increase in firm size will reduce firm performance.

3. Research Methodology

3.1. Sample Selection

Panel data is collected from audited financial statements and annual reports of non-financial joint stock companies listed on Ho Chi Minh Stock Exchange. Based on the sampling criterion that companies must have sufficient information on important business data for the period from the year 2013 to the year 2017, the number of samples obtained is 184 companies. Therefore, the sample of this study consists of 920 observations.

3.2. Definition and Measurement of Variables

3.2.1. Dependent Variables

- *Tobin's Q index (Tobin's Q)*

Tobin's Q index is calculated as the market value of the firm's assets divided by the replacement cost of the assets. Tobin's Q index is used to classify enterprises with good investment opportunities or not (Tobin, 1969). Many previous used Tobin's Q index as a dependent variable to measure the company's performance (Liu and Bredin, 2010; Le and Quach, 2017; Farooq et al., 2015; Ngo and Le, 2018).

- *Return on equity (ROE)*

Return on equity (ROE) which is the ratio of net return on equity reflects the ability of a firm to use capital to generate profits (Farooq et al., 2015). ROE is also an important ratio to determine the performance of a firm since ROE helps shareholders keep track of how much profit generated for a dollar of capital. The higher the ROE ratio, the better the performance of firm, which proves that the company has effectively used the shareholders' capital.

3.2.2. Independent Variables

- *Over-investment in new projects (QMMOI), Under-investment in new projects (DMMOI), Normal investment in new projects (THMOI)*

Farooq et al. (2015) argued that over-investment, under-investment, normal investment in new projects are variables formed after classifying investment status. This study combines the residual error after running regression model on investment and classification table of investment status, then uses dummy variable (QDUM) to classify investment status of firms. Finally, the variables of over-investment, under-investment, normal investment in new projects are measured by multiplying the value of the new investment variable (INEW) by the dummy variable of each investment state (QDUM). Specifically,

$$QMMOI = QDUM \times INEW \tag{1}$$

$$DMMOI = QDUM \times INEW \tag{2}$$

$$THMOI = QDUM \times INEW, \tag{3}$$

where new investment (INEW) for a given year is the total capital expenditures and acquisitions subtracted with sale of property, plant and equipment. New investment(INEW) is the scaled with total assets at the beginning of the year. Farooq et al. (2015) calculated the new investment as follows:

$$INEW_t = (\text{Investment in Fixed Assets}_t + \text{Investment in Intangibles}_t + \text{Acquisitions}_t + \text{Investment in Financial Assets}_t - \text{Sale of Investment}_t) / \text{Total Assets}_{t-1} \tag{4}$$

- *Financial leverage (LEV)*

Financial leverage helps investors and companies increase their ability to generate profits, but along with it, the risk is always higher. The higher the debt-equity ratio, the higher the capital efficiency. Firms can take advantage of other people's capital to increase profits for shareholders, but if they fail to do so, interest and default risk on debt repayment obligations can cause great losses to shareholders. Previous studies conducted by Farooq et al. (2015); Heydari et al. (2014); Tran and Truong (2018) also used financial leverage as independent variable in their research.

- *Free cash flow (FCF)*

Free cash flow can be calculated simply by subtracting capital expenditures from operating cash flow (OCF). In which, cash flow from operating activities has been calculated for changes in working capital, depreciation, and has also excluded interest expense, this item can easily be found on the statement of cash flows from production and business activities of the enterprise. The study of Le and Quach (2017); Farooq et al. (2015) also used this variable in the research model.

- *Firm size (SIZE)*

Size of a company helps evaluate the performance of a company. Firm size has different effects on firm performance. Firm size is measured by the natural logarithm of total assets (Mai and Nguyen, 2011; Vo and Doan, 2014; Heydari et al., 2014; Farooq et al., 2015).

- *Stock return (SR)*

Stock return is also one of the independent variables used in previous studies of irrational investment (Titman et al., 2004; Farooq et al., 2015). Stock return of a company can be calculated through stock price.

- *Accumulated profit (AP)*

The accumulated profit of a firm is measured by the ratio of the profit after tax to the value of the company's assets. Le (2008) said that the company's investment depends mainly on internal financial resources (also known as accumulated profits of the company).

- *Revenue growth rate (RGR)*

Pham et al. (2008) suggested that revenue growth rate indicates the favorable level of the business environment of enterprises. Mai and Nguyen (2011) also conducted a study on the impact of revenue growth rate on business performance and concluded that companies with better revenue growth rate have higher business performance. Since revenue growth rate shows economic potential, the stability of the enterprise, the position and the development trend of the enterprise.

3.3. Estimation Method

With panel data, this study employs random effects model (REM) and fixed effects model (FEM). Then, this study uses Hausman (1978) test to select the appropriate model between REM and FEM models. After that, the study uses Wald test to test the phenomenon of heteroscedasticity and uses Wooldridge test to test the phenomenon of autocorrelation in the regression models. In case the model has the problem of heteroscedasticity and/or autocorrelation, the study will apply generalized least squares (GLS) method for panel data to overcome these issues. To assess the performance of the company, the study relies on the research model of Farooq et al. (2015). The study uses Tobin's Q index and ROE ratio as dependent variables in the models to evaluate the company's performance. The study applies the following two research models to measure the effect of investment status on the performance of non-financial companies listed on Ho Chi Minh Stock Exchange.

$$\text{Tobin's } Q_{i,t} = \alpha_i + \beta_1 \text{QMMOI}_{i,t-1} + \beta_2 \text{DMMOI}_{i,t-1} + \beta_3 \text{THMOI}_{i,t-1} + \beta_4 \text{LEV}_{i,t-1} + \beta_5 \text{FCF}_{i,t-1} + \beta_6 \text{SIZE}_{i,t-1} + \beta_7 \text{SR}_{i,t-1} + \beta_8 \text{AP}_{i,t-1} + \beta_9 \text{RGR}_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

$$\text{ROE}_{i,t} = \alpha_i + \beta_1 \text{QMMOI}_{i,t-1} + \beta_2 \text{DMMOI}_{i,t-1} + \beta_3 \text{THMOI}_{i,t-1} + \beta_4 \text{LEV}_{i,t-1} + \beta_5 \text{FCF}_{i,t-1} + \beta_6 \text{SIZE}_{i,t-1} + \beta_7 \text{SR}_{i,t-1} + \beta_8 \text{AP}_{i,t-1} + \beta_9 \text{RGR}_{i,t-1} + \varepsilon_{i,t} \quad (6)$$

Where Tobin's Q is Tobin's Q index; ROE is return on equity; THMOI is normal investment; LEV is financial leverage; QMMOI is over-investment; FCF is free cash flow; SIZE is firm size;

SR is stock return; DMMOI is under-investment; AP is accumulated profit; RGR is revenue growth rate; i represents companies; β are regression coefficients of the explanatory variables; t represents time; ε is error term.

Table 1 summarizes the characteristics of the variables in the research model and the expected signs of the impact of the independent variables on the dependent variable.

Table 1: Summary of the variables in the research model

Variable	Measurement Method	Expected Sign
Tobin's Q index (Tobin's Q)	(Market capitalization + Total debt) / Total assets	
Return on equity (ROE)	Net profit after tax / Average equity	
Over-investment (QMMOI)	QDUM x INEW	(-)
Under-investment (DMMOI)	QDUM x INEW	(-)
Normal investment (THMOI)	QDUM x INEW	(+)
Financial leverage (LEV)	Long term debt / Total Assets	(+)
Free cash flow (FCF)	(Net operating activities + Purchase of fixed assets + Sale of fixed assets) / (Net revenue from operating activities)	(-)
Firm size (SIZE)	Ln(Total assets)	(+)
Stock return (SR)	Ln(Price _t) - Ln(Price _{t-1})	(+)
Accumulated profit (AP)	Profit after tax / Total assets	(+)
Revenue growth rate (RGR)	(Revenue _t - Revenue _{t-1}) / Revenue _{t-1}	(+)

4. Results and Discussion

4.1. Empirical Results

Table 2 illustrates the descriptive statistics of the variables used in the regression model.

Table 2: Descriptive statistics of the variables in the regression model (Obs. = 920)

Variable	Mean	Standard Deviation	Minimum	Maximum
Tobin's Q	1.179	0.640	0.160	9.043
ROE	0.130	0.166	-1.602	0.970
INEW	0.014	0.110	-1.095	1.137
LEV	0.101	0.140	0	0.683
FCF	0.014	0.403	-2.630	8.230
SIZE	20.892	1.160	18.661	25.014
SR	0.090	0.391	-1.682	1.729
AP	0.072	0.083	-0.624	0.721
RGR	0.123	0.461	-0.931	7.919

The study conducts Hausman test to select a suitable estimation method for Model 1 with Tobin’s Q as the dependent variable and for Model 2 with ROE as the dependent variable. For Model 1 with Tobin’s Q as the dependent variable, the Hausman test gives P-value of 0.000 with 99% confidence. Therefore, using FEM is more appropriate than using REM. After that, the study uses Wald test to test the phenomenon of heteroscedasticity and uses Wooldridge test to test the phenomenon of autocorrelation in the regression model. The results of these two tests show that the model has the issue of heteroscedasticity and autocorrelation. Hence, the model is estimated by GLS regression method for panel data to overcome these two problems. Estimated results of Model 1 using GLS regression method are presented in Table 3.

Table 3: Estimated results of the models using GLS regression method (Obs. = 920)

Variable	Model 1 with Tobin’s Q as the dependent variable	Model 2 with ROE as the dependent variable
	Estimated Coefficients	Estimated Coefficients
QMMOI	-0.0784 (0.0684)	-0.0634*** (0.0125)
DMMOI	-0.0782 (0.1481)	0.0406 (0.0349)
THMOI	0.2070*** (0.0555)	0.0175 (0.0112)
LEV	-0.1395*** (0.0437)	0.0526*** (0.0064)
FCF	-0.0196 (0.0157)	-0.0097** (0.0037)
SIZE	0.0619*** (0.0091)	0.0098*** (0.0008)
SR	0.1261*** (0.0134)	0.0280*** (0.0025)
AP	2.5074*** (0.1386)	1.5227*** (0.0168)
RGR	-0.0286** (0.0121)	0.0118*** (0.0030)
Constant	-0.3739 (0.1892)	-0.1954 (0.0163)

Note: ** and *** indicate statistical significance at the 5% and 1% levels, respectively. The values in parentheses () are Z-values.

Similarly, for Model 2 with ROE as the dependent variable, the Hausman test gives P-value of 0.000 with 99% confidence. Therefore, using FEM is more appropriate than using REM. Then, the study also uses Wald test to test the phenomenon of heteroscedasticity and uses Wooldridge test to test the phenomenon of autocorrelation in the regression model. The results of these two

tests show that the model only has the issue of heteroscedasticity. Hence, the model is estimated by GLS regression method for panel data to overcome the problem of heteroscedasticity. Estimated results of Model 2 using GLS regression method are presented in Table 3.

4.2. Discussion

The estimated results from Model 1 with Tobin's Q as the dependent variable presented in Table 3 show that normal investment (THMOI), financial leverage (LEV), firm size (SIZE), stock return (SR), accumulated profit (AP), and revenue growth rate (RGR) have statistically significant effects on the performance of non-financial firms. However, the study has not found the impacts of free cash flow (FCF), over-investment (QMMOI), and under-investment (DMMOI) on the performance of non-financial firms in the study area. Turning to Model 2 with ROE as the dependent variable, the estimated results presented in Table 3 show that over-investment (QMMOI), financial leverage (LEV), free cash flow (FCF), firm size (SIZE), stock return (SR), accumulated profit (AP), and revenue growth rate (RGR) have statistically significant influences on the performance of non-financial firms. However, the study has not found the impacts of under-investment (DMMOI), and normal investment (THMOI) on the performance of non-financial firms in the study area. The significant impacts of determinant factors on firm performance can be explained as follows.

As expected, a negative relationship between over-investment (QMMOI) and firm performance measured by ROE exists. This means that the performance of non-financial firms in Vietnam tends to decline when firms heavily invest in non-profitable projects. In other words, over-investment negatively affects the performance of firm. This is clearly shown through the research results of Model 2 with ROE as the dependent variable in Table 3 that the estimated coefficient is negative ($\beta_1 = -0.0634$) at the significance level of 1 percent. This empirical finding is in accordance with the results of previous studies conducted by Titman et al. (2004); Liu and Bredin (2010); Farooq et al. (2015). During the research period from 2013 to 2017, the socio-economic situation in Vietnam is developing very favorably, the inflation rate during this period is always below 5%. As reasonably low inflation causes cash to depreciate faster than investment, investing activity becomes a more attractive option than hoarding cash at companies. For manufacturing companies, the favorable economic situation helps firms buy more input materials and use labor at low prices. Therefore, companies in this period always foster investment activity and expand production. However, not all companies make the investment as effective as they originally wanted. Cuu Long An Giang Import-Export Joint Stock Company is a typical example of over-invested companies. This company is one of the largest pangasius exporting companies of Vietnam in the period 2013-2017 and the main export market of this company is the US market. Since the company always has to purchase raw materials from outside suppliers, when the scarcity of raw materials happens, this highly leveraged company also faces high interest payment pressure. As a result, the company's annual profit after tax has increased, but it is still unable to compensate for interest expenses, so profits are gradually being declined. The company in this phase is assessed as not having many investment opportunities because the company's Tobin's Q indexes are always lower than 1. In fact, this company continues to expand the implementation of purchasing and exporting projects regardless of

investment capacity of the company. These projects are mainly funded by loans, which negatively influences firm performance. This case is a specific demonstration of the research results that over-investment negatively affects business operations.

Under-investment variable (DMMOI) represents another form of the firm's irrational investment states. Under-investment can be explained when a company has a good investment opportunity but it ignores investing in these projects. The regression results in Table 3 indicate that under-investment has a negative impact on the company's performance, even though this relationship is not statistically significant. Among the companies listed on Ho Chi Minh Stock Exchange, FPT Joint Stock Company is one of the leading informatics companies in Vietnam with the main business of computer software and services. This company listed on Ho Chi Minh Stock Exchange in 2006 with its business segments mainly in software, technology, and telecommunications. In 2007, the company started a multi-industry business, encroaching on real estate, investing in banking and financial services but did not bring good business results. In 2013, the company operated in two separate business segments, including FPT Trading which provides information technology product and FPT Retail which trades mobile phones and laptops. Then, company offered its business segment to other companies. Although this divestment decision helped the company narrow the investment areas, focus on the company's core business, and earn more profit in 2017, this strategy still affected the performance of the parent company. In brief, during the period 2013-2017, FPT corporation always had good growth opportunities, but a consolidation strategy prevented the company from taking that advantage, so this company fell into under-investment state.

From the estimated results of Model 1 with Tobin's Q as the dependent variable in Table 3, it is clearly shown that normal investment (THMOI) has a positive correlation with firm performance as measured by Tobin's Q with the estimated coefficient ($\beta_3=0.2070$) at the significance level of 1 percent. This result is similar to the original assumptions and prior studies such as Farooq et al. (2015). HAI agro-pharmaceutical joint stock company is a case of normal investment, when there are good investment opportunities, the company implements appropriate investment policies, and when there are no investment opportunities, the company narrows down its business investment. Therefore, the company's profit is still growing well during the study period. This company was listed on Ho Chi Minh Stock Exchange in 2010 with the main business of producing and trading agro-pharmaceuticals and plant protection services in Vietnam. From 2013 to 2017, the company still invested steadily in projects, but still focused on the main production business. HAI agro-pharmaceutical production was completed in 2016 and expanded to produce agro-pharmaceuticals and plant protection products. In 2013 and 2014, the company had good growth opportunities and the company had implemented investment projects in its main business areas such as establishing a Research and Development Center in 2014, so its business efficiency was very high. The company's performance improved as the company had introduced a variety of new products with high efficiency. In the following years, due to competition from companies in the same industry and pressure on the consumption market, the opportunity for business growth is less, so the company reduced investment in new projects, and focused on the return of investment capital from previous projects. Thus, the company still generated profit.

From the estimated results in Table 3, it can be seen that financial leverage (LEV) positively affects firm performance in Model 2 with ROE as the dependent variable with the positive estimated coefficient ($\beta_4=0.0526$) at the significance level of 1 percent. The impact of financial leverage on company performance depends on the level of debt usage of the company. Firm that uses financial leverage effectively will increase firm efficiency and vice versa. The use of debt increases net profit after tax and has a positive effect on the performance of the company. However, this factor has a negative correlation with firm performance in Model 1 with Tobin's Q as the dependent variable with the negative estimated coefficient ($\beta_4=-0.1395$) at the significance level of 1 percent. In other words, financial leverage is negatively related to the company's growth opportunity. This finding is completely consistent with the study of Tran and Truong (2018), which is explained by the fact that in companies with low growth opportunities, the opportunity to access loans is lower than in companies with high growth opportunities.

The negative relationship between free cash flow (FCF) and firm performance exists in Model 2 with ROE as the dependent variable. This is clearly shown through the research results in Table 3 that in Model 2, the estimated coefficient is negative ($\beta_5=-0.0097$) at the significance level of 5 percent. This finding proves that an increase in free cash flow tends to reduce firm profitability as measured by ROE. This result is completely consistent with the study of Vo and Doan (2014). When firm owns large free cash flow, this will cause conflicts of interest between manager and shareholders within the firm, which negatively influences firm performance.

Firm size (SIZE) has a positive impact on firm performance in both models. This can be seen from the results in Table 3, firm size has a positive correlation at the significance level of 1 percent ($\beta_6=0.0619$) in Model 1 and at the significance level of 1 percent ($\beta_6=0.0098$) in Model 2. This result is consistent with the original assumption. In fact, when the scale increases, firm profitability and firm investment opportunities also increase since large companies have more competitive advantages, not only in terms of assets and market segments, but also in terms of distribution network and banking relationships. Hence, these companies can achieve better growth and operate more efficiently.

The research results in both models provide support for the proposed hypothesis. This is shown through the stock return variable (SR), which has a positive influence on the firm performance. In Model 1 with Tobin's Q as the dependent variable, stock return has a positive estimated coefficient ($\beta_7=0.1261$) at the significance level of 1 percent. In Model 2 with ROE as the dependent variable, the estimated coefficient is also positive ($\beta_7=0.0280$) at the significance level of 1 percent. This result is also consistent with stock market expectations. Stock returns are closely related to stock prices. When the share prices increase sharply, the earnings per share also increase, which positively affects the performance of the company.

The estimated results from Model 1 with Tobin's Q as the dependent variable presented in Table 3 show that firm's accumulated profit (AP) has a positive relationship with the firm performance with the positive estimated coefficient ($\beta_8=2.5074$) at the significance level of 1%. Similarly, the analysis results from Model 1 with ROE as the dependent variable indicate that firm's accumulated profit (AP) positively affects firm performance with an estimated coefficient ($\beta_8=1.5227$) at the significance level of 1%. This finding shows that the more the accumulated profits in the company, the better the performance of that company. In fact, accumulated profit is

also an indicator reflecting the business performance as based on the amount of retained earnings, the enterprise can evaluate whether its business is effective or not.

Last but not least, from the estimated results in Table 3, it can be seen that revenue growth rate (RGR) positively affects firm performance in Model 2 with ROE as the dependent variable with the positive estimated coefficient ($\beta_9=0.0118$) at the significance level of 1 percent. This means that there exists a statistically significant relationship between revenue growth rate and firm performance as measured by ROE. This result is similar to the finding in the study of Vo and Doan (2014). Under normal conditions, the growth of revenue represents the stability and strength of the business, which proves that the company is operating effectively. However, this factor has a negative correlation with firm performance in Model 1 with Tobin's Q as the dependent variable with the negative estimated coefficient ($\beta_9=-0.0286$) at the significance level of 5 percent. In other words, financial leverage is negatively related to the company's growth opportunity. This finding is contrary to the study of Vo and Doan (2014).

5. Conclusions

This study employs panel data regression with the fixed effects model to investigate the effect of irrational investment on the performance of non-financial firms in Vietnam. With the aim of assessing irrational investment status, Richardson's theoretical model of investment is adopted to separate irrational investment into over-investment and under-investment. A panel data of 184 non-financial companies listed on Ho Chi Minh Stock Exchange is collected over the period from the year 2013 to the year 2017.

The estimated results show that over-investment negatively affects firm performance while proper investment has a positive influence on firm performance. Meanwhile, the relationship between under-investment and the performance of enterprises is negative but not statistically significant. Regression results indicate that wellinvestment state always brings better business performance to companies than over-investment or under-investment state. This study draws similar conclusions as prior studies conducted by McConnell and Muscarella (1985); Titman et al. (2004); Liu and Bredin (2010) which show that over-investment has a negative impact on firm performance. Therefore, the control of investment activities is always one of the important issues that companies need to pay more attention.

Listed corporations often face over-investment problem as managers tend to invest irrationally for personal gain rather than for the greatest benefits of the company. Under-investment state is also related to agency problems when the manager ignores investing in projects with positive NPV or the manager is passive and does not actively seek out profitable projects for the company. Based on the empirical findings, the study provides some policy implications for the corporate governance. Companies should increase the ownership ratio of the board of directors and chief accountants in the company, such as implementing the stock bonus policy to encourage directors and employees to buy more shares. Large-sized companies should establish a system of corporate control to closely monitor the activities of the board of directors and managers at all management levels to limit the agency problem. In addition, firm should implement policies to attract foreign investment capital to improve management efficiency since foreign investors can act as a controller in the company, which helps reduce agency problems.

For over-invested companies due to excessive diversification of investments, investing in many business areas without competitive advantages negatively affects the company's performance. Therefore, the study recommends that companies should have an independent investment control department to analyze the effectiveness of investment projects to help managers have a relatively objective and more accurate view when considering future investment projects.

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