# THE IMPACT OF OVERCONFIDENCE ON STOCK MARKET VALUATION: AN EMPIRICAL STUDY ON LISTED FIRMS

Manh Tien Pham *, Phuong Thanh Do **

* *Corresponding author,* Banking Academy of Vietnam, Hanoi, Vietnam
Contact details: Banking Academy of Vietnam, 12 Chua Boc Street, Dong Da District, Hanoi, Vietnam
** Banking Academy of Vietnam, Hanoi, Vietnam

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## Abstract

Behavioral theory predicts that investor overconfidence leads to overpricing because overconfident investors overestimate the accuracy and quality of their information while underestimating risk (Adebambo & Yan, 2018). The paper investigates the impact of the overconfidence psychology of investors on firm valuation in the Vietnamese stock market. To test this relationship, the secondary data of 264 non-financial firms listed on the Ho Chi Minh Stock Exchange (HOSE) is investigated in the period of seven years from 2016–2022. The current study applies three different regression models, in which two alternative models are used to ensure the results are not sensitive to the variable proxy. This research employs the change in trading volume (*CTV*) variable as a main variable proxy of overconfidence and applies the feasible generalized least squares (FGLS) method as the main estimation. As a result, this study confirms the positive impact of overconfidence bias on firm valuation on the HOSE, regarding different investor overconfidence proxies since all of the proxies are statistically significant. These empirical results have several implications for market regulators, investors, and academic researchers as well as for investment costs, capital allocation, and market effectiveness.

**Keywords:** Overconfidence, Firm Valuation, Behavioral Biases, Vietnamese Stock Market

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## 1. INTRODUCTION

Overconfidence and firm valuation are the subject of considerable debate in the profession and there was little experimental research on this topic. The majority of related studies were examined in the stock market of a single country which did not have many indicated conclusions for other policymakers or investors of other distinguished stock markets due to the unique features of the single stock market. In addition, the number of related research in Vietnam is limited where it is a growing economy and stock market. Therefore, this research gap presents an opportunity to fill the void in the literature and contribute to the understanding of the existence and impact of

overconfidence on firm valuation and stock price in the Vietnamese stock market, an emerging stock market with a majority of individual investors.

This study aims to identify the extent of overconfidence bias among investors in the Vietnamese stock market and its impact on firm valuation. In addition, it is expected to provide practical recommendations for investors, regulators, and policymakers to mitigate the negative effects of overconfidence on firm valuation and promote a fair and efficient market in Vietnam.

To investigate the relationship between the overconfidence psychology of investors on firm valuation in Vietnam, this study employs a fixed-effects panel data model for the main analysis of secondary data of 264 non-financial firms listed on the Ho Chi Minh Stock Exchange (HOSE) in the period of 2016–2022.

As a result, the current study shows a positive relationship between overconfidence psychology and firm valuation on listed firms. These results could increase investors' awareness of the impact of these psychological factors, specifically overconfidence bias, on market valuation and asset pricing, leading to more rational stock market decision-making for increased market efficiency. In addition, this study implicated several recommendations for market regulators to promote consistency and effectiveness in regulation.

The rest of this paper is structured as follows. Section 2 reviews the theoretical background and the related literature. Section 3 contains the research methodology, and Section 4 explains the empirical results. Section 5 reports a discussion and Section 6 concludes this study.

## 2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

### 2.1. Theoretical background

In the 1960s, the term "*overconfidence*" started to be widely used in psychology. Oskamp (1965) provided a description of overconfidence in which it was defined simply as an excess of confidence over accuracy. Up to the 1970s, overconfidence in psychology has been defined as a particular form of miscalibration, which is related to the calibration and probability judgment that the answers given are correct and exceed the true accuracy of the answers. The most important extensions to this definition scope are studies of overconfidence in the context of positive illusions, which are the illusion of control and unrealistic optimism. Several reasons for overconfidence were summarized in the research of Skala (2008) namely self-motivation in cognitive processing, hard-easy effect, presence or lack of clarity.

In the 1970s, economists began incorporating psychological insights into economic models but the most rapid progress occurred in the 1990s. Overconfidence has since been a field of interest for economists, primarily in the context of financial market behavior. It is true that numerous experiments, formal models, and market data analysis show that overconfidence at least partially answers several financial market issues that mainstream economic theory cannot account for.

According to Skala (2008), overconfidence in finance is typically described as an overestimation of one's familiarity with or accuracy with private information, or the interpretation of it. In behavioral finance theoretical models, Skala (2008) expressed that overconfidence is frequently defined as overestimating the clarity of information or underestimating the danger to investors. Researchers have examined the presence of overconfidence and their implications on financial markets, such as excessive trade volumes, trading profitability, short and long-term asset misvaluations, and stock returns.

In terms of trading volume, overconfidence is demonstrated to lead to larger market depth and volatility. As demonstrated by Odean (1998), traders exhibit the better-than-average effect, evaluating their information as better than that of their peers. This is due to the assumption that traders, insiders, and market makers may unintentionally overestimate the precision of their information and rely on it more than is necessary. Market players that are so overconfident boost trading volume. A similar conclusion is reached by Benos (1998) in his model of an educated auction market, where the involvement of risk-neutral investors again overestimates the accuracy of their knowledge resulting in a rise in trading volume.

In terms of trading profits, even though there is disagreement on the extent and direction of the impact of overconfidence on trading profits, the phenomenon has proved useful in explaining a wide range of financial market occurrences. According to Kyle and Wang's (1997) speculative trading model with asymmetric information, overconfident traders with excessively close private signal distribution intervals may be seen as trading more aggressively and may experience bigger profits than their rational competitors. Benos (1998) also came to a similar conclusion, stating that even though both overconfident and rational traders are aware of one another's tendencies, the overconfident traders benefit from a "first mover's advantage" and make higher individual profits. By contrast, Gervais and Odean (2001) indicated that overconfident traders have smaller profits as a result of increasing their trading volume and volatility, both of which have a detrimental effect on their trading outcomes. It was a similar conclusion when Daniel et al. (1998) also show that overconfident informed investors incur losses on average, but they also suggest that overconfident traders may occasionally achieve returns that are higher than those of rational investors.

In terms of asset valuations, Daniel et al. (2001) proved that an asset pricing model with overconfidence leads to an equilibrium mispricing of securities. Some rational market participants take advantage of the pricing errors through arbitrage, but risk aversion prevents them from being completely eliminated. The model investigates how risk and investor undervaluation affect expected future returns on securities.

The experimental studies of overconfidence demonstrated the existence of it in financial markets. Kirchler and Maciejovsky (2002) find the largest overconfidence towards the end of the experiment when the participants gain more experience and start to rely more heavily on their

overestimated knowledge. This finding indicates that overconfidence may be subject to modifications, which goes back to the crucial role of clear, rapid feedback in shaping individual overconfidence levels (Russo & Schoemaker, 1992). In terms of personal confidence level, Glaser et al. (2005) indicated that financial specialists, such as professional traders and investment bankers are found to have higher levels of confidence than laymen.

To sum up, behavioral theory forecasts that overconfident investors underestimate risk while overestimating the accuracy and quality of their information. As a result, they seek an excessively high demand for risky assets while expecting to subject a smaller risk premium, which drives up asset prices and finally results in firm overvaluation.

## 2.2. Literature review

Several international researches have been conducted to investigate these predictions and a majority of them indicate the positive impact of overconfidence on firm valuation. For instance, the relationship between overconfidence psychology and firm valuation was examined by Adebambo and Yan (2018) on investors drawn from the characteristics and holdings of United States (US) stock mutual fund managers. The data was collected monthly from 1988 to 2010 including trading volume, stock return, share price, shares outstanding, and standard industrial classification code for common stocks, except for financial enterprises. As a result, they found that overconfidence among investors is strongly related to firm value and corporate actions. More specifically, according to a misvaluation metric and the market-to-book ratio, Adebambo and Yan (2018) discovered that companies with more overconfident investors are considerably overpriced.

In Pakistan, Zia et al. (2017) further aimed to test the overconfidence bias of investors in the Karachi stock exchange by using a simple random sample approach from 2005 to 2013. Applying the market-wide panel vector autoregression (VAR) model and econometric techniques, Zia et al. (2017) found that investors are overconfident in the Pakistani stock market since turnover is strongly related to stock returns. The findings had significant meanings for investors and brokers in terms of designing effective trading strategies. In addition, the study suggested that overconfidence bias tends to hinder portfolio diversification and promote excessive trading in Pakistan's financial market.

By conducting a survey, Trejos et al. (2019) used this primary data about participants, including their decisions in each of the rounds along with their characteristics to examine the nexus between overconfidence and firm valuation. By combining logistic regression techniques and qualitative comparative analysis (QCA), Trejos et al. (2019) concluded that overconfidence is explained by education level, career, and gender, while nationality, profits, and age are not significant variables. In addition, they confirmed the behavioral theory that overconfident investors overestimate the quality of their knowledge while underestimating the risk in the stock which leads to overvaluation of a stock. However, this study faced a limitation when they were only able to assemble 77 participants who didn't work as professional traders.

The positive relationship between investor overconfidence and US firm valuation was confirmed by Bouteska and Regaieg (2020). This research examined how overconfidence and loss aversion biases affect US company performances. The population of insured industrial and service enterprises in the US was the subject of about 6,777 quarterly observations utilized in this study, which ran from 2006 to 2016. The study's hypotheses were tested using two-panel data models with ordinary least squares (OLS) regression. In conclusion, the paper proved that the economic success of US firms is shown to be severely impacted by investors' pessimism indicating loss aversion, whereas investors' optimism expressing overconfidence positively impacts company stock market performance.

A study by Alsabban and Alarfaj (2020) examined the overconfidence behavior among investors in the Saudi stock market. This paper applied a VAR model to the monthly data collected from the Bloomberg database in the period of 2007–2018 to investigate the lead-lag relationship between market turnover and market return. As a result, the existence of overconfidence behavior in the Saudi stock market was concluded. In addition, the Granger causality test was applied as a robustness check for VAR results and both results confirmed the positive nexus between market turnover and market. However, being unable to collect data past 2007 became a substantial limitation of the research. This would have been more significant if this paper examined the Saudi investor's behavior before and after the local market crash of 2006.

Bouteska et al. (2023) conducted research to test the relationship between trading volume and return to determine how overconfidence psychology affects investors in the US stock market. Bouteska et al. (2023) used daily data covering the COVID-19 period from 2016 to 2020 and applied nonlinear Granger causality analysis to investigate this nexus. As a result, the existence of overconfidence psychology on investors' behavior in the US market was demonstrated since there was a causal association between trading volume and stock return. These results provide evidence of overconfidence among investors which pave the way for further related research. In addition, there are some other variables that could impact firm performance or firm value during merger events such as return on asset, and financial leverage (Khan et al., 2016; Almashaqbeh et al., 2023).

A recent research by Aljifri (2023) investigated how overconfidence influences business value in Saudi Arabia's stock market. This study combined two different methods of fixed-effects model and dynamic method on panel data. Aljifri (2023) collected a sample of 4004 firm-quarter observations in the period of 11 years from 2009 to 2019. To measure the valuation of firms in the Saudi stock market, this study used Tobin's Q ratio as a dependent variable. According to the panel regression model, the author confirmed that in the Saudi stock market, the overconfidence bias among investors has a significant positive effect on stock valuation. The findings provided an explanation for the nexus between overvaluation

and mispricing in emerging markets, especially the stock market of Saudi Arabia. Similarly, Basyith et al. (2022) also found a relationship between financial leverage and stock valuation via market capitalization value in Malaysia.

To date, there is no literature that examines how investor bias affects firm valuation in Vietnam. In order to determine whether biases influence investor decision-making, only a few research examined the effect of investor psychology on decision-making processes. To our knowledge, only several documents related to overconfidence in investment while only one Vietnamese research focuses on the trading behavior of investors and their investment decisions such as the paper of Ly and Tuan (2012).

The existence of excessive optimism and overconfidence among Vietnamese investors on the stock exchange and its impact on the trading behavior of investors was tested by Ly and Tuan (2012). To examine psychological factors in investors' trading activities, this paper applied a two-step data collection method on a sample of 150 individual investors with trading accounts at two securities companies in Ho Chi Minh City. The survey was conducted from February to March 2012 by sending directly to investors or via email. Within 800 questionnaires sent out, only 274 answers were collected. Research results indicated that overoptimism and overconfidence do exist in the majority of investors and they had a statistically significant effect on the trading turnover ratio of investors. These results implied awareness for individual investors in making investment decisions. However, this study only focused on examining the impact of over-optimism and overconfidence on investors' trading activities and ignored the influence of investor biases on the behavior of stock markets.

To sum up, there were a small number of studies that tested the link between overconfidence and firm valuation since it has been a growing consideration in just a few years, however, the majority of them indicated a positive relationship. Our hypotheses is supported by a part of the literature review that demonstrated how overconfidence bias affects the valuation of firms. The hypothesis of this study is written as below:

*$H1_0$: Overconfidence psychology has no effect on the valuation of firms listed on the Ho Chi Minh Stock Exchange.*

*H1: Overconfidence psychology positively affects the valuation of firms listed on the Ho Chi Minh Stock Exchange.*

## 3. METHODOLOGY

A detailed description of the variables is presented in Table 1 below.

**Table 1.** Description of variables

| *Variable* | *Description of variables* | *Measurement unit* | *Data sources* | *Source* |
|---|---|---|---|---|
| ***Dependent variable*** | | | | |
| Tobin's Q ratio (*TOBINQ*) | Tobin's Q ratio is calculated by adding the market value of equity to the book value of assets minus the book value of equity, then divided by the book value of assets. It measures the market value and its fixed capital replacement value. | Times | Fiinpro.com | Aljifri (2023) |
| ***Independent variables*** | | | | |
| Change in trading volume (*CTV*) | The change in trading volume relating to its prior period. | Percent | Fiinpro.com | Alsabban and Alarfaj (2020), Asaad (2020), Deaves et al. (2009), Trejos et al. (2019), Aljifri (2023) |
| Turnover rate (*TURNOVER*) | The ratio between the number of trading shares and the number of shares outstanding for each firm over each period. | Percent | Fiinpro.com | Chuang and Lee (2006), Griffin et al. (2007), Statman et al. (2006), Tekçe et al. (2016), Aljifri (2023) |
| Excessive trading (*ET*) | It is considered as overconfidence only if there is an increase in trading volume and $\phi$ denotes a null value. | Percent | Fiinpro.com | Benos (1998), Chuang and Lee (2006), Odean (1998), Aljifri (2023) |
| Increase in the number of shares outstanding (*ISO*) | It is considered as overconfidence only if the change in the number of shares outstanding is greater than 0 and $\phi$ denotes a null value. | Percent | Fiinpro.com | Bouteska and Regaieg (2020), Adebambo and Yan (2018), Baker and Wurgler (2002), Aljifri (2023) |
| ***Control variables*** | | | | |
| Market capitalization (*MARKETCAP*) | It is calculated by the product of the number of shares outstanding and share price, then logarithm. Market capitalization indicates the total market value of a firm. | Times | Fiinpro.com | Aljifri (2023), Basyith et al. (2022) |
| Return on assets (*ROA*) | It is a ratio between net profit and total assets of a firm. | Percent | Fiinpro.com | Khan et al. (2016). |
| Financial leverage (*LEV*) | It is a ratio between total debt and total assets of a firm. | Times | Fiinpro.com | Almashaqbeh et al. (2023), Basyith et al. (2022) |

*Source: Authors' calculations.*

This study investigates the quarterly sample of 264 non-financial firms listed on HOSE in the period of 2016–2022. Firstly, the quarterly frequency is chosen because a few of the variables are disclosed on a quarterly basis. Secondly, the current study excludes insurance and financial firms because of the significant differences in accounting methods and regulatory restrictions between financial and non-financial companies. Similar to previous research of Adebambo and Yan (2018) and Bouteska and Regaieg (2020), excluding financial firms contributes to a better exploration and analysis as

well as helps to avoid distorting the firm valuation results.

The current study uses *TOBINQ* as an independent variable. The independent variables in this research are the change in trading volume (*CTV*), turnover rate (*TURNOVER*), excessive trading (*ET*), and increase in the number of shares outstanding (*ISO*), respectively. Finally, three control variables are applied in the research, namely market capitalization (*MARKETCAP*), return on assets (*ROA*), and financial leverage (*LEV*).

This study applies three different regression models to examine the impact of overconfidence on the valuation of companies listed on the HOSE by focusing on a main model, then two alternative models are used to ensure the results are not sensitive for the variable proxy.

Firstly, in the main model, this study uses two independent variables measuring overconfident investors, namely change in trading volume (*CTV*) and turnover rate (*TURNOVER*), which have been popularly used before (Alsabban & Alarfaj, 2020; Asaad, 2020; Barber & Odean, 2001; Deaves et al., 2009; Chuang & Lee, 2006; Griffin et al., 2007; Statman et al., 2006; Tekçe et al., 2016; Trejos et al., 2019; Aljifri, 2023). The main model to examine the effect of overconfidence on the valuation of companies listed on the HOSE is written as follows:

$$TOBINQ_{it} = \beta_0 + \beta_1 MARKETCAP_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 CTV_{it} + \beta_5 TURNOVER_{it} + \varepsilon_{it} \quad (1)$$

Secondly, to re-examine the hypotheses, two alternative variable proxies were applied for investor overconfidence to avoid the sensitive results for variable proxy and to check the robustness of the findings. Thus, two alternative models are expressed as below:

$$TOBINQ_{it} = \beta_0 + \beta_1 MARKETCAP_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 ET_{it} + \varepsilon_{it} \quad (2)$$

$$TOBINQ_{it} = \beta_0 + \beta_1 MARKETCAP_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 ISO_{it} + \varepsilon_{it} \quad (3)$$

where, $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, and $\beta_5$ are the coefficients of *MARKETCAP*, *ROA*, *LEV*, and overconfidence proxies, respectively; $\varepsilon_{it}$ is the error term; $i$ is a company, which sampled 264 companies listed at the HOSE; $t$ represents time in quarters that covers the period of 2016–2022.

## 4. EMPIRICAL RESULT

### 4.1. Descriptive statistics and correlations

The following Table 2 summarizes the descriptive statistics of the database in the current study, including the number of observations, mean, maximum value, minimum value, and standard deviation.

**Table 2.** Descriptive statistics

| *Variable* | *Observations* | *Mean* | *Std. dev.* | *Minimum* | *Maximum* |
|---|---|---|---|---|---|
| *TOBINQ* | 7,314 | 1.2472 | 0.8071 | 0.1727 | 11.0317 |
| *MARKETCAP* | 7,199 | 27.5890 | 1.5774 | 23.9119 | 33.3439 |
| *ROA* | 7,230 | 0.0689 | 0.0854 | -1.0837 | 0.6127 |
| *LEV* | 7,230 | 0.4637 | 0.2154 | 0.0000 | 1.2900 |
| *CTV* | 7,114 | 4.8771 | 24.4403 | -1.0000 | 1599.8460 |
| *ET* | 4,597 | 7.7780 | 30.0104 | 0.0002 | 1599.8460 |
| *TURNOVER* | 7,122 | 0.0039 | 0.0066 | 0.0000 | 0.0721 |
| *ISO* | 704 | 0.2515 | 0.3758 | 0.0000 | 4.7850 |

*Source: Authors' calculations.*

First, *TOBINQ* is the dependent variable in the current study. The mean *TOBINQ* of these examined firms was 1.2472, which is greater than 1. According to the definition of *TOBINQ* a high *TOBINQ* of greater than 1 implies that a stock is more expensive than the replacement cost of its assets, which indicates that the stock is overvalued. In other words, the majority of 7,314 available observations for *TOBINQ* expressed an overvaluation.

Second, independent variables in this study include *CTV, TURNOVER*, *ET*, and *ISO*. Firstly, the main variable measures overconfidence *CTV* had a mean of 4.8771% with a standard deviation of 24.4403, which is significantly huge. It can be explained by the characteristics database which includes all 264 non-financial firms listed on HOSE with different sizes and industries. Secondly, the standard deviation *TURNOVER* states at 0.0066, which is significantly low. Thirdly, *ET* is similar to *CTV* since it is defined as a positive value of the *CTV* only. Finally, there are only 704 observations of *ISO* throughout the period of seven years from 2016 to 2022. The reason is that *ISO* will be null if there is no change or a decrease of number of shares outstanding. The maximum value and minimum value of *ISO* are 4.785% and 0% respectively.

Third, there are three control variables in the current study, consisting of *MARKETCAP*, *ROA* and *LEV*. Over 7,199 observations of *MARKETCAP* which is defined as the logarithm of the market capitalization, the mean value is 27.5890, with the standard deviation of 1.5774. The sample data has a mean *ROA* of 0.0696%, and the mean *LEV* is 0.4687.

**Table 3.** Correlation matrix of the main model

| *Variables* | *TOBINQ* | *MARKETCAP* | *ROA* | *LEV* | *CTV* | *TURNOVER* |
|---|---|---|---|---|---|---|
| ***TOBINQ*** | 1.0000 | | | | | |
| ***MARKETCAP*** | 0.4725 | 1.0000 | | | | |
| ***ROA*** | 0.6016 | 0.3080 | 1.0000 | | | |
| ***LEV*** | -0.2345 | -0.0572 | -0.4059 | 1.0000 | | |
| ***CTV*** | 0.0082 | 0.0245 | -0.0325 | 0.0110 | 1.0000 | |
| ***TURNOVER*** | -0.1063 | 0.1000 | -0.1051 | 0.0970 | 0.0656 | 1.0000 |

*Source: Authors' calculations.*

Table 3 shows the direction and magnitude of linear connections between the dependent, independent, and control variables. According to Cohen et al. (2002), the correlation analysis will indicate whether or not it is existence a nexus between the independent variables and dependent variables. As shown in Table 3, there is a positive relationship between the primary measure of overconfidence (*CTV*) and *TOBINQ,* at 0.0082. In other words, this correlation provides initial evidence that the overconfidence of investors is positively and strongly associated with firm valuation (measured by *TOBINQ*). For sample firms, the correlation between *TURNOVER* and *TOBINQ* is negative, which is in contrast with an expectation of the current study. Besides, the *TOBINQ* variable measured market valuation is highly and positively correlated with *ROA* and *MARKETCAP* while it has negatively correlated with leverage. It is the same as research's expectation. Finally, the highest correlation is between *ROA* and *TOBINQ* which can cause multicollinearity.

**Table 4.** Correlation matrix between overconfidence proxies

| *Variables* | *CTV* | *TURNOVER* | *ET* | *ISO* |
|---|---|---|---|---|
| ***CTV*** | 1.0000 | | | |
| ***TURNOVER*** | 0.1938 | 1.0000 | | |
| ***ET*** | 1.0000 | 0.1938 | 1.0000 | |
| ***ISO*** | -0.0392 | 0.0353 | -0.0392 | 1.0000 |

*Source: Authors' calculations.*

Table 4 shows the correlations among overconfidence proxies (*CTV, TURNOVER, ET, ISO*). The correlations between *TURNOVER* and other independent variables are positive and highly significant at lower than 0.2, implying that *TURNOVER* is a good proxy for measuring overconfidence. On the other hand, *ET* and *CTV* are perfectly correlated since by definition are calculated based on *CTV*. The correlations between *ISO, CTV,* and *ISO*, *ET* is negative while the correlation of *ISO* with *TURNOVER* is positive. However, as mentioned earlier, this study introduces these variables as an overconfidence proxy as different alternative measures that might capture the expression of overconfidence more precisely and widely. Hence, the current study does not exclude any proxy from further regression analysis for overconfidence robustness checks.

On the other hand, multicollinearity is considered as a phenomenon that does not decrease the explanatory power, however, it does reduce the statistical significance of the model, especially the independent variables. To guarantee that the research model does not have multicollinearity, this study uses a variance inflation factor (VIF) test.

**Table 5.** Multicollinearity

| *VIF* | *ROA* | *LEV* | *MARKETCAP* | *TURNOVER* | *CTV* | *ET* | *ISO* | *Mean VIF* |
|---|---|---|---|---|---|---|---|---|
| Model 1 | 1.34 | 1.21 | 1.13 | 1.04 | 1.01 | | | 1.15 |
| Model 2 | 1.32 | 1.22 | 1.09 | | | 1.00 | | 1.16 |
| Model 3 | 1.35 | 1.26 | 1.12 | | | | 1.03 | 1.19 |

*Source: Authors' calculations.*

The VIF values of all variables in Table 5 are at around 1, which is much lower than 10. Meanwhile, a VIF of greater or equal to 10 is often thought to indicate harmful collinearity, though problems are possible with lower VIF values (Franke, 2010). Therefore, it can be concluded that in all three models, there is no multicollinearity phenomenon among independent variables.

## 4.2. Model selections

This study conducts a F-test to find the appropriate regression model between the two methods pooled OLS and fixed effects model (FEM). It is clear that all of prob > F = 0.000 in three models, which is smaller than the significance level of 5% (Table 6). Therefore, it has enough conditions to reject $H1_0$, and accept *H1*. It means that a FEM method will be more optimal for Models 1, 2, and 3 than pooled OLS.

To choose whether the pooled OLS or random effects model (REM) model is more suitable for the current study, Breusch and Pagan test is applied. In all three models, prob > chibar2 = 0.0000 and these are smaller than the significance level of 5% (Table 7). Therefore, we reject $H1_0$ and accept *H1*. To sum up, a REM method will be more optimal for Models 1, 2, and 3 than pooled OLS.

**Table 6.** F-test results

| *Model* | *F-test* | *Prob > F* |
|---|---|---|
| Model 1 | 71.66 | 0.0000 |
| Model 2 | 42.05 | 0.0000 |
| Model 3 | 4.86 | 0.0000 |

*Source: Authors' calculations.*

**Table 7.** Breusch-Pagan test results

| *Model* | *Chibar2* | *Prob > chibar2* |
|---|---|---|
| Model 1 | 25540.20 | 0.0000 |
| Model 2 | 12940.27 | 0.0000 |
| Model 3 | 122.98 | 0.0000 |

*Source: Authors' calculations.*

This study employs the Hausman test to determine whether FEM or REM is more appropriate for the research data. It is clear that the prob > chibar2 = 0.0000 in all three models, and with a p-value of less than 5% (Table 8), the $H1_0$ is rejected. It means that FEM is more suitable for three models.

To sum up, after using the F-test, Breusch-Pagan test, and Hausman test, the FEM model is selected to be the most suitable model for research data.

However, there is a probability that the FEM model has defects which make the regression results

ineffective. Thus, this research applies two tests to investigate whether the FEM method has defects or not. Therefore, this study uses Wald tests to check whether the regression model by FEM methods has heteroskedasticity or not. Table 9 expresses that all models have a prob > chibar2 of 0.0000, which is less than the significant level of 5%. Therefore, $H1_0$ is rejected and *H1* is accepted. It indicates that the three models representing profitability all suffer from heteroskedasticity.

Wooldridge test is applied in the current study to identify the probability of autocorrelation in the FEM model. Table 10 shows the different results in prob > F of the three models. Both Model 1 and Model 2 have prob > F of 0.0000 < 0.05, which means that $H1_0$ is rejected and both models have first-order autocorrelation. In Model 3, the prob > F value is 0.1293 which is higher than the significant level of 0.05. As a result, the $H1_0$ is accepted. In other words, Model 3 does not have first-order autocorrelation.

**Table 8.** Ausman test results

| *Model* | *Chibar2* | *Prob > chibar2* |
|---|---|---|
| Model 1 | 158.33 | 0.0000 |
| Model 2 | 182.73 | 0.0000 |
| Model 3 | 57.16 | 0.0000 |

*Source: Authors' calculations.*

**Table 9.** Wald test results

| *Model* | *Chibar2* | *Prob > chibar2* |
|---|---|---|
| Model 1 | 1.9e+33 | 0.0000 |
| Model 2 | 4.6e+06 | 0.0000 |
| Model 3 | 1.2e+34 | 0.0000 |

*Source: Authors' calculations.*

**Table 10.** Wooldridge test results

| *Model* | *F-test* | *Prob > F* |
|---|---|---|
| Model 1 | 116.915 | 0.0000 |
| Model 2 | 114.883 | 0.0000 |
| Model 3 | 3.089 | 0.1293 |

*Source: Authors' calculations.*

In conclusion, it is concluded that using the FEM method is not significant because of heteroskedasticity and first-order autocorrelation in Models 1 and 2 and there is heteroskedasticity in Model 3. Therefore, the feasible generalized least squares (FGLS) method will be applied to improve and eliminate the above disadvantages of the FEM method.

On the other hand, there is an alternative estimation approach to investigate the relationship between overconfidence psychology and firm valuation. The dynamic generalized method of moments system (GMM) regression analyses could be used to ensure the results are robust to endogeneity issues. The endogeneity problem can lead to biased estimates or incorrect since the past values of the dependent variable can influence the future values of the independent variables. It is the truth that FEM ignores the correlation between the error term and lagged dependent variable which may result in biased coefficient estimates. In other word, in this study the dependent variable of firm valuation in a previous year may affect independent variable of investor overconfidence in the subsequent years. Therefore, dynamic GMM approach could be applied as an alternative method to eliminate the endogeneity issues.

### 4.3. Empirical results

Table 11 summarizes the regression results of the main model by four different research methods of pooled OLS, REM, FEM, FGLS, respectively. However, this research will focus only on the FGLS result in the result discussions since it is demonstrated as the most optimal model for the current study.

**Table 11.** Feasible generalized least squares results of three models

| *Variables* | *FGLS 1* | *FGLS 2* | *FGLS 3* |
|---|---|---|---|
| *MARKETCAP* | 0.176*** | 0.158*** | 0.178*** |
| | -35.13 | -28.39 | -10.12 |
| *ROA* | 4.411*** | 4.303*** | 5.549*** |
| | -47.64 | -37.45 | -14.84 |
| *LEV* | -0.0336 | -0.110** | -0.230* |
| | -0.96 | -2.53 | -1.72 |
| *CTV* | 0.000682** | | |
| | -2.47 | | |
| *TURNOVER* | -10.32*** | | |
| | -9.86 | | |
| *ET* | | 0.000482* | |
| | | -1.72 | |
| *ISO* | | | 0.125* |
| | | | -1.86 |
| C | -3.848*** | -3.336*** | -4.006*** |
| | -28.41 | -22.08 | -8.25 |
| N | 6917 | 4582 | 680 |

*Note: *, ** and *** denote statistical significance at the 1%, 5% and 10% levels, respectively.*
*Source: Authors' calculations.*

The current research examines the hypothesis stated that overconfidence psychology positively affects the firm valuation of companies listed in the HOSE. After presenting the regression results, this study focuses on discussing results and then, comparing these results with the findings of other authors.

On the one hand, the regression results in the main model will be examined.

Firstly, investor overconfidence is expected to have a considerable and favorable impact on the value of firms listed on HOSE and, consequently, the value of the stock market. The regression result reports that the primary measure of overconfidence (*CTV*) has a positive coefficient of 0.000682 and a p-value is smaller than 0.05. This value indicates that a rise in *CTV* variable of one unit leads to a rise in *TOBINQ* of 0.000682 units, holding other variables in the model constant. In addition, overconfidence is statistically significant in the valuation of companies listed on HOSE. This result is consistent with the *H1* of the current study and similar to the research results of Adebambo and Yan (2018), Bouteska and Regaieg (2020), Trejos et al. (2019) and Aljifri (2023). As clarified in the data section, overconfident investors overestimate their abilities and will act based on the information they obtain. Therefore, overconfident investors trade more actively and take higher risks than sensible investors, leading to higher levels of trading activity in financial markets (Odean, 1998).

Secondly, the *TURNOVER* variable has a negative coefficient of -10.3179 with a p-value of a lower than significant level of 5%. The value of

the coefficient is in contrast with an expectation before. According to the research of Statman et al. (2006), Tekçe et al. (2016), and Aljifri (2023), *TURNOVER* is employed as one of the independent variables. In the current study, *TURNOVER* is calculated quarterly for each period and firm which eliminates the influence of growth during a long period. In fact, the current research examines a research period of seven years from 2016 to 2022 while the period of 2019–2022 saw considerable growth of the Vietnamese stock market. Thus, regression results between *TURNOVER* and firm valuation might not be optimal and realistic.

Thirdly, the coefficients of all control variables are matched with an expectation of the current research. Both *MARKETCAP* and *ROA* have a p-value of 0.0000 and a positive coefficient of 0.1759 and 4.4106, respectively. It reports that *MARKETCAP* and *ROA* are positively affected and statistically significant on the valuation of non-financial firms listed on HOSE. However, *LEV* has a p-value of 0.3360 which is higher than a significant level of 5%. Hence, in this model, *LEV* variable has no statistical significance on the firms' valuation listed on HOSE.

On the other hand, the regression results in the second and third model will be examined. To ensure these findings are not sensitive for the variable, the current study applied alternative variables to measure the overconfidence level of investors, listed as *ET* and *ISO*. Two additional regression models are conducted for each of two alternative proxies to capture the effect of overconfidence on the valuation of companies listed on the HOSE. As a result, the study finds that alternative proxy variables are statistically significant at 10% and similar to the *H1* of positive relationship between overconfidence and firm valuation in Vietnamese stock market.

Firstly, the coefficient of *ET* states at 0.0004815 and p-value is 0.086. It can be concluded that overconfidence, which is expressed by excessive trading variables, has positively affected the firm values of 264 non-financial listed companies on HOSE, at a significant level of 10%. This result is similar to the nexus between *CTV* and firm valuation since *ET* is extracted on *CTV*.

Secondly, overconfidence, in the third model, positively affects the firm valuation of non-financial firms listed on HOSE, which is similar to research findings of Aljifri (2023). It is derived from Table 3, when the coefficient of *ISO* is positive, at 0.1255 and a p-value is smaller than 0.1. In addition, in both additional models, the regression result of other independent and control variables is similar to the main model and matched with the *H1*, at a significant level of 10%.

## 5. DISCUSSION

On the one hand, the current research that overconfidence bias positively affects the valuation of companies listed in the HOSE. By using the FGLS results, three of four variables measuring overconfidence psychology of investors have positive coefficients and all of them have significant statistically. More specificially, while *CTV*, *ET* and *ISO* variables show a positive impact on firm valuation of non-financial listed firms on HOSE, the impact of *ISO* variable on firm valuation is proved to be largest with the highest coefficient of 0.1255. Besides, only one of four independent variables measuring overconfidence has a negative impact on firm valuation of firms listed on HOSE. It can be explained by the research of Statman et al. (2006), *TURNOVER* eliminates the influence of growth during a long period, hence, regression results between turnover rate and firm valuation might not be optimal and realistic.

On the other hand, the current study demonstrates that the positive impact of overconfidence on firm valuation of listed stock on HOSE be not sensitive for the variable proxy. As a result, the current study can arrive at the conclusion that there is a positive and significant relationship between investor overconfidence and the valuation of firms listed on the HOSE thanks to the establishment of reliable measurements for investor overconfidence.

In conclusion, the research results on the alternative measurement of investor overconfidence proxies show that all results are statistically significant. Despite the different proxies for investor overconfidence in the current investigation, there are consistent results when three of four overconfident proxies indicate the positive impact on firm valuation of listed firms on HOSE. It demonstrates that using the alternative overconfidence metrics has no effect on the report's results. In addition, the positive impact of overconfidence on firm valuation on listed stocks on HOSE is concluded to not be sensitive for the variable proxy. As a result, the current study can arrive at the conclusion that there is a positive and significant relationship between investor overconfidence and the valuation of firms listed on the HOSE thanks to the establishment of reliable measurements for investor overconfidence. These findings are consistent with the research results of Bouteska and Regaieg (2020), Adebambo and Yan (2018), and Aljifri (2023). In addition, these conclusions are also similar to the prediction about the impact of overconfidence psychology on firm valuation in the Vietnamese stock market and it is particularly important to suggest recommendations for Vietnamese investors, market regulators, and researchers.

To our knowledge, there are few papers that have studied the impact of overconfidence psychology on firm valuation and a majority of those have examined the stock market of a single country. Due to the unique features of the single stock market, there are not many indicated conclusions for other policymakers or investors of other distinguished stock markets. The previous Vietnamese study just focused solely on examining the evidence for the existence of overconfidence biases among Vietnamese investors while ignoring the impact of this bias on the Vietnamese stock market (Ly & Tuan, 2012). The current study is the first paper to examine the impact of overconfidence on the firm valuation of companies listed on HOSE. Therefore, this paper provides empirical results and suggests critical recommendations for both Vietnamese investors and market regulators. It is necessary for Vietnamese investors to raise awareness about the influence of overconfidence bias on mispricing and irrational investment decisions. It has several

implications for Vietnamese market regulators to take overconfidence bias into consideration to maintain stock market effectiveness. However, it is believed that more related research is needed to compare developed stock markets versus emerging stock markets to examine the effect of market characteristics on this relationship.

## 6. CONCLUSION

The current study examines the impact of the overconfidence of investors on firm valuation in the sample of 264 non-financial firms listed on HOSE in the period of seven years from 2016–2022. This research employs the change in trading volume variable as a main variable proxy of overconfidence and applies the FGLS method as the main estimation.

The current study arrives at several outcomes. Firstly, this paper confirms the significant and positive nexus between overconfidence psychology among investors and firm valuation of sample firms listed on the HOSE. Secondly, two additional sensitivity analyses are provided in this study. As a result, all of the results on two alternative regression models support and confirm the conclusions derived from the main model.

To sum up, all variable proxies are concluded to have statistically significant and generates consistent results when used in our analysis, regarding different investor overconfidence proxies. These empirical results suggest that investors in the Vietnamese stock market are affected by overconfidence psychology which has been neglected by traditional financial theory.

These findings are believed to have implications for market regulators, investors as well as for investment costs, market effectiveness and capital allocation. Taking an example that these findings are expected to raise awareness of investors about the impact of their psychology on asset pricing then increase their rationality of decision making on stock market for better market efficiency. In addition, it is important for investors to consider the impact of costs on investment decisions, even in the presence of overconfidence. It is expected that by incorporating these recommendations, investors can mitigate the potential negative effects of overconfidence on investment costs and make more informed investment decisions. In term of market regulators, these findings suggest that it is necessary to reduce the disadvantage of overconfidence psychology on investment decisions of investors by educating to promote consistency and market effectiveness.

Moreover, these findings are believed to have significant implications for academic researchers. For instance, it provides explanation of mispricing and overvaluation in emerging markets and supports behavioral theories that investor psychology affects asset pricing. In addition, this study also contributes to the development of empirical models and introduces new proxies measuring overconfidence bias, which are believed to be useful for further research.

However, a possible limitation of the current research relates to data availability due to Vietnamese stock market characteristics. Because of the lack of data, it is difficult to use more proxies to measure investor overconfidence, such as earnings forecast deviation proxy as research by Lin et al. (2005). In addition, the limited scope of available data presents some obstacles as its interpretation does not always provide answers as expected.

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