IMPACT OF THE COVID-19 PANDEMIC ON THE RISK-TAKING BEHAVIOR OF NON-FINANCIAL FIRMS LISTED IN VIETNAM WITH CASH HOLDINGS AS A MODERATING VARIABLE

Nguyen Hoang Minh
University of Economics and Law, Ho Chi Minh City, Vietnam
Vietnam National University, Ho Chi Minh City, Vietnam

Le Hoang Vinh
University of Economics and Law, Ho Chi Minh City, Vietnam
Vietnam National University, Ho Chi Minh City, Vietnam

ABSTRACT

Vietnam has faced the long-lasting COVID-19 outbreak, which has imposed a negative impact on corporate activities, since 2020. This study aims to examine how the COVID-19 outbreak has influenced the risk-taking behavior of companies in Vietnam, investigating this relationship with the moderating role of cash holdings. We used the research data of non-financial listed firms in Vietnam during the period from quarter 1 2018 to quarter 2 2021. According to the Generalized Method of Moments approach, the study concludes that the COVID-19 pandemic period is negatively associated with corporate risk-taking behavior. In addition, there is a significant increase in the level of risk-taking behavior during the COVID-19 pandemic period by enterprises that have more cash holdings.

Keywords: COVID-19, risk-taking behavior, non-financial firms

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INTRODUCTION

As Shen et al. (2020) noted, the COVID-19 outbreak caused a global recession which the completely defeated the Vietnamese economy. And, as Qin et al. (2020) pointed out, the pandemic seriously affected the operations of listed firms. Most empirical studies on COVID-19 focus on the effect of the pandemic on the real economy (Shen et al., 2020; Iyke, 2020; Mirza et al., 2020; Khatib & Nour, 2021; Liu et al., 2020; Qin et al., 2020). Studies on the relationship between the COVID-19 outbreak and corporate risk-taking activities are limited, however.

The COVID-19 outbreak affects corporate risk-taking from the following aspects. First, COVID-19 leads to the increase in external risks, which recommends managers to decrease their risk-taking in case of urgencies. Ming et al. (2016) suggested that managers may choose to delay their investment decisions when uncertainties arise, but this choice may lead to the abandonment of valuable projects. Less risk-taking behavior reduces enterprises' development (Faccio et al., 2011). Second, the COVID-19 outbreak affects government's future policy decisions, which is directly related to

corporate risk-taking behavior, so firms will choose fewer risky investments (Luo et al., 2017).

The motivation for choosing Vietnam for this study are as follows. First, because the first COVID-19 case appeared on the 23 of January 2020 in Vietnam, followed by a chain of new cases (T. H. Nguyen & Vu, 2020), the government decided to apply social distancing rules, which stopped economic activities. Hence, corporate activities and the risk-taking behavior of many companies was negatively affected. In Vietnam, risk-taking activities are very important to the development of Vietnamese companies (Vo, 2018), however how the COVID-19 pandemic has affected corporate risk-taking behavior has not been explored. Thus, an important question to ask is whether or not there is a relationship between the COVID-19 outbreak and corporate risk-taking activities.

In our paper, we evaluate how the COVID-19 outbreak has influenced corporate risk activities. To conduct our study, we used data on 396 companies, which accounted for over 50% of the stock market capitalization from quarter 1 2020 to quarter 2 2021. Using the Generalized Method of Moments method, we found that the COVID-19 pandemic is negatively related with the lever of corporate risk-taking behavior. Furthermore, cash holdings may moderate the negative relationship between the COVID-19 pandemic and corporate risk-taking behavior. On the other hand, our results show a negative relationship between free cash flow and corporate risk-taking, and that companies that have more cash and assets exhibit less risk-taking behavior.

Our study contributes to the literature on the effect of COVID-19 on risk-taking behavior of non-financial companies. First, this study is the first to test the impact of the COVID-19 pandemic on risk-taking activities. Previous studies have focused on assessing the impact of COVID-19 on the stock market (Liu et al., 2020; Iyke, 2020), corporate solvency (Mirza et al., 2020), firm performance (Fu & Shen, 2020; Khatib & Nour, 2021; Qin et al., 2020; Shen et al., 2020), and supply chains (Sharma et al., 2020). Second, we find that corporate risk-taking behavior would have changed when companies have more cash during the period COVID-19 pandemic. Third, the study is of great significance in the current period since the COVID-19 pandemic caused a global recession.

Following the Introduction above, the study is structured into 4 parts: (i) Section 2 presents the literature review and hypotheses development, (ii) Research data and empirical design are given in Section 3, (iii) Section 4 presents the main empirical analyses, and (iv) Section 5 presents the conclusions.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The Pecking Order theory in corporate finance starts with the assumption about the existence of asymmetric information, as managers hold more useful information about a company's prospects, risks and values than outside investors (Donaldson, 1961; Myers & Majluf, 1984). Accordingly, this theory states that financial managers can choose and prioritize the sources of financing in the following order: internal financing and external financing (borrowings and new equity), because they expect a minimization of the cost related to the asymmetric information problem (Myers & Majluf, 1984). However, these prioritization choices may have negative effects on firms' operating activities. Because the inevitability of firms' cash holdings increases the likelihood of agency problems, overinvestment and fraud problems can arise (Dittmar et al., 2003). Using the Pecking Order view, Opler et al. (1999) analyzed the relationship between cash holdings and financial performance. The finding showed that an increasing level of cash holdings will increase firm performance and vice versa. Many other studies with the same results, including HC et al. (2019), Ifada et al. (2020), confirmed that the level of cash holdings will meet and support firms in any period of crisis or uncertainties in the core operating activities of firms.

The outbreak of the Covid-19 pandemic has prompted governments around the world to shut down key activities of their economies. This action was intended to limit the spread of the pandemic, but it could have pushed many companies into liquidity crises (Acharya & Steffen, 2020). The empirical studies of Shen et al. (2020) and Zheng (2021) proved that the COVID-19 pandemic has a negative effect on the performance of companies listed in China. Tawiah & O'Connor Keefe (2020) found that the Covid-19 pandemic had a negative effect on investing activities of firms. The pandemic also had a negative impact on the risk-taking

behavior of corporations' financial managers and chief executive officers because they thought that the governments' policies with respect to a decrease in the spread of the pandemic would disrupt the production chain and strongly decrease impacts on the domestic demand sector. Accordingly, we suggest the first hypothesis as follows:

H1: The COVID-19 outbreak negatively affects corporate risk-taking behavior.

Keynes' Liquidity Theory (Keynes, 1936) indicates that firms have three motives for holding cash - transactions, precautionary, and speculative. Lee (1986) and Atrill & McLaney (2017) argued that cash flow is like a blood vessel in the human body. Li et al. (2020) found that many companies decrease their borrowing from commercial banks and increase firms' cash holdings level. Bates et al. (2018) found that the level of cash holdings of companies is increased because of the financial downturn and adverse shocks. The empirical research of Tawiah & O'Connor Keefe (2020) pointed out a negative relationship between the COVID-19 pandemic and investment decisions, but this relationship decreases because of the moderation of cash holdings. Zheng (2021) proved that the increasing level of cash holdings during the pandemic had a positive impact on firm performance. Because of the negative impact of the COVID-19 pandemic, t companies increased the level of cash holdings in the expectation of liquidity risk hedging and the immediate responses to unexpected situations that negatively affect firm performance. Thus, the increasing level of cash holdings during the COVID-19 pandemic could help companies more proactively respond to the pandemic and more easily deploy their new investment opportunities. Accordingly, we propose the second hypothesis as follows:

H2: Cash holdings may moderate the negative relationship between the COVID-19 pandemic and corporate risk-taking behavior.

DATA AND METHODOLOGY

Research Sample and Data

We used the financial data of non-financial listed firms in Vietnam. According to the purposive sampling method, the sample included company observations by fiscal quarters beginning in Q1 2018 and ending in Q2 2021. Accordingly, we determined the post COVID-19 pandemic period when a company's quarter observation crops out after the first quarter of 2020. These selection criteria formed a research sample of 5,544 corporate-quarter observations.

Research Model and Method

We employed a difference-in-difference method that analyzed the COVID-19 pandemic as an exogenous factor to corporate risk-taking behavior. According to Fredriksson & Oliveira (2019), this method has been widely used in economics, public policy, management, and other fields because it relies on a combination of before-after and treatment-control group comparisons. We consider the following model:

$$RT1_{i,t} = \alpha_0 + \beta_1.COVID_t + \beta_2.COVID_t.CASH_{i,t} + \beta_3.CASH_{i,t} + \beta_4.LASSETS_{i,t} + \beta_5.LEVERAGE_{i,t} + \beta_6.FIXED_{i,t} + \beta_7.CASHFLOW_{i,t} + \beta_8.RT1_{i,t-1} + \mu_{i,t} \quad (1)$$

$$RT2_{i,t} = \alpha_0 + \beta_1.COVID_t + \beta_2.COVID_t.CASH_{i,t} + \beta_3.CASH_{i,t} + \beta_4.LASSETS_{i,t} + \beta_5.LEVERAGE_{i,t} + \beta_6.FIXED_{i,t} + \beta_7.CASHFLOW_{i,t} + \beta_8.RT2_{i,t-1} + \mu_{i,t} \quad (2)$$

where i and t are the firm and year-quarter, respectively.

RT1 and RT2 are the dependent variables measuring corporate risk-taking behavior (Chen et al., 2015; Vo, 2018), we employed two risk-taking indicators that were calculated as follow:

$$RT1 = \frac{ROAA}{\sigma_{ROAA}} \qquad RT2 = \frac{ROAE}{\sigma_{ROAE}}$$

where ROAA and ROAE are the return on average assets and the return on average equity respectively; σ_{ROAA} and σ_{ROAE} are the standard deviation of the return on average assets and the standard deviation of the return on average equity. Accordingly, RT1 represents business risk taking behavior, while RT2 represents overall risk-taking behavior; the overall risk includes two components, business risk and financial risk. These indicators are reverse measures of risk-taking; the lower value of the dependent variables recommends a higher value of risk-taking (Vo, 2018)

The independent variable COVID is a dummy variable measure of the COVID-19 pandemic, which is measured as an indicator factor that takes the value of 1 if the calendar quarter falls after Q 4 2019 and 0 otherwise (Qin et al., 2020; Shen et al., 2020).

CASH is the independent variable representing cash holdings, which is the ratio of cash holdings

to total assets in firms (Zheng, 2021; Dittmar et al., 2003; Opler et al., 1999), and represents the moderation role of cash holdings in modifying the effect of the COVID-19 pandemic on corporate performance (Zheng, 2021).

COVID*CASH is an interaction variable, which is the COVID-19 outbreak interacting with the cash holdings variable (Zheng, 2021).

In addition, we used control variables to represent a firm's characteristics, as follows:

- LASSETS is the variable representing firm size, which is the logarithm base 10 of total assets in firms (Nguyen et al., 2020; Acharya & Steffen, 2020; Faccio et al., 2011; Fu & Shen, 2020; Shen et al., 2020; Qin et al. (2020). Nguyen et al. (2020) examined the positive relationship between firm size and corporate risk-taking behavior.
- LEVERAGE is the variable showing financial leverage, which is the ratio of total liabilities to total assets in firms (Nguyen et al., 2020; Acharya & Steffen, 2020; Faccio et al., 2011; Fu & Shen, 2020; Khatib & Nour, 2021; Opler et al., 1999; Shen et al., 2020; Qin et al., 2020).
- FIXED is the variable representing tangible fixed assets, and is calculated by the ratio of total tangible fixed assets to total book value of assets in firms (Faccio et al., 2016).
- CASHFLOW is the variable representing t free cash flows, which is the ratio of free cash flow to total assets in firms (Faccio et al., 2016; Shen et al., 2020; Qin et al., 2020).

The variables in the research model are defined in Table 1.

Table 1. Summary of Variable Definitions

Variables	Definition	Empirical studies
RT1	The ratio of ROAA to the standard deviation of ROAA, representing business risk taking behavior.	Chen et al. (2015), Vo (2018)
RT2	The ratio of ROAE to the standard deviation of ROAE, representing total risk-taking behavior.	Chen et al. (2015), Vo (2018)
COVID	Taking the value of 1 if the calendar quarter falls after Q4 2019q4 and 0 otherwise	Shen et al. (2020), Qin et al. (2020)
CASH	The ratio of cash holding to total assets	Opler et al. (1999), Zheng (2021), Dittmar et al. (2003)
LASSETS	The logarithm of the total assets	Fu & Shen (2020), Nguyen et al. (2020), Acharya & Steffen (2020), Faccio et al. (2011), Shen et al. (2020), Qin et al. (2020)
CASHFLOW	The ratio of free cash flow to total assets	Faccio et al. (2016), Shen et al. (2020), Qin et al. (2020)
LEVERAGE	The ratio of total liabilities on total assets	Nguyen et al. (2020), Acharya & Steffen (2020), Fu & Shen (2020), Khatib & Nour (2021), Opler et al. (1999), Shen et al. (2020), Qin et al. (2020), Faccio et al. (2011)
FIXED	The ratio of fixed assets to total assets	Faccio et al. (2016)

Source: Compiled by the authors

In this study, we used the dynamic Generalized Method of Moment (GMM) approach to solve heteroskedasticity and autocorrelation problems (Baltagi, 2008). The GMM method is better than other normal methods because the GMM method works when a serial correlation exists and the assumption on the strict exogeneity of regression is false (Wooldridge, 2001). We used one lag of dependent variable, $RT1_{t-1}$ and $RT2_{t-1}$ in the GMM regression, and we used one lag of the independent variables as instrumental variables.

EMPIRICAL RESEARCH RESULTS

Descriptive Statistics Analysis

Table 2 presents the results of descriptive statistics for all variables used in our research model. The number of observations for each of the variables summarized in this table is 5,544. As shown, the sample mean of RT1 equals 2.9472 and is 3.1817 for RT2. While Vo (2018) reported that the average value of RT1 equaled 2.182 and was 2.224 for RT2 during the period from 2007 to 2015. The matching results show that non-financial companies listed in Vietnam tend to take higher risks, both business risk and financial risk.

Table 2. Summary of Descriptive Statistics

Variables	Observations	Mean	Median	Minimum	Maximum
RT1	5,544	2.9472	3.1265	-3.4814	21.1359
RT2	5,544	3.1817	3.3061	-3.5012	28.6012
CASH	5,544	0.0758	0.0814	0.0010	0.7380
LASSETS	5,544	4,790.232	20,971.75	13.0000	430,011
LEVERAGE	5,544	0.4786	0.2077	0.0010	1.2770
FIXED	5,544	0.2843	0.1982	0.1000	0.9000
CASHFLOW	5,544	0.0169	0.0926	-1.2545	1.5660

Source: Calculated by the authors

In addition, Table 2 also presents firm-specific characteristics that might explain risk-taking behavior. The descriptive statistics of these variables show that the average level of cash holdings is 7.58% of total asset value, there is diversity in firm size, the average use of debt is lower than equity (with the average debt ratio of 47.86%), the average level of tangible fixed assets is 28.43% of the total asset value, and the operating cash flow is a surplus and represents the ability to generate cash.

Correlation Coefficients Matrix

According to the results shown in Table 3, we synthesized the correlation coefficients between the variables in the model, including the correlation between dependent variables and explanatory variables and the correlation among the explanatory variables.

Table 3. Correlation Coefficients Matrix

	RT1	RT2	COVID	CASH	LASSETS	LEVERAGE	FIXED	CASHFLOW
RT1	1 ----							
RT2	0.9101*** [0.0000]	1 ----						
COVID	-0.0430*** [0.0014]	-0.0497*** [0.0002]	1 ----					
CASH	0.2277*** [0.0000]	0.2029*** [0.0000]	-0.0355*** [0.0082]	1 ----				
LASSETS	0.0785*** [0.0000]	0.0777*** [0.0000]	0.0194 [0.1479]	-0.1305*** [0.0000]	1 ----			
LEVERAGE	-0.2253*** [0.0000]	-0.1763*** [0.0000]	-0.0175 [0.1917]	-0.3489*** [0.0000]	0.2978*** [0.0000]	1 ----		
FIXED	-0.0027 [0.8426]	0.0283** [0.0349]	-0.0039 [0.7737]	-0.0720*** [0.0000]	0.0610*** [0.0000]	-0.0844*** [0.0000]	1 ----	
CASHFLOW	0.0638*** [0.0000]	0.0668*** [0.0000]	-0.0084 [0.5301]	0.1619*** [0.0000]	-0.0122 [0.3641]	-0.0599*** [0.0000]	0.0749*** [0.0000]	1 ----

Note: (***) statistically significant at level of 1%, and (**) statistically significant at level of 5%.

P-value of correlation coefficients in square brackets

Source: Calculated by the authors

The negative correlation coefficients between RT1, RT2 and COVID indicate that the COVID-19 pandemic and corporate risk-taking behavior have a positive relationship. This suggests that the COVID-19 pandemic is related to a higher level of risk-taking behavior in firms.

With the variable RT1, at a significance level of 1%, it has positive correlations with CASH, LASSETS and CASHFLOW, but a negative correlation with LEVERAGE (Table 3). These results indicate that the volatility of financial leverage has a positive relationship with the volatility of the business risk taking behavior, while the cash holdings, the total assets and the free cash flows have negative ones. The negative correlations between RT1 and FIXED has no statistical significance.

With the variable RT2, at significance levels of 1% or 5%, it has positive correlations with CASH, LASSETS, FIXED and CASHFLOW, but a negative correlation with LEVERAGE (Table 3). These results indicate that cash holdings, total assets, tangible fixed assets and free cash flows have negative relationships with the volatility of the overall risk-taking behavior, whereas the volatility of financial leverage has a positive one.

In addition, the correlation coefficients of each pair of explanatory variables have negative values from 0.0039 to 0.3489 and positive values from 0.0194 to 0.2978 at the statistical significance level of 1%, or statistically non-significant (Table 3). According to these results and the guidelines of Hair et al. (2006), the authors determined that multicollinearity is not a serious problem in our research model.

Relationship between COVID-19 Pandemic and Corporate Risk-taking Behavior

Table 4 indicates that the p-value from the Hansen test is non-significant at the 10% level, suggesting that the GMM estimation of the selected instrumental variables in the model are suitable. The p-value of the Arellano-Bond test for AR (2) represents that all independent and control variables are uncorrelated with the error terms.

The analysis results in Table 4 show that the coefficient of COVID is positive and significant at the 1% level; thus, we accept hypothesis H1. That is, the COVID-19 pandemic period is significantly associated with less risk-taking behavior. These results are consistent with the empirical evidence that has been confirmed from recent studies. Wen et al. (2021) which suggests that the uncertainty in operating activities reduces the risk-taking behavior of companies. Besides, the result of comparing this relationship between model (2) and model (1) indicates that companies changed their tolerance for overall risk less than business risk during the COVID-19 outbreak, suggesting that companies were more inclined to accept financial risk in this event. These findings are similar to the research point of Shen et al. (2020) that the COVID-19 epidemic had a negative impact on firm performance, affecting the risk-taking behavior of firms when making investment decisions.

The Table 4 results also suggest that the coefficient of COVID*CASH are negatively significant at the 1% level across the two models, suggesting that enterprises which had more cash holdings led to a significant increase in corporate risk-taking behavior during the COVID-19 pandemic period, thus supporting hypothesis H2. Moreover, the marginal effect of the COVID-19 outbreak was determined by cash holdings. The negative interaction between the COVID-19 outbreak and cash holdings suggests that cash holdings can reduce the negative impact of the COVID-19 pandemic on risk-taking activities. This finding shows that the marginal effect of the COVID-19 outbreak shows that if companies have more cash holdings, the COVID-19 pandemic positively affects the level of risk-taking behavior. The results of this study are consistent with the assertions from the study of Qin et al. (2020) and Zheng (2021). Holding cash will help companies cope well with negative external influences, seize investment opportunities, and increase firm performance.

During the period of the COVID-19 pandemic, the Vietnam government decided to apply social distancing rules, which stopped economic activities. Companies had to conduct COVID-19 tests weekly, increasing fixed costs. This negatively impacted corporate activities. Thus, companies engaged in less risky activities to survive. Moreover, the increasing number of COVID-19 cases affected the government's future policy decisions, which was directly related to corporate risk-taking behavior, so enterprises chose fewer risky investments. The risk-taking behavior was not uniform for all firms, however, as the tendency to engage in risk-taking activities depended on the firms' cash holdings available.

The variable CASH has positive effects on RT1 and RT2 at the statistical significance level of 1%. These results indicate that the level of cash holdings negatively impacted on business and overall risk tolerance, in which the magnitude of the change in overall risk was higher than in business risk. The results of this study are similar to the conclusions from the study of Vo (2018); companies with less cash are willing to take on higher business risks with the expectation of high returns, and vice versa. In addition, they also tend to take on more borrowings, and this adds to their financial and overall risk with the expectation of amplifying the increase in profits.

Table 4. Generalized Method of Moment estimation results

Explanatory variables	Dependent variables	
	Model (1): RT1	Model (2): RT2
RT1(-1)	0.43*** (10.18)	-
RT2(-1)	-	0.469*** (9.84)
COVID	0.764*** (3.47)	0.64*** (2.61)
COVID*CASH	-10.531*** (-3.42)	-9.161*** (-2.74)
CASH	20.83*** (6.10)	21.16*** (5.42)
LASSETS	0.199*** (4.13)	0.172*** (3.44)
LEVERAGE	-0.176 (-0.31)	0.527 (1.00)
FIXED	0.304 (0.71)	0.628 (1.51)
CASHFLOW	-2.399*** (-4.54)	-1.854*** (-3.39)
Constant	-1.249** (-2.21)	-1.511*** (-2.71)
Number of obs.	5,544	5,544
Number of groups	396	396
Arellano-Bond test for AR (1)	0.000	0.000
Arellano-Bond test for AR (2)	0.440	0.136
Hansen test	0.388	0.510

Note: (***) statistically significant at level of 1%, and (**) statistically significant at level of 5%.

z-statistics are reported in parentheses.

Source: Calculated by the authors

At the statistical significance level of 1%, Table 4 also presents positive relationships between RT1, RT2 and LASSETS, and negative relationships between RT1, RT2 and CASHFLOW. The regression results of the variable LEVERAGE and FIXED are statistically non-significant. These findings highlight that firms with more free cash flow tended to engage in more risk-taking behavior, and firms with less total assets engaged in more risk-taking activities. Besides, we also find through RT1(-1) and RT2(-1) that the risk-taking behavior of the previous period will continue with the same trend for this period.

CONCLUSIONS AND RECOMMENDATIONS

This paper analyzes the moderating role of cash holdings in modifying the effect of the COVID-19 pandemic on corporate risk-taking behavior. Using the data of non-financial listed firms in Ho Chi Minh City and the Hanoi Stock Exchange during the period from quarter 1 2018 to quarter 2 2021, the study concludes that the

COVID-19 pandemic negatively related to business and overall risk-taking activities.

The results also show that risk-taking behavior was not uniform for all firms, and the tendency toward risk-taking activities depended on the firms' cash holdings available. Thus, the negative interaction between the COVID-19 outbreak and cash holdings suggests that cash holdings softened the negative effect of the pandemic on risk-taking activities. Based on the findings, the research suggests that companies should have an efficient cash holdings policy to respond to shock from the external environment.

Our findings add empirical evidence to form the theory of the moderating role of cash holdings on the impact of the pandemic on the risk-taking behavior of non-financial companies. In addition, we provide useful reference information for company managers and other entities when making relevant decisions. However, the limitation of this study is that it only considers the moderating role of cash holdings on the risk-taking behavior of enterprises during the impact of the pandemic. Therefore, in order to better inform the risk management of companies, the authors propose further research directions that can supplement the assessment of the impact of the COVID-19 pandemic on the risk-taking behavior of companies with capital structure, firm size or other relevant financial factors as moderating variables. Finally, the sample size could be increased in order to improve the precision and efficiency of statistical estimates. Moreover, a longer period of time before and after the financial shock could be beneficial to compare the behavior of the firms before and after the window of the shock event.

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CORRESPONDING AUTHORS

Vinh Hoang Le, email: vinhlh@uel.edu.vn

Vinh Hoang Le, holds PhD in Finance and Banking since 2015. He is working as lecturer at Faculty of Finance and Banking, University of Economics and Law, National University – Ho Chi Minh City, Vietnam. His research area involves Financial Analysis, Financial Management, Derivatives Finance, Risk Management, Tax Policy Analysis and Behavioral Finance.