The Effect of Cash Holding on Firm Performance

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Abstract

This paper uses panel data from Compustat North America listed firms during 1980-2021 to analyze the factors that influence firms' performance and determine whether holding so much cash leads to a better or worse corporate performance. Specifically, in light of the presence of conflicting evidence concerning the worth of cash stock, the role of moderating factors that can shape the magnitude of this relationship is investigated. The results show that the value of cash holding is affected by firm specific characteristics, in our case it is a financial constraint.

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*Gulnur's parts Abstract,1,3,6 and Zhichen's parts 2,4,5,Appendix.

1 Introduction

For a long time, the theme of cash holdings has been a selected focus of investigation for financial researchers around the world who observe an increasing diffusion of liquid assets within corporations. In a relatively recent article Harris and Raviv (2017) noted that the cash holdings for US firms grew by 10 % in the period 1995–2010, more considerable than the value of 7 % for the period 1980–1995. In contrast to the past, when having a vast amount of cash in hand was considered an ineffective managerial decision full of opportunism, connecting the theme to the problems of corporate governance, nowadays more and more businesses choose to accumulate cash reserves as a tool to support their growth and business development processes. In fact, the choice of holding cash reflects the goal of assuring better levels of financial flexibility in order to capture growth opportunities. Therefore, with an accelerating pace of market globalization, internationalization of firms, integration of financial markets and higher competitiveness, there is a low tolerance for corporate inefficiencies, which may be the immediate cause of instability and bankruptcy. There is a need to be immediately responsive to avoid losing any growth opportunities.

From a theoretical point of view, hoarding a significant volume of cash renders an uncertain effect on firm performance. On the one hand, the positive effect on business performance is justified by precautionary factors related to the availability of cash to support the company in any time of crisis and unforeseen need (Opler, T., Pinkowitz, L., Stulz, R., and Williamson, R. 1999), the ability to reduce the transaction costs that arise in the numerous business and economic relations and the preference exercised by the manager for the use of internal funding sources. On the other hand, a company's cash holding can also give rise to potential negative effects on business performance. In fact, the availability of cash can result in issues with opportunism and agency costs, overinvestment, entrenchment and appropriation of private benefits at the expense of other investors in the company (Yun, J., Ahmad, H., Jebran, K., and Muhammad, S.2021).

Although the empirical evidence mostly demonstrates a positive effect, the

relationship between cash holdings and performance is shown to be dependent on some kind of firm-specific characteristics. The former refers to the presence of financial constraint problems (Almeida et al., 2004). Therefore, the prevailing literature points to the importance of the investigation of the moderating factor role, which is able to amplify the value of cash reserves.

The problems of information asymmetry and the high cost of external finance can limit firms' ability to obtain credit, namely, financial constraints that hinder the growth and development of the firm (Fazzari, Hubbard, and Petersen, 1988). As a result, companies will be interested in accumulating much larger cash reserves when they are financially constrained (Almeida et al., 2004) in order to have a buffer that allows them to capture growth opportunities that would otherwise be lost due to difficulties in accessing the external capital market. Holding vast amounts of cash lowers the expenses associated with difficult access to external funding, promoting companies' ability to capitalize on growth opportunities. Furthermore, Denis and Sibilkov (2009) showed evidence that the value of cash holdings is higher for financially constrained firms than for unconstrained firms. Also, Harford, Humphery-Jenner, and Powell (2012) demonstrated that the agency costs resulting from the possession of abundant liquidity are lower for financially constrained firms, given the lower managerial discretion, and thus they are less likely to invest in unprofitable projects.

1.1   Research Question

In order to have a scientific approach to this study we came up with the following research questions:

What is the effect of cash holding on the financial performance of US-listed firms?

Is there any difference between the results of the two proxy: payout ratio vs text-based financial constraint?

To shed the light on the impact that cash has on a firm performance, the following study explores it the context of financial constraints by investigating the obtained data of the US companies, therefore, contributing to the academia of this field from this specific perspective. The study is based on the

analysis of secondary data collected from Compustat Industrial Annual files (1980 – 2021) and involves regression tests performed via statistical software (STATA).

The present paper includes four main sections, starting from data and methodology describing research design and analysis, followed by empirical results. The closing section is dedicated to the conclusion of the final output of the research. An Appendix 6 presents all the relevant tables used in this study.

2   Related Literature

Under perfect capital market conditions, cash holdings are irrelevant to the value of a firm based on the irrelevant theory (Modigliani and Miller, 1958). However, concerning information asymmetry, agency costs, and other different financial restrictions in corporate finance theories, cash holdings may have an impact on firm performance (Jensen and Meckling, 1976).

Cash holding is characterized by cash and assets of highly liquid with maturity within three months (Grill and Shah, 2012). To answer why firms hold cash, four motives have been identified, those are transaction motive, precautionary motive, tax motive, and agency motive (Thomas W. Bates, Kathleen M. Kahle, and Ren M. Stulz, 2009). Several studies report that when the sources of external funds are costly and unavailable to firms, they tend to accumulate more cash to avoid financial distress (Erwan Morellec, Boris Nikolov, and Francesca Zucchi, 2013).

According to previous research, there are many financial indexes to measure firm performance. Some studies often use the ratio of return on assets (ROA) and the ratio of return on equity (ROE) (Kangarlouei, et al., 2012). The relationship between cash holdings and firm performance has been a controversial topic for a long time among economists around the world. However, different results have been shown in these studies. Thu-Trang Thi Doan (2020) found a positive relationship between cash holdings and firm performance, while the study of Wang (2002) presented a negative impact of cash holdings on firm performance. Raja Muddessar (2018) investigated that be-

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fore the 2008 financial crisis, when investment opportunities were large, cash holdings had a positive effect on firm performance; however, this relationship changed after 2008 when the effects of the financial crisis were felt across the board.

Our objective is to figure out the impact of cash holdings on firm performance moderated by financial constraints. Consequently, if we overcome the endogeneity problem to some extent, that is eliminating the impact of firm performance on cash holdings, we analyze the channel through financial constraint.

3   Data

3.1   Sample

This study sample comprises US-listed companies for the time period of (1980-2021). During sample selection, companies related to the financial sector are not selected. The reason for not selecting such companies is due to the difference in profit and capital structure from non-financial sector companies. Observations with missing net income, total assets, cash and short-term investments, sales, debt, dividends, intangible assets, stockholders' equity, and operating income are deleted. After applying these to the population, we ended up with 33,815 firms and 374,197 observations as sample. The sources of the data used in the study involved data collected from Compustat Industrial Annual files.

Also, we collect data on the text-based financial constraints from Hoberg and Maksimovic(2015), which has a range from 1997 to 2015. For tariff rates, we use data compiled by Philip Valta(2016), which has a range from 1980 to 2005. The definition and construction of the variables are summarized in Table 1.

3.2   Financial constraint measures

Financial constraints are unobservable at the firm level. That is why scholars propose various methods to measure these constraints. We decide to focus

on the two different measures, which are considered to be the most reliable. The first is to use a company's payout ratio(Fazzari,Hubbard and Petersen, 1988). The payout ratio is determined and explained in Table 1. Afterward, it is distributed into ten deciles. Thus, in our sample firms that are facing financial constraints are classified by being in the bottom three deciles of the payout ratio distribution. We set a dummy variable, which is equal to 1 for the above-mentioned firms, and 0 otherwise. The second one is to use text-based financial constraints collected by Hoberg and Maksimovic(2015). Each of the measures conveys essential information, which contributes to the robustness of the analysis.

4 Methodology

4.1 Measuring the Impact of Cash holdings on Firm Performance

To figure out the connection between cash holdings and firm performance, we further investigate the link between cash holdings and firm performance by analyzing financial constraints. Cash holdings can be valuable when other sources of funds are insufficient to satisfy a firm's demand for capital. That is firm facing external financing constraints can use available cash holdings to fund capital expenditures. Consistently, the company will be interested in accumulating more cash other than making the external investments when they are financially constrained in order to capture growth opportunities since covering the potential losses is costly. Many previous studies also report that cash holdings are more valuable for financially constrained firms than unconstrained firms (DJ Denis and V Sibilkov, 2010).

4.2 Empirical Methods

There exists reverse causality in our model that makes it challenging to identify a causal link going from cash holdings to firm performance. Firms with better performance may hold more cash due to earning more profits. So even if we get a positive relationship between cash holdings and firm performance,

we can not simply say that cash holdings have a positive effect on firm performance. To tackle the potential endogeneity problem, we use an identification strategy which is the instrumental variable approach. We take import tariff rates as exogenous variation at the industry-level. The reason why we take that index is that if we take average tariff rates, it might not satisfy the exclusion restriction. Exclusion restriction tells us that the instrumental variable that we use must not be correlated with the dependent variable. The tariff rates of raw materials may differ from each country, countries can then make profits due to lower tariff rates to get higher market share. According to the US tariffs policy, the tariffs have been lowered on nearly all products and declined significantly since 1980. With the reduction in import tariffs, the cost of entering the market will decrease for firms, which will increase competitive pressure. Firms then have to use their cash holdings to compete in such a competitive environment. As a result, a reduction in tariffs represents an exogenous shock to firms that alter their attractiveness of having cash on hand. We collect data on import tariffs (at the four-digit SIC level) compiled by Philip Valta(2016). A robust fixed-effect panel model is also applied to avoid problems of heterogeneity in our model. This method mainly controls for omitted variables bias due to unobserved heterogeneity when this heterogeneity is constant over time. We set up our model as follows.

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\begin{aligned}
\log(\mathrm{ROA}_{i,t}) = {} & \alpha_i + \gamma_t + \beta_1 \log(\mathrm{Cash}_{i,t-1}) + \beta_2 \log(\mathrm{Finconstraint}_{i,t-1}) \\
& + \beta_3 \log(\mathrm{Cash}_{i,t-1}) \# \log(\mathrm{Finconstraint}_{i,t-1}) + \beta_4 Leverage_{i,t-1} \\
& + \beta_5 Firmsize_{i,t-1} + \beta_6 Int_{i,t-1} + \varepsilon_{i,t}
\end{aligned}
$$

The subscripts i,t represent firm and year respectively. α_i is a vector of time-invariant firm fixed effects and γ_t is a vector of time fixed effects. The dependent variable is a proxy of firm performance. $Cash_{i,t-1}$ represents cash holdings observed for firm i at time $t-1$. To measure financial constraint $Finconstraint_{i,t-1}$, we use two different methods as discussed above. $Cash\#Finconstraint_{i,t-1}$ is the interaction between cash holdings and firms facing financial constraint, so it also has two ways of measurement. Our main focus is on the coefficient estimates β_1 and β_3. $Leverage_{i,t-1}$, $Firmsize_{i,t-1}$

and $Int_{i,t-1}$ are control variables that are commonly believed to affect cash holdings. We lag all independent and control variables to see a dynamic trend.

Since we have a huge amount of dataset, there are so many outliers and missing values. To make variables have a better distribution and get an ideal result, we first take the logarithm of the main variables of interest, then trim all variables by eliminating five percent of the data at both ends of the distribution. While taking logarithm may have some problems, especially when considering the case for return on assets. Because there exists negative values of return on assets in our model, negative observations can be dropped and we then face the sample selection problem. The definition of dependent, independent, dummy, and control variables are listed in Table 1. Descriptive Statistics is used in our model which can be referred to Table 2.

5 Result

5.1 Fixed Effect

Table 3 presents the results of panel regressions examining the effect of cash holdings on firm performance. The proxy for the financial constraint is the data collected from Hoberg and Maksimovic(2015). As we can see in column 2, the estimated coefficient on cash holdings is positive and significant at 5% level, which provides support to our assumption, suggesting that the more cash holding the firms have at $t-1$, the better the firm performance becomes at t. Furthermore, a 1% increase in cash holdings is associated with 0.07% increase in return on assets when the financial constraint is not taken into consideration. If the firm is facing financing constraint, then 1% increase in cash holdings leads to a 0.09% in return on assets, which can only partially explain the link between cash holdings and firm performance moderated by financial constraint due to the insignificance of statistics. The R^2 suggests that 58% of the total variance of the return on assets is explained by the model.

Table 4 presents the results of panel regressions examining the effect of cash holdings on firm performance. The proxy for the financial constraint is

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measured by dummy variables. Notably, from column 2, cash holdings and the interaction between cash holdings and dummy variables are all positive and significant at 1% level, which also supports our assumption.

More precisely, a 1% increase in cash holdings in year $t-1$ leads to a 0.01% increase in return on assets in year t when the dummy variable equals to 0 which means the firm is not financially constrained as defined in our model. For the case that when a firm faces financing constraint, 1% increase in cash holdings in year $t-1$ causes 0.32% increase in return on assets in year t. The R^2 suggests that 50% of the total variance of the return on assets is explained by the model.

5.2 Instrumental Variable

Table 5 presents the results of IV regressions of cash holdings on firm performance. The proxy for the financial constraint is the data collected from Hoberg and Maksimovic(2015). Cash holdings, as well as the interaction between cash holdings and financial constraint, are instrumented by tariff rates, the interaction between tariff rates and financial constraints, and control variables including firm size, leverage, and intangible assets. From column 2 we can only see that cash holdings has a positive impact on return on assets with significance at 5% level, suggesting that 1% increase in cash holdings in year $t-1$ leads to 0.95% increase in return on assets in year t. We can not get to the conclusion between the interaction of two independent variables and the dependent variable. According to the weak identification test with Cragg-Donald Wald F statistic is equal to 5.99 which is smaller than Stock-Yogo weak ID test critical value 7.03 under 10% level, we can not refuse the null hypothesis that the equation is weakly identified.

Table 6 also presents the results of IV regressions of cash holdings on firm performance. The proxy for the financial constraint is measured by dummy variables. From column 2, we get all three main independent variables positive and statistically significant at 1% level. For the case that when a firm face financing constraint, 1% increase in cash holdings causes 0.88% increase in return on assets. According to the weak identification test with Cragg-Donald Wald F statistic is equal to 119.34, we can refuse the null hypothesis that the

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equation is weakly identified, which means weak instrumental variable may not exist.

We observe that under both methods of regression, the results with dummy variables are better than those with financial constraint data. The problem may be related to the lack of data, since we investigate our model over the 1980-2021 period, while the data for financial constraint only ranges from 1997-2015. Another problem may be that this kind of proxy is not the best one to estimate firms' financial situations.

5.3   Problem Statement

One tough issue we encounter when dealing with the variables is sample selection bias. Sample selection bias occurs when non-random data is selected for statistical analysis in a research study. Since we take the logarithm of return on assets and there are negative values in return on assets, this kind of trimming may systematically exclude the subset of data. The exclusion of the subset can influence the statistical significance of the test, and it also can bias the estimates of parameters of the statistical model. Therefore, to solve this problem we run a regression with negative values, the coefficients of which turned out to be insignificant.

6   Conclusion

Cash holdings have recently generated a lot of debate in academia and in the financial community with regard to the considerable increase in cash stocks in the United States. Studies have considered the consequences of retaining cash in firms, although from an empirical point of view, there are many ongoing controversial questions about the development of various best practices in cash management. Starting from 1980, there was documented a dramatic increase in the average cash ratio for US firms. In our study, we observe that the main reasons for the increase in the cash ratio are financial constraints and a decrease in the import tariff rates. It is examined that the tariff reductions represent real-side shocks that exogenously shift the competitive landscape of industries and hence holding cash becomes more appealing for companies.

To be precise it is crucial to focus only on the import tariff rates of the finished goods rather than raw materials as they might directly affect the firm's performance.

The research aimed to reveal the effect of cash holding on the performance of firms that experience financial constraints by investigating a number of US companies. In accordance with the statistical analysis of obtained datasets, we observe significant results that distinctly demonstrate the positive impact of hoarding large volumes of cash on corporate profitability. The positive correlation between cash and return on assets is confirmed by the outcome of the fixed effect and instrumental variable regressions. A more compelling result is exhibited while using financial constraint as a dummy variable.

Based on the observation that the model with dummy variable shows better results, it can be derived that this study has limitations in terms of insufficiency of available data. That is, the financial constraint data comprises only a limited year range (1997-2015) out of the whole sample period (1980-2021). For future implications of this research, it is recommended to use the payout ratio method to produce more comprehensive and convincing results.

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Appendix

Table 1: Data Definition

Data	
Variables	**Definition**
ROA	Net Income(NI)/Total Assets(AT)
$CASH$	Cash and short-term investments(CHE)/Total assets(AT)
$PayoutRatio$	(Dividends preferred(DVP)+Dividends common(DVC) +Purchase of common and preferred Stocks(PRSTKC))/Income before extraordinary Items (IB)
fc_dummy	Identified as being in the bottom three deciles of the annual PayoutRatio distribution
$Leverage$	(Long-term Debts(DLTT)+Debt in current Liabilities(DLC))/Stockholders Equity total(SEQ
$FirmSize$	log(Total Assets (AT))
Int	Intangible Assets(INT)/Total Assets (AT)

Table 2: Descriptive Statistics

Variables	Obs	Mean	Std.Dev.	Min	Max
ROA	212,148	-2.71	1.05	-5.02	-0.34
$CASH$	150,163	-2.63	1.34	-5.84	-0.34
$finconstraint$	13,385	-2.96	0.85	-5.28	-1.63
$Leverage$	162,288	0.64	0.74	0	3.52
$FirmSize$	153,751	4.94	2.16	0.80	9.46
Int	162,288	0.42	0.073	0	0.32

Table 3: Robust Fixed Effect Regression1

Table 2 presents results of panel regressions examining the effect of cash holdings on firm performance. The dependent variable is $\log(\text{ROA}_{i,t})$ (net income/total assets). Financial constraint is measured by data from Hoberg and Maksimovic(2015). Column 1 and column 2 report the result without and with control variables respectively. The sample is based on Compustat Fundamentals Annual files over the 1980-2021 period. The symbols ***,** and * indicate statistical significance at the 1%,5%, and 10% levels, respectively.

| | $\log(\text{ROA}_{i,t})$ | $\log(\text{ROA}_{i,t})$ |
	No controls	Controls
$\log(\text{Cash}_{i,t-1})$	0.10***	0.07**
	(0.03)	(0.04)
$\log(\text{Finconstraint}_{i,t-1})$	0.05*	0.07**
	(0.03)	(0.03)
$\log(\text{Cash}_{i,t-1})\#\log(\text{Finconstraint}_{i,t-1})$	0.02**	0.02
	(0.01)	(0.01)
Standardized Coefficients		
Controls		✓
R^2	0.58	0.58
Observations	8654	6774

Table 4: Robust Fixed Effect Regression2

Table 3 presents results of panel regressions examining the effect of cash holdings on firm performance. The dependent variable is $\log(\text{ROA}_{i,t})$ (net income/total assets). Financial constraint is measured by dummy variable. Dummy variable equals to 1 when the firm is facing financing constraint which annual payout ratio being in the bottom three deciles of the distribution, otherwise 0. Column 1 and column 2 report the result without and with control variables respectively.

| | $\log(\text{ROA}_{i,t})$ | $\log(\text{ROA}_{i,t})$ |
	No controls	Controls
$\log(\text{Cash}_{i,t-1})$	0.02***	0.01***
	(0.00)	(0.00)
$i.fc\_dummy$	0.06***	0.02**
	(0.01)	(0.01)
$i.fc\_dummy\#c.\log(\text{Cash}_{i,t-1})$	0.38***	0.31***
	(0.03)	(0.03)
Standardized Coefficients		
Controls		✓
R^2	0.51	0.50
Observations	133441	109062

Table 5: Instrumental Variable Regression1

Table 4 presents results of IV regressions of cash holdings on firm performance. The firm performance is measured by return on assets $\log(\text{ROA}_{i,t})$ (net income/total assets). Return on assets is instrumented with the level of import tariffs(at the four-digit SIC level) over the 1974-2005 period, compiled by Philip Valta(2016) . Financial constraint is measured by data from Hoberg and Maksimovic(2015). Column 1 and column 2 report the result without and with control variables respectively. The sample is based on Compustat Fundamentals Annual files over the 1980-2021 period. The symbols ***,** and * indicate statistical significance at the 1%,5%, and 10% levels, respectively.

	$\log(\text{ROA}_{i,t})$	$\log(\text{ROA}_{i,t})$
	No controls	Controls
$\log(\text{Cash}_{i,t-1})$	0.39	0.95**
	(0.35)	(0.44)
$\log(\text{Cash}_{i,t-1})\#\log(\text{Finconstraint}_{i,t-1})$	-0.02	0.14
	(0.10)	(0.12)
$\log(\text{Finconstraint}_{i,t-1})$	-0.03	0.30
	(0.23)	(0.24)
Standardized Coefficients		
Controls		✓
R^2	.	.
Observations	1390	1169

Table 6: Instrumental Variable Regression2

Table 5 presents results of IV regressions of cash holdings on firm performance. The firm performance is measured by return on assets $\log(\text{ROA}_{i,t})$ (net income/total assets). Return on assets is instrumented with the level of import tariffs(at the four-digit SIC level) over the 1974-2005 period, compiled by Philip Valta(2016) . Financial constraint is measured by dummy variable. Dummy variable equals to 1 when the firm is facing financing constraint which annual payout ratio being in the bottom three deciles of the distribution, otherwise 0. Column 1 and column 2 report the result without and with control variables respectively. The sample is based on Compustat Fundamentals Annual files over the 1980-2021 period. The symbols ***,** and * indicate statistical significance at the 1%,5%, and 10% levels, respectively.

	$\log(\text{ROA}_{i,t})$ No controls	$\log(\text{ROA}_{i,t})$ Controls
$\log(\text{Cash}_{i,t-1})$	0.08	0.21***
	(0.07)	(0.06)
$i.fc\_dummy \# c.\log(\text{Cash}_{i,t-1})$	0.19**	0.24***
	(0.09)	(0.09)
$i.fc\_dummy$	0.75***	0.67***
	(0.23)	(0.21)
Standardized Coefficients		
Controls		✓
R^2	0.05	0.00
Observations	22718	19525