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Cash Policy of Bank-Dependent Corporations*

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We compare cash policies of bank-dependent Japanese firms and their counterparts. Although the sample mean of cash saved by bank-dependent firms is slightly greater than that of their counterparts, we provide new evidence that bank-dependent firms have less excess cash than their counterparts because the former are relatively concerned with agency motive while the latter are relatively concerned with precautionary motive. The results are robust to whether firms are listed or non-listed. The sample mean of excess cash of the matched bank-dependent firms is lower than that of their counterparts by 0.2% point.

Keywords: Cash holdings, Precautionary motive, Agency conflicts, Bank dependence

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Ⅰ. Introduction

According to the literature, there are two motives for corporate cash savings: precautionary (Opler et al., 1999; Bates et al., 2009; McLean, 2011; Harford et al., 2014; Chen et al., 2018) and agency (Jensen, 1986; Harford, 1999; Dittmar et al., 2003; Dittmar and Mahrt-Smith, 2007)[1]. The precautionary motive makes firms save cash from internal cash flows to protect themselves from their financial risks. The agency motive hypotheses explain that conflicts between managers and shareholders make firm managers hold free cash flows for empire building (Jensen, 1986; Harford, 1999; Pinkowitz et al., 2006; Harford et al., 2007)[2].

In this study, we examine the precautionary and agency motives of cash savings from the viewpoint of bank-dependency. Since banks can provide funds when needed in the future, the precautionary motive of cash for bank-dependent firms is not so strong as their counterparts (Hubbard et al., 2002; Cui et al., *forthcoming*). Also, if banks play the monitoring roles (Hoshi et al. 1991), they mitigate the agency problems to prevent firm managers from empire-building activities, which weakens the agency motive for bank-dependent firms. The study aims to show that bank-dependent firms hold less excess cash than their counterparts because of these two reasons.

To test the hypothesis that bank-dependent firms hold less excess cash than their counterparts, we employ multi-equation models of the allocation of internal cash flow (Gatchev et al., 2010; Chang et al., 2014; Drobetz et al., 2017). Firms allocate internal cash flow among various uses: capital expenditure, dividends payout, reducing debt or equity financing, holding cash. Since firms make financing and investment decisions jointly subject to the constraint that financing sources must be equal to the uses of internal cash flow.

Our main findings are as follows:

(i) Bank-dependent firms hold less excess cash than their counterparts.

(ii) Bank-dependent listed firms hold less excess cash than their counterparts.

(iii) Bank-dependent non-listed firms hold less excess cash than their counterparts.

The main contribution of this study is to provide new evidence that bank-dependency induces firm managers to have less excess cash, instead of less cash holding. The mechanism of bank- dependency affecting firms' cash holding decisions from two sides. On one hand, the existence of the main bank guarantees the liquidity for bank-dependent firms when there is a sudden shock. This indicates that bank-dependent firms are less affected by the precautionary motive and are mainly affected by agency motive. On the other hand, the counterparts are principally subjected to the precautionary motive. Even though they have channels for direct financing from the public market, the market fluctuation or recession could substantially increase the difficulty and costs for direct financing. As a result, the volatility of cash holding of bank-dependent firms is less than that of its counterparts.

Gao et al. (2013) find evidence that private firms hold less cash than public firms do because the former faces lower agency costs than the latter. Private firms have lower agency costs because they have more concentrated ownership than public firms that have a dispersed ownership structure. This study examines the influence of bank-dependency on excess cash, instead of the private/public status of the stock ownership. Our evidence shows that bank-dependency also affects the agency cost or precautionary motive, which makes bank-dependent firms choose less excess cash than their counterparts. For the concerns of the potential influence from private and public firms according to Gao et al. (2013), we also conduct a robustness check and our conclusions are consistent in both private firms and public firms.

Furthermore, we emphasize that bank-dependent firms tend to be concerned with agency motive and their counterparts with a precautionary motive. If a bank-dependent firm were not bank-dependent with the same investment opportunity as its counterpart, the bank-dependent firm would have more excess cash than its counterpart.

Our finding is different from Hubbard et al. (2002), which argue that small firms with weak banks hold more cash than firms with strong banks do. Our

result shows just that the bank-dependency has a negative influence on excess cash, whether a bank is weak or not. Our finding is also different from Cui et al. (*forthcoming*) which find evidence that bank health affects a firm's cash policy through the firm-bank relationship.

Nakajima and Sasaki (2016) compare the cash policies of Japanese firms with and without access to bond markets, i.e., weakly bank-dependent firms and bank-dependent firms. They argue that bank-dependent firms that do not have access to bond markets have higher cash holdings because such firms want to maintain good relationships with banks. Our finding that bank-dependent firms have a higher cash flow sensitivity is consistent with their conclusions.

It is noteworthy that bank-dependent and the firm-bank relationship are two different concepts. The firm-bank relationship is "the connection between a bank and customer that goes beyond the execution of simple, anonymous, financial transactions" (Ongena & Smith, 2000). A non-bank-dependent (or the counterparts of bank-dependent) just indicates that it has corporate bonds issued in the bond market and it does not necessarily mean the firm-bank relationship is weak, as non-dependent firms in the Japanese market also sought and received emergent liquidity from banks during the Great Financial Crisis in 2008 (Uchino,2013). It would be hard to distinguish firm-bank relationship by whether the company has corporate bonds so that we emphasize "bank-dependence" instead of "firm-bank relationship".

The organization of the paper is as follows. Section II explains our econometric methodology and hypotheses. Section III describes data, explains variables, and report the results of our econometric analyses. Section IV concludes our paper.

Ⅱ. Methodology and Hypotheses

Our econometric methodology follows the works of Gatchev et al. (2010), Chang et al. (2014), and Drobetz et al. (2017). The analysis of firms' cash allocation starts from the cash flow statement:

$$CF_{it} = \Delta Cash_{it} + I_{it} + DIV_{it} - \Delta D_{it} - \Delta E_{it} \tag{1}$$

CF_{it} is the abbreviation of operating cash flow of firm i at year t, $\Delta Cash_{it}$ is the net change of cash holding, I_{it} denotes the investment expenditure, DIV_{it} is the dividend paid to the shareholders, ΔD_{it} represents the net debt issuance, and ΔE_{it} is the net equity issuance. The negative values of the last two terms are considered as uses of cash flow. Therefore, equation (1) expresses that firms utilize the cash flow generated from operating activities to save as cash, proceed investment, deliver dividend payment, and reduce the external financing from liability and equity instruments.

Following Chang et al. (2014), we consider the following seemingly unrelated regressions (SUR) model consisting of five equations:[3)]

$$\begin{aligned}\Delta Cash_{it} = {} & \alpha^{\Delta Cash} + \beta_1^{\Delta Cash} Bank\_dependent_{it} \\ & + \beta_2^{\Delta Cash} CF_{it} + \beta_3^{\Delta Cash} Q_{i,t-1} \\ & + \beta_4^{\Delta Cash} ln(Assets)_{i,t-1} + \beta_5^{\Delta Cash} Risk_{i,t-1} \\ & + \beta_6^{\Delta Cash} Leverage_{i,t-1} + \beta_7^{\Delta Cash} NWC_{i,t-1} \\ & + \beta_8^{\Delta Cash} R\&D_{i,t-1} + Industry\ FEs \\ & + Year\ FEs + \varepsilon_{it}^{\Delta Cash}\end{aligned} \tag{2}$$

$$\begin{aligned}I_{it} = {} & \alpha^I + B_1^I Bank\_dependent_{it} + \beta_2^I CF_{it} + \beta_3^I Q_{i,t-1} \\ & + \beta_4^I ln(Assets)_{i,t-1} + \beta_5^I Risk_{i,t-1} + \beta_6^I Leverage_{i,t-1} \\ & + \beta_7^I NWC_{i,t-1} + \beta_8^I R\&D_{i,t-1} \\ & + Industry\ FEs + Year\ FEs + \varepsilon_{it}^I\end{aligned} \tag{3}$$

$$\begin{aligned}DIV_{it} = {} & \alpha^{DIV} + B_1^{DIV} Bank\_dependent_{it} + \beta_2^{DIV} CF_{it} \\ & + \beta_3^{DIV} Q_{i,t-1} + \beta_4^{DIV} ln(Assets)_{i,t-1} \\ & + \beta_5^{DIV} Risk_{i,t-1} + \beta_6^{DIV} Leverage_{i,t-1} \\ & + \beta_7^{DIV} NWC_{i,t-1} + \beta_8^{DIV} R\&D_{i,t-1} \\ & + Industry\ FEs + Year\ FEs + \varepsilon_{it}^{DIV}\end{aligned} \tag{4}$$

$$\begin{aligned}\Delta D_{it} = {} & \alpha^{\Delta D} + B_1^{\Delta D} Bank\_dependent_{it} + \beta_2^{\Delta D} CF_{it} \\ & + \beta_3^{\Delta D} Q_{i,t-1} + \beta_4^{\Delta D} ln(Assets)_{i,t-1} \\ & + \beta_5^{\Delta D} Risk_{i,t-1} + \beta_6^{\Delta D} Leverage_{i,t-1} \\ & + \beta_7^{\Delta D} NWC_{i,t-1} + \beta_8^{\Delta D} R\&D_{i,t-1} \\ & + Industry\ FEs + Year\ FEs + \varepsilon_{it}^{\Delta D}\end{aligned} \tag{5}$$

$$\begin{aligned}\Delta E_{it} = {} & \alpha^{\Delta E} + B_1^{\Delta E} Bank\_dependent_{it} + \beta_2^{\Delta E} CF_{it} \\ & + \beta_3^{\Delta E} Q_{i,t-1} + \beta_4^{\Delta E} ln(Assets)_{i,t-1} \\ & + \beta_5^{\Delta E} Risk_{i,t-1} + \beta_6^{\Delta E} Leverage_{i,t-1} \\ & + \beta_7^{\Delta E} NWC_{i,t-1} + \beta_8^{\Delta E} R\&D_{i,t-1} \\ & + Industry\ FEs + Year\ FEs + \varepsilon_{it}^{\Delta E}\end{aligned} \tag{6}$$

Among these five equations, our main interest lies in the first equation of $\Delta Cash$. In the baseline regression model, we first focus on the dummy $Bank\_dependent_{it}$, which takes one for bank-dependent firm

and zero for the counterpart. If the coefficient $\beta_1^{\Delta Cash}$ is negative, the bank dependency has negative effect on the cash through the constant term, and vice versa.

For each equation, we include Tobin's *Q*, the log of total assets (*ln (Assets)*), the volatility of cash flow (*Risk*), leverage (*Leverage*), net working capital (*NWC*), R&D expenses (*R&D*). In addition, we include year dummies (*Year FEs*) and industry dummies (*Industry FEs*)[4]. The definitions of variables are in the Appendix table.

If the error terms eit are not correlated across the equations, the standard ordinary least squares (OLS) estimate is consistent and unbiased. However, when error terms are probably correlated, the OLS estimate is consistent but generally not as efficient as the SUR estimate. In the equations from (2) to (6), the error terms are very likely to be correlated with each other because for example, other factors that may affect how much amount of cash put into investment may also have some influences on how much cash firms prefer to hold[5]. Besides, since all the usages of cash flow consist of the operating cash flow according to equation (1), the following constraints must hold:

$$\beta_2^{\Delta Cash}+\beta_2^{I}+\beta_2^{DIV}-\beta_2^{\Delta D}-\beta_2^{\Delta E}=1 \quad (7)$$

$$\beta_j^{\Delta Cash}+\beta_j^{I}+\beta_j^{DIV}-\beta_j^{\Delta D}-\beta_j^{\Delta E}=0 \quad (j=3,4,\cdots,8) \quad (8)$$

Equation (7) reflects the requirement that the use of cash flow should be equal to the source of cash flow. The sources of cash are operating activities and external financing, while the usages of cash are investments, dividend payment, and net cash holding. There are no more other sources or usages in the model so that equation (7) must hold compulsorily. Equation (8) describes that the general effects from other variables must be zero because those variables only explain parts of cash allocation patterns, but they never generate or utilize cash flows by themselves.

We define the bank-dependent firm as a firm that does not issue bonds. Otherwise, a firm is called non-dependent, hereafter. The main hypothesis of this study is stated as:

Hypothesis 1: Bank-dependent firms hold less excess cash than their counterparts.

To test this hypothesis, we define excess cash as the difference between the actual $\Delta Cash_{it}$ and the predicted $\Delta Cash_{it}$, following Gao et al. (2013). We test Hypothesis 1 by examining the difference between the sample mean of the excess cash for bank-dependent firms and that of their counterparts. There are two reasons behind Hypothesis 1. First, as the precautionary motive hypothesis (Opler et al., 1999; Bates et al., 2009; McLean, 2011; Harford et al., 2014) implies, the bank as a liquidity provider can be a substitute of cash savings. A bank-dependent firm does not need to hold much of the precautionary savings because the bank will provide cash when needed in the future. Hence, the precautionary motive of cash for bank-dependent firms is not so strong as their counterparts.

Second, as the agency motive hypothesis (Jensen, 1986; Harford, 1999; Dittmar et al., 2003; Pinkowitz et al., 2006; Dittmar and Mahrt-Smith, 2007; Harford et al., 2007) and the bank monitoring hypothesis (Hoshi et al. 1991) implies, firm managers of bank-dependent firms are not able to enjoy the empire-building activities because the banks monitor their activities intensively. Hence, the agency motive of cash holdings for bank-dependent firms is weaker than their counterparts.

For the robustness check, we examine the following two hypotheses by splitting our sample into two subsamples: listed subsample and non-listed subsample.

Hypothesis 2: Bank-dependent listed firms hold less excess cash than non-dependent listed firms.

Hypothesis 3: Bank-dependent non-listed firms hold less excess cash than non-dependent non-listed firms.

Throughout the empirical analyses, our main interests lie in the regressions where the dependent variable is the change in cash holding. To explain the expected sign of the coefficient of each variable, we take equation (2) as an example. The coefficient $\beta_1^{\Delta Cash}$ measures the influence of whether a firm is bank-dependent or non-dependent. We expect the coefficient to be negative, according to Hypothesis 1 that bank-dependent firms hold less excess cash than non-dependent firms.

The coefficient $\beta_2^{\Delta Cash}$ measures the cash flow sensitivity, indicating when a firm increases one-unit of cash flow, how much proportion will be saved as cash. It is supposed to be positive and less than one, consistently with the previous research (Almeida et al. 2004, 2011; Chen et al. 2012).

Tobin's Q measures investment opportunities (Opler et al. 1999). As usual, we use the market value over the book value as a proxy for investment opportunities. As the precautionary motive, we expect firms with high market-to-book ratios to hold more cash because such firms incur higher costs when their financial condition worsens. In contrast, as the agency motive, we expect firms with low market-to-book ratios to hold more cash because the managers of such firms intend to hold more cash to facilitate entrenchment activities which is difficult to finance through the capital markets (Opler et al. 1999(p13); Stulz 1990).

Since there are economies of scale with the transaction motive of cash, large firms hold less cash. The variable *ln* (*Assets*) measures the scale effect of firms in respective to total assets. The variable *Risk* is defined as the volatility of cash flow in a specified industry and year. Firms increase cash as the volatility of cash flow becomes higher.

The variable *Leverage* is defined as the debt to equity ratio. Leverage has a negative effect on cash because firms use cash to reduce leverage if the debt is sufficiently constraining. However, the hedging argument of Acharya et al. (2007) is consistent with a positive relationship between leverage and cash holdings. *NWC* considers the impacts of the change in net working capital. We expect a negative relation between NWC and cash holdings because NWC works as a substitute for cash (Opler et al.1999, p16). R&D also measures growth opportunities. Firms with greater R&D expenses have greater costs of financial distress, which leads to a positive relationship between cash and R&D spending.

Ⅲ. Empirical results

1. Data and variables

Our analysis employs the Nikkei NEEDS-Financial QUEST database. The original data have the sample period from 1995 to 2018 and contain 20,878 firm-year observations. The sample includes non-listed firms as well as listed firms, but it does not include financial firms.

Table 1. Summary statistics

	Bank-dependent		Non-dependent		Difference
Variables	Mean	Standarddeviation	Mean	Standarddeviation	
ΔCash	0.005	0.052	0.004	0.041	0.001*
I	0.004	0.073	0.008	0.060	-0.005***
DIV	0.012	0.018	0.010	0.019	0.002***
ΔD	-0.005	0.099	0.000	0.084	-0.005***
ΔE	0.016	0.071	0.016	0.058	0.001
Cash flow	0.080	0.056	0.079	0.048	0.001
Q	1.082	0.694	1.124	0.552	-0.042***
Ln (Assets)	10.784	1.144	11.767	1.589	-0.982***
Risk	0.267	0.496	0.223	0.439	0.044***
Leverage	1.483	10.795	1.946	2.571	-0.463***
NWC	0.006	0.059	0.005	0.059	0.001
R&D	0.024	0.032	0.025	0.030	-0.001***
Number ofobservations	14,111		6,767		

(Notes) This table presents the means and standard deviations of the variables for bank-dependent firms and their counterparts. Definitions of variables are in the Appendix. ***, **, and * indicate the significance of the mean equality hypothesis between the two groups at 1%, 5%, and 10% level respectively.

2. Summary statistics

Table 1 compares the summary statistics by bank-dependence. The definitions of variables are in the Appendix. In Table 1, we report the t-test statistics on the null hypothesis that there is no difference in the means between bank-dependent firms and their counterparts (non-dependent firms). It can be observed clearly that for the bank-dependent group, the mean level of change in cash holding is slightly higher than that of the non-dependent group, which contradicts our Hypothesis 1. However, the difference is so small relative to other variables and the significance level is only at 10%. Therefore, we need to carefully examine how bank-dependence affects firms' cash holdings in the regression analyses.

Meanwhile, there are several significant differences in other aspects. More specifically, bank-dependent group firms, on average, spend less on investments, pay more dividends, utilize more debt financing than non-dependent groups do. Besides, the mean levels of other variables also show several significant differences. Therefore, to reveal the relationship of change in cash holdings for two groups, it is necessary to conduct further regression analysis and sample matches.

Table 2 presents the correlation matrix for the independent variables and dependent variables of five regressions. None of these correlations shows the appearance of collinearity problems for the multivariate analysis.

3. Regression analyses

To conduct the SUR (seemingly unrelated regression) analysis, we match each bank-dependent firm in our sample with a non-dependent firm in the sample. We use the propensity score matching method to obtain the matched sample. The matched bank-dependent firm is the nearest neighbor of a non-dependent firm within the same industry in the same year. Using the sample consisting of the control (non-dependent firms) and the matched (bank-dependent firms), we estimate the SUR model.

In Table 3, we present the results for the cash equation in panel A, capital expenditure in B, dividend payout in C, ΔD in D, and ΔE in E, respectively. For each panel, we use the full sample (model 1) as well as the combination of the matched bank-dependent firms and the counterparts (model 2).

In models 1 and 2, the coefficients of the bank-dependent dummy are significantly negative, consistently with Hypothesis 1. We also see that cash flow sensitivity of cash is positive and that large firms hold less cash.

In models 3 and 4, we estimate the cash equation

Table 2. Correlation matrix

Variables	ΔCash	I	DIV	ΔD	ΔE	Bank-dependent	CF	Q	Ln(Asset)	Risk	Leverage	NWC	R&D
ΔCash	1.000												
I	0.127*	1.000											
DIV	0.015*	0.038*	1.000										
ΔD	0.335*	0.606*	0.043*	1.000									
ΔE	0.333*	0.543*	0.027*	0.154*	1.000								
Bank-dependent	0.013	-0.031*	0.054*	-0.024*	0.005	1.000							
CF	0.228*	0.283*	0.272*	0.161*	0.523*	0.008	1.000						
Q	0.027*	0.062*	0.153*	0.012	0.120*	-0.030*	0.200*	1.000					
Ln (Asset)	-0.014*	0.062*	0.048*	0.012	0.052*	-0.332*	0.173*	0.078*	1.000				
Risk	0.025*	0.045*	-0.005	0.014*	0.052*	0.043*	-0.023*	-0.050*	-0.008	1.000			
Leverage	-0.006	-0.013	-0.045*	-0.003	-0.027*	-0.024*	-0.051*	0.007	0.005	-0.005	1.000		
NWC	0.036*	0.100*	0.011	0.100*	0.043*	0.009	0.115*	0.038*	-0.023*	0.002	-0.014*	1.000	
R&D	0.008	0.017*	0.104*	0.029*	0.005	-0.021*	0.093*	0.128*	0.103*	0.005	-0.036*	-0.038*	1.000

(Note) * shows significance at the 0.05 level

separately using the matched bank-dependent firm subsample and the non-dependent firm subsample, respectively. In column 5, we report the Chi-squared statistics associated with the Chow-test for different coefficients on the same firm characteristics across two subsamples.

Among the variables, the cash flow sensitivity of cash is greater for bank-dependent firms than for non-dependent firms. The coefficient of Tobin's Q is significantly negative for bank-dependent firms while it is positive for non-dependent firms. Tobin's q contributes much to making bank-dependent firms hold less cash than their counterparts. We consider that bank-dependent firms tend to be concerned with agency motive because the coefficient of Q is negative[6]. On the other hand, non-dependent firms are concerned with the precautionary motive because the coefficient is positive. If bank-dependent firms were non-dependent with the same investment opportunity, we can say that they have more cash than otherwise, from these two coefficients. In this sense, Tobin's q contributes much to making bank-dependent firms hold less cash than their counterparts.

Now we look at other panels of Table 3, which report the coefficients for equations other than cash. Bank-dependent firms tend to invest less compared to non-dependent firms according to Panel B. Under the regression which includes all sample data, the bank-dependent dummy is - 0.004 and it is significant at 1% significance level. Similarly, in column (2) which uses the sample of matched bank-dependent firms and non-dependent firms, the bank-dependent dummy is - 0.005 at significance level. According to the column (3) and (4), the investment of bank-dependent firms is more limited to the R&D expenditure while more sensitive to the NWC and cash flow.

Besides, the bank-dependent firm utilizes less debt financing (or reduces outstanding debts more) compared to non-dependent firm according to Panel D, and debt financing decision for non-dependent firms is heavily sensitive to the risk of the firms according to column (3) and (4) in Panel D.

Table 3. SUR regression analysis

Panel A: ΔCash equation

Model	1	2	3	4	5
Sample	Full sample	Matched bank-dependent firms and non-dependent firms	Matched bank-dependent firms	Non-dependent firms	Chow test (3)-(4)
Dependent var.	ΔCash	ΔCash	ΔCash	ΔCash	ΔCash
Independent var.					
Bank-dependent dummy	-0.003***	-0.002***			
	(0.001)	(0.001)			
CF	0.402***	0.259***	0.309***	0.197***	29.575
	(0.007)	(0.008)	(0.012)	(0.012)	0.000
Q	-0.002***	0.001	-0.002**	0.006***	28.762
	(0.001)	(0.001)	(0.001)	(0.001)	0.000
Ln (Asset)	-0.003***	-0.002***	-0.003***	-0.002***	0.893
	(0.000)	(0.000)	(0.001)	(0.000)	0.345
Risk	-0.026	-0.244**	-0.565***	0.048	0.158
	(0.117)	(0.124)	(0.189)	(0.159)	0.691
Leverage	0.000	0.000	0.000	-0.000*	3.434
	(0.000)	(0.000)	(0.000)	(0.000)	0.064
NWC	0.006	-0.021***	-0.036***	-0.001	6.493
	(0.006)	(0.006)	(0.009)	(0.008)	0.011
R&D	0.014	0.008	-0.034	0.045**	2.568
	(0.014)	(0.017)	(0.026)	(0.023)	0.109
Constant	0.018*	0.033***	0.062***	0.007	
	(0.009)	(0.010)	(0.015)	(0.012)	
Number of Observations	20,878	13,534	6,767	6,767	
R-squared	0.046	0.013	0.023	0.016	

Panel B: I equation

Model	1	2	3	4	5
Sample	Full sample	Matched bank-dependent firms and non-dependent firms	Matched bank-dependent firms	Non-dependent firms	Chow test (3)-(4)
Dependent var.	I	I	I	I	I
Independent var.					
Bank-dependent dummy	-0.004***	-0.005***			
	(0.001)	(0.001)			
CF	0.361***	0.219***	0.295***	0.126***	32.255
	(0.009)	(0.011)	(0.015)	(0.016)	0.000
Q	0.001	0.006***	0.006***	0.007***	0.194
	(0.001)	(0.001)	(0.001)	(0.001)	0.660
Ln (Asset)	0.000	0.000	0.000	0.001*	41.574
	(0.000)	(0.000)	(0.001)	(0.000)	0.000
Risk	-0.109	-0.125	-0.347	0.012	0.165
	(0.162)	(0.160)	(0.230)	(0.221)	0.685
Leverage	0.000	0.000	0.000***	-0.002***	32.259
	(0.000)	(0.000)	(0.000)	(0.000)	0.000
NWC	0.087***	0.041***	0.048***	0.033***	0.555
	(0.008)	(0.008)	(0.011)	(0.012)	0.456
R&D	-0.006	-0.093***	-0.174***	-0.036	0.042
	(0.019)	(0.022)	(0.031)	(0.032)	0.837
Constant	-0.007	-0.010	-0.004	-0.012	
	(0.013)	(0.013)	(0.018)	(0.017)	
Number of Observations	20,878	13,534	6,767	6,767	
R-squared	0.155	0.154	0.167	0.151	

Panel C: DIV equation

Model	1	2	3	4	5
Sample	Full sample	Matched bank-dependent firms and non-dependent firms	Matched bank-dependent firms	Non-dependent firms	Chow test (3)-(4)
Dependent var.	DIV	DIV	DIV	DIV	DIV
Independent var.					
Bank-dependent dummy	0.001***	0.001			
	(0.000)	(0.000)			
CF	0.251***	0.254***	0.267***	0.234***	11.476
	(0.002)	(0.004)	(0.005)	(0.005)	0.001
Q	0.002***	0.001***	0.000	0.003***	36.553
	(0.000)	(0.000)	(0.000)	(0.000)	0.000
Ln (Asset)	-0.000	-0.000	0.000	-0.000**	0.191
	(0.000)	(0.000)	(0.000)	(0.000)	0.662
Risk	0.408***	0.329***	0.239***	0.399***	5.372
	(0.043)	(0.054)	(0.082)	(0.069)	0.020
Leverage	-0.000***	-0.000***	-0.000	-0.001***	48.181
	(0.000)	(0.000)	(0.000)	(0.000)	0.000
NWC	-0.004*	0.001	0.007*	-0.006*	4.992
	(0.002)	(0.003)	(0.004)	(0.004)	0.025
R&D	0.038***	0.036***	0.056***	0.008	10.838
	(0.005)	(0.007)	(0.011)	(0.010)	0.001
Constant	-0.036***	-0.027***	-0.025***	-0.029***	
	(0.004)	(0.004)	(0.007)	(0.005)	
Number of Observations	20,878	13,534	6,767	6,767	
R-squared	-0.079	-0.049	-0.036	-0.046	

Panel D: ΔD equation

Model	1	2	3	4	5
Sample	Full sample	Matched bank-dependent firms and non-dependent firms	Matched bank-dependent firms	Non-dependent firms	Chow test (3)-(4)
Dependent var.	ΔD	ΔD	ΔD	ΔD	ΔD
Independent var.					
Bank-dependent dummy	-0.005***	-0.013***			
	(0.001)	(0.002)			
CF	-0.411***	-0.601***	-0.573***	-0.652***	17.432
	(0.011)	(0.014)	(0.019)	(0.019)	0.000
Q	-0.005***	0.002	0.001	0.004***	3.889
	(0.001)	(0.001)	(0.001)	(0.002)	0.049
Ln (Asset)	-0.000	0.000	0.000	0.000	41.662
	(0.000)	(0.000)	(0.001)	(0.001)	0.000
Risk	0.534***	0.265	-0.231	0.674**	0.439
	(0.195)	(0.199)	(0.294)	(0.266)	0.507
Leverage	0.000	-0.000**	0.000**	-0.004***	98.923
	(0.000)	(0.000)	(0.000)	(0.000)	0.000
NWC	0.120***	0.072***	0.071***	0.070***	0.000
	(0.009)	(0.010)	(0.014)	(0.014)	0.996
R&D	0.100***	0.067**	0.066*	0.051	0.654
	(0.023)	(0.028)	(0.040)	(0.038)	0.419
Constant	-0.019	-0.019	-0.005	-0.036*	
	(0.016)	(0.016)	(0.024)	(0.021)	
Number of Observations	20,878	13,534	6,767	6,767	
R-squared	-0.045	-0.021	0.005	-0.026	

Panel E: ΔE equation

Model	1	2	3	4	5
Sample	Full sample	Matched bank-dependent firms and non-dependent firms	Matched bank-dependent firms	Non-dependent firms	Chow test (3)-(4)
Dependent var.	ΔE	ΔE	ΔE	ΔE	ΔE
Independent var.					
Bank-dependent dummy	-0.002**	-0.000			
	(0.001)	(0.001)			
CF	0.425***	0.333***	0.444***	0.208***	51.607
	(0.007)	(0.009)	(0.012)	(0.013)	0.000
Q	0.005***	0.007***	0.004***	0.012***	26.325
	(0.001)	(0.001)	(0.001)	(0.001)	0.000
Ln (Asset)	-0.002***	-0.002***	-0.002***	-0.002***	0.725
	(0.000)	(0.000)	(0.001)	(0.000)	0.395
Risk	-0.261**	-0.305**	-0.442**	-0.215	0.678
	(0.127)	(0.130)	(0.190)	(0.175)	0.410
Leverage	-0.000	0.000**	0.000	0.001***	12.812
	(0.000)	(0.000)	(0.000)	(0.000)	0.000
NWC	-0.030***	-0.051***	-0.052***	-0.044***	0.349
	(0.006)	(0.006)	(0.009)	(0.009)	0.555
R&D	-0.054***	-0.117***	-0.218***	-0.034	1.313
	(0.015)	(0.018)	(0.026)	(0.025)	0.252
Constant	0.034***	0.036***	0.047***	0.029**	
	(0.010)	(0.010)	(0.015)	(0.014)	
Number of Observations	20,878	13,534	6,767	6,767	
R-squared	0.348	0.328	0.373	0.294	

(Notes) The five panels present estimated coefficients of independent variables for five equations. Column (1) reports the regression results for the full sample data. Column (2) reports the regression results for the sample of matched bank-dependent firms and non-dependent firms using the propensity score matching method. Column (3) and Column (4) report the regression results, using subsamples of matched bank-dependent firms and subsamples of non-dependent firms, respectively. The numbers in parenthesis for column (1) to (4) represent the standard errors. Column (5) reports the Chi-squared- statistics of Chow test over the difference of (3) and (4), and the number below denotes the p-value accordingly. Definitions of variables are in the Appendix. ***, **, and * indicate significance at 1%, 5%, and 10% level, respectively.

In Table 4, we can estimate how bank-dependent firms should behave if they were a non-dependent firm. To test Hypothesis 1, we use excess cash calculated as the difference between the actual $\Delta Cash_{it}$ and the predicted $\Delta Cash_{it}$. We test Hypothesis 1 by examining the difference between the sample mean of the excess cash for bank-dependent firms and that of their counterparts.

From Table 4, it can be observed that the mean difference of excess cash holding is -0.196 and it is significant at 1% significance level. In other words, the results suggest that bank-dependent firms would hold more excess cash if they were the same firm but non-dependent. Table 4 also reports each median to confirm that there is not much difference between the mean and the median. The result supports Hypothesis 1 so that we can say that bank-dependent firms hold less excess cash than their counterparts.

Table 4 also reports the excess amount of other usages of internal cash flow. Consistently with the previous table, the mean difference of excess investment is -0.525. The result indicates that bank-dependent firms would have more investment if they were non-dependent. The mean difference in excess debt increasing is -1.342, indicating that bank-dependent firms would have more debt financing if there were the same firm but non-dependent. All these findings are consistent with our hypotheses.

4. Robustness check

Gao et al. (2013) find evidence that private firms hold less cash than public firms do because the former faces lower agency costs than the latter. This finding suggests that the agency issues of private firms may be different from those of public firms. Hence, as a robustness check, we conduct the SUR regression analysis for the subsample of the listed firms and the subsample of the non-listed firms.

Table 5 reports the frequency distributions of our sample firms. We divide the original sample into the

Table 4: Comparison of the Mean and Median of Excess Amount for Each Equation

	Mean	Median
Excess ΔCash	-0.196***	-0.185
Excess I	-0.525***	-0.555
Excess DIV	0.026	-0.068
Excess ΔD	-1.342***	-0.968
Excess ΔE	-0.018	0.010

(Note) The excess amount of each variable is calculated from the coefficients of non-dependent firms of Table 2, using the sample of the matched bank-dependent firms. ***, **, and * indicate significance at 1%, 5%, and 10% level, respectively.

Table 5. Frequency distributions

	Bank-dependent	Non-dependent	Total
A) Original sample	14,111	6,767	20,878
B) Listed subsample	12,682	6,181	18,863
C) Non-listed subsample	307	134	441
D) Total (B+C)	12,989	6,315	19,304

(Note) The total number of Row D is smaller than the original of Row A because we exclude the sample of some industry-year observations where the total sum of the individual number of firms is less than 20.

two groups: listed subsample and non-listed subsample[7]. The original sample includes 20,878 observations and 14,111 are bank-dependent. The subsamples of listed and non-listed consist of 18,863 and 441 observations, respectively. The total number of listed subsample and non-listed subsample is 19,304. This number of observations is smaller than that of the original sample because we exclude industry-year observations where the total number of the individual number of firms is less than 20, to make it easier to match the sample. Even though the number of observations of non-listed subsample is much smaller than the listed group, the regression results are still effective in the aspect of statistics.

Table 6 reports the SUR regression results for the sample consisting of the listed firms. The results for the listed subsample in Table 6 are similar to those of the original sample shown in Table 3. In particular, the coefficients of the bank-dependent dummy are significantly negative in models 1 and 2 and the mean value in panel B is significantly negative. Thus, the result supports Hypothesis 2 that bank-dependent listed firms hold less excess cash than non-dependent listed firms.

Table 7 reports the SUR regression results for the sample consisting of the non-listed firms. The coefficient of the bank-dependent dummy is negative, but not significant in model 1. However, it is significantly negative in model 2. Also, the mean value in panel B is significantly negative. Thus, the result supports

Table 6. SUR regression analysis with matched sample (Listed firms only)

Panel A: ΔCash equation

Model	1	2	3	4	5
Sample	Full sample	Matched bank-dependent firms and non-dependent firms	Matched bank-dependent firms	Non-dependent firms	Chow test (3)-(4)
Dependent var.	ΔCash	ΔCash	ΔCash	ΔCash	ΔCash
Independent var.					
Bank-dependent dummy	-0.003***	-0.002**			
	(0.001)	(0.001)			
CF	0.383***	0.249***	0.303***	0.186***	33.103
	(0.007)	(0.008)	(0.012)	(0.012)	0.000
Q	-0.002***	0.000	-0.003***	0.005***	32.987
	(0.001)	(0.001)	(0.001)	(0.001)	0.000
Ln (Asset)	-0.003***	-0.002***	-0.003***	-0.002***	3.996
	(0.000)	(0.000)	(0.001)	(0.000)	0.046
Risk	-0.007	-0.218*	-0.549***	0.109	0.026
	(0.120)	(0.116)	(0.167)	(0.158)	0.873
Leverage	0.000	-0.000	0.000	-0.000**	4.632
	(0.000)	(0.000)	(0.000)	(0.000)	0.031
NWC	0.022***	0.002	0.007	-0.004	1.545
	(0.006)	(0.006)	(0.008)	(0.009)	0.214
R&D	0.027*	0.041**	0.037	0.045**	1.060
	(0.014)	(0.017)	(0.026)	(0.023)	0.303
Constant	0.017*	0.032***	0.064***	0.002	
	(0.010)	(0.009)	(0.014)	(0.012)	
Number of Observations	18,863	12,362	6,181	6,181	
R-squared	0.046	0.015	0.032	0.012	

Panel B

Excess Cash	Mean	Median
	-0.148***	-0.099

(Notes) Panel A presents estimated coefficients of independent variables for cash equation, using the subsample of listed firms. Definitions of variables are in the Appendix. The standard errors are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% level, respectively. Panel B presents the excess amount of DCash calculated from the coefficients of non-dependent firms of Panel A, using the sample of the matched bank-dependent firms.

Table 7. SUR regression analysis with matched sample (Non-Listed firms only)

Panel A: ΔCash equation

Model	1	2	3	4	5
Sample	Full sample	Matchedbank-dependent firms and non-dependent firms	Matched bank-dependent firms	Non-dependent firms	Chow test (3)-(4)
Dependent var.	ΔCash	ΔCash	ΔCash	ΔCash	ΔCash
Independent var.					
Bank-dependent dummy	-0.001	-0.011*			
	(0.006)	(0.006)			
CF	0.612***	0.548***	0.742***	0.450***	1.166
	(0.051)	(0.064)	(0.091)	(0.090)	0.280
Q	-0.018**	-0.025**	-0.088***	0.003	4.920
	(0.007)	(0.012)	(0.022)	(0.014)	0.027
Ln (Asset)	-0.001	-0.006	-0.016**	-0.005	1.273
	(0.004)	(0.004)	(0.008)	(0.005)	0.259
Risk	-0.002	0.003	0.009	0.001	3.409
	(0.008)	(0.008)	(0.011)	(0.011)	0.065
Leverage	0.000	0.001	0.004	-0.001	0.420
	(0.000)	(0.003)	(0.004)	(0.003)	0.517
NWC	0.087**	0.093**	0.063	0.162***	1.317
	(0.044)	(0.044)	(0.058)	(0.061)	0.251
R&D	0.018	-0.146	-0.274**	0.118	2.890
	(0.078)	(0.097)	(0.125)	(0.166)	0.089
Constant	0.005	0.055	0.186**	0.008	
	(0.040)	(0.046)	(0.081)	(0.057)	
Number of Observations	441	268	134	134	
R-squared	0.129	0.192	0.406	0.240	

Panel B

Excess Cash	Mean	Median
	-1.260**	-0.371

(Notes) Panel A presents estimated coefficients of independent variables for cash equation, using the subsample of non-listed firms. The definition of variables is in the Appendix. The standard errors are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% level, respectively. Panel B presents the excess amount of Dcash calculated from the coefficients of non-dependent firms of Panel A, using the sample of the matched bank-dependent firms.

Appendix: Definition of variables

Variables	
ΔCash	Change in the cash holdings divided by the total assets of beginning balance (abbr. total assets following)
I	Change in the fixed assets divided by the total assets
DIV	Amount of Cash dividend and stock dividend divided by the total assets
ΔD	The net change in liabilities divided by the total assets, a positive value represents cash inflow from debt instruments
ΔE	The net change in capital divided by total assets
CF	Net income plus non-cash items (depreciation and amortization) divided by total assets
Q	The market value of assets divided by the total assets
Ln (Assets)	The Napierian logarithm of total assets
Risk	The standard deviation of cash flow in a certain industry and a certain fiscal year
Leverage	D/E ratio, liability divided by net assets
NWC	Change in net working capital divided by the total assets
R&D	R&D expenditure divided by sales
Bank_dependent dummy	If a firm does not have an outstanding bond, then *Bank_dependent dummy* is equal to 1 and 0 otherwise.

Hypothesis 3 that bank-dependent non-listed firms hold less excess cash than non-dependent non-listed firms. The other results also are much similar to those of the previous two tables.

Ⅳ. Conclusions

In this paper, we provide empirical analysis over the cash holding behavior of bank-dependent firms and non-dependent firms based on Japanese firms' data from 1995 to 2018. The results show that bank-dependent firms significantly hold less excess cash than non-dependent firm. The subsample of listed and non-listed also provide robust supporting evidence. The findings are consistent with the findings of the previous research that larger firms generally hold more cash due to the greater agency conflicts. Besides, bank-dependent and non-dependent firms decrease the cash holding when total assets increase, indicating a significant characteristic of the economy to scale. Bank-dependent firms are significantly sensitive to the fluctuation of cash flow in the industry level while non-dependent firms receive have more incentives for cash saving when there are more investment opportunities. The influence of leverage remains ambiguous in our observations.

Notes

1) The cash literature started from the seminal works of Baumol (1952) and Miller and Orr (1966).
2) Jensen (1986) argues that entrenched managers in firms with high free cash flow are reluctant to pay out cash to shareholders.
3) SUR is proposed by Zellner, A. (1962) and it is a generalization of a linear regression model constituted by several regression equations. The name "seemingly unrelated" comes from the fact that each regression equation is a valid regression and can be estimated separately.
4) Industrial category is based on the information of Tokyo Stock Industrial Category Code, which is a 4-digit code specifying the industries a firm belongs to. "0050": Fisheries, agriculture and forestry; "1050": Mining;"2050": construction; "3050": Foods; "3100": Textiles and Apparels; "3150": Pulp and Paper;"3200": Chemicals; "3250": Pharmaceutical; "3300": Oil and Coal Products;"3350": Rubber Products; "3400": Glass and Ceramics Products; "3450": Iron and Steel; "3500": Nonferrous Metals; "3550": Metal Products; "3600": Machinery; "3650": Electric Appliances; "3700": Transportation Equipment; "3750": Precision Instruments; "3800": Other Products; "4050": Electric Power and Gas; "5050": Land Transportation; "5100": Marine Transportation; "5150": Air Transportation; "5200": Warehousing and Harbor Transportation; "5250": Information & Communication; "6050": Wholesale Trade;"6100": Retail Trade; "7050": Banks; "7100": Securities and Commodities Futures; "7150": Insurance; "7200": Other Financing Business; "8050": Real Estate; "9050": Services; "9999": Others.
5) See for example, Carpenter et al. (1998), Dasgupta and Sengupta (2007), and Hovakimian (2009).
6) However, the negative effect of Tobin's q on cash is not usual in the empirical literature. Nakajima and Sasaki (2016) report the negative results.
7) The stock exchanges in Japan include Tokyo, Osaka, Nagoya, Kyoto, Hiroshima, Fukuoka, Niigata, Sapporo, and as long as a firm is listed in any of the stock exchanges above, it is counted as listed subsample.

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