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Corporate international activities and cash holdings

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This research extends previous studies of cash holdings and presents the first empirical evidence on the relationship between cash holdings and internationalization. Using U.S. firms as sample, our findings reveal that Multinational Corporations (MNCs) have more cash holdings than Domestic Corporations (DCs), and that internationalization is a determinant of cash holdings. Furthermore, there is an inverted-U-shape relationship between cash holdings and internationalization. Specifically, a firm's cash holdings rise as international expansion increases, but only at low levels of internationalization. After a certain turning point, however, a firm's cash holdings begin to fall with increasing internationalization.

Key words: Cash holding, internationalization, panel threshold regression model.

INTRODUCTION

Internationalization is one of several strategies that firms might adopt to maintain or improve their competitive advantages. Much literature supports the notion that the primary benefit to international expansion is the exploitation of market imperfections. For example, to take advantage of imperfections in markets for products, production factors, and financial assets. MNCs are better able to exploit competitive factors such as economics of scale, scale, managerial and technological expertise, product differentiation, and financial strength (Eiteman and Stoehill, 2010). Following this logic, many studies confirmed that a higher level of internationalization leads to better firm performance. Many researchers have explored topics related to internationalization, yet few have focused on how internationalization impacts a firm's financial factors or strategies. Only some studies investigate the relationship between internationalization and a firm's performance, risks, and capital structure, respectively. Successful firms, however, need to adjust their financial policies at every stage of expansion, including international expansion. Yet, to the best of our knowledge, none of those studies has focused on the relationship between internationalization and a firm's cash holdings.

The issue of cash holdings has recently become particularly appealing to financial researchers. Nearly all investigate the determinants of cash holdings and from

the viewpoint of corporate governance. In terms of internationalization, only Chang and Noorbakhsh (2006) mentioned that foreign direct investment inflows act as substitutes for corporate cash holdings, while Foley et al., (2007) found that repatriation taxes have some impact on a firm's cash holdings. The relationship between a firm's international expansion and cash holdings has been ignored, despite the fact that many U.S. firms operate in several countries. Considering this, the purpose of this research is to shed additional light on the internationalization's key role as a determinant of cash holdings, a research issue that remains unexplored. We contribute to the literature by providing empirical evidence to answer the following three main questions.

First, do MNCs have more cash holdings than DCs? Some previous studies have shown that MNCs have different characteristics than DCs; for example, MNCs always have greater growth opportunities (Bodnar and Weintrop, 1997), higher profitability (Chen et al., 1997) and greater access to international capital markets (Doukas and Pantzalis, 2003) than do DCs. MNCs, however, are exposed to additional risks, such as political and exchange rate risks, compared to domestic markets (Lee and Kwok, 1988; Chen et al., 1997). The agency costs induced by internationalization may also be greater for MNCs due to information asymmetries and greater monitoring costs (Wright and Madura, 2002; Doukas and Pantzalis, 2003). We argue that MNCs and DCs have different characteristics that might result in different cash holdings. In this study, we compare cash holdings. In this study, we compare cash holdings and their important

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determinants between MNCs and DCs.

Second, does internationalization act as a determinant of cash holdings? By using multiple regression analyses, we examine whether internationalization can explain cash holdings after controlling for the effects of other major determinants of cash holdings. This approach explicitly examines whether a direct relationship exists between internationalization and cash holdings. Third, what type of relationship exists between cash holdings and internationalization? Is there a non-monotonic relationship in addition to the traditional linear relationship? Some literature documents the non-monotonic relationships between internationalization and a firm's performance well, and others have shown evidence of the non-monotonic relations between internationalization and a firm's capital structure. Still, the impact of internationalization on a firm's cash holdings remains unknown. We argue that a strictly linear specification may not fully capture the impact of internationalization on cash holdings, and that firms are likely to adjust cash holdings based on different levels of internationalization. Specifically, at an early stage of international expansion, cash holdings may rise due to precautionary motives.

This effect emanates from the increasing business risks and learning costs due to unfamiliarity with new business environments (Hymer, 1976) and investors' perception of greater information asymmetries. As international expansion continues, firms might overcome the liabilities of foreignness, thus controlling their business risks and growing their reputations as they are able to operate internationally. This experience thereby gives investors more confidence in investing in their securities, and thus financing costs decrease. The substitution effect from external funds encourages firms to decrease cash holdings. Thus, this study also investigates a possible non-monotonic relationship between internationalization and a firm's cash holdings.

Using a sample of U.S. firm-year observations from the Compustat Database in the period of 2003 to 2008, we show that MNCs have more cash holdings than DCs, and that internationalization acts as a determinant of cash holdings. Furthermore, we find an inverted-U-shape relationship between a firm's cash holdings and internationalization.

Our findings suggest that MNCs tend to increase cash holdings with increasing internationalization at the earlier stages of internationalization. Only when an MNC has achieved a higher level of internationalization does the firm decrease its cash holdings.

LITERATURE REVIEW

Internationalization and firm performance

Early studies examine a linear relationship between internationalization and firm performance. However, results from these studies have been inconclusive. These

range from "positive" (Grant, 1987; Kim and Hwang, 1993), to "weak" (Kumar, 1984; Morck and Yeung, 1991), and to "negative" (Michel and Shaked, 1986; Denis and Denis, 2002). Later studies recognize that internationalization may encounter both risks and advantages, and have both costs and benefits. They improve the linear model by adding the squared terms to be the curvilinear model. There exists a threshold in the curvilinear model. Thus, it is a U shape (Mathur and Singh, 2001; Ruigork and Wagner, 2003) or an inverted-U shape (Sullivan, 1994; Hitt and Hoskisson, 1997; Gomes and Ramaswamy, 1999).

Internationalization and firm risk

Early studies by Hughes and Logue (1975) and Rugman (1976) posited that diversification benefits of MNCs lead to lower levels of risk. Yet et al. (1996) and Reeb and Kwok (1998) found that firm risks are positively related to internationalization due to some risk factors, such as exchange rate risks and political risks, offsetting the diversification benefit of MNCs. Kwok and Reeb (2000) proposed an upstream-downstream hypothesis and gave evidence that the overall effect of internationalization on the risks of MNCs depends on the risk classes among countries.

Internationalization and capital structure

Previous researchers such as Chen et al. (1997), Chkir and Cosset (1999), Reeb and Mansi (2001) demonstrated a positive relationship between debt ratio and internationalization because of the risk reduction inherent in having operations in imperfectly correlated markets. However, Lee and Kwok (1988) and Burgman (1996) found a negative relationship between debt ratio and internationalization because of increased risk from agency costs, exchange rate risks and political risks. Mansi and Reeb (2002) and Singh and Nejadmalayeri (2004) examined the nonlinear relationship between debt financing and internationalization. They used the curvilinear model and got a U-shaped relationship.

Cash holdings

Opler et al. (1999)'s investigation of U.S. firms found that firms with strong growth opportunities, small firm size and high R&D expenditures hold relatively higher cash ratios. Ferreira and Vilela (2004) studied EMU firms, finding a positive relationship between investment opportunity and cash holdings. In addition, asset's liquidity, leverage, firm size, bank debt, and capital markets development have negative impacts on cash holdings. Recently, Pedro and Pedro (2008) used a sample of Spanish SMEs and found that firms with more growth opportunities and larger cash

flows have higher target cash levels. Dittmar et al. (2003) provided evidence that firms in countries with poor shareholders rights hold up to twice as much cash as firms in countries with strong shareholder protection. Ozkan et al. (2004) found a significant non-monotonic relationship between managerial ownership and cash holdings. Pinkowitz et al. (2006) found that the relationship between cash holdings and firm value is much weaker in countries with poor investor protection than in other countries. Dittmar et al. (2007) found that good governance increases firm values by improving the use of cash holdings, while poorly governed firms waste excess cash resources and thus destroy firm values. Kalcheva et al. (2007) showed that when external country-level shareholder protection is weak, firm values are lower when controlling managers hold more cash, and are higher when controlling managers pay dividends. Harford et al. (2008) found that firms with weaker corporate governance structures actually have smaller cash reserves. In addition, Chang et al. (2006) extended the model of Dittmar et al. (2003) to find that foreign direct investment inflows in today's highly integrated capital markets act as substitutes for corporate cash holdings. Foley et al. (2007) found that U.S. MNCs that incur tax consequences associated with repatriating foreign earnings hold higher levels of cash.

DATA AND VARIABLES

Sample and data source

Our initial sample consists of all U.S. firms for which data are available between 2003 and 2008 on Compustat. Following Dittman et al. (2003), Foley et al. (2007) and Bates et al. (2009), we exclude the financial and utility firms. Then, we remove the missing data, and all variables are winsorized at their 1st and 99th percentiles to minimize the effect of outliers. Finally, only firms with complete six firm-year observations during the sample period are chosen. The remaining observations total 4,014. MNCs account for 1,286, while DCs amount to 2,854, respectively. Following Doukas and Pantzalis (2003), firms are defined as MNCs if they report both foreign assets and foreign sales ratios of 10% or more. Firms are classified as DCs if they do not report any foreign assets or foreign sales.

Dependent variables

Cash ratio

Following Dittmar et al. (2003) and Harford et al. (2008), we define cash ratio as $\ln(\text{cash/assets})$.

Degree of Internationalization (DOI) variables

Following Doukas and Pantzalis (2003), two proxies are used to measure a firm's degree of internationalization (DOI):

- (1) Foreign sales ratio (FS) = foreign sales/total sales. This provides a measure of a firm's dependence on overseas markets for sales revenues.
- (2) Foreign Assets ratio (FA) = foreign assets/total assets. This

Control variables

We use the common variables mentioned in the literature as control variables.

Cash Flow Variability (CF)

According to Gueney et al. (2007), firms with more volatile cash flows are expected to hold more cash to mitigate the expected costs of liquidity constraints. Higher cash flow volatility increases the probability of financial distress because firms might not be able to fulfill their debt-servicing commitments. Thus, we expect a firm's cash holdings to increase as cash flows variability increases, especially when firms suffer from exchange rate and political risks due to international expansion. Following the definition of Ozkan and Ozkan (2004) and Gueney et al. (2007), the measure we use for cash flow variability is the standard deviation of cash flow to total assets.

Liquidity (Liq)

The existence of other liquid assets may substitute for cash (Ozkan and Ozkan, 2004). Firms with sufficient liquid assets may not have to use the capital markets to raise funds when they are short of cash (Ferreira and Vilela, 2004). Thus, a negative relationship between a firm's cash holdings and liquid assets is expected. Following Ozkan and Ozkan (2004) and Gueney et al. (2007), we use (net working capital - cash and cash equivalent) to total assets as liquid asset substitutes.

Leverage ratio (Lev)

Leverage increases the probability of bankruptcy. To reduce the probability of experiencing financial distress, firms with higher leverage are expected to hold more cash (Ozkan and Ozkan, 2004). On the other hand, low-leverage firms are less subject to monitoring, allowing for more managerial discretion and the ability to hold more cash (Ferreira and Vilela, 2004). Thus, the relationship between cash holdings and leverage is ambiguous. Following Ozkan et al. (2004), Gueney et al. (2007), and Kalcheva et al. (2007), the proxy we use for leverage ratio is total debts to total assets.

Growth opportunity (MKTB)

Firms with better investment opportunities are expected to hold more cash to mitigate the opportunity costs of foregone investment. Thus, a positive relationship exists between a firm's cash holdings and its growth opportunities. Following Opler et al. (1999), Dittmar et al. (2003), and Harford et al. (2008), we use market-to-book ratio as the proxy of growth opportunity.

Firm size (Size)

Larger firms are more likely to be diversified and thus less likely to experience financial distress (Titman and Wessels, 1988); further, less asymmetric information exists for larger firms compared to small firms (Jorden et al., 1998). In addition, there are economies of scale to hold cash (Bates, et al., 2009). Thus, we would expect a negative relationship between firm size and cash holdings. Following Arslan et al. (2006), Chang et al. (2006), and Foley et al. (2007), we use the log of total assets as a proxy for firm size.

Table 1. Definition of variables.

Variable	Expected sign	Definition
Cash ratio		Ln (cash/assets)
Degree of internationalization (<i>DOI</i>)	+/-	(1) Foreign Sales ratio (<i>FS</i>) = Foreign sales / total sales (2) Foreign Assets ratio (<i>FA</i>) = Foreign assets / total assets
Cash flow variability (<i>CF</i>)	+	Standard deviation of cash flow to total assets
Liquidity (<i>Liq</i>)	-	(Net working capital - cash and cash equivalent) / total assets
Leverage Ratio (<i>Lev</i>)	+/-	Total debts / total assets
Growth opportunity (<i>MKTB</i>)	+	Market-to-book ratio = Market value / book value
Firm size (<i>Size</i>)	-	Ln (total assets)
Dividend (<i>Div</i>)	-	Dummy variable = 1 if firms pay dividend in a given year and 0 otherwise
Managerial ownership (<i>Man</i>)	+/-	The percent of shares owned by managers

Dividend (*Div*)

According to Ferreira and Vilela (2004), firms that currently pay dividends can afford to hold less cash as they are more capable of raising funds when needed by cutting dividends. Following Gueney et al. (2007) and Kalcheva et al. (2007), we use the dividend dummy for dividend policy. That is, dummy equals 1 if firms pay dividend in a given year and 0 otherwise.

Managerial ownership (*Man*)

According to Opler et al. (1999), managers might wish to protect their human capital with a cash buffer due to risk aversion. Thus, a positive relationship exists between managerial ownership and cash holdings. On the other hand, managers like to pursue their own objectives at the expenses of shareholders. One way to control the agency problem between managers and shareholders is to increase manager's equity ownership, which allows managers and shareholders to share the same goals. Under this incentive-alignment effect, a negative relationship exists between managerial ownership and cash holdings (Ozkan and Ozkan, 2004). Thus, the relationship between cash holdings and managerial ownership is ambiguous.

Table 1 summarizes and defines all variables used in this study, while Table 2 provides descriptive statistics and the correlation matrix of all variables. In addition, the correlation among variables is low, and the multicollinearity does not appear to be a problem in the second stage of the multiple regression analysis.

Methodology and hypotheses

Cash holdings of MNCs vs. DCs

We hypothesize that the many different characteristics between MNCs and DCs result in different cash holdings of MNCs and DCs and conduct a univariate test to determine if there are significant differences for the variables in relation to the cash holdings between MNCs and DCs, including cash holdings.

Internationalization plays as a determinant of cash holdings

We investigate if internationalization is one of the determinants of

cash holdings by using multiple regression analysis. Three proxies of internationalization are used as shown in equations (1) and (2). Standard errors in these equations are corrected for autocorrelation and heteroscedasticity using the Newey-west method (1987). In equation (1), a dummy variable for international activities, dummy, equals 1 if firms are MNCs and 0 otherwise. In equation (2), two proxies of the degree of internationalization (*DOI*) include the foreign sales ratio (*FS*) and the foreign assets ratio (*FA*). If the proxies of internationalization in these two equations are significant, then internationalization is a determinant of cash holdings.

$$\begin{aligned} Cash_i = & \alpha + \beta_1 Dummy_i + \beta_2 CF_i + \beta_3 Liq_i + \beta_4 Lev_i + \beta_5 MKTB_i \\ & + \beta_6 Size_i + \beta_7 Div_i + \beta_8 Man_i + \varepsilon_i \end{aligned} \quad (1)$$

$$\begin{aligned} Cash_i = & \alpha + \beta_1 DOI_i + \beta_2 CF_i + \beta_3 Liq_i + \beta_4 Lev_i + \beta_5 MKTB_i \\ & + \beta_6 Size_i + \beta_7 Div_i + \beta_8 Man_i + \varepsilon_i \end{aligned} \quad (2)$$

Where *CF* is cash flow variability, *Liq* is liquidity, *Lev* is leverage ratio, *MKTB* is growth opportunity, *Size* is the firm size, *Div* is dividend, and *Man* is managerial ownership.

The relationship between cash holdings and internationalization

In Equation (3), a non-monotonic relationship is investigated between cash holding and internationalization, using a quadratic model, which implies a single turning point. Standard errors are corrected for autocorrelation and heteroscedasticity using the Newey-west method (1987).

$$\begin{aligned} Cash_i = & \alpha + \beta_1 DOI_i + \beta_2 DOI_i^2 + \beta_3 CF_i + \beta_4 Liq_i + \beta_5 Lev_i \\ & + \beta_6 MKTB_i + \beta_7 Size_i + \beta_8 Div_i + \beta_9 Man_i + \varepsilon_i \end{aligned} \quad (3)$$

We hypothesize an inverted-U-shape relationship between cash holding and internationalization. That is, as internationalization internationalization increases, we expect to observe first a positive effect, then a negative effect of internationalization on cash holdings after a certain turning point. Specifically, at the early stage of internationalization, firms have larger learning costs because they are

Table 2. The descriptive statistics and correlation matrix of variables.

Variable	Mean	Std. Dev.	Cash	FS	FA	CF	Liq	Lev	MKTB	Size	Div	Man
Cash	0.1305	0.1522	1									
FS	0.1058	0.2133	0.1297	1								
FA	0.0786	0.1851	0.1158	0.7139	1							
CF	0.1216	0.1690	0.0834	0.0264	0.0396	1						
Liq	0.0931	0.1916	-0.0362	0.0478	0.0767	-0.0661	1					
Lev	0.4932	0.2103	-0.3702	-0.0457	-0.0122	-0.0792	-0.3981	1				
MKTB	3.2270	8.1770	0.0866	0.0194	0.0251	0.0731	-0.1414	0.1678	1			
Size	5.7800	2.1268	-0.2910	0.0752	0.0966	-0.1351	-0.2371	0.3863	-0.0239	1		
Div	0.9043	0.2941	-0.0349	0.0288	0.0130	-0.0193	-0.0186	0.0406	0.0199	0.1002	1	
Man	0.0014	0.0018	-0.0856	-0.0058	0.0250	0.0362	0.0810	-0.1256	-0.0342	-0.4437	-0.0069	1

Cash is cash holding, FS is foreign sales ratio, FA is foreign assets ratio, CF is cash flow variability, Liq is liquidity, Lev is leverage ratio, MKTB is growth opportunity, Size is the firm size, Div is dividend, and Man is managerial ownership.

learning costs because they are operating in unfamiliar environments (Hymer, 1976). Investment opportunities abroad may be more volatile than domestic opportunities, and firms may have more volatile cash flows due to foreign exchange and political risks. In addition, the existence of asymmetric information between firms and investors makes external financing costly. Opler et al. (1999) found that firms with riskier cash flows and poor access to external capital hold more cash. According to Dittmar et al. (2003), the precautionary motive for holding cash is based on the impact of asymmetric information on the ability to raise external funds. Gueney et al. (2007) provided evidence that firms with more volatile cash flows are expected to hold more cash to mitigate the expected costs of liquidity constraints. Bates et al. (2009) demonstrated that firms have increasing cash holdings mainly for precautionary motivations. We infer, therefore, that firms tend to hold more cash at the early stage of international expansion because of this precautionary effect.

Once at a high level of internationalization, firms are more familiar with handling foreign exchange and political risks. A firm's established international reputation helps investors feel more confident in it. Then, external financing costs decrease and firms need not hold so much cash because of the substitution effect from the external funds. They thus tend to decrease cash holdings and invest cash in other profitable projects or increase dividend payouts to shareholders. We infer, therefore, that firms tend to hold

less cash at a higher level of internationalization because of the substitution effect.

RESULTS

Cash holdings of MNCs vs. DCs

As it is shown in Table 3, the mean cash holding for MNCs is 0.1331, which is significantly higher than that of DCs, 0.0941. In addition, MNCs have significantly higher liquidity, growth opportunities, firm size and dividend payouts than DCs. The main reason MNCs hold more cash might be due to the fact that MNCs have greater growth opportunities. Specifically, the precautionary motives from mitigating the opportunity costs of foregone investments exceed the motives for holding less cash from the other effects, such as large size, liquidity, and dividend payouts.

Internationalization plays as a determinant of cash holdings

As shown in Model 1 of Table 4, the coefficient of

DOI dummy is significantly positive, indicating that MNCs have more cash holdings than DCs even after we control for the major determinants of cash holdings. In Models 2 to 1 and 2 to 2, the coefficients of FS and FA are both significantly positive. Our results demonstrate that internationalization is one of the determinants of cash holdings, regardless of whether the proxy is MNC Dummy, FS or FA.

The relationship between cash holdings and internationalization

As shown in Model 2 and 3 of Table 4, the coefficients of FS and FA are both significantly positive and the coefficients of FS² and FA² are significantly negative, indicating an inverted-U-shape relationship between cash holdings and internationalization. The turning points are 0.5539 and 0.5389 for FS and FA, respectively. Specifically, firms increase cash holdings as the degree of internationalization increases before the turning points noted above. Thereafter, the relationship

Table 3. Means and standard deviations of the variables of MNCs and DCs.

Variable	MNCs : FS>10% and FA>10%		DCs : FS=0 and FA=0		Means difference test
	Mean	St. Div.	Mean	St. Div.	t-value
Cash	0.1331	0.1299	0.0941	0.1507	2.9558**
FS	0.4396	0.2275	0	0	70.6305***
FA	0.4007	0.2285	0	0	52.6113***
CF	0.1219	0.3073	0.1217	0.1199	0.0275
Liq	0.1256	0.1775	0.0820	0.1910	5.6221***
Lev	0.4944	0.1890	0.4962	0.2114	1.3511
MKTB	3.5908	9.3285	2.9857	6.2521	2.8318***
Size	6.5697	1.9264	5.6411	2.1375	6.2923***
Div	0.9183	0.2740	0.8945	0.3072	3.2015***
Man	0.0013	0.0019	0.0015	0.0018	0.8687

Cash is cash holding, *FS* is foreign sales ratio, *FA* is foreign assets ratio, *CF* is cash flow variability, *Liq* is liquidity, *Lev* is leverage ratio, *MKTB* is growth opportunity, *Size* is the firm size, *Div* is dividend, and *Man* is managerial ownership. * indicates significance at the 10%. ** indicates significance at the 5%. *** indicates significance at the 1%.

becomes negative. The results confirm our hypothesis.

With regard to the effects of control variables, firms with higher liquidity, leverage, firm size and managerial ownership have lower cash holdings. Firms with higher MKTB have higher cash holdings. These findings are all in line with the expected signs. In addition, cash flow variability and dividend payouts have no significant impacts on the cash ratio.

Robustness test

We use the panel threshold regression model, developed by Hansen (1999), to reexamine the possible non-linear relationship between cash holdings and internationalization. The method has been widely used in the literature and is particularly suitable for our purpose.

We then set up the following threshold model:

$$Cash_i = \begin{cases} \alpha + \theta_1 DOI_i + \beta_1 CF_i + \beta_2 Liq_i + \beta_3 Lev_i + \beta_4 MKTB_i + \beta_5 Size_i + \beta_6 Div_i + \beta_7 Man_i + \epsilon_i, & \text{when } DOI_i \leq \gamma \\ \alpha + \theta_2 DOI_i + \beta_1 CF_i + \beta_2 Liq_i + \beta_3 Lev_i + \beta_4 MKTB_i + \beta_5 Size_i + \beta_6 Div_i + \beta_7 Man_i + \epsilon_i, & \text{when } DOI_i > \gamma \end{cases} \quad (4)$$

Where α_i is a given fixed effect used to grasp the heterogeneity of different firms under different operating conditions; γ is the hypothesized specific threshold value; θ_1 and θ_2 are the threshold coefficients when the

the value of threshold variable is lower and greater than γ , respectively. Equation (4) can also be presented as Equation (5), and the symbol “I(.)” is the indicator function:

$$Cash_i = \alpha + \theta_1(DOI)_i I(DOI_i \leq \gamma) + \theta_2(DOI)_i I(DOI_i > \gamma) + \beta_1 CF_i + \beta_2 Liq_i + \beta_3 Lev_i + \beta_4 MKTB_i + \beta_5 Size_i + \beta_6 Div_i + \beta_7 Man_i + \epsilon_i \quad (5)$$

The derivation of the threshold value (turning point), γ , is literally setting the threshold value and calculating sum of square errors by the least square estimate. The estimated γ is the one under which the model has the minimal sum of square errors. Then the coefficients of different regimes can be tested by the threshold effect (Hansen, 1999). The null hypothesis is $H_0 : \theta_1 = \theta_2$, and the alternative hypothesis is $H_1 : \theta_1 \neq \theta_2$. If the result rejects the null hypothesis, the threshold effect exists and the model has two regimes (nonlinear).

By repeating the bootstrap procedures 300 times to obtain the asymptotic distribution for testing the threshold effect in equation (5), we find the threshold values are 0.5246 and 0.5011 when DOI is FS and FA, respectively, as shown in Table 5. Significant positive θ_1 and significant negative θ_2 in both Table 6 and Table 7 confirm our hypothesis that cash holdings rise at the early stage of international expansion due to the precautionary effect. After a certain turning point, cash holdings decrease with increasing internationalization due to the substitution

Table 4. Results of Internationalization and cash holdings.

Variable	Model 1	Model 2-1	Model 3-1	Model 2-2	Model 3-2
C	-0.2895* (0.1722)	-0.3836** (0.1788)	-0.3543** (0.1792)	-0.3064* (0.1722)	-0.2627 (0.1731)
Dummy	0.6784*** (0.0896)				
FS		1.0404*** (0.2021)	2.6781*** (0.5123)		
FS ²			-2.4171*** (0.6616)		
FA				1.3132*** (0.2409)	3.6094*** (0.4483)
FA ²					-3.3487*** (0.6425)
CF	0.0292 (0.4278)	0.0317 (0.4471)	0.0101 (0.4122)	0.0711 (0.4400)	0.0101 (0.4003)
Liq	-2.0729*** (0.1587)	-1.9762*** (0.1616)	-2.0412*** (0.1651)	-2.0537*** (0.1600)	-2.1231*** (0.1584)
Lev	-3.0863*** (0.1598)	-3.0544*** (0.1619)	-3.0776*** (0.1631)	-3.1003*** (0.1605)	-3.0914*** (0.1601)
MKTB	0.0216*** (0.0066)	0.0220*** (0.0067)	0.0214*** (0.0065)	0.0217*** (0.0067)	0.0208*** (0.0064)
Size	-0.1792*** (0.0154)	-0.1652*** (0.0153)	-0.1724*** (0.0159)	-0.1718*** (0.0153)	-0.1867*** (0.0156)
Div	-0.0305 (0.0757)	-0.0438 (0.0749)	-0.0547 (0.0754)	-0.0282 (0.0747)	-0.0349 (0.0755)
Man	-3.5173** (1.4908)	-3.2823** (1.5096)	-3.2737** (1.4877)	-4.0201*** (1.4855)	-3.9549*** (1.4714)
Turning point			0.5539		0.5389
F-statistic	170.0056***	152.0819***	165.4922***	158.6047***	168.5325***
Adjusted-R ²	0.2462	0.2412	0.2472	0.2446	0.2552

Cash is cash holding, *FS* is foreign sales ratio, *FA* is foreign assets ratio, *CF* is cash flow variability, *Liq* is liquidity, *Lev* is leverage ratio, *MKTB* is growth opportunity, *Size* is the firm size, *Div* is dividend, and *Man* is managerial ownership. The figure in () is the standard error. * indicates significance at the 10%, ** indicates significance at the 5%, *** indicates significance at the 1%.

Table 5. Results of panel threshold regression model.

Panel A: LR Test for the threshold effect	DOI = FS	DOI = FA
Threshold value	0.5246	0.5011
F-statistics	15.0437 ¹	16.9838 ¹
p-value	0.0429	0.0000
	10%	12.6438
F-statistics critical value	5%	14.2758
	1%	21.3315
		9.3405
		10.7842
		13.9497

F-Statistics and p-value are derived by repeating bootstrap procedure 300 times.

Table 6. Coefficients of the regime-dependent and -independent variables when DOI = FS.

		Coefficient	Homogeneous standard error	Heteroscedastic standard error
Regime-dependent variable (DOI = FS)	θ_1^1	1.0764*** ²	0.3181	0.2808
	θ_2	-0.1100**	0.0574	0.0508
Regime-independent variable	CF	-0.0466	0.0411	0.0377
	Liq	-0.0578**	0.0291	0.0306
	Lev	-0.0401	0.0661	0.0665
	MKTB	8.1359	4.4710	3.9717
	Size	-0.0147**	0.0079	0.0076
	Div	-0.1105**	0.0347	0.0342
	Man	-0.1424	0.1081	0.0949

Table 7. Coefficients of the regime-dependent and -Independent variables when DOI = FA.

		Coefficient	Homogeneous standard errors	Heteroscedastic standard errors
Regime-dependent variable (DOI = FA)	θ_1^1	0.0440*** ²	0.0108	0.0120
	θ_2	-0.0249**	0.0121	0.0126
Regime-independent variable	CF	-0.0067	0.0041	0.0067
	Liq	-0.3209***	0.0145	0.0183
	Lev	-0.3233	0.0104	0.0141
	MKTB	0.7156***	0.2632	0.3179
	Size	-0.0229***	0.0032	0.0041
	Div	-0.0117*	0.0062	0.0057
	Man	-0.0148	0.0073	0.0119

θ_1 is the coefficient of Regime I, while θ_2 is the coefficient of Regime II. *, **, *** represents significant levels of 10, 5, and 1%.

effect. We also use other popular definitions of control variables, such as value of sales and market capitalization as the proxies of firm size, and price-earnings ratio as the proxy of growth opportunity.

SUMMARY AND DISCUSSION

The results gave evidence that MNCs tend to keep more cash than DCs due to precautionary motives, especially at the early stage of the international expansion. Only when firms are at a higher stage of internationalization and substitute effects overcome precautionary effects do they reduce cash holdings and use them for more profitable investments. We demonstrate that firms adjust cash holdings dynamically with the changing international environment. Since cash holdings have no return and may influence firm values to some extent, our results provide one of the reasons for a U-shape relationship

between internationalization and a firm's performance, as mentioned in the literature.

Conclusion

This study investigates cash holding behavior of U.S. firms from 2003 to 2008, with a focus on the largely unexplored relationship between internationalization and cash holdings. Our results demonstrate that MNCs have more cash holdings than DCs, and that internationalization is a determinant of cash holdings. In addition, there is an inverted-U-shape relationship between cash holdings and internationalization.

Our findings could help firms design their cash holding policies when they plan to expand internationally. This study only focuses on U.S. firms. Future research could focus on other countries and compare the results for more profound and interesting implications.

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