

# Determinants of Corporate Cash Holdings: Evidence from Canada

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## Abstract

The purpose of this study is to investigate the determinants of corporate cash holdings in Canada. This study also seeks to extend the findings of Afza and Adnan (2007). A sample of 166 Canadian firms listed on Toronto Stock Exchange for a period of 3 years (from 2008-2010) was selected. This study applied co-relational and non-experimental research design. The results show that market-to-book ratio, cash flow, net working capital, leverage, firm size, board size, and the CEO (chief executive officer) duality significantly affect the corporate cash holdings in Canada. This study contributes to the literature on the factors that determine the corporate cash holdings. The findings may be useful for the financial managers, investors, and financial management consultants.

**Keywords:** Market-To-Book Ratio, Cash flow, Net working capital, Leverage, Firm size, Board size, CEO duality, Cash holdings

## 1. Introduction

The purpose of this study is to find the determinants of corporate cash holdings in Canada. Cash holding, in the context of this study, is defined as cash in hand or readily available for investment in physical assets and to distribute to investors. Corporations hold a certain amount of liquid balance, in the spirit Keynesian postulations of the money demand, for various motives such as precautionary, speculative, and transactional (Isshaq & Bokpin, 2009). Transaction motive refers to cash which is held for everyday transactions to pay for goods or services; that is, cash is held for day-to-day operations to make routine payments. Precautionary motive refers to cash held for safety reasons; that is, cash balance is held in reserve for unforeseen fluctuations. From speculation motive point of view, corporations hold cash balance to take advantages of any bargain purchases that may arise (Besley & Brigham, 2005).

Tradeoff theory, pecking order theory, and free cash flow theory usually explain the pattern of cash holdings. Firms, according to tradeoff theory, set their optimal level of cash holdings by weighting the marginal costs and marginal benefits of holding cash (Afza & Adnan, 2007). According to Ferreira and Vilela (2004) the benefits of cash holding are: i) reduction in the likelihood of financial distress, ii) allowing the pursuance of investment policy when financial constraints are met, and iii) minimization of the costs of raising external funds or liquidating existing assets. The main cost of holding cash is the opportunity cost of the capital invested in liquid assets. The pecking order theory of Myers (1984) suggests that the firms should finance investments first with retained earnings, then with safe debt and risky debt, and finally with equity to minimize asymmetric information costs and other financing costs. Myers' theory suggests that firms do not have target cash levels, but cash is used as a buffer between retained earnings and investment needs. The free cash flow theory of Jensen (1986) describes that managers have an incentive to build up cash to increase the amount of assets under their control and to gain discretionary power over the firm investment decision. In addition, cash reduces the pressure to perform well and allows managers to invest in projects that best suit their own interests, but may not be in the shareholders best interest (Ferreira & Vilela, 2004).

Afza and Adnan (2007) describe that maintaining appropriate level of liquidity within the organization is fundamental for smooth operations of a firm. The level of cash a firm maintains is characterized by its policies regarding capital structure, working capital requirements, cash flow management, dividend payments, investment and asset management (Opler *et al.*, 1999).

The board of directors and the CEO are responsible for formulating cash management, corporate governance, and all other policies in the organization. Thus, board size and the CEO duality play an important role in the organization and can lead to higher cash balances. The higher cash balances can lead to an agency problem because the board of directors and the CEO may not work in the favor of the shareholders to maximize their wealth.

A variety of variables that might potentially be associated or 'responsible' for the corporate cash holdings can be found in the literature. In this study, the selection of explanatory variables is based on alternative theories related to working capital requirements, corporate governance, and additional variables that were studied in reported empirical work. The choice is sometimes limited, however, due to lack of relevant data. As a result, the final set of proxy variables includes ten factors: cash holdings, market-to-book ratio, cash flow to net asset ratio, net working capital-to-asset ratio, leverage, firm size, dividends, board size, CEO duality, and industry dummy.

Afza and Adnan (2007) have tested relationships between cash holdings and market-to-book ratio, cash flow to net asset ratio, net working capital-to-asset ratio, leverage, firm size, dividends, and cash holdings by collecting data from Karachi Stock Exchange (KSE). Drobetz and Gruninger (2007) have tested the relationships between board size, CEO duality, and cash holdings by collecting data from Switzerland. This study extends these studies using data about Canadian manufacturing and service firms. The results might be generalized to manufacturing and service industries.

This study contributes to the literature on the determinants of corporate cash holdings in at least two ways. First, it focuses on Canadian manufacturing and service firms while only limited research has been conducted on such firms recently. Second this study validates some of the findings of previous authors by testing the relationship between cash holdings and market-to-book ratio, cash flow to net asset ratio, net working capital-to-asset ratio, leverage, firm size, dividends, board size, CEO duality, and industry dummy of the sample firms. Thus, this study adds substance to the existing theory developed by previous authors.

## 2. Literature Review

Cash is the most liquid assets and is the measure of a corporation's ability to pay its bills on time. Cash holding is important because it provides corporations with liquidity; that is, corporations are able to pay off their obligations on time even if bad times hit. To grow sales and profits, a corporation needs to build up cash reserves by ensuring that the timing of cash movements creates an overall positive cash flow situation. Thus, cash is the essential ingredient that enables a business to survive and prosper. Cossin and Hricko (2004) describe that cash holdings allow for optimal timing of an investment and avoid the under pricing issue. However, holding excessive cash does not necessarily make good business sense. Therefore, financial managers need to understand the determinants of cash holdings in a corporation.

The CEO duality and board size play an important role in maintaining appropriate level of cash in the organization. Dahya and Travlos (2000) describe that with dual-responsibility, CEOs serve the interests of the management team and one way to protect the team's position is to hold excessive cash. In addition, CEO together with board of directors formulates the policies including policy related to cash holdings. Yermack (1996) and Lipton and Lorsch (1992) explain that small board of directors are more effective in decision making process than the larger board of directors. The larger board size may cause to hold excess cash in the firm.

Nadiri (1969) pioneered study on cash holdings by collecting data from US manufacturing sector from 1948 to 1964 to estimate a model relating the desired level of real cash balances. The results showed that the demand for real cash balances is determined by output, the interest rate, the expected rate of change in general price level, and factor prices. Then, Campbell and Brendsel (1977) conducted an empirical study by collecting data from US manufacturing firms from 1953-1963 to examine the impact of compensating balance requirements on the cash holdings. Campbell and Brendsel used Ordinary Least Square (OLS) regression analysis and found that compensating balance requirements are not binding.

Opler *et al.* (1999) collected data in the 1971 to 1994 period from 1048 publically traded US firms to find the determinants and implications of corporate cash holdings. Through time-series and cross-section tests, they found that firms with strong growth opportunities and riskier cash flows hold relatively high ratios of cash to total non-cash assets. Firms that have the greatest access to the capital markets tend to hold lower ratios of cash to total non-cash assets. Opler *et al.* also found that firms that do well tend to accumulate more cash.

Harford (1999) estimated a sample of all acquisition attempts made by US firms during the period of 1977 to 1993. Harold found that cash-rich firms are more likely to attempt acquisitions than other firms. Stock return evidence shows that acquisitions by cash-rich firms are value decreasing. Cash-rich bidders destroy 7 cents in value for every excess dollar of cash reserves held. Cash-rich firms are more likely to make diversifying acquisitions and their targets are less likely to attract other bidders. Consistent with the stock return evidence, mergers in which the bidder is cash-rich are followed by abnormal declines in operating performance. Overall, the evidence supports the agency costs of free cash flow explanation for acquisitions by cash-rich firms (Harford, 1999, p.1969).

Dittmar *et al.* (2003, p. 111) collected a sample of more than 11,000 firms from 45 countries and found that corporations in countries where shareholders rights are not well protected hold up to twice as much cash as corporations in countries with good shareholder protection. They also found that when shareholder protection is poor, factors that generally drive the need for cash holdings, such as investment opportunities and asymmetric information, actually becomes less important. In addition, study found that firms hold larger cash balances when access to funds is easier. Dittmar *et al.* explain that agency problems are important determinants of corporate cash holdings.

Ferreira and Vilela (2004, p. 295) used a sample of 400 firms in 12 Economic and Monetary Union (EMU) countries for the period of 1987-2000 to investigate the determinants of corporate cash holdings. Their results suggest that cash holdings are positively affected by the investment opportunity set and cash flows and negatively affected by asset's liquidity, leverage and size. Bank debt and cash holdings are negatively related, which supports that a close relationship with banks allows the firm to hold less cash for precautionary reasons. In addition, firms in countries with superior investor protection and concentrated ownership hold less cash, supporting the role of managerial discretion agency costs in explaining cash levels. Ferreira and Vilela also found that capital markets development has a negative impact on cash levels, contrary to the agency view.

Nguyen (2005) collected a sample of 9,168 firm-year observations from Tokyo Stock Exchange for the period of 1992 to 2003. He investigated the hypothesis that cash balances have a precautionary motive and serve to mitigate the volatility of operating earnings. Through regression analysis, Nguyen found that cash holdings are positively associated with firm level risk, but negatively related to industry risk. He also found that cash holdings decrease with the firm's size and debt ratio, and increase with its profitability, growth prospects, and dividend payout ratio. Nguyen investigated the precautionary motive for holding cash by undertaking various classification schemes under which cash shortages have different cost implications. His results show that keiretsu affiliated firms hold less cash and are less risk sensitive.

Saddour (2006) investigated the determinants of the cash holdings by collecting data from 297 French firms over the period 1998-2002, using the trade-off theory and the pecking order theory. Through regression analysis, author found that French firms increase their cash level when their activities are risky and the levels of their cash flow are high, and reduce it when they are highly leveraged. Growth companies hold higher cash levels than mature companies. For growth companies, there is a negative relationship between cash and the following firm's characteristics: size, level of liquid assets and short term debt. The cash level of mature companies increase with their size, their investment level, and the payout to their shareholders in the form of dividends or stock repurchases, and decreases with their trade credit and their expenses on research and development (Saddour, 2006, p. 1).

Afza and Adnan (2007) focused on determining the level of corporate cash holdings of non-financial Pakistani firms, across different firm sizes and different industries. They used dataset for the period of 1998 to 2005 for the firm size, growth opportunities, cash flow, net working capital, leverage, cash flow uncertainty, and dividend payments. Afza and Adnan found negative relationships between i) market-to-book ratio, net working capital, leverage, dividends, and cash holdings, and ii) positive relationships between i) firm size, cash flow, and cash holdings. Their findings show that firm size, cash flow, cash flow uncertainty, net working capital, and leverage significantly affect the cash holdings of non-financial firms in Pakistan.

Drobtz and Grüniger (2007) investigated the determinants of cash holdings for a comprehensive sample of 156 Swiss non-financial firms between 1995 and 2004. Through regression analysis, they found that that asset tangibility and firm size are both negatively related to corporate cash holdings. Dividend payments and operating cash flows are positively related to cash reserves. In addition, Drobtz and Grüniger found a positive relationship between i) CEO duality and corporate cash holdings, and ii) a non-significant relationship between board size and corporate cash holdings. That is, CEO duality leads to significantly higher cash holdings and larger board size has no impact on the corporate cash holdings.

Hardin III *et al.* (2009) used a sample of 1,114 firm-year observations for 194 equity real estate investment trusts (REITs) from USA over the 1998 to 2006 period. Through ordinary least square regression analysis, they found that

REIT cash holdings are inversely related to funds from operations, leverage and internal advisement, and are directly related to the cost of external finance and growth opportunities. Cash holdings are also negatively associated with credit line access and use. The results imply that REIT managers elect to hold little cash to reduce the agency problems of cash flow thereby increasing transparency and reducing the future cost of external capital.

Meggison and Wei (2010) studied the determinants of cash holdings and the value of cash in China's share-issue privatized firms from 1993-2007. Through regression analysis, they found that smaller, more profitable and high growth firms hold more cash. Debt and net working capital are negatively related to cash holdings, while cash holdings decline as state ownership increases.

Kim *et al.* (2011) examined a panel data set obtained from 125 publicly traded US restaurant firms between 1997 and 2008 and found that restaurant firms with greater investment opportunities tend to hold more cash. At the same time, large restaurant firms, firms holding liquid assets other than cash, firms with higher capital expenditures, and firms paying dividends were shown to hold less cash. Kim *et al.* describe that both precautionary and transaction motives play important roles in explaining the determinants of cash holdings for restaurant firms.

Rizwan and Javed (2011) collected data from 300 Pakistani firms listed on Karachi Stock Exchange (KSE) over the period 1998-2007. Authors found that the cash holdings of Pakistani firms increases with increase in cash flow and market-to-book ratio. They also found that net working capital and leverage are negatively related with corporate cash holdings of the Pakistani firms.

In summary, the literature review indicates that market-to-book ratio, cash flow to net asset ratio, net working capital to asset ratio, leverage, firm size, dividends, board size, CEO duality, and industry dummy determine corporate cash holdings.

### 3. Methods

The study applied co-relational and non-experimental research design. The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expression of quantitative relationships.

#### 3.1 Measurement

To remain consistent with previous studies, all the measures (except board size and CEO duality) pertaining to the determinants of corporate cash holdings were taken from Afza and Adnan (2007, p. 7). Measures pertaining to board size and the CEO duality were taken from Kajola (2008, p. 21). The measurements of the independent and dependent variables are as follows:

$MTB_{i,t}$  (Market-to-book ratio for firm  $i$  in time  $t$  - independent variable) = (Book value of assets - Book value of equity + Market value of equity) / Book value of assets

$CF_{i,t}$  (Cash flow to net asset ratio for firm  $i$  in time  $t$  - independent variable) = (After tax profit + Depreciation) / (Total assets - Cash and cash equivalents)

$NWC_{i,t}$  (Net working capital to asset ratio for firm  $i$  in time  $t$  - independent variable) = (Net current assets - Cash and cash equivalents) / (Total assets - Cash and equivalents)

$LVRG_{i,t}$  (Leverage for firm  $i$  in time  $t$  - independent variable) = Total debt / (Total assets - Cash and equivalents)

$FS_{i,t}$  (Firm size of firm  $i$  in time  $t$  - independent variable) = Natural log of total assets of firm

$DIV_{i,t}$  (Dividends paid by firm  $i$  in time  $t$  - independent variable) = One (1) is used if firm paid dividends each year, otherwise 0

$BS_{i,t}$  (Board size of firm  $i$  in time  $t$  - independent variable) = Number of directors serving on the board

$CD_{i,t}$  (CEO duality for firm  $i$  in time  $t$  - independent variable) = One (1) is used if CEO is the chairman of the board, otherwise 0

$CASH_{i,t}$  (Corporate cash holdings for firm  $i$  in time  $t$  - dependent variable) = Cash and cash equivalents / (Book value of assets - Cash and equivalents)

$IndDum_{i,t}$  (Industry dummy for firm  $i$  in time  $t$  - independent variable) =  $IndDum$  is used as industry code

$\mu_{i,t}$  = the error term

The regression model is as follows:

$$CASH_i = \beta_0 + \beta_1 MTB_{i,t} + \beta_2 CF_{i,t} + \beta_3 NWC_{i,t} + \beta_4 LVRG_{i,t} + \beta_5 FS_{i,t} + \beta_6 DIV_{i,t} + \beta_7 BS_{i,t} + \beta_8 CD_{i,t} + \beta_9 IndDum_{i,t} + \mu_{i,t}$$

### 3.2 Data Collection

A database was built from a selection of approximately 800 financial reports from publicly traded companies between January 1, 2008 and December 31, 2010. The selection was drawn from Mergent Online [http://www.mergentonline.com/compsearch.asp] to collect a random sample of manufacturing and service companies. Out of approximately 800 financial reports announced by public companies between January 1, 2008 and December 31, 2010, only 166 financial reports were usable. The cross sectional yearly data was used in this study. Thus, 166 financial reports resulted to 498 total observations. Since the random sampling method was used to select companies, the sample is considered a representative sample.

For the purpose of this research, certain industries were omitted due to the type of activity. For example, all companies from the financial services industry were omitted. In addition, some of the firms were not included in the data due to lack of information for the time periods being studied.

### 3.3 Descriptive Statistics

Table 1 shows descriptive statistics of the collected variables. The explanation on descriptive statistics is as follows:

- i) Total observations:  $166 \times 3 = 498$ ; Manufacturing firms: 91; Service firms: 75
- ii) CASH (Corporate cash holdings): 38.70%
- iii) MTB (Market-to-book ratio) = 1.562
- iv) CF (Cash flow) = 13.20%
- v) NWC (Net working capital) = -0.096
- vi) LVRG (Leverage) = 44%
- vii) FS (Firm size) = 2.64 million
- viii) BS (Board size): 7.71

Table 2 provides the Pearson correlation for the variables that were used in the regression model.

The Bivariate correlation analysis shows that i) corporate cash holdings of Canadian firms is i) positively correlated with the cash flow, leverage, board size, CEO duality, and industry dummy and ii) negatively correlated with net working capital. The findings also show that i) corporate cash holdings positively correlated with market-to-book ratio and net working capital, and ii) negatively correlated with firm size in the Canadian manufacturing industry.

In addition, the findings show that i) corporate cash holdings positively correlated with leverage and the CEO duality, and ii) negatively correlated with net working capital in the Canadian service industry (see Table 2).

## 4. Regression Analysis, Findings, Conclusion, Limitations, and Future Research

This section provides regression analysis, findings, conclusion, limitations and recommendations for future research. The Ordinary Least Square (OLS) regression analysis was used to conduct data analysis. Table 3 provides the summary of previous authors' findings.

Overall, positive relationships between i) CF and CASH, ii) LVRG and CASH, iii) BS and CASH, and iv) CD and CASH were found; that is, cash flow, leverage, large board size, and CEO duality increase cash holdings in the Canadian firms. Negative relationships between i) MTB and CASH, ii) NWC and CASH, and iii) FS and CASH were found; that is, market-to-book ratio, net working capital, and firm size reduce cash holdings in the Canadian firms. Non significant relationship between DIV, IndDum, and CASH were found (see Table 4). The overall findings of this paper lend some support to the findings of:

- i) Ferreira and Vilela (2004) who found that cash holdings are positively affected by the cash flows and negatively affected by asset's liquidity, leverage, and firm size.
- ii) Nguyen (2005) who found that cash holdings decrease with the firm size.
- iii) Saddour (2006) who found cash levels negatively affected by firm size.
- iv) Afza and Adnan (2007) who found a positive relationship between i) cash flow and cash holdings and ii) negative relationships between market-to-book ratio, net working capital, and cash holdings.

v) Drobetz and Grüninger (2007) who found i) positive relationships between operating cash flows, CEO duality, and cash holdings, ii) a negative relationship between firm size and cash holdings.

vi) Megginson and Wei (2010) who found a negative relationship between net working capital and cash holdings.

vii) Alam *et al.* (2011) who found a positive relationship between cash flow and cash holdings and a negative relationship between net working capital and cash holdings.

Positive relationships between i) MTB and CASH, ii) NWC and CASH, and iii) BS and CASH, were found in the Canadian manufacturing industry; that is, market-to-book ratio, net working capital, and board size increase cash holdings in the Canadian manufacturing firms. A negative relationship between FS and CASH was found; that is, corporate cash holdings decreases with firm size in the Canadian manufacturing industry. Non significant relationships between CF, LVRG, DIV, CD, and CASH were found (see Table 4). The findings from the manufacturing industry lend some support to the findings of:

i) Ferreira and Vilela (2004) who found a negative relationship between firm size and cash holdings.

ii) Nguyen (2005) who found that cash holdings decrease with the firm size.

iii) Saddour (2006) who found cash levels negatively affected by firm size.

iv) Drobetz and Grüninger (2007) who found a positive relationship between CEO duality and cash holdings and a negative relationship between firm size and cash holdings.

v) Alam *et al.* (2011) who found a positive relationship between market-to-book ratio and cash holdings.

Positive relationships between i) LVRG and CASH, ii) BS and CASH, and iii) CD and CASH were found in the Canadian service industry; that is, leverage, board size, and CEO duality increase cash holdings in the Canadian service industry. Negative relationships between i) MTB and CASH, ii) NWC and CASH, and iii) FS and CASH were found; that is, market-to-book ratio, net working capital, and firm size reduce cash holdings in the Canadian service industry. A non significant relationship between dividend payments and CASH was found (see Table 4). The findings from the service industry lend some support to the findings of:

i) Ferreira and Vilela (2004) who found that cash holdings are negatively affected by firm size.

ii) Nguyen (2005) who found that cash holdings decrease with the firm size.

iii) Saddour (2006) who found cash levels negatively affected by firm size and level of liquid assets.

iv) Afza and Adnan (2007) who found negative relationships between market-to-book ratio, net working capital, and cash holdings.

v) Drobetz and Grüninger (2007) who found a negative relationship between firm size and cash holdings.

vi) Megginson and Wei (2010) who found a negative relationship between net working capital and cash holdings.

vii) Alam *et al.* (2011) who found a negative relationship between net working capital and cash holdings.

Note that:

- A test for multicollinearity was performed. All the variance inflation factor (VIF) coefficients are less than 2 and tolerance coefficients are greater than 0.50.
- 35.40% ( $R^2 = 0.354$ ) of the variance in the degree of CASH can be explained by the degree of IndDum, MTB, CD, DIV, CF, FS, LVRG, BS, and NWC in Canada.
- 38.20% ( $R^2 = 0.382$ ) of the variance in the degree of CASH can be explained by the degree of CD, FS, MTB, LVRG, BS, DIV, CF, and NWC in the Canadian manufacturing industry.
- 48.00% ( $R^2 = 0.480$ ) of the variance in the degree of CASH can be explained by the degree of CD, DIV, MTB, BS, CF, LVRG, NWC, and FS in the Canadian service industry.
- The analysis of variance (ANOVA) tests are also significant at 0.000 (see Table 4).

#### 4.1 Conclusion

In conclusion, market-to-book ratio, cash flow, net working capital, leverage, firm size, CEO duality, and board size significantly affect the cash holdings in Canadian firms. Larger board size and CEO duality may not be in the favor of Canadian firms because they increase cash holdings.

This study also supports the argument that agency problems are important determinants of corporate cash holdings. According to Ferreira and Vilela (2004) cash reduces the pressure to perform well and allows managers to invest in projects that best suit their own interests. This may be one of the reasons that larger board size and CEO duality

increase cash holdings in Canadian firms which may not be in the shareholders best interest. Hardin III *et al.* (2009) explain that less cash in the organizations reduce agency problems. Therefore, Canadian firms should use an optimal board size based on size of the firm.

The results of this study generally support the trade-off theory of cash holdings. Precautionary and transaction motives play important roles in explaining the determinants of cash holdings for Canadian firms.

#### 4.2 Limitations

This study is limited to the sample of Canadian firms. The findings of this study could only be generalized to firms similar to those that were included in this research. In addition, sample size is small.

#### 4.3 Future Research

Future research should investigate generalizations of the findings beyond the Canadian firms. Important control variables such as industry sectors from different countries, audit committee, board composition, etc., should also be used.

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Table 1. Descriptive Statistics of Independent, Dependent, and Control Variables (2008-2010)

	Minimum	Maximum	Mean	Std. Deviation
CASH	-0.845	7.540	0.387	1.064
MTB	0.291	8.365	1.562	1.056
CF	-0.378	0.925	0.132	0.138
NWC	-2.162	7.303	-0.096	0.762
LVRG	0.054	0.972	0.440	0.204
FS	0.700	4.420	2.640	0.720
BS	2	18	7.710	2.465

Table 2. Pearson Bivariate Correlation Analysis

Entire Sample (N = 166)										
	CASH	MTB	CF	NWC	LVRG	FS	DIV	BS	CD	IndDum
CASH	1	-0.076	0.158*	-0.312**	0.376**	-0.034	-0.009	0.158*	0.285**	0.280**
MTB		1	0.303**	-0.077	-0.016	-0.198*	0.059	-0.074	-0.049	0.035
CF			1	-0.323**	-0.105	-0.162*	0.038	-0.003	-0.192*	0.071
NWC				1	-0.160*	-0.083	0.061	-0.184*	0.034	-0.421**
LVRG					1	0.181*	0.281**	0.275**	0.144	0.400**
FS						1	0.318**	0.390**	0.095	0.078
DIV							1	0.336**	-0.011	0.156*
BS								1	-0.150	0.183*
CD									1	0.087
IndDum										1
Manufacturing Industry (N = 91)										
	CASH	MTB	CF	NWC	LVRG	FS	DIV	BS	CD	
CASH	1	0.283**	0.112	0.507**	-0.137	-0.432**	-0.107	0.046	-0.141	
MTB		1	0.441**	0.257*	-0.225*	-0.200	0.119	-0.112	0.042	
CF			1	0.206	-0.254*	-0.090	0.095	-0.087	-0.324**	
NWC				1	-0.340**	-0.477**	-0.067	-0.146	-0.217*	
LVRG					1	0.237*	0.351**	0.327**	-0.073	
FS						1	0.347**	0.338**	-0.016	
DIV							1	0.441**	-0.040	
BS								1	-0.227*	
CD									1	
Service Industry (N = 75)										
	CASH	MTB	CF	NWC	LVRG	FS	DIV	BS	CD	
CASH	1	-0.140	0.163	-0.239*	0.425**	-0.043	-0.071	0.157	0.403**	
MTB		1	0.236*	-0.139	0.119	-0.203	-0.003	-0.057	-0.133	
CF			1	-0.415**	-0.090	-0.220	-0.014	0.027	-0.133	
NWC				1	0.082	0.020	0.225	-0.144	0.161	
LVRG					1	0.100	0.135	0.128	0.301**	
FS						1	0.275*	0.428**	0.189	
DIV							1	0.184	-0.009	



BS									1	-0.111
CD										1

\*\* Correlation is significant at the 0.01 level (2-tailed)

\* Correlation is significant at the 0.05 level (2-tailed)

CASH = Corporate cash holdings

MTB = Market-to-book ratio

CF = Cash flowNWC = Net working capital

LVRG = Leverage

FS = Firm size

DIV = Dividends

CD = CEO duality

BS = Board size

IndDum = Industry dummy

Table 3. Previous Findings Related to the Determinants of Corporate Cash Holdings

Author(s)	Findings Related to the Determinants of Corporate Cash Holdings	Country(ies)
Ferreira and Vilela (2004)	► Found that cash holdings are positively affected by the cash flows and negatively affected by asset's liquidity, leverage and firm size.	EMU Countries
Nguyen (2005)	► Found that cash holdings decrease with the firm size and debt ratio, and increase with its dividend payout ratio.	Japan
Saddour (2006)	► Found that cash levels negatively affected by high leverage, firm size, level of liquid assets.	France
Afza and Adnan (2007)	► Found negative relationships between i) market-to-book ratio, net working capital, leverage, dividends, and cash holdings, and ii) positive relationships between i) firm size, cash flow, and cash holdings.	Pakistan
Drobetz and Grüninger (2007)	► Found a negative relationship between firm size and corporate cash holdings. ❖ Found positive relationships between dividend payments, operating cash flows, and cash holdings. ❖ Found a positive relationship between i) CEO duality and corporate cash holdings, and ii) a non-significant relationship between board size and corporate cash holdings.	Switzerland
Hardin III <i>et al.</i> (2009)	► Found negative relationships between funds from operations, leverage, and cash holdings.	USA
Megginson and Wei (2010)	► Found negative relationships between debt, net working capital, and cash holdings.	China
Kim <i>et al.</i> (2011)	► Found positive relationships between firm size, dividend payments, and cash holdings.	USA
Alam <i>et al.</i> (2011)	► Found positive relationships between cash flow, market-to-book ratio, and cash holdings. ❖ Found negative relationships between net working capital, leverage, and corporate cash holdings.	Pakistan

Table 4. OLS Regression Estimates on the Determinants of Corporate Cash Holdings<sup>a, b, c</sup>

Entire Sample (N = 166)							
[R <sup>2</sup> = 0.354; SEE = 0.880; F = 9.478; ANOVA's Test Sig. = 0.000]							
Regression Equation: CASH = -0.418 - 0.152 MTB + 1.656 CF - 0.245 NWC + 1.666 LVRG - 0.243 FS - 0.196 DIV + 0.071 BS + 0.749 CD + 0.082 IndDum							
	Unstandardized Coefficients		Standardized Coefficients <sup>c</sup>	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-0.418	0.370		-1.129	0.261		
MTB	-0.152	0.069	-0.151	-2.194	0.030	0.872	1.147
CF	1.656	0.573	0.215	2.891	0.004	0.747	1.338
NWC	-0.245	0.109	-0.175	-2.241	0.026	0.677	1.476
LVRG	1.666	0.392	0.319	4.253	0.000	0.736	1.358
FS	-0.243	0.107	-0.170	-2.260	0.025	0.734	1.363
DIV	-0.196	0.160	-0.091	-1.226	0.222	0.748	1.337
BS	0.071	0.033	0.164	2.152	0.033	0.710	1.408
CD	0.749	0.162	0.316	4.627	0.000	0.890	1.124
IndDum	0.082	0.165	0.038	0.496	0.620	0.695	1.438
Manufacturing Industry (N = 91)							
[R <sup>2</sup> = 0.382; SEE = 0.107; F = 6.338; ANOVA's Test Sig. = 0.000]							
Regression Equation: CASH = 0.059 + 0.030 MTB - 0.058 CF + 0.248 NWC + 0.042 LVRG - 0.050 FS - 0.038 DIV + 0.014 BS - 0.010 CD							
	Unstandardized Coefficients		Standardized Coefficients <sup>c</sup>	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	0.059	0.085	0.697	0.697	0.488		
MTB	0.030	0.015	2.040	2.040	0.045	0.701	1.427
CF	-0.058	0.147	-0.391	-0.391	0.697	0.626	1.597
NWC	0.248	0.073	3.386	3.386	0.001	0.617	1.621
LVRG	0.042	0.080	0.525	0.525	0.601	0.668	1.497
FS	-0.050	0.021	-2.408	-2.408	0.018	0.629	1.589
DIV	-0.038	0.030	-1.280	-1.280	0.204	0.620	1.613
BS	0.014	0.006	2.344	2.344	0.022	0.680	1.471
CD	-0.010	0.031	-0.312	-0.312	0.756	0.706	1.416
Service Industry (N = 75)							
[R <sup>2</sup> = 0.480; SEE = 1.60; F = 7.616; ANOVA's Test Sig. = 0.000]							
Regression Equation: CASH = -0.721 - 0.302 MTB + 1.136 CF - 0.407 NWC + 2.764 LVRG - 0.474 FS - 0.075 DIV + 0.125 BS + 1.264 CD							
	Unstandardized Coefficients		Standardized Coefficients <sup>c</sup>	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-0.721	0.678	-1.063	-1.063	0.292		
MTB	-0.302	0.120	-2.522	-2.522	0.014	0.874	1.144
CF	1.136	0.893	1.272	1.272	0.208	0.736	1.359
NWC	-0.407	0.157	-2.598	-2.598	0.012	0.727	1.375
LVRG	2.764	0.725	3.814	3.814	0.000	0.831	1.204
FS	-0.474	0.207	-2.287	-2.287	0.025	0.658	1.520
DIV	-0.075	0.296	-0.253	-0.253	0.801	0.822	1.217
BS	0.125	0.062	2.009	2.009	0.049	0.730	1.370
CD	1.264	0.323	3.919	3.919	0.000	0.792	1.262

<sup>a</sup> Dependent Variable: CASH<sup>b</sup> Independent Variables: MTB, CF, NWC, LVRG, FS, DIV, BS, CD, and IndDum<sup>c</sup> Linear Regression through the Origin

SEE = Standard Error of the Estimate