CASH FLOW SENSITIVITIES OF FINANCIAL DECISIONS: EVIDENCE FROM AN EMERGING MARKET

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Abstract

This study investigates the sensitivity of financing, investment, and distribution decisions to changes in operating cash flow, and whether these sensitivities depend on whether or not firms are financially constrained. Using a sample of 2,650 firm-years of Turkish firms for the period 1996 to 2013, we find that an increase in the short-term cash flows is associated with an increase in cash balances, irrespective of whether or not firms are financially constrained. However, unconstrained firms hold a larger cash balance than constrained firms. Dividends are positively related to the short-term cash flows of both types of firms. Investments are not sensitive to cash flow for either type of firms. An increase in their short-term cash flow induces the financially constrained firms to reduce debt financing, but makes the unconstrained firms increase their debt financing and reduce equity financing. Although firms in general prefer to use part of the saved cash in the long term, they do not deplete their cash savings. Constrained firms resort to debt financing in response to an increase in their long-term cash flow.

Keywords: financial constraints, cash flow, investment, financing decisions, distribution decisions, capital structure

JEL Classification: C30, G30, G31, G32, G35

1. Introduction

Beginning with the work of Fazzari, Hubbard, and Petersen (1988), a growing body of literature has examined whether the sensitivity of capital investments to cash flow can be considered a signal of financial constraints. The underlying thinking is that if external finance is more expensive than internal finance because of information asymmetry and/or agency problems, investment spending by financially constrained firms will be sensitive to their cash flow.

Fazzari *et al.* (1988) regress capital investments against cash flow, Tobin's Q (to control for investment opportunities), and other variables that can affect investment spending. They use the significance of the coefficient of cash flow in the regression equation as a measure of investment - cash flow sensitivity, and argue that a firm is financially constrained if it has a significant cost disadvantage when using external rather than internal finance. They propose using the payment of low dividends as a proxy for financial constraints, and then divide the sample of firms into two categories - constrained and unconstrained - based on the proxy variable. Their results indicate that constrained firms have a higher investment-cash flow sensitivity.

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Prague Economic Papers, 2018, 27(5), 554–572, https://doi.org/10.18267/j.pep.675

Fazzari *et al*. (1988) state that James Tobin criticizes the logic behind their study, claiming that decisions associated with the uses of cash are jointly determined, and that estimation should be done to model all uses of cash using the same group of independent variables. Gatchev, Pulvino, and Tarhan (2010) also argue that decisions on cash flow use are interdependent, and that the model should consider the joint determination of these decisions.

The financial systems of most emerging economies are bank-dominated. Therefore, firms in these countries rely heavily on banks for financing. However, the high financing costs charged by banks, resulting from severe information asymmetry and weak contract enforcement, may affect cash flow use. Given this situation, an examination of the sensitivities of the uses of cash to cash flows in emerging market economies is a meaningful contribution to the literature. In this study, we examine these sensitivities in Turkey, which is an example of an emerging market. Using a system of equations model, we examine how firms allocate cash in the short and long term. We also analyse whether constrained and unconstrained firms allocate cash flows differently. The proxies for financial constraints we use in the analysis are firm growth rate, payout ratio, and asset tangibility ratio. The analysis is based on a sample of 2,650 firm-years of Turkish firms publicly listed on Borsa Istanbul during the period 1996–2013. We show that cash holdings exhibit positive sensitivity to cash flows in both financially constrained and financially unconstrained firms. Furthermore, investments are not sensitive to cash flows, regardless of whether or not a firm is financially constrained. In the case of an increase in short-term cash flows, financially constrained firms reduce debt, while unconstrained firms reduce equity financing and increase debt financing. However, constrained firms increase their debt financing with an increase in long-term cash flows.

The remainder of the paper proceeds as follows: Section 2 discusses the relevant literature, Section 3 describes our methodology, and Section 4 depicts the sample and gives summary statistics. Our empirical findings are presented in Section 5, and the robustness checks of the main findings are discussed in Section 6. Lastly, Section 7 concludes the paper.

2. Review of the Relevant Literature

To examine the relationship between cash flow sensitivity of the uses of cash and the level of financial constraints, we must define what being financially constrained means. Several definitions of the concept are found in the literature. Almeida, Campello, and Wiesbach (2004) argue that a firm is financially unconstrained if it has unrestricted access to external finance, and does not need to shield against future investment needs using liquidity. Kaplan and Zingales (1997) view the firms more financially constrained as the wedge between internal and external cost of funds increases.

The literature offers several ways to proxy for financial constraints. Fazzari *et al*. (1988) use payments of low dividends as a proxy for financial constraints. Other studies that use dividends as a classification criterion include Allayannis and Mozumdar (2004) and Cleary (1999). Alternative proxies include firm size (Almeida *et al*., 2004; Carpenter and Guariglia, 2008), the existence of bond ratings (Bond and Meghir, 1994), firm age (Arslan, Florackis, and Ozkan, 2006; Schaller, 1993), affiliation with an industrial group (Arslan *et al*., 2006),

and asset tangibility (Almeida and Campello, 2010). Yet other studies use indices such as the Kaplan-Zingales Index (KZ-Index) (*e.g*. Lamont, Polk, and Requejo, 2001) and the Whited-Wu Index (WW-Index) (*e.g*. Whited and Wu, 2006), which consider several factors in the classification criteria.

Various studies analyse the sensitivity of investment and financing decisions to cash flow in isolation, using a static single-equation methodology. Fazzari *et al*. (1988), for example, show that investment-cash flow sensitivity of the most financially constrained firms is higher than that of the least constrained firms, a position supported by Allayannis and Mozumdar (2004) and Carpenter and Guariglia (2008), among others.

The argument of Fazzari *et al*. (1988) has been challenged by Kaplan and Zingales (1997) and Cleary (1999). Kaplan and Zingales (1997) show that constrained firms have lower investment-cash flow sensitivity, eventually arguing that the cash flow sensitivity of investments is not indicative of financial constraints. Similarly, Cleary (1999) finds that investment-cash flow sensitivity is higher when firms are more creditworthy, and that the investment spending of all firms is sensitive to liquidity.

Almeida *et al*. (2004) argue that the cash flow sensitivity of cash can be used to capture financial constraints, given that constrained firms tend to have a propensity to save cash, in contrast to unconstrained firms. They show that the liquid asset holdings of constrained firms increase in line with cash flow, while unconstrained firms show no cash flow sensitivity of cash.

Charitou and Vafeas (1998) argue that liquidity is expected to be a contributing factor to the dividend payout policy, and that cash flows are a direct measure of liquidity. However, they find that cash flows have no power to explain dividend changes. Benito and Young (2003), on the other hand, show that in UK firms, a low level of cash flow is associated with an increased propensity to cut dividends, and argue that dividend cuts can conserve investment plans when there is a reduction in cash flow.

The literature provides evidence of a negative relationship between internal funds and debt issuance (*e.g*. Myers, 1984; Myers and Majluf, 1984; Fama and French, 2002). This negative relationship is explained by the pecking order theory. On the other hand, Almeida and Campello (2010) show that the negative relationship between internal funds and debt issuance is concentrated among financially unconstrained firms. They argue that constrained firms prefer to keep cash rather than reduce debt with a positive cash flow shock, because they know that they may not be able to raise debt in the future.

Gatchev *et al*. (2010) criticize the single-equation models of investment-cash flow sensitivity in the literature on the grounds that the interdependency of financing decisions resulting from the accounting identity that sources of funds are equal to the uses of funds is not recognized by the single-equation models. They analyse the cash flow sensitivities of investment, financing, and distribution decisions using a multi-equation model, where intertemporal effects are also considered. In addition to showing that both financially constrained and unconstrained firms do not have investment-cash flow sensitivity, they provide evidence that the negative effect of changes in cash flow levels on investment spending is avoided by debt financing, and that firms use cash flows to retire debt and increase cash balances.

Using a system of equations model, Dasgupta, Noe, and Wang (2011) also investigate the cash flow sensitivities of investment, financing, and distribution decisions, and analyse whether the sensitivities differ between financially constrained and unconstrained firms. They show a tendency to save cash in the short term, and point to evidence that part of the cash flow is used for debt reduction, both in the short and in the long term. Furthermore, they report that cash savings are spent in the longer run, and that financially unconstrained firms spend a higher portion of their cash savings than financially constrained firms do. In the long run, there is a positive investment-cash flow sensitivity, but firms do not use their entire cash flow for investments. Constrained firms use a smaller portion of cash flow for investment spending and a higher fraction of cash flow for debt reduction than unconstrained firms.

A few studies analyse the cash flow implications of the sources and uses of cash in Turkish firms. Arslan *et al*. (2006) provide evidence showing that financially constrained firms have higher investment-cash flow sensitivity than unconstrained firms, and that the sensitivity is even higher during a financial crisis. This indicates that the dependence of financially constrained firms on internal funds is higher during times of financial crisis. Karadeniz, Yilmaz, Balcilar, and Onal (2009) show there is no relationship between free cash flow and the debt ratio of Turkish lodging companies. Uyar and Kuzey (2014) find that cash flow has a positive effect on cash holdings.

3. Research Methodology

The key idea behind our analysis is the cash flow identity that sources of cash are equal to the uses of cash. The formulation used for the cash flow identity by Gatchev *et al*. (2010) and Dasgupta *et al*. (2011) is as follows:

$$\begin{aligned} &\Delta Cash\ Holdings\ +\ Investments\ +\ Dividends\ -\ Debt\ Finance\ - \\ &-\ Equity\ Finance\ -\ Asset\ Sales\ =\ Cash\ Flow\ from\ Operations. \end{aligned} \tag{1}$$

Following Gatchev *et al*. (2010) and Dasgupta *et al*. (2011), investment, financing, and distribution decisions can be described using the following system of equations, where the cash flow from operations is used as an independent variable:

$$\Delta Cash\ Holdings_{i,t} = \alpha_{1,i} + \beta_1 CFO_{i,t} + \delta_1 X_{i,t} + e_{1,i,t}, \tag{2}$$

$$Investments_{i,t} = \alpha_{2,i} + \beta_2 CFO_{i,t} + \delta_2 X_{i,t} + e_{2,i,t}, \tag{3}$$

$$Dividends_{i,t} = \alpha_{3,i} + \beta_3 CFO_{i,t} + \delta_3 X_{i,t} + e_{3,i,t}, \tag{4}$$

$$-Debt\ Finance_{i,t} = \alpha_{4,i} + \beta_4 CFO_{i,t} + \delta_4 X_{i,t} + e_{4,i,t}, \tag{5}$$

$$-Equity\ Finance_{i,t} = \alpha_{5,i} + \beta_5 CFO_{i,t} + \delta_5 X_{i,t} + e_{5,i,t}, \tag{6}$$

$$-Asset\ Sales_{i,t} = \alpha_{6,i} + \beta_6 CFO_{i,t} + \delta_6 X_{i,t} + e_{6,i,t}, \tag{7}$$

where *CFO* is the cash flow from operations, and is calculated as:

$$CFO = Earnings\ before\ Extraordinary\ Items\ and\ Depreciation - \\ - Working\ Capital\ Accruals, \tag{8}$$

following Bushman, Smith, and Zhang (2011).

Working Capital Accruals is calculated as:

$$Working\ Capital\ Accruals = \begin{pmatrix} Change\ in\ Current\ Assets\ - \\ Change\ in\ Cash\ and\ Cash\ Equivalents \end{pmatrix} - \\ - \begin{pmatrix} Change\ in\ Current\ Liabilities\ -\ Change\ in\ Short\ Term\ Debt\ - \\ Change\ in\ Tax\ Payable \end{pmatrix}. \tag{9}$$

X is a set of control variables that are included to capture firm-specific effects. Δ*Cash Holdings* denotes the annual change in cash and cash equivalents, *Investments* shows total investment spending (including acquisitions), *Dividends* represents cash dividends, *Equity Finance* is defined as net equity issuances, and *Debt Finance* is defined as net debt issuances.

The control variables that can affect how internally generated funds are used include the market-to-book ratio, size, debt ratio, stock return volatility, and past stock returns. The market-to-book ratio acts as a proxy for growth opportunities, which are likely to affect firms' investment and financing decisions (Dasgupta *et al*., 2011; Jung, Kim, and Stulz, 1996). They also influence cash holding decisions, because firms with valuable growth options tend to save cash (Opler, Pinkowitz, Stulz, and Williamson, 1999).

Firm size is likely related to investment opportunities and access to external finance (Gatchev *et al*., 2010). Moreover, the literature on the determinants of cash holdings uses firm size as a proxy for the scale of operations based on the standard arguments of economies of scale in liquid assets (Almeida *et al*., 2004; Opler *et al*., 1999). In our analysis, size is represented as the natural logarithm of total assets.

The debt ratio, which is calculated by dividing total debt by total assets, is expected to affect the way a firm uses its cash flow. For instance, firms with high debt ratios may prefer to reduce their debt levels to eschew a debt overhang (Dasgupta *et al*., 2011). Leverage can also affect the amount of dividend distributions. Moreover, debt can be used as an alternative to dividends to reduce the agency costs of free cash flow (Jensen, 1986).

Stock return volatility calculated as the average of the standard deviation of daily stock returns for years $t-1$ and t is included as a measure of asymmetric information between a firm and its investors (Dasgupta *et al*., 2011; Drucker and Puri, 2005). The past stock return variable, which is the average of the annual compounded stock return for years $t-2$ and $t-1$, is included in the model because a large number of studies find that stock price run-ups are followed by equity issuances (*e.g.* Chang, Dasgupta, and Hillary, 2006; Lucas and McDonald, 1990).

The variable definitions are presented in Table 1.

Table 1 | Variable Definitions

Dependent Variables	Description
ΔCash Holdings	Yearly change in cash and cash equivalents
Investments	Capital expenditures
Dividends	Cash dividends
–Equity Finance	–Net equity issues
–Debt Finance	–Net debt issues
–Asset Sales	–Value of assets sold
Independent Variables	**Description**
Cash Flow from Operations (CFO)	Earnings before extraordinary items and depreciation – Change in working capital
Market-to-Book Ratio	Market value of equity / Book value of equity
Size	Natural logarithm of total assets (2002 prices)
Debt Ratio	Total debt/Total assets
Stock Return Volatility	Average of the standard deviation of daily stock returns for years *t*–1 and t
Past Stock Return	Average of the annual compounded stock return for years *t*–2 and *t*–1

Note: We scale the dependent variables and the cash flow from operations variable by total assets. Inflation adjustment is carried out using the wholesale price index, 1994 = 100.

Source: Author.

We include lagged *CFO* and lagged dependent variables as additional regressors, and estimate the following system of six equations:

$$\Delta Cash\ Holdings_{i,t} = \alpha_{1,i} + \beta_{11} CFO_{i,t} + \beta_{12} CFO_{i,t\text{-}1} + \gamma_1 \Delta Cash\ Holdings_{i,t\text{-}1} + \delta_1 X_{i,t} + e_{1,i,t}, \quad (10)$$

$$Investments_{i,t} = \alpha_{2,i} + \beta_{21} CFO_{i,t} + \beta_{22} CFO_{i,t-1} + \gamma_2 Investments_{i,t-1} + \delta_2 X_{i,t} + e_{2,i,t}, \quad (11)$$

$$Dividends_{i,t} = \alpha_{3,i} + \beta_{31} CFO_{i,t} + \beta_{32} CFO_{i,t-1} + \gamma_3 Dividends_{i,t-1} + \delta_3 X_{i,t} + e_{3,i,t}, \quad (12)$$

$$-Equity\ Finance_{i,t} = \alpha_{4,i} + \beta_{41} CFO_{i,t} + \beta_{42} CFO_{i,t-1} + \gamma_4 - Equity\ Finance_{i,t-1} + \delta_4 X_{i,t} + e_{4,i,t}, \quad (13)$$

$$-Debt\ Finance_{i,t} = \alpha_{5,i} + \beta_{51} CFO_{i,t} + \beta_{52} CFO_{i,t-1} + \gamma_5 - Debt\ Finance_{i,t-1} + \delta_5 X_{i,t} + e_{5,i,t}, \quad (14)$$

$$-Asset\ Sales_{i,t} = \alpha_{6,i} + \beta_{61} CFO_{i,t} + \beta_{62} CFO_{i,t-1} + \gamma_6 - Asset\ Sales_{i,t-1} + \delta_6 X_{i,t} + e_{6,i,t}. \quad (15)$$

We add the lag of the dependent variable as a control in each equation to incorporate an intertemporal dimension, following Gatchev *et al*. (2010). Our approach is also similar to that used in studies on investigations of investment-cash flow sensitivities conducted by Attig, Cleary, El Ghoul, and Guedhami (2014) and La Rocca, Stigliano, La Rocca, and Cariola (2015), who include a lag of investments as a control to make their models dynamic.

We scale the dependent variables and *CFO* by total assets. Income statements and balance sheets are used to construct the *CFO*. Dividends and investments are taken from the cash flow statement, and all the other variables are calculated from the balance sheet.

We use three criteria for financial constraints in the analysis: the firm growth rate, payout ratio, and asset tangibility ratio. Firm growth rate is measured by yearly sales growth rate. Firms with higher sales growth are expected to be less financially constrained. We also expect that financially unconstrained firms have higher payout ratios (Allayannis and Mozumdar, 2004; Cleary, 1999). Asset tangibility is equal to tangible assets divided by total assets. Bhagat, Moyen, and Suh (2005) suggest that firms with fewer tangible assets face greater financial constraints because of the greater information asymmetry they encounter. In this study, firms in the bottom (top) 30% in terms of firm growth, payout ratio, and asset tangibility are considered financially constrained (financially unconstrained) for each year. Previous studies that have used this classification scheme include Almeida *et al*. (2004), Dasgupta *et al*. (2011), and Erickson and Whited (2000).

4. Data

The sample comprises firms listed on Borsa Istanbul, excluding financial institutions and utilities. The panel covers the period 1996 to 2013, and the firm-level data include 2,650 firm-years. The accounting and return data are obtained from the Finnet database (http://www.finnet.com.tr).

Table 2 presents the summary statistics of the dependent and independent variables.

Table 2 | Summary Statistics, Overall Sample

	Mean	Standard Deviation	Median
Dependent Variables			
ΔCash Holdings	0.019	0.097	0.002
Investments	0.060	0.092	0.025
Dividends	0.020	0.059	0.000
–Equity Finance	–0.060	0.201	0.000
–Debt Finance	–0.193	0.328	–0.122
–Asset Sales	0.008	0.043	0.000
Independent Variables			
Cash Flow from Operations (CFO)	0.110	0.167	0.095
Market-to-Book Ratio	2.065	2.339	1.422
Size	17.514	1.753	17.497
Debt Ratio	0.485	0.266	0.487
Stock Return Volatility	0.169	0.090	0.149
Past Stock Return	0.040	0.129	0.032

Note: Monetary values are in million TL. We scale the dependent variables and the cash flow from operations variable by total assets. Returns are indicated as percentages.

Source: Own calculations.

Prague Economic Papers, 2018, 27(5), 554–572, https://doi.org/10.18267/j.pep.675

The summary statistics of dependent and independent variables for constrained and unconstrained firms classified according to our financial constraint measures are presented in Table 3.

Table 3 | Summary Statistics, Financially Constrained and Financially Unconstrained Firms

	Constrained Firms (806 firm-years)			Unconstrained Firms (806 firm-years)		
	Mean	Standard Deviation	Median	Mean	Standard Deviation	Median
Payout Ratio Classification						
ΔCash Holdings	0.015	0.095	0.002	0.020	0.077	0.003
Investments	0.052	0.088	0.021	0.062	0.086	0.032
Dividends	0.009	0.020	0.000	0.022	0.055	0.000
–Equity Finance	−0.053	0.116	0.000	−0.057	0.117	0.000
–Debt Finance	−0.149	0.271	−0.078	−0.176	0.275	−0.117
–Asset Sales	−0.011	0.066	0.000	−0.007	0.034	0.000
Cash Flow from Operations (CFO)	0.096	0.145	0.096	0.128	0.181	0.107
Market-to-Book Ratio	1.987	2.241	1.356	2.263	2.759	1.497
Size	17.610	1.756	17.584	17.478	2.077	17.406
Debt Ratio	0.463	0.262	0.437	0.496	0.241	0.507
Stock Return Volatility	0.170	0.080	0.154	0.184	0.096	0.173
Past Stock Return	0.039	0.042	0.034	0.044	0.042	0.038
Firm Growth Classification						
ΔCash Holdings	0.006	0.091	0.000	0.028	0.087	0.006
Investments	0.059	0.092	0.026	0.073	0.104	0.031
Dividends	0.011	0.049	0.000	0.029	0.065	0.000
–Equity Finance	−0.056	0.098	−0.010	−0.060	0.330	0.000
–Debt Finance	−0.050	0.233	−0.019	−0.373	0.337	−0.355
–Asset Sales	−0.012	0.057	0.000	−0.004	0.018	0.000
Cash Flow from Operations (CFO)	0.052	0.159	0.050	0.165	0.176	0.134
Market-to-Book Ratio	1.914	2.374	1.268	2.564	2.605	1.845
Size	18.092	1.563	18.115	17.049	1.658	16.971
Debt Ratio	0.474	0.324	0.444	0.523	0.224	0.534
Stock Return Volatility	0.169	0.103	0.142	0.234	0.084	0.223
Past Stock Return	0.028	0.047	0.021	0.070	0.036	0.070
Asset Tangibility Classification						
ΔCash Holdings	0.006	0.068	0.001	0.028	0.136	0.003
Investments	0.037	0.076	0.006	0.087	0.116	0.043
Dividends	0.012	0.036	0.000	0.021	0.077	0.000
–Equity Finance	−0.081	0.334	0.000	−0.053	0.103	0.000
–Debt Finance	−0.169	0.262	−0.099	−0.200	0.437	−0.101
–Asset Sales	−0.009	0.057	0.000	−0.006	0.032	0.000
Cash Flow from Operations (CFO)	0.078	0.151	0.072	0.114	0.193	0.090
Market-to-Book Ratio	1.738	2.066	1.430	2.179	2.580	1.189
Size	17.237	1.848	17.257	17.662	1.693	17.622
Debt Ratio	0.469	0.240	0.439	0.484	0.345	0.513
Stock Return Volatility	0.196	0.121	0.176	0.199	0.083	0.191
Past Stock Return	0.045	0.047	0.041	0.048	0.044	0.043

Note: Monetary values are in million TL. We scale the dependent variables and the cash flow from operations variable by total assets. Returns are indicated as percentages.

Source: Own calculations.

All classifications show that changes in cash holdings, investments, dividend payments, and cash flow from operations are higher for unconstrained firms than they are for constrained firms. Unconstrained firms also use more debt financing and have a higher debt ratio, market-to-book ratio, stock return volatility, and past stock returns.

We analyse whether there is a problem of multicollinearity by looking at the variance inflation factor (VIF) of the independent variables. VIF values higher than 10 denote multicollinearity (Gujarati, 2004; Hair, Black, Babin and Anderson, 2010). Because the independent variables have a VIF value that is lower than this cutoff threshold, multicollinearity is not a problem for the data.

5. Empirical Findings

The first estimation uses the system of five equations given by equations (10) – (15), for the entire sample, using time fixed effects within the panel data model. Separate estimations are also conducted for constrained and unconstrained firms. The time fixed effects model accounts for macroeconomic factors by the inclusion of a time varying intercept which is constant cross-sectionally across entities.

5.1 Results on the sample of all firms

The results of the system of equations on the overall sample are presented in Table 4, where the estimation uses seemingly unrelated regressions. The independent variables in all equations are either exogenous or predetermined. We include time fixed effects in the panel data model because they are jointly significant.

Table 4 | Cash Flow Sensitivities of the Sample of All Firms

	CFO_t	CFO_{t-1}	Market-to-Book Ratio	Size	Debt Ratio	Stock Return Volatility	Past Stock Return	Dependent Variable$_{t-1}$	R^2
ΔCash Holdings	0.232*** (0.000)	−0.099*** (0.000)	0.003** (0.019)	0.001 (0.591)	0.014 (0.238)	0.069** (0.024)	−0.028 (0.681)	−0.156*** (0.000)	0.12
Investments	0.043** (0.019)	−0.010 (0.574)	−0.000 (0.682)	0.001 (0.386)	0.015 (0.157)	0.060 (0.027)	0.188*** (0.001)	0.239 (0.000)	0.08
Dividends	0.129*** (0.000)	−0.042*** (0.000)	0.001 (0.250)	0.000 (0.565)	−0.011** (0.014)	0.016 (0.184)	−0.042 (0.111)	0.522*** (0.000)	0.52
−Equity Finance	0.065** (0.012)	0.011 (0.650)	−0.001 (0.714)	0.004 (0.112)	0.099*** (0.000)	0.231*** (0.000)	−0.108 (0.189)	−0.037 (0.162)	0.08
−Debt Finance	0.085* (0.085)	−0.293*** (0.000)	−0.004 (0.180)	0.011*** (0.008)	−0.482*** (0.000)	0.028 (0.692)	−1.191*** (0.000)	0.028 (0.255)	0.29
−Asset Sales	−0.048*** (0.000)	0.038*** (0.000)	−0.000 (0.474)	0.000 (0.606)	0.000 (0.936)	−0.011 (0.450)	0.011 (0.736)	0.083 (0.002)	0.02

Note: The estimation uses the system of equations method based on seemingly unrelated regressions. The independent variables in all equations are either exogenous or predetermined. All regressions control for time fixed effects. The *p*-values of the estimated coefficients are given in parentheses. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Source: Own estimations.

Column 1 reports the estimated cash flow sensitivities for the overall sample.[1] We see that the cash flow from operations affects all uses of cash contemporaneously. The statistically significant coefficients of cash flow show that it has a positive relationship with change in cash holdings, investments, and dividends. We see that although firms prefer to save a part of their cash flow in the short term, they do still invest and increase dividends.

The positive coefficients of cash flow in the equity financing and debt financing regressions show that an increase in cash flow results in a reduction in equity and debt financing. The decrease in external finance with an increase in cash flow suggests that firms replace or substitute costly external financing when their cash flows increase, because they face constraints in their access to financial markets. Furthermore, the reduction in borrowing with an increase in cash flow suggests that firms prefer to alleviate debt overhang problems.

The negative statistically significant coefficient of cash flow estimated in the asset sales regression shows that an increase in cash flow brings an increase in asset sales. This finding suggests that firms prefer to renew their assets when their cash flows increase.

Column 2 shows the cash flow sensitivities to the previous year's cash flow from operations. The negative statistically significant coefficient of lagged *CFO* in the change in cash holdings regression shows that an increase in cash flow produces a decrease in the change in cash balances, which indicates that part of the saved cash is used in the following year. Lagged cash flow has a statistically significant negative relationship to dividends: an increase in cash flow produces a decrease in dividends. Furthermore, an increase in the lagged cash flow produces an increase in debt financing. With a reduction of debt in the short run, liquidity may allow more debt financing in the long term. Lagged *CFO* is found to have no relationship to investments, indicating that firms do not wait to use their cash flow for investments. Instead, they directly deplete a part of the current period's cash flow for capital expenditures. Lagged *CFO* has no statistically significant relationship to equity financing.

Examining whether our control variables are related to the uses of cash, we see that the market-to-book ratio has a statistically significant positive effect on the change in cash holdings. This finding indicates that firms with higher growth opportunities prefer to hold cash balances. The market-to-book ratio has no relationship to other uses of cash. The absence of a relationship between the market-to-book ratio and investments signals that there is no effect of growth opportunities on investments in the short term.

Size has a statistically significant impact on debt financing. As size increases, firms resort less to debt financing, thus providing support for the argument that larger firms rely less on bank loans because of their better access to equity capital markets. Size does not have a statistically significant relationship to other uses of cash.

An increase in the debt ratio has a statistically significant negative relationship to dividends, which may signal the existence of debt covenants that restrict dividend

1 According to the cash flow identity, the coefficients across the uses of cash should sum approximately to unity. However, we find that this is not the case in our models. A potential reason for this is any uncorrelated irregular movement in the uses of cash variables and the *CFO* variable that reduces the coefficients.

payments. The statistically significant effect of the debt ratio on the external financing variables shows that firms with high debt ratios resort less to equity financing and more to debt financing. These findings suggest that firms with high debt ratios prefer to continue to take advantage of the favourable effect of financial leverage on earnings *per* share and return on equity.

Stock return volatility is positively related to change in cash holdings. Additionally, firms with higher stock return volatility tend to reduce equity financing. Greater asymmetric information is expected to affect the use of cash flows in this manner (Dasgupta *et al*., 2011).

Along with a positive relationship between past stock returns and investments, we find that firms with higher past stock returns reduce their debt financing. Having identified no relationship between past stock returns and equity financing, we are unable to support the findings of Chang *et al*. (2006) and Lucas and McDonald (1990), who report that stock price run-ups are followed by equity issuances.

When we analyse whether lagged dependent variables affect the uses of cash, we see that a lagged change in cash holdings and lagged dividends have statistically significant coefficients. An increase (decrease) in change in cash holdings is followed by a decrease (increase) in the following year's change in cash balance. This finding suggests that firms prefer to turn to their target cash levels after a change in cash holdings. The significantly positive coefficient of lagged dividends indicates persistence in dividends.

5.2 Regression results for financially constrained and unconstrained firms

In this section, we provide the estimated cash flow sensitivities for financially constrained and unconstrained firms. Because the regression results for our classification methods are similar, we report only the firm growth classification results. Results for other classification methods are available from the author upon request. The regression results are presented in Table 5.

We find that both types of firms have positive and significant cash flow sensitivities of change in cash holdings, which signals that both groups of firms tend to save cash with an increase in their cash flow. The higher coefficient of the change in cash holdings variable for unconstrained firms suggests that these firms have a greater tendency to save cash than constrained firms. Dividends also have positive and statistically significant cash flow sensitivities in the two groups of firms. The higher coefficient of dividends for unconstrained firms shows that they have a stronger tendency to increase dividends with an increase in cash flow than constrained firms.

Equity financing is unaffected by cash flow in constrained firms. However, unconstrained firms reduce equity financing with an increase in their cash flow. Although constrained firms reduce their debt financing with an increase in cash flow, unconstrained firms tend to resort to debt financing in such an instance. Constrained firms seem to have a strong 'deleveraging' motivation when there is an improvement in cash flow, expecting an improved capacity to raise external finance in future. Unconstrained firms, on the other hand, seem to have a strong preference for using financial leverage to produce a positive effect on earnings *per* share and return on equity.

Prague Economic Papers, 2018, 27(5), 554–572, https://doi.org/10.18267/j.pep.675

Table 5 | Regression Results Based on Firm Growth Classification of Financially Constrained and Financially Unconstrained Firms

Financially Constrained Firms	CFO_t	CFO_{t-1}	Market-to-Book Ratio	Size	Debt Ratio	Stock Return Volatility	Past Stock Return	Dependent Variable$_{t-1}$	R^2
ΔCash Holdings	0.103* (0.002)	−0.009 (0.730)	0.000 (0.969)	−0.001 (0.640)	0.026 (0.120)	0.027 (0.531)	−0.163* (0.075)	−0.077* (0.076)	0.03
Investments	0.027 (0.416)	−0.006 (0.836)	0.004** (0.044)	0.001 (0.769)	0.004 (0.802)	0.047 (0.271)	0.085 (0.351)	0.105** (0.017)	0.04
Dividends	0.162* (0.000)	−0.033** (0.012)	0.000 (0.841)	0.001 (0.318)	−0.022* (0.003)	0.019 (0.317)	0.002 (0.961)	0.194* (0.000)	0.33
−Equity Finance	0.059 (0.108)	0.024 (0.417)	0.001 (0.551)	0.009* (0.004)	−0.060* (0.001)	0.156 (0.559)	0.026 (0.789)	0.000 (0.961)	0.09
−Debt Finance	0.243* (0.000)	−0.141** (0.010)	0.001 (0.879)	0.003 (0.603)	0.227* (0.000)	0.055** (0.035)	−0.629* (0.001)	0.045 (0.249)	0.15
−Asset Sales	0.127* (0.000)	−0.004 (0.828)	−0.000 (0.991)	−0.004** (0.040)	0.008 (0.478)	0.054*** (0.062)	−0.035 (0.576)	0.016 (0.711)	0.08
Financially Unconstrained Firms	CFO_t	CFO_{t-1}	Market-to-Book Ratio	Size	Debt Ratio	Stock Return Volatility	Past Stock Return	Dependent Variable$_{t-1}$	R^2
ΔCash Holdings	0.184* (0.000)	0.006 (0.825)	0.003*** (0.074)	0.004 (0.182)	0.010 (0.661)	0.069 (0.203)	0.014 (0.908)	−0.030 (0.524)	0.12
Investments	0.006 (0.868)	0.016 (0.580)	−0.005 (0.242)	0.006** (0.074)	0.010 (0.708)	0.063 (0.304)	0.192 (0.160)	0.045 (0.333)	0.03
Dividends	0.248* (0.000)	0.014 (0.495)	0.002*** (0.074)	−0.000 (0.874)	−0.022 (0.160)	0.024 (0.516)	0.011 (0.893)	−0.016 (0.788)	0.37
−Equity Finance	0.089* (0.003)	0.006 (0.825)	−0.001 (0.535)	0.005*** (0.096)	−0.120* (0.000)	0.093 (0.436)	−0.192 (0.119)	0.055 (0.235)	0.08
−Debt Finance	−0.128*** (0.098)	−0.075 (0.251)	−0.017* (0.001)	0.027* (0.000)	0.805* (0.000)	0.679* (0.000)	−1.332* (0.000)	−0.020 (0.515)	0.42
−Asset Sales	−0.013* (0.059)	−0.009 (0.101)	0.001** (0.015)	0.001 (0.315)	0.004 (0.410)	−0.010 (0.428)	0.009 (0.756)	0.124** (0.046)	0.06

Note: The estimation uses the system of equations method based on seemingly unrelated regressions. The independent variables in all equations are either exogenous or predetermined. All regressions control for time fixed effects. The *p*-values of the estimated coefficients are given in parentheses. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Source: Own estimations.

Cash flow has a statistically significant relationship to asset sales in both constrained and unconstrained firms. An increase in cash flow results in a reduction in asset sales in constrained firms and an increase in asset sales in unconstrained firms. As expected, constrained firms prefer to reduce their asset sales as their cash flow improves. The findings

indicate that an increase in cash flow leads to unconstrained firms selling their assets for renewal purposes.

Cash flow has no relationship to investments, neither for constrained nor unconstrained firms. Our finding that investments have no cash flow sensitivity supports that of Gatchev *et al*. (2010), but not that of Fazzari *et al*. (1988), who argue that constrained firms have a higher investment-cash flow sensitivity, and can be identified by this characteristic.

We find that an increased lagged *CFO* is associated with a decrease in dividends in constrained firms, suggesting that these firms prefer not to use their cash flow to distribute dividends in the first year of the cash flow shock. Lagged *CFO* is associated with an increase in debt financing for constrained firms. Constrained firms prefer to reduce their debt with a cash flow shock, and raise it again in the longer term, possibly with better terms. Lagged *CFO* has no relationship to other uses of cash for constrained firms.

The uses of cash are not sensitive to the lagged *CFO* in unconstrained firms. Because the lagged *CFO* has no statistically significant relationship to the majority of the uses of cash in constrained firms, and to any of the uses of cash in unconstrained firms, we can say that both types of firms prefer not to determine the uses of cash by considering the prior year's cash flow. This indicates that financing and investment decisions are mainly short-term decisions that depend on the short-term cash flow.

The market-to-book ratio has a statistically significant positive relationship to investments for constrained firms. This result suggests that constrained firms with high growth opportunities spend more on investments. All uses of cash other than investments and equity financing are affected by the market-to-book ratio in unconstrained firms. As the market-to-book ratio increases, unconstrained firms increase change in cash holdings, dividends, and debt financing, and decrease asset sales. Unconstrained firms with high growth opportunities save cash as a precautionary measure with the improvement of their cash flow. However, they also do not refrain from raising more debt and distributing higher dividends.

As size increases, constrained firms reduce equity financing and increase asset sales. However, unconstrained firms increase investments and reduce equity financing and debt financing with an increase in size. The dividends of constrained firms decrease with an increase in the debt ratio. Both constrained and unconstrained firms increase equity financing and reduce debt financing as the debt ratio increases. These results support the notion that both types of firms that have high levels of financial leverage prefer to reduce their debt levels using equity financing.

As the stock return volatility of constrained firms increases, there is a reduction in debt financing and in asset sales. The result of an increase in stock return volatility in unconstrained firms is again a reduction in debt financing. Both constrained and unconstrained firms with high return volatility seem to reduce their debt levels to lower the risk of financial distress.

An increase in past stock returns is associated with a decrease in cash holdings and an increase in debt financing in constrained firms. Unconstrained firms also increase their debt financing with an increase in past stock returns.

With regard to the lagged dependent variables for constrained firms, we find positive coefficients for dividends and investments, which indicates persistence in these uses

of cash. The negative coefficient of the lagged change in cash holdings shows that an increase in change in cash holdings is followed by a reduction in the change in cash balance the following year. This result supports the notion that constrained firms turn to their target cash levels after a change in cash holdings. In unconstrained firms, we see persistence in asset sales.

6. Robustness of the Results

Allayannis and Mozumdar (2004) argue that when cash flow is negative, the cash flow sensitivity of investment will be suppressed, because investment will be at its lowest possible level. We carry out a robustness check for our results by controlling whether negative cash flow observations suppressed our estimated sensitivities of the uses of cash. We use negative cash flow and negative lagged cash flow dummy variables, and include interaction terms of the cash flow variables and the dummy variables in our analysis. The sensitivities of the uses of cash for firms in the overall sample, constrained firms, and unconstrained firms are given in Table 6.

We see that the interaction effect between *CFO* and the negative cash flow dummy variable is statistically significant in the dividend equation for the overall sample. The negative coefficient for the interaction effect that is opposite to the sign of the coefficient of the main effect of *CFO* means that the cash flow sensitivity of dividends of firms with a negative cash flow is lower than that of firms with a positive cash flow. The significant negative interaction effects of *CFO* and the negative cash flow dummy in the dividend equations for constrained firms and unconstrained firms also indicate that firms with a negative cash flow have lower dividend-cash flow sensitivity than do firms with a positive cash flow, because the main effect of cash flow has a positive sign. These findings do not change our evaluation of the cash flow sensitivity of dividends for the overall sample, constrained firms, and unconstrained firms.

The significant interaction effect of *CFO* and the negative cash flow dummy variable in the asset sales equation has a positive sign for the firms in the overall sample. Because this sign is opposite to the sign of the main effect of *CFO*, we can say that firms with a negative cash flow have a lower tendency to sell their assets. The interaction effect between *CFO* and the negative cash flow dummy variable is also statistically significant in the asset sales equation for constrained firms. The negative coefficient for the interaction effect that is opposite to the sign of the coefficient of the main effect of *CFO* means that constrained firms with a negative cash flow have a higher tendency to sell their assets than do constrained firms with a positive cash flow. These results do not affect our evaluation of the cash flow sensitivity of asset sales for the overall sample and the sample of constrained firms. Thus, the robustness checks do not alter our results.

Table 6 | Regression Results with Interaction Terms of Cash Flow Variables and Negative Cash Flow Dummy Variables

Overall Sample	CFO_t	CFO_{t-1}	$CFO_t \times$ Negative Cash Flow Dummy$_t$	$CFO_{t-1} \times$ Negative Cash Flow Dummy$_{t-1}$
ΔCash Holdings	0.232* (0.000)	−0.096* (0.000)	−0.027 (0.698)	−0.026 (0.581)
Investments	0.057** (0.021)	−0.013 (0.505)	0.055 (0.372)	0.027 (0.523)
Dividends	0.209* (0.000)	−0.061* (0.000)	−0.207* (0.000)	0.046 (0.012)
−Equity Finance	0.065*** (0.070)	0.023 (0.395)	−0.142 (0.095)	−0.094 (0.101)
−Debt Finance	0.076* (0.090)	−0.285* (0.000)	−0.059 (0.710)	−0.046 (0.667)
−Asset Sales	−0.086* (0.000)	0.041* (0.000)	0.111* (0.000)	0.016 (0.453)
Financially Constrained Firms	CFO_t	CFO_{t-1}	$CFO_t \times$ Negative Cash Flow Dummy$_t$	$CFO_{t-1} \times$ Negative Cash Flow Dummy$_{t-1}$
ΔCash Holdings	0.119* (0.008)	−0.011 (0.692)	−0.026 (0.851)	0.016 (0.793)
Investments	0.049 (0.287)	−0.008 (0.779)	0.052 (0.710)	0.019 (0.761)
Dividends	0.273* (0.000)	−0.036** (0.010)	−0.310* (0.000)	0.036 (0.178)
−Equity Finance	0.010 (0.831)	0.036 (0.261)	0.027 (0.855)	−0.069 (0.311)
−Debt Finance	0.234** (0.011)	−0.084** (0.040)	−0.310 (0.274)	−0.272 (0.533)
−Asset Sales	0.210* (0.000)	−0.007 (0.705)	−0.266* (0.004)	0.017 (0.688)
Financially Unconstrained Firms	CFO_t	CFO_{t-1}	$CFO_t \times$ Negative Cash Flow Dummy$_t$	$CFO_{t-1} \times$ Negative Cash Flow Dummy$_{t-1}$
ΔCash Holdings	0.155* (0.000)	0.002 (0.950)	0.505 (0.231)	0.075 (0.386)
Investments	0.067*** (0.075)	0.012 (0.662)	0.103 (0.567)	0.342 (0.128)
Dividends	0.310* (0.000)	0.013 (0.527)	−0.310* (0.004)	−0.007 (0.900)
−Equity Finance	0.076** (0.028)	0.013 (0.597)	0.041 (0.802)	−0.104 (0.236)
−Debt Finance	−0.170*** (0.055)	−0.065 (0.329)	0.253 (0.563)	−0.153 (0.492)
−Asset Sales	−0.030*** (0.068)	−0.013 (0.120)	−0.010 (0.779)	−0.114 (0.119)

Note: The estimation uses the system of equations method based on seemingly unrelated regressions. The independent variables in all equations are either exogenous or predetermined. All regressions control for time fixed effects. The *p*-values of the estimated coefficients are given in parentheses. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.
Source: Own estimations.

7. Conclusion

The literature has contradictory results on whether the sensitivity of investments to internally generated funds is a signal of financial constraints, and, in general, neglect the fact that investment, distribution, and financing decisions are interdependent. Dasgupta *et al*. (2011) argue that non-investment uses of cash may positively or negatively affect investment potential and catch part of the effect of cash on investments. Thus, studies examining financial decisions using models that reflect the interdependent nature of investment and financing decisions provide a better view of financial behaviour. Dasgupta *et al*. (2011) show that cash savings and debt reduction dominate cash flow use in the short term. Both constrained and unconstrained firms increase investments in the longer term, but the long-term investment-cash flow sensitivity is higher for unconstrained firms. Gatchev *et al*. (2010) find no relationship between investments and cash flow in financially constrained and unconstrained firms. They provide evidence that the negative effect of changes in cash flow levels on investment spending is avoided by changes to debt and cash holding levels. The authors find that firms decrease debt and increase cash holdings when their cash flows are high. On the other hand, they increase debt and decrease cash holdings when they have low cash flows. Thus, they do not forgo positive NPV investments because they are unable to access external funds.

This study analyses the cash flow sensitivities of financing, investment, and distribution decisions using a multi-equation methodology, and examines whether financially constrained and unconstrained firms differ in terms of their sensitivities. Our sample includes 2,650 firm-years of Turkish firms whose stocks were traded on Borsa Istanbul during the period 1996−2013. We find that most firms prefer to add to their cash balances in the short term after an increase in cash flows. While both constrained and unconstrained firms save a portion of their cash flows, unconstrained firms tend to save more than constrained firms providing partial support for Almeida *et al*. (2004), who argue that the tendency of a firm to save part of its cash flow can be used to evaluate the degree of financial constraints. Neither type of firm shows investment-cash flow sensitivity in the short term, a finding consistent with that of Kaplan and Zingales (1997) and Cleary (1999), who argue that investment-cash flow sensitivity does not provide a good measure of financial constraints.

In general, firms allocate a part of their cash flow to dividends in the short term. This finding supports the argument that the cash flow is expected to be a determinant of the dividend payout policy, as a direct measure of liquidity (Charitou and Vafeas, 1998). Although both constrained and unconstrained firms have positive cash flow sensitivity of dividends, constrained firms allocate less cash flow to dividends than unconstrained firms.

Firms also allocate a portion of their cash flow to reducing equity and debt financing, in general. This finding support that of Dasgupta *et al*. (2011), who argue that firms prefer to replace or substitute costly external finance with an increase in cash flow when they face financial constraints. Furthermore, the finding implies that firms try to mitigate debt overhang problems. An increase in cash flow that results in both an increase in cash holdings and a decrease in debt financing supports the pecking order theory (Myers, 1984; Myers and Majluf, 1984), which argues that firms prefer internal to external sources of funds and avoid external financing with ample financial slack. The finding is also consistent

with Modigliani and Miller (1963), who suggest that the tax advantage of debt financing does not mean firms should use the maximum possible amount of debt in their capital structures, and maintaining a reserve borrowing capacity in order to preserve flexibility is one of the reasons limiting the use of debt.

An increase in cash flow prompts constrained firms to reduce debt financing, a finding that indicates that an increase in cash flow constitutes a deleveraging incentive for constrained firms, which expect to improve their capacity to raise external financing in the future. Unconstrained firms increase their debt financing and reduce their equity financing in the short term with an increase in cash flow. This finding is consistent with Buus (2015) who suggests that because low-risk firms have low costs of financial distress, they use high leverage to increase the return on equity, which means they infrequently use equity financing.

An increase in cash flow is followed by a depletion of cash holdings and a decrease in dividends in the long term. Firms with increasing longer-run cash flows also resort to greater levels of debt financing. Similarly, financially constrained firms decrease dividends with an increase in long-term cash flow. Moreover, they prefer to increase their debt with a cash flow shock in the long term, possibly on better terms.

Because this is a single-country study, replicating the analysis for other emerging markets to determine whether the findings can be generalized is a logical step for future research. Furthermore, longer-term relationships between cash flow and uses of cash warrant research, bearing in mind the intertemporal nature of the uses of cash.

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