

Corporate Cash Holding And Monetary Policy

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Abstract

Corporate cash holding behavior is important to understand firms in terms of management and decision-making, and the finance literature provides diverse views on the determinants of corporate cash holdings. This study examines the cash holding decision from a macroeconomic perspective and investigates whether monetary policy affects firms' cash holding decisions. The analysis based on Turkish listed non-financial firms suggests that monetary policy has no effect on corporate cash holdings, contrary to recent empirical evidence. In this regard, the results infer that the relationship between monetary policy and cash holding decisions established before in the literature could not be generalizable.

Keywords: cash holding, monetary policy, dynamic panel estimation

Jel Codes: C23, E52, G32

Firma Nakit Tutma Davranışı ve Para Politikası

Öz

Firma nakit tutma davranışı, firmaları yönetim ve karar verme biçimleri açısından anlamak için önemlidir ve finans literatürü firma nakit tutma belirleyicileri hakkında çeşitli görüşler sunmaktadır. Bu çalışmada, nakit tutma kararı makro ekonomik bir perspektiften incelenmekte ve para politikasının firmaların nakit tutma kararlarını etkileyip etkilemediği araştırılmaktadır.

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Türkiye'de borsada işlem gören finansal olmayan firmalara dayalı analizimiz, son ampirik kanıtların aksine, para politikasının firma nakit tutma üzerinde etkisi olmadığını göstermektedir. Bu bağlamda sonuçlar, literatürde daha önce kurulmuş olan para politikası ile firma nakit tutma kararı arasındaki ilişkinin genellenemeyeceği sonucunu göstermektedir.

Anahtar Kelimeler: nakit tutma, para politikası, dinamik panel tahmini

1. Introduction

The determinants of corporate cash holdings have been widely discussed in the finance literature over the past decades. From a conceptual perspective, three main theories are the most common to explain the mechanisms behind a firm's decision to hold cash. The first one is the Trade-Off Theory, pioneered by Myers (1977), asserting that corporate cash holdings are jointly determined by the marginal profit and cost of holding cash. On the one hand, by holding cash, firms cannot benefit from investing the excess cash in profit-generating assets. This opportunity cost is the main cost of corporate cash holding. On the other hand, firms benefit from holding cash by avoiding the transaction costs that originated from converting non-liquid assets to cash in the case of an investment opportunity. Besides, firms tend to hold cash with precautionary motives considering the periods when the cost of alternative financing or the likelihood of financial constraints is high. The second theory on corporate cash holding is the Pecking Order Theory of Myers and Majluf (1984). The theory states that there is an information asymmetry between the firms and their creditors, and this asymmetry induces a risk premium over external financing. Since external financing becomes more costly, firms rely more on internal funds and cash. The third theory is the Free Cash Flow Theory by Jensen (1986). The theory suggests that managers tend to hold cash to be able to fund the investment opportunities they prefer instead of distributing the profits among the shareholders.

On the empirical side, the literature provides ample evidence for different countries from different perspectives.³ Among many others, the literature so far includes studies interested in the link between corporate governance and corporate cash holdings (Al-Najjar, 2015; Al-Najjar & Clark, 2017; Belghitar & Khan, 2013; Chen et al., 2020; Schauten et al., 2013), the relationship between taxation and holding cash (Hanlon et al., 2017; Wang, 2015), the impact of institutions and state ownership on corporate cash holdings (R. R. Chen et al., 2018; Kusnadi et al., 2015), the impact of culture on cash

³ Appendix A summarizes the main determinants documented in the empirical literature and their expected signs.

holding (Chang & Noorbakhsh, 2009; Hou et al., 2015), the impact of political connections on holding cash (Hill et al., 2014), the link between uncertainty and cash holding (Demir & Ersan, 2017; Im et al., 2017; Xu et al., 2016), and the relationship between chief executive officer (CEO) characteristics and cash (Huang-Meier et al., 2016; Liu et al., 2014; Miranda-Lopez et al., 2019).

Although the literature is rich and varied, the studies on Turkish case remain relatively limited. Uyar and Kuzey (2014) examine the determinants of corporate cash holdings for Turkish listed non-financial firms over 1997-2011. The results suggest that the lagged cash holdings, the leverage, tangibility, financial indebtedness, other liquid assets, and the capital expenditures are inversely related to corporate cash holdings, while higher cash-flow and better growth opportunities lead cash holdings to increase. Abdioğlu (2016) estimates dynamic panel data regressions using listed Turkish firm data over 2005-2013 and documents a negative relationship between managerial ownership and corporate cash holdings. Moreover, the results indicate the significant positive effect of lagged cash holdings, firm size, tangibility, and liquidity on the current year's cash holdings.

Given the role of monetary policy on credit conditions, the link between corporate cash holding behavior and monetary policy stance also deserves special attention. Conceptually, one may explain the possible links between monetary policy and corporate cash holding decisions via two main theories. From the perspective of the Trade-Off Theory, variations in the monetary policy are expected to affect the cash holding decisions by influencing the marginal cost of holding cash. For instance, the tighter the monetary policy, the opportunity cost of having excess cash increases, and the amount of cash holdings is expected to decline. However, from a Pecking Order Theory perspective, a tighter monetary policy increases the costs of external finance and leads firms to depend more on internal funds. Thus, it leads the corporate cash holdings to increase and the net impact of the monetary policy stance on the corporate cash holdings may be determined by the composition of those two opposite transmission channels.

The literature on the relationship between monetary policy stance and corporate cash holdings is rather more limited. Tran (2020) examines the impact of a monetary expansion on the corporate cash holding of listed Vietnamese firms over the 2007-2017 period and concludes that looser monetary policy leads firms to hold less cash, referring to the effect of lower transaction costs of the precautionary motives. Deng and Yao (2021) investigate the impact of monetary policy shocks on firms' cash holding decisions before the global financial crisis using data of listed United States (US) firms over the 1970-2007 period. The results show that firms hold more cash while the

monetary policy is tight. They also note that the impact of monetary policy stance on corporate cash holdings is stronger for financially constrained firms. Considering the existence of the limited evidence so far, this study attempts to add to the literature interested in the link between monetary policy and corporate cash holdings.

The purpose of this paper is to provide recent evidence on the determinants of corporate cash holdings of firms by examining the case of Turkey as an emerging open economy. Using data from the listed non-financial Turkish firms over the 2009-2019 period, this study estimates the impact of monetary policy on cash holding behavior by employing dynamic panel data models after controlling for variables commonly used in the literature. The results may be summarized as follows. First, findings support the previous evidence on the determinants of corporate cash holdings. Positive innovations in the lagged cash, cash-flow, and uncertainty lead corporate cash holdings to increase for the sample of non-financial firms. On the contrary, tangibility, leverage, investment, and net working capital are negatively linked to the Turkish firms' cash holdings. The results, however, do not provide supporting evidence that variations in the monetary policy stance affect the corporate cash holdings. Findings are robust to the choice of the estimation model and the indicators for monetary policy stance.

The remainder of this paper is structured as follows. Section 2 introduces the data and the model employed in the analysis, and Section 3 presents the empirical findings. Results from the robustness tests are provided in Section 4, while Section 5 concludes the paper.

Data and Model

In the empirical analysis part, the data consists of the annual financial indicators of firms trading in the BIST (Borsa Istanbul) between 2006 and 2019. This study excludes financial firms, investment trusts⁴ and the firms not having consecutive two years of data.⁵ The data sources are FINNET and CBT⁶. After restructuring, the dataset includes 4373 firm-year observations of 369 firms, and all variables from financial statements' data are winsorized at 1% from both tails. The summary statistics in Table 1 reveal that the cash ratio is 9% and close to previous studies on Turkey and other countries (Ozkan and Ozkan, 2004; Uyar and Kuzey, 2014).

⁴ Investment trusts include real estate investment trusts, investment trusts, and venture capital investment trusts.

⁵ Our results are similar for the dataset including only firms having at least five consecutive years of data.

⁶ The financial statement data is collected from FINNET, a data vendor providing data for stocks trading in the BIST, and money supply and interest rate data is provided by CBT (Central Bank of Turkey).

Table 1

Descriptive Statistics

The sample includes 369 stocks listed in BIST from 2006 to 2019. The table summarizes the statistics of yearly values of variables used in the empirical analysis. The variables are cash holding (CASH), firm size (SIZE), tangibility (TANG), cash flow (CASHFLOW), leverage (LEV), market-to-book ratio (MB), financial leverage (FINDEBT), investment (INV), net working capital (NWC), Tobin q (TOBINQ), asset growth (GROWTH), Altman Z-score (ALTMAN), public openness (PUBLIC), dividend ratio (DIV), money supply growth (MSGR) and interest rate (INT). The detailed definitions of the variables are given in Appendix B.

Variables	Obs	Mean	Std.Dev.	Skew.	Kurt.
CASH	4373	.09	.12	2.3	9.17
SIZE	4373	19.2	1.98	.26	2.8
TANG	4373	.3	.22	.49	2.55
CASHFLOW	4373	.08	.11	.39	6.6
LEV	4373	.52	.34	2.68	20.39
MB	4373	1.65	2.4	2.58	19.48
FINDEBT	4373	.23	.23	2.16	14.15
INV	4373	.03	.12	.32	12.66
NWC	4373	.2	.18	.75	2.89
TOBINQ	4373	1.39	1.12	3.89	25.6
GROWTH	4373	.2	.54	9.22	136.61
ALTMAN	4373	11.22	34.24	11.36	181.61
PUBLIC	4373	.36	.24	.93	3.43
DIV	4373	.3	.46	.87	1.76
MSGR	4373	.18	.05	.31	2.12
INT	4373	.12	.05	.72	2.05

Since the firms bear some adjustment costs to attain their target cash ratio, firms do not adjust towards the target level quickly, and the adjustment takes place gradually. Hence, the study assumes a partial periodic adjustment of cash level towards its target level, and adopts a dynamic model setup as commonly used in literature. This study estimates the model in Eq. (1) where the dependent variable⁷ is cash ratio ($CASH_{i,t}$) and independent variables include lagged value of cash ratio ($CASH_{i,t-1}$), monetary policy measure⁸ (INT_{t-1}) and vector of control variables ($X_{i,t}$). The control variables contain the firm size (SIZE), tangibility (TANG), cash flow (CASHFLOW), leverage (LEV), market-to-book ratio (MB), financial leverage (FINDEBT), investment (INV),

⁷ The detailed definitions of the variables are reported in Appendix B.

⁸ CBT implements an inflation-targeting regime, so the main policy tool is interest rates. However, the Bank has not used a single policy rate from time to time in line with macroprudential policies. Therefore, our interest rate variable (INT_{t-1}) is the weighted average cost of funding provided by CBT.

net working capital (NWC), Tobin q (TOBINQ), asset growth (GROWTH), Altman Z-score⁹ (ALTMAN), free-float (PUBLIC) and dividend ratio (DIV).

$$CASH_{i,t} = \alpha_i + \beta_1 CASH_{i,t-1} + \beta_2 INT_{t-1} + \gamma X_{i,t} + \varepsilon_{i,t} \quad (1)$$

In a dynamic model setup, Dang et al. (2015) show that, compared to pooled ordinary least squares (POLS) and system generalized method of moments (SYS-GMM) by Blundell and Bond (1998), the bias-corrected least-squares dummy variable estimator (LSDVC) by Kiviet (1995) and bias-corrected FE estimator through iterative bootstrap (BC) by Everaert and Pozzi (2007) are the most robust methods for estimating the coefficients on the lagged variable and other explanatory variables. Also, the augmented doubly-censored Tobit estimator by Loudermilk (2007) (DPF) is the most robust method for fractional data compared to fixed-effect estimation and system GMM estimations. Based on the Dang et al. (2015) evidence, Eq. (1) is estimated by using all five methods (POLS, SYS-GMM, LSDVC, BC, and DPF) to provide robust results.

3. Results

Table 2 presents the estimates from the model in Eq. (1). Accordingly, the coefficient estimate for the main variable of interest, the central bank policy rate (INT), is not statistically significant, which may be interpreted as that monetary policy has no impact on the cash holding decision of firms. On the other hand, some of the other control variables commonly documented in the literature are shown to have an effect on cash holding decisions. In light of the estimation results, the coefficient estimate of the lagged cash is positive and statistically significant, indicating that firms with a higher cash-to-asset ratio in the previous year, on average, are expected to have a higher cash-to-asset ratio in the current year. Thus, cash holding decisions indicate a substantial degree of persistency over time. The comparison of estimation methods reveals that the coefficient estimate from POLS estimation is biased, and the coefficient estimate from robust estimation methods shows a slower adjustment towards cash target compared to Uyar and Kuzey (2014).

Higher leverage decreases cash holding, consistent with Pecking Order Theory in the sense that firms use cash first to finance the investment and then debt and equity in sequence. On the other hand, the positive coefficient estimate for financial debt contradicts previous findings in the literature, such as the findings of Uyar and Kuzey (2014) for Turkey and Ozkan and Ozkan (2004) for the UK. However, results seem intuitive in the sense that while

⁹ The methodology of Altman Z-score is based on (Altman, 2005).

firms hold less cash as leverage increases, they hold more cash to get debt from the financial sector. Hence, the positive coefficient estimate for financial debt infers that financial institutions consider firm liquidity as an essential prerequisite in loan assessment.

The negative coefficient estimate of tangibility is consistent with the argument that tangible assets could be used as collateral against debt and could be converted into cash. Also, the positive coefficient estimate of cash flow infers that firms hold more cash as they raise cash flow, as documented by Opler et al. (1999), Ozkan and Ozkan (2004), and Uyar and Kuzey (2014). Consistent with Pecking Order Theory, firms with higher investment tend to hold lower cash balance because they utilize first internal funds to finance investment. The negative coefficient estimate of net working capital suggests that non-cash liquid assets compensate cash holding. As an indicator of riskiness, Altman Z-score affects firms' cash holding in a way that firms owning higher risk hold higher cash balance with precautionary motives. Other variables such as size, growth, MB, Tobin Q, free-float, and dividend payment have no statistically significant effect on the cash holding decision of listed non-financial firms in Turkey.

Table 2

The table reports the estimation results from alternative regression methods for the model setup in Eq. (1) given below:

$$CASH_{it} = \alpha_i + \beta_1 CASH_{it-1} + \beta_2 INT_{t-1} + \gamma X_{it} + \varepsilon_{it}$$

In the model above, the dependent variable of $CASH_{it}$ is the cash holding of i^{th} firm at time t and it is a function of previous cash holding ($CASH_{it-1}$), interest rate INT_{t-1} and other control variables (X_{it}) where X_{it} consists of the following variables: firm size (SIZE), tangibility (TANG), cash flow (CASHFLOW), leverage (LEV), market-to-book ratio (MB), financial leverage (FINDEBT), investment (INV), net working capital (NWC), Tobin q (TOBINQ), asset growth (GROWTH), Altman Z-score (ALTMAN), public openness (PUBLIC) and dividend ratio (DIV). The detailed definitions of the variables are reported in Appendix B.

The regression results are for the methodologies of pooled OLS (POLS), system GMM (SYS-GMM), bias-corrected FE estimator through iterative bootstrap (BC), bias-corrected least-squares dummy variable estimator (LSDVC), and augmented doubly-censored Tobit estimator (DPF).

The data covers the period of 2009-2019. The values in the parenthesis below the coefficients are t-values, and ***, **, and * indicate statistical significance for the coefficients at the 1%, 5%, and 10% levels, respectively.

Variables	POLS (1)	SYS-GMM (2)	BC (3)	LSDVC (4)	DPF (5)
$CASH_{it}$	0.597*** (23.88)	0.444*** (9.91)	0.415*** (10.45)	0.446*** (25.45)	0.433*** (27.32)
INT_{t-1}	0.0166 (0.72)	0.0261 (1.23)	0.0105 (0.25)	0.0000323 (0.00)	0.0123 (0.52)
$SIZE_i$	0.000167 (0.19)	-0.000139 (-0.09)	-0.00550 (-1.33)	-0.00452* (-1.72)	-0.00407* (-1.95)
$TANG_i$	-0.0789*** (-10.37)	-0.118*** (-7.58)	-0.135*** (-6.23)	-0.149*** (-11.58)	-0.151*** (-12.57)

CASHFLOW _t	0.115*** (5.90)	0.0647*** (2.75)	0.0653** (2.43)	0.0543*** (4.44)	0.0545*** (3.27)
LEV _t	-0.0581*** (-7.03)	-0.0897*** (-5.65)	-0.0821*** (-3.23)	-0.0959*** (-12.22)	-0.0948*** (-9.61)
MB _t	0.0000518 (0.12)	0.000127 (0.28)	0.000239 (0.40)	0.000231 (0.41)	0.000126 (0.19)
FINDEBT _t	0.0394*** (4.34)	0.0760*** (4.29)	0.0801*** (3.89)	0.0854*** (6.95)	0.0885*** (6.51)
INV _t	-0.0503*** (-3.61)	-0.0359** (-2.56)	-0.0558*** (-3.05)	-0.0369** (-2.28)	-0.0359*** (-2.82)
NWC _t	-0.105*** (-10.78)	-0.156*** (-8.10)	-0.174*** (-7.59)	-0.204*** (-14.80)	-0.204*** (-16.75)
TOBINQ _t	0.00411** (2.33)	0.00522** (2.06)	0.00431 (1.48)	0.00282* (1.79)	0.00245 (1.36)
GROWTH _t	-0.00336 (-0.56)	0.00275 (0.57)	0.00162 (0.21)	0.0000970 (0.06)	-0.000456 (-0.19)
ALTMAN _t	0.000200 (1.60)	0.000239** (2.35)	0.000409*** (2.69)	0.000413*** (6.28)	0.000387*** (7.78)
PUBLIC _t	0.000953 (0.14)	-0.0152* (-1.75)	0.00224 (0.10)	0.00236 (0.21)	0.00313 (0.32)
DIV _t	0.00646* (1.95)	0.00872* (1.76)	0.00263 (0.50)	0.00566 (1.22)	0.00586 (1.43)
Obs.	4004	4004	3258	4004	4004

Regarding the impact of the monetary policy stance on the corporate cash holdings of Turkish non-financial firms, results provide no conclusive evidence. The coefficient estimate is not statistically significant, indicating that corporate cash holding behavior does not respond to the changes in monetary policy stance. Results, however, should be interpreted carefully. The two opposing forces may have provided opposite mechanisms regarding the impact of monetary policy stance on the cash holding decisions of firms. For instance, in the case of a monetary tightening, the opportunity cost of holding cash increases that leads to lower cash holdings. On the other hand, if the asymmetric information problem is severe, the monetary policy tightening causes external finance, which is already more costly than internal finance, to be even more expensive. Thus, the Pecking Order Theory suggests that firms that rely on internal finance to fund their investment are likely to hold more cash. Therefore, a combination of these two opposite mechanisms may be the reason behind the statistically insignificant link between monetary policy stance and cash holdings. Although our results do not support the evidence by Tran (2020), Deng and Yao (2021), this study contributes to the literature by providing up-to-date evidence from the non-financial firms of an open emerging market economy and questioning the generalizability of previous empirical evidence of the impact of monetary policy on cash holding.

4. Robustness

As CBT is an inflation-targeting central bank and its main policy instrument is the interest rates, this study utilized policy rate as the proxy to reflect monetary policy stance in the previous section. On the other hand, money supply growth has also been used in the literature to reflect the monetary policy stance, and as a robustness check, the study replaces interest rate with money supply (M2) annual growth rate ($MSGR_{t-1}$) and estimates the model in Eq. (2). The results are in line with the baseline results and present that monetary policy seems not to affect the cash holding decision of Turkish listed non-financial firms. The sign and significance of the control variables' coefficients remain almost the same.

$$CASH_{i,t} = \alpha_i + \beta_1 CASH_{i,t-1} + \beta_2 MSGR_{t-1} + \gamma X_{i,t} + \varepsilon_{i,t} \quad (2)$$

Table 3

The table reports the estimation results from alternative regression methods for the model setup in Eq. (2) given below:

$$CASH_{i,t} = \alpha_i + \beta_1 CASH_{i,t-1} + \beta_2 MSGR_{t-1} + \gamma X_{i,t} + \varepsilon_{i,t}$$

In the model above, the dependent variable of $CASH_{i,t}$ is the cash holding of i^{th} firm at time t and it is a function of previous cash holding ($CASH_{i,t-1}$), money supply growth $MSGR_{t-1}$ and other control variables ($X_{i,t}$) where $X_{i,t}$ consists of the following variables: firm size (SIZE), tangibility (TANG), cash flow (CASHFLOW), leverage (LEV), market-to-book ratio (MB), financial leverage (FINDEBT), investment (INV), net working capital (NWC), Tobin q (TOBINQ), asset growth (GROWTH), Altman Z-score (ALTMAN), public openness (PUBLIC) and dividend ratio (DIV). The detailed definitions of the variables are reported in Appendix B.

The regression results are for the methodologies of pooled OLS (POLS), system GMM (SYS-GMM), bias-corrected FE estimator through iterative bootstrap (BC), bias-corrected least-squares dummy variable estimator (LSDVC), and augmented doubly-censored Tobit estimator (DPF).

The data covers the period of 2009-2019. The values in the parenthesis below the coefficients are t-values, and ***, **, and * indicate statistical significance for the coefficients at the 1%, 5%, and 10% levels, respectively.

Variables	POLS (1)	SYS-GMM (2)	BC (3)	LSDVC (4)	DPF (5)
$CASH_{t-1}$	0.597*** (23.89)	0.445*** (9.94)	0.415*** (10.36)	0.445*** (25.57)	0.432*** (27.36)
$MSGR_{t-1}$	0.000166 (0.01)	-0.00612 (-0.27)	0.00306 (0.10)	-0.0112 (-0.41)	-0.00966 (-0.37)
$SIZE_t$	0.000236 (0.27)	0.000201 (0.13)	-0.00505 (-1.49)	-0.00460 (-1.63)	-0.00384* (-1.91)
$TANG_t$	-0.0791*** (-10.40)	-0.118*** (-7.48)	-0.135*** (-6.27)	-0.149*** (-11.34)	-0.150*** (-12.50)
$CASHFLOW_t$	0.115*** (6.02)	0.0693*** (2.82)	0.0658** (2.52)	0.0549*** (4.44)	0.0555*** (3.33)
LEV_t	-0.0581*** (-7.02)	-0.0891*** (-5.61)	-0.0822*** (-3.23)	-0.0958*** (-12.25)	-0.0947*** (-9.60)
MB_t	0.0000712 (0.16)	0.000209 (0.45)	0.000248 (0.42)	0.000250 (0.44)	0.000167 (0.25)
$FINDEBT_t$	0.0394***	0.0760***	0.0801***	0.0852***	0.0881***

	(4.34)	(4.27)	(3.91)	(6.92)	(6.47)
INV _t	-0.0501*** (-3.58)	-0.0366** (-2.51)	-0.0559*** (-3.10)	-0.0376** (-2.27)	-0.0368*** (-2.87)
NWC _t	-0.105*** (-10.81)	-0.156*** (-8.00)	-0.175*** (-7.66)	-0.204*** (-14.84)	-0.203*** (-16.74)
TOBINQ _t	0.00408** (2.31)	0.00504** (1.97)	0.00434 (1.46)	0.00274 (1.63)	0.00229 (1.27)
GROWTH _t	-0.00346 (-0.58)	0.00202 (0.41)	0.00155 (0.21)	0.000100 (0.06)	-0.000503 (-0.21)
ALTMAN _t	0.000200 (1.60)	0.000237** (2.37)	0.000409*** (2.68)	0.000414*** (6.29)	0.000387*** (7.78)
PUBLIC _t	0.00155 (0.23)	-0.0131 (-1.55)	0.00312 (0.14)	0.00291 (0.24)	0.00476 (0.49)
DIV _t	0.00633* (1.92)	0.00791 (1.62)	0.00246 (0.48)	0.00565 (1.23)	0.00581 (1.42)
Obs.	4004	4004	3258	4004	4004

5. Conclusion

Cash holding decision determines the shareholders' wealth and thus the cash holding level depends on marginal cost-benefit balance. Higher cash holding brings the benefits of having higher liquidity and avoiding funding and transaction costs in exchange of accepting lower returns on firm' assets. The literature provides diverse views on the determinants of cash flow from micro level to macro level. This study provides recent evidence on the impact of monetary policy and other determinants on cash holding of listed non-financial firms in Turkey, as an emerging open economy, over the 2009-2019 period by employing dynamic panel data models after controlling for variables commonly used in the literature. This study contributes to the literature mainly in three ways, first, by providing up to date analysis and inputting wide range of variable set, second, by using different estimation methods and lastly by questioning the generalizability of previous empirical evidence of the impact of monetary policy on cash holding.

The estimation results support the previous findings on the determinants of corporate cash holdings in the literature. Positive innovations in the lagged cash ratio, cash-flow, and uncertainty lead corporate cash holdings to increase. Conversely, tangibility, leverage, investment, and net working capital are negatively associated with cash holdings. The results, however, do not provide supporting evidence of the effect of monetary policy on the corporate cash holdings, and they are robust to the choice of the estimation model and the monetary policy proxy. However, the results should be evaluated carefully considering possible opposing forces. That said, higher opportunity cost of holding cash following monetary tightening leads to lower cash holdings but firms may prefer hold higher cash balances due to more costly borrowing costs in the existence of severe asymmetric information problem.

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Appendix A. The determinants of corporate cash holdings in the empirical literature: expected signs and the transmission channels

Variables	Expected Sign	Transmission Channel
Lagged Cash	+	Higher cash in the previous period increases the likelihood to hold more cash in the current period.
Leverage	+,-	TOT: Higher leverage increases the likelihood of bankruptcy, leading firms to hold more cash with precautionary motives. POT: Higher leverage causes a decline in cash because of the debt payments since firms use the internal funds in the first place to pay them. FCT: High indebtedness can reduce the tendency to hold cash by increasing control over management.
Size	+,-	Larger firms are more likely to borrow with lower costs, which decreases their need to hold more cash. On the contrary, considering larger firms are more likely to be more profitable, they may need to hold less cash.
Cash Flow	+,-	TOT: Cash flow reduces the need to hold cash. POT: Firms that generate cash flow are more likely to hold cash for their investments.
Investment	-	POT: More investment requires greater use of internal funds.
Dividend ratio	-	The increase in dividend is associated with a decrease in the amount that will remain in cash, or the firm that wants to hold more cash may choose to pay less dividend.
Net working capital	-	TOT: Net working capital is negatively related to cash since it consists of mainly cash substitute liquid assets.
Growth/Investment Opportunities	+	TOT: Precautionary motive leads firms to keep cash on hand not to miss an investment opportunity when it comes.
Profitability	+	POT: More profit accumulation is associated with more cash flow and cash.
Tangibility	-	Tangible fixed assets are expected to be negatively related to cash since they can be liquefied more quickly in case of need for cash.
Uncertainty	+	TOT: When uncertainty increases, firms hold more cash with precautionary motives.

TOT: Trade-Off Theory, POT: Pecking Order Theory, FCT: Free Cash Flow Theory. The table mainly relies on the review of Guizani (2017). For more details on the determinants of corporate cash holdings and their expected signs, readers may refer to the study.

Appendix B. Variables and definitions

Variables	Definitions
CASH	The ratio of the total of cash and cash equivalents to total assets
SIZE	The logarithm of the book value of total assets
TANG	The ratio of fixed assets to total assets
CASHFLOW	The ratio of EBITDA to total assets
LEV	The book value of debt to asset ratio
MB	Market-to-book value
FINDEBT	The book value of financial debt to asset ratio
INV	The ratio of investment to total assets
NWC	The ratio of net working capital to total assets
TOBINQ	Tobin q-ratio
GROWTH	The annual growth rate of total asset
ALTMAN	Altman Z-score
PUBLIC	The ratio of free-floating shares to total shares
DIV	The ratio of paid dividend to net income
MSGR	The annual growth rate of the M2 money supply
INT	The annual average of the weighted cost of funding by Central Bank

Ekler

Ek. 1. Veri Tanımları

BIST100 Endeksi: Borsa İstanbul Pay Piyasası için temel endeks olarak kullanılmaktadır. Yıldız Pazar ve Ana Pazar'da işlem gören şirketlerle, Kolektif Yatırım Ürünleri ve Yapılandırılmış Ürünler Pazarı'nda işlem gören gayrimenkul yatırım ortaklıkları ve girişim sermayesi yatırım ortaklıkları arasından seçilen 100 paydan oluşmakta olup, BIST 30 ve BIST 50 endekslerine dahil payları da kapsar.

MOEX Russia: MOEX Rusya Endeksi (Aralık 2017'ye kadar MICEX Endeksi olarak bilinir), Moskova Menkul Kıymetler Borsası'nda işlem gören 10 ana ekonomi sektöründen en büyük ve en likit 50 Rus şirketinin performansını izleyen büyük bir borsa endeksidir.

FTSE MIB: 40 İtalyan hisse senedinin performansını ölçer ve İtalyan borsasının geniş sektör ağırlıklarını yansıtmayı amaçlar. Endeks, Borsa Italiana (BI) ana hisse senedi piyasasında işlem gören hisse senetlerinden türetilmiştir.

Dow Jones Industrial Average: Dow30 olarak da bilinen DJIA, New York Menkul Kıymetler Borsası ve NASDAQ'da işlem gören 30 büyük, halka açık blue-chip şirketini kapsayan bir borsa endeksidir.

S&P_TSX: Yaklaşık 250 şirketin dahil olduğu Toronto Menkul Kıymetler Borsası'ndaki toplam piyasa kapitalizasyonunun yaklaşık %70'ini temsil eden Kanada gösterge endeksidir.

Shanghai Composite: SSE Endeksi olarak da bilinen SSE Bileşik Endeksi, Şanghai Menkul Kıymetler Borsası'nda işlem gören tüm hisse senetlerini (A hisseleri ve B hisseleri) içeren bir borsa endeksidir.