Corporate Financial Policy and the Value of Cash: The Case of Turkey

by

Lütfiye Gizem Tüzen

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Abstract

This paper investigates the cross sectional variation in the market value of corporate cash holdings for Turkish non-financial public firms from 1990 to 2014. On average, the estimated marginal value of cash is around TRY 0.56 for a firm with zero cash and no leverage, indicating that the potential agency problems associated with cash holdings outweighs the benefits of liquidity on average. Through examining the changes in excess stock returns during the fiscal year, the findings suggest that the marginal value of cash decreases with higher cash holdings, higher leverage and better access to external financing. The findings of this study are in line with the existing theories in cash literature.

Keywords: Cash Holdings, Financial Constraints, Agency Cost, Firm Value

Özet

Bu çalışma, 1990-2014 yılları arasında Türkiye'deki halka açık firmaların nakit ve nakit benzeri varlıklarının firmaların piyasa değerini nasıl etkilediği konusunu incelemektedir. Bu çalışmada, nakit varlıkları ve banka borcu olmayan firma için ortalamada bir lira ilave nakit varlığın marjinal değeri 56 kuruş olarak bulunmuş olup; bu sonuç, nakit tutma maliyetlerinin nakit tutma faydalarına ağır bastığını göstermektedir. Hisse senedi getirilerindeki değişiklikler incelenerek yapılan bu çalışmada, nakdin marjinal değerinin firmaların nakit varlıkları, borçluluk oranları ve dış finansman araçlarına erişilebilirlik arttıkça azaldığı gözlemlenmektedir. Bu çalışmanın sonuçları literatürdeki teorilerle aynı doğrultuda bulunmuştur.

Anahtar sözcükler: Nakit Varlık, Finansal Kısıt Ölçeği, Vekalet Maliyeti, Firma Değeri

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1. Introduction

In perfect capital markets, firms can access to external financing when needed; thus, they do not necessarily hold cash. In reality, firms' access to capital markets is interrupted due to various frictions such as transaction costs and information problems; hence, firms might be forced to cancel or delay profitable investment projects due to lack of liquidity. Therefore, firms with limited access to external financing accumulate precautionary cash to mitigate this problem. On the other hand, corporate liquidity comes at a cost since interest gain from cash holdings is taxed at a higher rate than interest gain by individuals. Moreover, corporate liquidity may enable managers to invest in unprofitable projects which in turn reduce marginal value of cash. As a result, the market value would differ across firms in response to additional cash holdings depending on certain firm specific factors. That is to say, the marginal value of cash may be less than one due to liquidity premium, tax disadvantages and managerial agency costs whereas it may be greater than one for the financially distressed firms as cash reduces the likelihood of passing up NPV projects.

In the literature, the research related with the corporate cash holdings determinants is extensive. Early investment research, especially the work of Modigliani and Miller (1958), has stated that real firm decisions, driven by the motive of maximizing shareholders' claims, are independent from financial factors if the capital markets are perfect. They asserted that the financial structure of firms is irrelevant of their market value in capital markets and real firm decisions, such as debt leverage, distributing dividend and holding liquidity, are not determined by financial factors. As capital markets are imperfect, cash holdings may affect the firm value and there are various motives for firms' cash holdings.

The first and most commonly studied work in this field is Keynes' (1936) first two motives of cash holdings, namely transaction cost motive and precautionary motive. The transaction cost motive suggests that firms should hold enough cash for their current transactions in order to avoid

transaction costs. Thus, holding cash benefits for the firm to save transaction costs associated with raising funds and liquidating assets. Another reason for firms to prefer holding cash is the precautionary motive. According to this motive, firms hold cash in order to secure their positive NPV investment during the periods when raising debt is costly. This situation is especially important for financially constrained firms which have positive NPV opportunities; yet are lack of internal funds and difficult to reach capital markets. Since that time, there has been a lot of contribution to this topic. For instance, Almeida et al. (2004) investigate the relation between financial constraints and firms' demand for liquidity by examining publicly traded manufacturing firms from 1971 to 2000. They suggest that firms foreseeing financing constraints in the future respond to those potential constraints by hoarding cash today.

The principal for holding financial slack - i.e. cash, liquid assets and unused borrowing power is discussed by Myers and Majluf's (1984). They argue that there might be some cases in which a firm may desire to hold excess cash that would be consistent with shareholder wealth maximization. If cash leads to undertaking positive NPV projects, then one dollar of cash held by the firm could be valued more than one dollar for investors.

On the other hand, holding cash comes at a cost due to lower rate of return of these assets because of a liquidity premium and tax disadvantages as well as agency problems. For instance, Opler et al.(1999) state that cash holdings yield less due to its low risk characteristics, which is associated with the liquidity premium. The premium is expected to be lowest for cash holdings, and highest for assets that are poor substitutes for cash. Consequently, holding cash has an opportunity cost. Additionally, taxes increase the cost of holding cash. The reason is that corporate tax rate is generally higher than the personal tax rate paid on interest income; thus, investors are better off if firms distribute excess cash as dividend rather than holding within the firm. Then, the interest income is taxed twice, first under the name of corporate tax and then of dividend tax.

Excess cash reserves might lead to 'free cash flow' problem, as argued by Jensen (1986). He mentions that interest and incentives of managers and shareholders might conflict regarding some issues such as optimal size of the firm and the payment of dividends. In addition, the managers of firms with excess cash and low growth opportunity may invest even in negative NPV projects. Easterbrook (1984) states that dividend distribution to shareholders decreases the resources available to management, leading to decline in managers' power. In addition, when the firm needs financing for future investment, they need to raise the required financing from capital markets which disciplines management and controls their wasteful behavior. Thus, managers in firms that have excess cash may invest into negative NPV projects rather than distributing to shareholders. Harford's (1999) findings are also supportive for this by demonstrating that cash cow firms are more prone to make value decreasing acquisitions.

Additionally, Jensen and Meckling (1976) consider that there might be conflict between bondholders and shareholders when risky debt is in place. In this case, shareholders attach a lower value to an additional dollar of cash, since a small increase in cash reserves partially goes to increasing debt value, not solely to increasing equity value. This situation is viable in firms where the risk of financial distress is high, since the benefits of the cash may accrue mainly to bondholders.

Previous studies on corporate cash holdings mainly focus on the time-series and cross sectional variation in cash to asset ratio, or in other words the level of cash holdings. Both theory and evidence demonstrates that the firms should hold enough cash for their needs, but too much cash holdings would be costly for shareholders. By taking into account of both costs and benefits, it becomes a valid question as to what value shareholders attach to the firm's cash holdings and what characteristics determine that value. Therefore, the question regarding the marginal value of cash in the eyes of shareholders is explored in this study.

Faulkender and Wang (henceforth FW) (2006) investigate the cross-sectional variation in the marginal value of cash holdings that stems from differences in corporate financial policy. They point out that the marginal value of cash is lower for firms with higher cash holdings, higher leverage, and better access to capital markets. This study follows in the footsteps of FW (2006) and examines how shareholders value additional cash holdings depending on the firm specific factors for Turkish non-financial public firms. Empirical construction is based on the relation between excess stock return and firm characteristics variables using a dataset that contains financial statement items for 353 Turkish publicly quoted firms during the period from 1990 to 2014. I use a methodology that captures the return of excess equity instead of variation in the market-to-book levels. All independent variables are scaled by the firm's previous period equity value; hence, the estimated coefficients can be interpreted as the change in equity value corresponding to one lira change in explanatory variables. Using the regression approach of FW (2006), I demonstrate that, on average, shareholders value marginal cash holdings at a discount to face value. Please see Section 2.2 for the further discussion of methodological approach.

Three hypotheses, which discussed in Section 2.1, about how the marginal value of cash should vary across with firms' level of cash, indebtedness level and access to external financing are tested by using this methodological approach. Empirical findings in this study can be summarized as follows:

1) The average marginal value of cash across all firms is TRY 0.56 for a firm with no leverage and zero cash holding.
2) As the level of cash holdings and leverage increases, the marginal value of cash decreases.
3) The average marginal value of cash is greater for financially constrained firms compared to those that are less likely to be constrained.

4) The average marginal value of cash is higher for firms with investment opportunities; yet those lack internal funds.

The findings in this study are consistent with the results of FW (2006) such that the marginal value of cash holdings declines with higher cash holdings and higher leverage. Additionally, the hypothesis that the shareholders place higher value into the financially constrained firms is also supported with the findings as well.

The rest of this study proceeds as follows. Section 2 is split into two parts. First part focuses on three hypotheses that describe how the marginal value of cash should change together with the higher cash holdings, leverage and accessibility to financial markets. The second part explains the methodological approach in testing those hypotheses. Section 3 discusses the data used in empirical analysis. Section 4 presents the empirical results, and Section 5 concludes.

2. The Value of Cash

This paper investigates to the questions of what value shareholders attach to additional corporate cash holdings and how that value differs across firms depending on firm specific factors. If the firms are financially constrained, then one lira of additional cash held by a firm might worth more than one lira due to high transaction costs. On the other hand, if additional cash can only serve to increase (taxable) distributions, or leads to agency problems, then the marginal value of cash may be less than one lira.

2.1. Empirical Predictions

Given the abovementioned literature, it seems reasonable that there exist cross sectional differences in the market value of cash holdings. Thus, I hypothesize that the market value of additional cash would be a function of certain firm characteristics in line with the study of FW (2006).

Specifically, the value of cash should be associated with: the level of the firm's cash, the magnitude of shareholder-bondholder conflicts, and the extent to which the firm is financially constrained. The three hypotheses are explained below:

H1: The marginal value of cash declines as the firm's level of cash increases.

Holding profitability constant, as the firm's level of cash increases, the probability of accessibility to external financing becomes lower in the near future and the firm is instead more prone to distribute dividend to shareholders. In this circumstance, the value of one lira additional cash is lower than one, due to dividend taxation. On the other hand, a financially constrained firm with low level of cash holdings more likely needs to reach the external capital markets to finance its positive NPV investments. Due to high transaction costs incurred for accessing to external financing, the marginal value of extra one lira cash is greater than one lira. As a result, except from firms that are under financial distress, the marginal value of cash should be a decreasing function of the cash level.

H2: An extra cash holding is less valuable for shareholders in firms with higher shareholders-bondholders conflict.

In capital structure models, this theory is widely used. When the risky debt is in place, conflicts may arise between shareholders and debt holders. Jensen and Meckling (1976) argue that since equity security is a call option on the firm's value, shareholders prefer a riskier investment program. As cash holdings are risk-free, shareholders may value liquidity at a discount. That is to say, shareholders attach a lower value to additional cash holdings if the debt is risky since a small increase in cash reserves partially goes to increasing debt value, not solely to increasing equity value. Thus, as leverage increases, all else being constant, more of the firm value generated by additional cash holdings benefits to debt holders. Therefore, the marginal value of cash should be a decreasing function of leverage.

H3: In financially constrained firms, an additional cash holding is more valuable for shareholders.

If firms are financially unconstrained; that is to say, can easily reach to capital markets, then holding cash would not be a concern. On the other hand, for financially constrained firms with good investment opportunities and lack of internal funds, they might have to forgive positive NPV investments due to high transaction costs. The higher the cost of raising external funds, the more possible that positive NPV projects would be passed up. Therefore, shareholders attach a greater value on additional cash holdings.

There are several studies that show evidence related to the third hypothesis. For instance, Fazzari et al. (1988) state that; when firms are financially constrained, investment spending decision is based on the availability of internal funds, not to the availability of positive NPV projects. Almeida et al. (2004) find that financially constraint firms save cash out of cash flows (i.e. hoarding liquidity) systematically, while there is no systematic pattern for unconstrained firms regarding the reserving liquidity. Acharya et al. (2007) demonstrate that financially constrained firms, which have value enhancing investment opportunities, save cash rather than pay their debt if internal fund generation capacity is low. However, unconstrained firms and constrained firms with a high correlation between the presence of investment opportunities and high cash flows pay down debt rather than save cash. These studies support the hypothesis that the accessibility of capital alters the liquidity choices of firms and the value of cash across firms.

2.2. Empirical Specification

In order to test abovementioned hypotheses, the methodology of FW (2006) has been utilized in this study. The dependent variable is the excess return of stock, which is defined as stock i's return during fiscal year t subtracted by the return of stock i's benchmark portfolio during the similar fiscal year. By subtracting the benchmark portfolio return from stock return, the expected portion of the

stock return resulting from its size and market-to-book ratio is offset. Other firm characteristics are controlled when examining the effect of additional cash holdings on the market value of equity. Thus, the unexpected changes in firm characteristics should illustrate the abnormal returns.

In order to estimate the excess stock returns, six portfolios have been constructed based on size and book-to-market ratio in line with the methodology of Fama and French (1998). Fama and French (1993) points out that these two variables are a good proxy in specifying the cross section of expected stock returns. Thus, in the light of this evidence, firms are sorted into two groups, according to median MCap size. Then, each group is sorted into three groups as well (bottom 30 percent, middle 40 percent, and top 30 percent) based on book-to-market ratio. As a result, six portfolios are constructed based on the intersections of size and book-to-market ratio. In order to form excess return for any stock, the return of portfolio is subtracted from the realized return of stock.

The intention of this paper is to investigate how changes in cash holdings affect the shareholder's value; as a result, the individual stock returns should be used rather than portfolio returns as discussed in FW (2006). Since the impact of changes in cash holdings on shareholders' wealth is examined, other firm characteristics that might be in correlation with cash holdings changing the firm value should be controlled. Thus, I regress the excess stock return on changes in cash holding by controlling other variables such as firm's profitability, dividend policy and investment policy by using pooled OLS regression technique in which the standard errors are clustered at firm level. The sensitivity of firms to these firm characteristics is assumed to be same. The first two hypotheses, investigating whether the level of cash holdings and leverage affect the marginal value of cash, are tested through including interaction terms and by examining differences in coefficients across subsamples.

The baseline regression model is constructed as follows in line with the methodology of FW (2006):

$$r_{i,t} - R_{i,t}^{B} = \beta_0 + \beta_1 \frac{\Delta C_{i,t}}{M_{i,t-1}} + \beta_2 \frac{\Delta E_{i,t}}{M_{i,t-1}} + \beta_3 \frac{\Delta NA_{i,t}}{M_{i,t-1}} + \beta_4 \frac{\Delta I_{i,t}}{M_{i,t-1}} + \beta_5 \frac{\Delta D_{i,t}}{M_{i,t-1}} + \beta_6 \frac{C_{i,t-1}}{M_{i,t-1}}$$

$$+ \beta_7 L_{i,t} + \beta_8 \frac{NF_{i,t}}{M_{i,t-1}} + \beta_9 \frac{C_{i,t-1}}{M_{i,t-1}} * \frac{\Delta C_{i,t}}{M_{i,t-1}} + \beta_{10} L_{i,t} * \frac{\Delta C_{i,t}}{M_{i,t-1}} + \in_{i,t}$$

in which the notation of ΔX shows the unexpected changes in the variable X.

As FW (2006) conducted in their study, the realized changes are used with the assumption that expected change is zero, and then a number of robustness tests are conducted with various estimations of the unexpected change in cash. Excess stock return, i.e. $r_{i,t} - R_{i,t}^{B}$, is the dependent variable in which $r_{i,t}$ represents the annual return of the stock of firm i during fiscal year t and $R_{i,t}^{B}$ is the return of stock i's benchmark portfolio at time t. The independent variables are cash holdings (C_t), interest expense ($I_{i,t}$), total dividends ($D_{i,t}$), leverage ($L_{i,t}$) and the firm's net financing during the fiscal year ($NF_{i,t}$). Firms' profitability is controlled by including earnings before interest and taxes ($E_{i,t}$) and investment policy through using net assets (NA_t). Note that, there are slight variations in the independent variables of this study compared to FW's study (2006). For instance, the computation of net financing variable differs from FW's (2006) study due to lack of available data. In this study, net financing ($NF_{i,t}$) is calculated as $Equity_t - (Equity_{t-1} + Net\ Income_t - Dividend_t) + Total\ Debt_t - Total\ Debt_{t-1}$ instead of net financing variable in FW's study, which is calculated as total equity issuance minus repurchases plus debt issuance minus debt redemption. Moreover, although FW (2006) include R&D variable into the regression, it is not included in this study as R&D activities of Turkish firms are limited.

In order to prevent that the results are dominated by the largest firms, all firm specific factors (except leverage) are divided by one year lagged Mcap ($M_{i,t-1}$). Thus, the estimated coefficients can be interpreted as the lira change in value placed by shareholders for one lira change

in the corresponding independent variable. Also, all data are converted to real values in 1994 using the consumer price index (CPI). Moreover, in order to test the hypotheses that the level of cash and the level of leverage affect the value of cash, the interaction terms are included into regressions, i.e. $\frac{C_{i,t-1}}{M_{i,t-1}} * \frac{\Delta C_{i,t}}{M_{i,t-1}}$ for testing the different levels of cash holdings and $L_{i,t} * \frac{\Delta C_{i,t}}{M_{i,t-1}}$ for the effect of leverage on the marginal value of cash. According to both hypotheses, the coefficients of both variables, i.e. β_9 and β_{10}, should be negative. If β_9 is negative, it demonstrates that the marginal value of cash is a decreasing function of cash holdings of the firm, all else being constant. If β_{10} is negative, it indicates that an extra cash holding is less valuable for shareholders in firms with higher leverage as the conflict between shareholders & debt holders increases. Note that, the lagged cash position and the level of leverage are also included in these regressions in order to enable that the estimated coefficients on the interaction variables are resulting from the interaction, not resulting from the level of cash and/or leverage individually.

3. Data and Summary Statistics

We obtain annual balance sheet, income statement, cash-flow and equity market data of 353 publicly quoted Turkish non-financial firms over the 1990-2014 period from Rasyonet: StockGround Service. All financial variables are only taken from Financial Summary reporting type from Rasyonet to avoid any discrepancies between reporting types. In order not to disrupt integrity in the dataset, missing firm year data are excluded from the dataset and are not derived from any other data sources. All financial institutions, i.e. banks, leasing, factoring and insurance companies, are excluded in this study as their financial statement items differs from non-financial firms.

All data are adjusted for the effect of inflation by converting them to real values using the consumer price index (CPI). Balance sheet items that are used in this study are cash holdings and net assets. Cash holding is calculated as cash and cash equivalents plus marketable securities and

net assets is total asset minus cash holdings. Income statement items are EBIT (Earnings Before Interest and Taxes) and net interest expense. EBIT is calculated as gross profit minus operating expenses. Net interest expense is taken as financial expenses minus financial income, which includes interest expense/gain, FX loss/gain from financial activities and other financial expenses/gains such as commissions. Dividend, which is a cash flow item, is measured as common dividends paid. Equity market items used in this analysis is Market Capitalization (annual average). Several financial ratios are utilized in the analysis as well. Leverage ratio is total debt over the sum of total debt and the market value of equity. Net financing is calculated as change in the equity level minus net income plus dividend plus change in total debt during the fiscal year.

Some firm years are eliminated in which net assets, cash & cash equivalents and market capitalization (Mcap) is negative. Also, missing values are taken as zero. As one year of change is required in some variables, usable data commences from 1991. All in all, my ultimate sample includes 4,180 firm years. Summary statistics are presented below:

Table 1 – Summary Statistics

Variable	Mean	1st Quartile	Median	3rd Quartile	Std. Dev.
$r_{i,t} - R_{i,t}$	0.061	-0.202	-0.019	0.213	0.475
$\Delta' C_t$	0.016	-0.027	0.000	0.036	0.216
C_{t-1}	0.145	0.013	0.053	0.158	0.323
$\Delta' E_t$	0.010	-0.062	0.000	0.061	0.450
$\Delta' NA_t$	0.106	-0.113	0.013	0.197	0.844
$\Delta' I_t$	-0.026	-0.039	0.000	0.029	0.300
$\Delta' D_t$	0.001	0.000	0.000	0.002	0.076
L_t	0.235	0.021	0.170	0.387	0.233
NF_t	0.072	-0.124	-0.035	0.114	0.933

This table provides summary statistics for the variables of 353 publicly traded Turkish non-financial firms over the period 1990 to 2014. $r_{i,t} - R_{i,t}^B$ is the excess stock return in which $r_{i,t}$ represents the annual return of the stock of firm i at time t (fiscal year-end) and $R_{i,t}$ is the return of stock i's benchmark portfolio at time t. C_t is cash and cash equivalents plus marketable securities, E_t is measured as earnings before interest and taxes (EBIT), NA_t is total assets less cash balances. I_t is net interest expense and D_t is gross dividend paid. L_t is market leverage, calculated as total debt over the sum of total debt and the market value of equity. Net financing (NF_t) is calculated as change in equity minus Net Income plus Dividend plus Change in Total Debt. Apart from L_t and excess stock return ($r_{i,t} - R_{i,t}$), all variables are divided by the lagged market value of equity (M_{t-1}). All data are converted to real values in 1994 dollars using the consumer price index (CPI). ΔXt denotes notation for the 1-year change, i.e. $X_t - X_{t-1}$. The subscript t - 1 means the value of the variable is at the beginning of fiscal year t or at the end of fiscal year t - 1.

All independent variables, excluding leverage L_t, are divided by the one year lag value of Mcap. The median firm has -1.9% one-year excess stock returns while the mean is standing positive at 6.1%, which shows that the distribution is right skewed in line with the distribution of abnormal stock returns. The median change in cash holdings is almost zero indicating that firms' cash holdings tend to be persistent, which is in line with the findings of Opler at al. (1999) and Pinkowitz and Williamson (2002). Additionally, the mean change in cash holdings is also close to zero, demonstrating that change in cash holdings is distributed relatively symmetric.

The mean of cash holdings level is standing at 14.5%, which is greater than its median of 5.3%, suggesting that cash holdings are right-skewed. Moreover, Table 1 demonstrates that the net assets of the mean firm grow significantly. However, the standard deviation of net assets seems so large that it is contrary to the expectation that the asset bases of firms are stable over time. My

summary statistics are in line with the FW's (2006) study such that they also find that excess stock returns and cash holdings level are right skewed and change in cash holdings is relatively symmetric.

In order to test whether the value of cash differs between financially constrained and unconstrained firms, four financial constraint criteria have been used as detailed below. Although there is a debate in the literature regarding the measurement of financial constraints, financial constraints in Almeida et al (2004) study, namely dividend pay-out ratio, firm size, bond ratings, commercial paper ratings and Kaplan-Zingales Index, are widely used in the literature. In this study, dividend payout ratio, firm size, BIST 100 and SA Index are used as financial constraint criteria while KZ Index, bond ratings and commercial paper ratings constraints are not utilized in lack of data as well as due to different financial characteristics of Turkish firms.

- ***Payout Ratio:*** Financially constrained firms should retain internal funds to meet their debt obligations and to finance their investments; thus, constrained firms are expected to distribute low dividends. In light of this view, financially constrained firms have lower pay-out ratio, calculated as total dividends divided by net income. Thus, a firm is considered as constrained (unconstrained) if the pay-out ratio is less than or equal to the lowest (highest) 30th percentile (70th percentile) of the annual payout ratio distribution.
- ***Firm Size:*** Smaller firms are considered as more financially constrained since they face higher informational asymmetry problems and agency costs when raising financing for their investments; thus, they face greater constraints in case of accessing to financial markets. Sales is used as measure of firm-size and a firm is taken as constrained (unconstrained) if its sales are less (greater) than or equal to the sales in the lowest (highest) three deciles of the sample size.

- ***BIST100:*** A firm is considered as unconstrained if it is included in BIST100 index. For instance, Denis et al. (2003) show that being included in S&P500 index is a highly informative event leading to increase in earnings forecasts and realized earnings for firms. My analysis considers BIST100 index, the most prominent index of Turkey's stock exchange, which provides the sense that inclusion of the index provides financial opportunities.
- ***SA Index:*** In the literature, the index constructed by Hadlock and Pierce (2010) is usually used as financial constraint measure. Hadlock and Pierce (2010) form the SA index is as follows:

$$\text{SA index} = -0.737\times\text{size} + 0.043\times\text{size}^2 - 0.04\times\text{age}$$

where size is the log of the book value of total assets and age is the difference between the sample year and the year of the firm's incorporation or founding. However, in my computation, the variables are amended slightly by replacing total assets with net total assets (Total assets minus cash) and age is calculated as the difference between the sample year and the year of the firm's IPO. Following the Chen, Harford and Lin's (2014) study, firms in the lowest (top) three deciles of the SA index ranking are considered as financially unconstrained (constrained).

4. Empirical Results

This section demonstrates the regression results that are mainly based on FW (2006) framework. First part of this section shows the results of the first two hypotheses which are conducted with the whole sample during the 1990-2014 period. In the second part, the robustness check of these results is presented. Third section shows the result of the third hypothesis by examining the impact of capital market accessibility through using different financial constraint measures. In the final section, three subsamples are constructed according to interest coverage and

market-to-book ratio based upon their cash position, cash generation ability and investment opportunities.

4.1. Findings for Cash Level and Leverage

In order to measure the marginal value of cash for an average firm, the baseline regression model is estimated and the results are presented in Table 2. According to regression results, the coefficient of cash holdings demonstrates that an additional lira of cash holdings is valued by shareholders at TRY 0.31. However, the results alter when change in cash together with the level of cash ($C_{t-1} * \Delta C_t$) and with leverage ($L_t * \Delta C_t$) are included into the model as can be depicted in Column II. Thus, it can be concluded that the level of cash at hand as well as the financing structure of the firms impact the marginal value of cash. When these two variables are added, the estimated marginal value of cash for a firm with zero cash and no leverage is standing at TRY 0.56.

Recall that, the first hypothesis is that the marginal value of cash is a decreasing function of cash level. The estimated coefficient of the level of cash holdings together with the change in cash, i.e. ($C_{t-1} * \Delta C_t$), is negative and statistically significant at 1% level; therefore, the result is consistent with the hypothesis. The estimated coefficient implies that; if the two firms are identical to each other except from cash levels, the value of an additional lira of cash for the firm with lower cash level, i.e. 10% of equity, is almost TRY 0.02 higher than the firm with the cash holdings equal to 20% of equity. That is to say, for a firm with no leverage and cash level equal to 10% of its equity, the value of an additional lira of cash is TRY 0.54 (= TRY 0.564 + (-0.222 * 10%)); while the value of an additional lira of cash is TRY 0.52 for the firm with no leverage and cash holding equal to 20% of its equity. This result is consistent with the first hypothesis that the value of additional cash for the firms with lower cash holdings is higher compared to the firms with higher cash holdings due to high transaction costs; since firms with lower cash holdings are more likely to borrow at higher costs.

The findings are also supportive for the second hypothesis that the marginal value of cash is a decreasing function of the amount of leverage. The estimated coefficient of the level of leverage together with the change in cash, i.e. ($L_t * \Delta C_t$), is negative and statistically significant at 5% level. The estimated coefficient implies that if the two firms are identical to each other except from their leverage levels, the value of an additional lira of cash for debt free firm, i.e. zero leverage, is almost TRY 0.04 higher than the firm with a 10% leverage ratio. This finding also empirically supports the hypothesis that; as leverage increases, all else being constant, more of the firm value generated by additional cash benefits to debt holders. As cash increases, the probability of bankruptcy decreases; thus, a small increase in cash reserves partially goes to increasing debt value, not solely to increasing equity value.

The marginal value of cash is dependent on the estimated coefficient on the change in cash and the interactions with the level of cash holdings as well as leverage. If the firm has zero cash and no debt, marginal value of cash is TRY 0.56. The marginal value of cash for the mean firm is TRY 0.44 (=TRY 0.564 + (- TRY 0.222 * 0.145) + (- TRY 0.395 * 0.235)). Recall that, the mean firm's cash holdings is equal to 14.5% of Mcap while its leverage ratio is 23.5%. This result shows that one lira increase in cash is not fully reflected onto stock prices; due to lower rate of return of liquid assets because of a liquidity premium, tax disadvantages and agency costs.

Table 2 - Regression Results for the Whole Sample

Independent Variables	I	II
ΔC_t	0.308***	0.564***
	(0.000)	(0.000)
ΔE_t	0.349***	0.339***
	(0.000)	(0.000)
ΔNA_t	0.0770***	0.0685***
	(0.001)	(0.002)
ΔI_t	-0.159***	-0.158** *
	(0.002)	(0.002)
ΔD_t	1.685***	1.673***
	(0.000)	(0.000)
C_{t-1}	0.150**	0.190***
	(0.017)	(0.000)
L_t	-0.340***	-0.340***
	(0.000)	(0.000)
NF_t	-0.00455	0.00697
	(0.851)	(0.773)
$C_{t-1} * \Delta C_t$		-0.222***
		(0.004)
$L_t * \Delta C_t$		-0.395**
		(0.026)
Constant	0.105***	0.0980***
	(0.000)	(0.000)
Observations	4180	4180
R-squared	0.12	0.12

This table presents coefficient estimates of regressing the excess stock return, i.e. $r_{i,t} - R_{i,t}^B$, on changes in firm characteristics over the fiscal year. $r_{i,t} - R_{i,t}^B$ is the excess stock return in which $r_{i,t}$ represents the annual return of the stock of firm i at time t (fiscal year-end) and $R_{i,t}$ is the return of stock i's benchmark portfolio at time t. C_t is cash and cash equivalents plus marketable securities, E_t is measured as earnings before interest and taxes (EBIT), NA_t is total assets less cash balances. I_t is net interest expense and D_t is gross dividend paid. L_t is market leverage, calculated as total debt over the sum of total debt and the market value of equity. Net financing (NF_t) is calculated as change in equity minus Net Income plus Dividend plus Change in Total Debt. Apart from L_t and excess stock return ($r_{i,t} - R_{i,t}^B$), all variables are divided by the lagged market value of equity (M_{t-1}).Coefficient estimates are from pooled OLS data. Columns 1 measure the marginal value of cash for the average firm through regressing change in equity value to changes in the cash holdings of the firms through controlling other factors that may be correlated with changes in cash affecting firm value as well. Column 2 shows coefficient estimates from regression when allowing the change in cash to interact with the level of cash ($C_{t-1} * \Delta C_t$) and with leverage ($L_t * \Delta C_t$). Standard errors are clustered at firm level. ***,**,* statistically different from 0 at the 1%, 5% and 10% level, respectively. p values are in parantheses.

4.2. Alternative Measures of the Expected Change in Cash

The robustness check of the results are conducted through using two alternative measures of the expected change in cash and the difference between the realized change and the expected change is used in the robustness analysis, in line with the study of FW (2006). They state that the expected change in cash has already been incorporated into the market value of the firm at the beginning of the fiscal year; thus, solely the unexpected portion of the change in cash should affect the excess return.

Average change in cash in the benchmark portfolio is used as the first measure of the expected change in cash during the corresponding fiscal year. If most firms in the same portfolio increase their cash positions during the fiscal year, then the return of the portfolio should already incorporate the impact of the average increase in cash and the excess return should not reflect the change in cash in the benchmark portfolio. To illustrate this, if all firms in the same portfolio increase their cash holdings with the same ratio compared to their market value of the equity, then the market's reaction to the cash increase would already be reflected in the average return of the firms in the benchmark portfolio, and the excess return of the firms should be close to zero. The result of this alternative measure is depicted in Column 1 of Table 3.

The other measure of the unexpected change comes from Almeida et al. (2004)'s model, which estimates the expected change in cash holdings by controlling the industry fixed effects. In this model, change in cash holdings is modeled as a function of a number of sources and uses of cash. The realized values of these factors at the previous fiscal year are used to estimate the expected change in the current fiscal year. In order to find out the unexpected portion, the estimated expected change is subtracted from the realized change in the current fiscal year. The target is to estimate the market's expectation of the change of cash holdings in the current fiscal year; thus, the

Table 3 - Regressions with Alternative Definitions of the Expected Change in Cash Holdings

Independent Variables	Portfolio Average	ACW
ΔC_t	0.490***	0.529***
	(0.000)	(0.000)
ΔE_t	0.341***	0.342***
	(0.000)	(0.000)
ΔNA_t	0.0703***	0.0688***
	(0.001)	(0.002)
ΔI_t	-0.164***	-0.159***
	(0.002)	(0.002)
ΔD_t	1.671***	1.674***
	(0.000)	(0.000)
C_{t-1}	0.183***	0.183***
	(0.000)	(0.000)
L_t	-0.343***	-0.345***
	(0.000)	(0.000)
NF_t	0.0137	0.00716
	(0.572)	(0.770)
$C_{t-1} * \Delta C_t$	-0.176***	-0.210***
	(0.001)	(0.009)
$L_t * \Delta C_t$	-0.418***	-0.336**
	(0.003)	(0.049)
Constant	0.105***	0.106***
	(0.000)	(0.000)
Observations	4181	4180
R-squared	0.121	0.121

This table presents coefficient estimates of regressing the excess stock return, i.e. $r_{i,t} - R_{i,t}^{B}$, on changes in firm characteristics over the fiscal year. $r_{i,t} - R_{i,t}^{B}$ is the excess stock return in which $r_{i,t}$ represents the annual return of the stock of firm i at time t (fiscal year-end) and $R_{i,t}$ is the return of stock i's benchmark portfolio at time t. C_t is cash and cash equivalents plus marketable securities, E_t is measured as earnings before interest and taxes (EBIT), NA_t is total assets less cash balances. I_t is net interest expense and D_t is gross dividend paid. L_t is market leverage, calculated as total debt over the sum of total debt and the market value of equity. Net financing (NF_t) is calculated as change in equity minus Net Income plus Dividend plus Change in Total Debt. Apart from L_t and excess stock return ($r_{i,t} - R_{i,t}^{B}$), all variables are divided by the lagged market value of equity (M_{t-1}).Coefficient estimates are from pooled OLS data. Standard errors are clustered at firm level. ***,**,* statistically different from 0 at the 1%, 5% and 10% level, respectively. p values are in parantheses.

previous fiscal year's values are used as the market's information is limited to the previous fiscal year's results. The model used in the test written as follows:

$$\Delta CashHoldings_{i,t} = \alpha_0 + \alpha_1 Cashflow_{i,t-1} + \alpha_2 Q_{i,t-1} + \alpha_3 Size_{i,t-1} + \varepsilon_{i,t}$$

In this equation, *Cashflow* is calculated as EBIT over Total Asset, *Q* as the market value divided by the book value of assets and *Size* is measured as natural log value of assets. The result of this estimate can be found in Column 2 of Table 3. The results of Table 3 are almost similar to Table 2. The coefficients of leverage and cash levels are in similar magnitude and almost have the same strong statistical significance. Thus, the stability of the estimated coefficients is an indication of the robustness of the value of additional cash as well as how that value is affected with the level of cash and leverage.

4.3. Financial Constraints Results

The third hypothesis states that shareholders attach more value to additional cash holding for financially constrained firms. In order to test this hypothesis, four criteria, namely dividend payout ratio, firm size, BIST 100 index and SA Index are used to determine the constrained and unconstrained firms as explained in Section 3.

Table 4 displays the summary statistics of constrained and unconstrained groups under each criterion. The letter (C) stands for constrained firms and the letter (U) for unconstrained firms. The first line for each variable represents the mean value for the associated variable and the median is written in italics form. There is a positive but imperfect relation between four criteria such that the median change in cash holdings is zero or negative for constrained firms whereas the median change is zero or positive for unconstrained firms under three of the four criteria. This result can be explained as financially constrained firms are more prone to consume their cash holdings compared to unconstrained firms. In contrast to the findings of Almeida et al. (2004) and FW (2006), the

summary statistics show that unconstrained firms have higher cash holdings compared to the constrained firms.

Table 4 - Summary Statistics for Constrained and Unconstrained Groups

	Payout Ratio		Firm Size		BIST Constrained		SA Constrained	
Financial Criteria	(C)	(U)	(C)	(U)	(C)	(U)	(C)	(U)
dC_t	**0.020**	**0.009**	**0.003**	**0.032**	**0.011**	**0.028**	**0.006**	**0.038**
	0.000	*0.000*	*-0.001*	*0.003*	*-0.000*	*0.002*	*-0.000*	*0.001*
C_{t-1}	**0.133**	**0.165**	**0.101**	**0.213**	**0.127**	**0.186**	**0.098**	**0.232**
	0.043	*0.075*	*0.029*	*0.095*	*0.043*	*0.083*	*0.040*	*0.091*
dE_t	**0.024**	**-0.018**	**-0.001**	**0.032**	**0.009**	**0.014**	**0.008**	**0.013**
	0.003	*-0.004*	*-0.003*	*0.005*	*-0.002*	*0.002*	*0.000*	*0.002*
dNA_t	**0.110**	**0.095**	**0.027**	**0.172**	**0.080**	**0.163**	**0.012**	**0.189**
	0.003	*0.019*	*-0.018*	*0.046*	*0.001*	*0.038*	*-0.020*	*0.036*
dI_t	**-0.044**	**0.004**	**-0.035**	**-0.011**	**-0.031**	**-0.015**	**-0.036**	**-0.008**
	-0.002	*0.001*	*-0.000*	*0.000*	*-0.000*	*-0.000*	*-0.001*	*0.000*
dD_t	**-0.009**	**0.018**	**-0.002**	**0.005**	**0.001**	**0.002**	**0.000**	**0.004**
	0.000	*0.008*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
L_t	**0.279**	**0.171**	**0.207**	**0.240**	**0.242**	**0.219**	**0.195**	**0.259**
	0.231	*0.105*	*0.123*	*0.195*	*0.172*	*0.165*	*0.102*	*0.208*
NF_t	**0.116**	**0.015**	**0.048**	**0.105**	**0.062**	**0.093**	**0.013**	**0.112**
	-0.024	*-0.043*	*-0.037*	*-0.027*	*-0.04*	*-0.025*	*-0.049*	*-0.02*

This table presents the summary statistics for the variables across groups of financially constrained and unconstrained firms from 1990 to 2014. The letter (C) is used for constrained firms and (U) for unconstrained firms. The first number corresponds to the mean and the medians are written in italics form. Excess stock return, i.e. $r_{i,t} - R_i^B{}_{,t}$, where $r_{i,t}$ is the annual stock return of firm i at time t and $R_i^B{}_{,t}$ is stock i's benchmark portfolio return at time t. All variables except L_t and excess stock return are deflated by the lagged merket value of equity (M_{t-1}) ΔX_t is compact notation for the realized one year change in cash relative to the expected change in cash for that specification. C_t is cash and cash equivalents plus marketable securities, E_t is measured as earnings before interest and taxes (EBIT), NA_t is total assets less cash balances. I_t is net interest expense and D_t is gross dividend paid. L_t is market leverage, calculated as total debt over the sum of total debt and the market value of equity. Net financing (NF_t) is calculated as change in equity minus Net Income plus Dividend plus Change in Total Debt.

Table 5 shows the regression results for the constrained and unconstrained firms through using four criteria. My findings are consistent with the third hypothesis that the marginal value of cash is significantly higher for constrained firms as compared to unconstrained firms, both statistically and economically. The difference between the coefficients of constrained and unconstrained firms is statistically significant at 10% level under all four criteria. This finding suggests that the market does not attach a high value for cash holdings for financially unconstrained firms as these firms are able to access external financing when needed. On the other hand, the

market gives higher value for the cash holdings of financially constrained firms; as these firms may face high transaction costs when they need to raise external financing.

The coefficients of the interaction terms, i.e. $C_{t-1} * \Delta C_t$ and $L_t * \Delta C_t$, are almost similar to Table 2 in terms of direction. Nonetheless, the coefficients of these variables differ in each subsample. The coefficient of the interaction term with cash holdings are more negative for constrained firms compared to unconstrained firms; which demonstrates that constrained firms' marginal value of cash is higher as their cash positions are getting smaller. This finding is consistent with the idea that additional cash holdings is most valuable for firms that want to raise external financing yet and that would incur high transaction costs while doing so. This result also shows that the constrained firms' marginal value of cash holdings decreases faster as their cash position increases. The coefficients of the interaction variable with leverage are not stable and statistically different from zero, yet the coefficients are all negative. This finding suggests that increase in cash holdings partially goes to increasing debt value, irrespective of whether the firm is financially constrained or not.

One of the major purposes of this paper is to measure whether the marginal value of cash is different between financially constrained and unconstrained firms. In order to test this hypothesis, three coefficient estimates which include change in cash holdings are utilized. Using the summary statistics from Table 4, the marginal value of cash is TRY 0.47 (= TRY 0.616 + (- TRY 0.216 * 0.133) + (- TRY 0.404 * 0.279)) for financially constrained firms on average under payout criteria; while shareholders of financially unconstrained firms place value of TRY 0.34 (= TRY 0.453 + (- TRY 0.152 * 0.165) + (- TRY 0.494 * 0.171)) on average for the extra one lira cash holdings. This finding is consistent with the third hypothesis that shareholders of financially constrained firms attach more value to the extra one lira cash holding on average as compared to the shareholders of financially unconstrained firms. The estimated marginal cash values under each constraint are TRY 0.93 vs. TRY 0.14 using firm size as constraint; TRY 0.56 vs. TRY 0.19 using BIST 100 as constraint; and TRY

0.49 vs. TRY 0.21 using SA Index. In each constraint, the marginal value of cash is higher for financially constrained firms than for unconstrained firms. The difference in the marginal value of cash holdings range from TRY 0.13 to TRY 0.79 between financially constrained and unconstrained firms, showing that how market perceives the additional cash holdings based on the accessibility to financial markets.

In order to verify that the findings demonstrating the effects of financial constraints are solid, robustness tests are conducted with the unexpected change in cash holdings. Hence, firms are again split based on four financial constraints criteria and the average change in cash in the benchmark portfolio is used in place for change in cash. The results of the robustness test can be found in Table 6.

Based on the results, the marginal value of cash is still higher for constrained firms compared to unconstrained firms. The coefficients of both the average change in cash in the benchmark portfolio and the interaction variables with cash holdings and leverage are almost similar to Table 5. Through incorporating the summary statistics for constrained and unconstrained samples, the marginal value of cash is TRY 0.37 for the financially constrained firms versus TRY 0.30 for financially unconstrained firms. For the other three constraints, the marginal value of cash are TRY 0.84 vs. TRY 0.15 using firm size as financial constraint; TRY 0.42 vs. TRY 0.23 using BIST 100 index; and TRY 0.44 vs. TRY 0.15 using SA Index as financial constraints. These findings again justify the third hypothesis that the marginal value of cash is higher for firms that are more likely to face problems while reaching to capital markets.

Table 5 - Regression for Constrained and Unconstrained Groups

Independent Variables	Payout Ratio		Firm Size		BIST Constrained		SA Constrained	
	(C)	(U)	(C)	(U)	(C)	(U)	(C)	(U)
ΔC_t	0.616***	0.453***	1.082***	0.236**	0.725***	0.251	0.784***	0.331**
	(0.000)	(0.000)	(0.000)	(0.016)	(0.000)	(0.106)	(0.000)	(0.020)
p- value (C - U ≠ 0)	0.0295		0.000		0.0613		0.0967	
ΔE_t	0.229**	0.514***	0.341**	0.569***	0.252**	0.579***	0.307**	0.612***
	(0.010)	(0.000)	(0.018)	(0.000)	(0.014)	(0.000)	(0.019)	(0.000)
ΔNA_t	0.0381**	0.195***	0.0622*	0.104*	0.0551**	0.126**	0.139***	0.0535
	(0.046)	(0.001)	(0.074)	(0.051)	(0.016)	(0.013)	(0.001)	(0.150)
ΔI_t	-0.139***	-0.151	-0.170*	-0.140**	-0.163***	-0.133**	-0.108*	-0.148*
	(0.003)	(0.233)	(0.072)	(0.044)	(0.005)	(0.042)	(0.080)	(0.072)
ΔD_t	1.459***	1.821***	1.404**	2.081***	1.766***	1.592***	1.538***	1.665***
	(0.000)	(0.000)	(0.013)	(0.002)	(0.000)	(0.001)	(0.000)	(0.004)
C_{t-1}	0.243***	0.152***	0.337**	0.0944***	0.201***	0.227***	0.353***	0.122***
	(0.000)	(0.001)	(0.014)	(0.007)	(0.000)	(0.000)	(0.001)	(0.005)
p- value (C - U ≠ 0)	0.0215		0.0238		0.6619		0.000	
L_t	-0.364***	-0.226***	-0.368***	-0.286***	-0.339***	-0.323***	-0.306***	-0.309***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
NF_t	0.0359	-0.113**	-0.0198	-0.0112	0.0133	-0.0417	-0.0411	0.0171
	(0.180)	(0.039)	(0.659)	(0.870)	(0.659)	(0.389)	(0.370)	(0.624)
$C_{t-1} * \Delta C_t$	-0.216*	-0.152**	-0.433**	-0.00733*	-0.331***	0.226	-0.202	-0.0793
	(0.088)	(0.033)	(0.025)	(0.939)	(0.000)	(0.267)	(0.323)	(0.462)
$L_t * \Delta C_t$	-0.404	-0.494**	-0.523	-0.377	-0.478**	-0.458	-0.481	-0.404 *
	(0.126)	(0.040)	(0.171)	(0.109)	(0.012)	(0.276)	(0.225)	(0.079)
Constant	0.103***	0.0509***	0.0948***	0.0878***	0.0951***	0.0905***	0.0843***	0.0825***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

This table presents the regression results across groups of financially constrained and unconstrained firms from 1990 to 2014. The letter (C) is used for constrained firms and (U) for unconstrained firms. The first number corresponds to the mean and the medians are written in italics form. Excess stock return, i.e. $r_{i,t} - R_i^B{}_{,t}$, where $r_{i,t}$ is the annual stock return of firm i at time t and $R_i^B{}_{,t}$ is stock i's benchmark portfolio return at time t. All variables except L_t and excess stock return are deflated by the lagged merket value of equity (M_{t-1}) ΔX_t is compact notation for the realized one year change in cash relative to the expected change in cash for that specification. C_t is cash and cash equivalents plus marketable securities, E_t is measured as earnings before interest and taxes (EBIT), NA_t is total assets less cash balances. I_t is net interest expense and D_t is gross dividend paid. L_t is market leverage, calculated as total debt over the sum of total debt and the market value of equity. Net financing (NF_t) is calculated as change in equity minus Net Income plus Dividend plus Change in Total Debt. ***,**,* statistically different from 0 at the 1%, 5% and 10% level, respectively.

Table 6 - Robustness Checks for Constrained and Unconstrained Firms

Independent Variables	Payout Ratio		Firm Size		BIST 100		SA Index	
	(C)	(U)	(C)	(U)	(C)	(U)	(C)	(U)
ΔC_t	0.498***	0.429***	1.036***	0.190**	0.579***	0.264*	0.769***	0.227**
	(0.000)	(0.000)	(0.000)	(0.014)	(0.000)	(0.063)	(0.000)	(0.048)
p- value (C - U ≠ 0)	0.3346		0.000		0.0946		0.0022	
ΔE_t	0.231**	0.529***	0.341**	0.567***	0.256**	0.579***	0.308**	0.615***
	(0.011)	(0.000)	(0.018)	(0.000)	(0.014)	(0.000)	(0.019)	(0.000)
ΔNA_t	0.0413**	0.189***	0.0594*	0.103**	0.0526**	0.116**	0.136***	0.0551
	(0.033)	(0.001)	(0.087)	(0.047)	(0.024)	(0.017)	(0.001)	(0.114)
ΔI_t	-0.143***	-0.185	-0.157	-0.147**	-0.171***	-0.116*	-0.105*	-0.157**
	(0.003)	(0.145)	(0.112)	(0.011)	(0.005)	(0.060)	(0.092)	(0.045)
ΔD_t	1.393***	1.835***	1.365**	2.064***	1.775***	1.578***	1.517***	1.668***
	(0.000)	(0.000)	(0.021)	(0.002)	(0.000)	(0.002)	(0.000)	(0.004)
C_{t-1}	0.232***	0.153***	0.327**	0.101***	0.181***	0.217***	0.327***	0.122***
	(0.000)	(0.002)	(0.011)	(0.002)	(0.000)	(0.000)	(0.002)	(0.004)
p- value (C - U ≠ 0)	0.0800		0.0406		0.4535		0.000	
L_t	-0.366***	-0.224***	-0.376***	-0.297***	-0.344***	-0.340***	-0.315***	-0.319***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
NF_t	0.0418	-0.101*	-0.00977	-0.00620	0.0238	-0.0271	-0.0338	0.0210
	(0.121)	(0.046)	(0.830)	(0.927)	(0.435)	(0.558)	(0.450)	(0.549)
$C_{t-1} * \Delta C_t$	-0.154	-0.118*	-0.318*	-0.0591	-0.208***	0.0574	-0.186	-0.0866
	(0.163)	(0.074)	(0.093)	(0.330)	(0.001)	(0.742)	(0.312)	(0.279)
$L_t * \Delta C_t$	-0.368*	-0.648***	-0.769**	-0.132	-0.543***	-0.205	-0.774**	-0.211
	(0.060)	(0.009)	(0.021)	(0.466)	(0.001)	(0.594)	(0.013)	(0.333)
Constant	0.110***	0.0563***	0.100***	0.0914***	0.104***	0.0978***	0.0923***	0.0883***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	2423	1614	1042	1358	2866	1315	1491	1110
R-squared	0.099	0.164	0.122	0.177	0.103	0.194	0.112	0.181

This table presents the regression results across groups of financially constrained and unconstrained firms from 1990 to 2014. The letter (C) is used for constrained firms and (U) for unconstrained firms. The first number corresponds to the mean and the medians are written in italics form. Excess stock return, i.e. $r_{i,t} - R_{i,t}^{B}$, where $r_{i,t}$ is the annual stock return of firm i at time t and $R_{i,t}^{B}$ is stock i's benchmark portfolio return at time t. All variables except L_t and excess stock return are deflated by the lagged merket value of equity (M_{t-1}) ΔX_t is compact notation for the realized one year change in cash relative to the expected change in cash for that specification. C_t is cash and cash equivalents plus marketable securities, E_t is measured as earnings before interest and taxes (EBIT), NA_t is total assets less cash balances. I_t is net interest expense and D_t is gross dividend paid. L_t is market leverage, calculated as total debt over the sum of total debt and the market value of equity. Net financing (NF_t) is calculated as change in equity minus Net Income plus Dividend plus Change in Total Debt. ***,**,* statistically different from 0 at the 1%, 5% and 10% level, respectively.

4.4. Subsample Tests

In order to check the robustness of the cross-sectional results, the sample is divided into three subsamples based upon a measure of interest coverage and market-to-book ratio. Thus, the market value of equity should differ for an additional cash holding in the firm. Interest coverage is defined as the sum of the beginning cash position of the firm and earnings before interest and taxes within that fiscal year divided by the net financial expense in that year. Low interest coverage means that the firm needs more external financing in order to finance its investments or even to finance its debt obligations. Conversely, firms with higher interest coverage need to allocate less cash and cash flow to debt obligations; thus, have more funds available for investment and distribution. Market to book ratio can be interpreted as a measure of firm's investment opportunities. Although FW (2006) used industry market to book value, I have used individual firm's market-to-book ratio as majority of the firms in my sample belong to the same industry, namely manufacturing.

As above mentioned, three subsamples have been constructed based on the interest coverage and market-to-book ratio and median values are used while constructing the subsamples. The first subsample is constructed according to low level of interest coverage ratio and low level of market-to-book ratio. These firms do not have valuable investment opportunities and significant portion of cash holdings increase the value of debt holders; thus, the marginal value of cash of this category is expected to be low. The second subsample is formed with low interest coverage and high market-to-book ratio. These firms have less cash holdings yet have valuable investment opportunities; thus, the marginal value of cash holdings is expected to be high for this category as it reduces the high transaction costs. Lastly, the third category is with high interest coverage and low market-to-book ratios. These firms hold high cash balances yet do not have investment opportunities; that is to say, they are more prone to distribute cash. Thus, it is expected that the

marginal value of additional cash holdings is also low for this category as well. These firms are likely to suffer from agency problem as described by Jensen (1986) in addition to tax problems.

My empirical findings, which can be found in Table 7, are supportive for the hypotheses above. When I examine the first category of firms with low interest coverage and low market-to-book ratio, an additional cash holding is only valued at TRY 0.44. This result is consistent with the Jensen and Meckling (1976)'s findings which demonstrate that shareholders value liquidity at a discount when the debt is risky since a small increase in cash reserves partially goes to increasing debt value, not solely to increasing equity value. For the second category, the marginal value of cash is TRY 0.93 for the firms with low interest coverage and high market-to-book ratio. This finding is also consistent with the hypothesis that firms with investment opportunities but low internal funds place higher value for additional cash holdings due to high transaction costs. Finally, the third subsample represents the firms with high interest coverage and low market-to-book ratio. For this category, the marginal value of additional cash holding is TRY 0.21, which is in line with the Jensen's (1986) agency problem as well as dividend tax problem. If these results are combined, I can conclude that the shareholders place on more value on the additional cash holdings to the firms that reinvest their cash into the firm and lower value on the cash holdings to the firms that are prone to distribute the cash to debt holders and equity holders.

Table 7 - Results for Three Different Coverage and M/B Groups

Independent Variables	I	II	III
ΔC_t	0.446***	0.929***	0.213**
	(0.001)	(0.001)	(0.002)
ΔE_t	0.131	0.490**	0.617***
	(0.121)	(0.047)	(0.000)
ΔNA_t	0.0372	0.190**	0.0866**
	(0.129)	(0.044)	(0.021)
ΔI_t	-0.117***	-0.126	-0.309***
	(0.005)	(0.534)	(0.001)
ΔD_t	2.137***	1.053**	1.761***
	(0.000)	(0.011)	(0.000)
C_{t-1}	0.454***	2.030***	0.0954**
	(0.000)	(0.000)	(0.032)
L_t	-0.305***	-0.877***	-0.206***
	(0.000)	(0.000)	(0.000)
NF_t	0.0325	0.154	-0.0500
	(0.287)	(0.265)	(0.120)
Constant	0.0565**	0.191***	0.0261
	(0.040)	(0.000)	(0.248)
Observations	1397	688	801
R-squared	0.116	0.129	0.269

This table presents the results of regressing the excess stock return $r_{i,t}$ - $R_{i,t}^B$ on changes in firm characteristics over the fiscal year. All variables except L_t and excess stock return are deflated by the lagged market value of equity (M_{t-1}). C_t is cash plus marketable securities, E_t is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits, and NA_t is total assets minus cash holdings. I_t is interest expense, total dividends (D_t) are measured as common dividends paid, L_t is market leverage, and NF_t is the total equity issuance minus repurchases plus debt issuance minus debt redemption. ΔX_t is compact notation for the 1-year change, X_t -X_{t-1}. The subscript t - 1 means the value of the variable is at the end of fiscal year t - 1. Regression I is on the subset of firms in the bottom quarter of interest coverage and the bottom quarter of the industry market-to-book ratio. Interest coverage is defined to be (Cash+EBIT)/interest expense. Regression II is on firms in the bottom quarter of interest coverage and the top quarter of the industry market-to-book ratio. Regression III is on firms in the top quarter of interest coverage and the bottom quarter of the industry market-to-book ratio. ***,**,* statistically different from 0 at the 1%, 5% and 10% level, respectively.

5. Conclusion

In this study, how additional cash holding affects the market value of equity is examined for publicly quoted Turkish non-financial firms from 1990-2014. Following the methodology of FW (2006), empirical findings show that there exists cross-sectional variation in the market value of cash, based on the firm characteristics.

On average, the market value of additional cash holding is standing at TRY 0.56 with no leverage and zero cash holding, which shows that the potential agency problems associated with cash holding outweigh the benefits of liquidity on average. My findings are supportive of the three hypotheses stated in FW's (2006) study. As such, additional cash holding is mostly valued by equity holders of firms with low cash holdings, low leverage and constraints in accessing to capital markets. The results become even stronger when the sample is examined by dividing into subsets. The study mainly illustrates that the marginal value of cash is higher for firms that have investment opportunities, yet those are lacking of internal funds, which suggests that the market identifies the existence of frictions that leads to higher transaction costs.

Results of this study demonstrate that the market value of holding additional cash is higher for the firms with higher valuations, yet lower internal funds. On the other hand, the marginal value of additional cash holdings decreases with the level of cash holdings. Combining these two results, it is suggested that there might be an upper limit on the amount of cash holdings in which the market rewards for it.

Several suggestions can be made for further research. Apart from the financial constraint measures in the literature, other financial constraint criteria should be constructed specifically for Turkish firms; since the financial characteristics of Turkish firms are different from the firms in developed countries. For instance, line of credit data can be taken into consideration while building a financial constraint. Additionally, corporate governance can be added into the scope of this study

in order to test how good governance improves the marginal value of cash. An alternative for net financing variable can be formulized, since it is the only variable that seems statistically insignificant in the baseline regression of this study.

6. References

Acharya, V.V., Almeida, H., Campello M. (2007), Is Cash Negative Debt? A Hedging Perspective on Corporate Financial Policies. Journal of Financial Intermediation 16 (4): 515-554.

Almeida, H., Campello, M., Weisbach, M.S. (2004), The Cash Flow Sensitivity of Cash. The Journal of Finance 59: 1777–1804.

Chen, T., Harford, J., Lin, C. (2013), Financial Flexibility and Corporate Cash Policy. Working Paper

Easterbrook, F.H. (1984), Two Agency-Cost Explanations of Dividends. American Economic Review 74 (4): 650-659.

Fama, E.F., French, K.R. (1993), Common Risk Factors in the Returns on Stocks and Bonds, Journal of Financial Economics 33: 3-56

Fama, E.F., French, K.R. (1998), Taxes, Financing Decisions, and Firm Value, Journal of Finance 53: 819-843.

Faulkender, M., Wang, R. (2006), Corporate Financial Policy and the Value of Cash. Journal of Finance 61: 1957–90.

Fazzari, S.M., Hubbard, G.R., Petersen, B.C. (1988), Financing Constraints and Corporate Investment. Brookings Papers on Economic Activity 1: 141-195.

Harford, J. (1999), Corporate Cash Reserves and Acquisitions. The Journal of Finance 54: 1969 1997.

Jensen, M.C. (1986), Agency Cost of Free Cash Flow, Corporate Finance, and Takeovers. American Economic Review 76 (2): 323-329.

Jensen, M.C., Meckling, W.H. (1976), Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics 3 (4): 305-360.

Keynes, J.M. (1936), The General Theory of Employment. Interest and Money. Macmillan, London.

Miller, M.H., Orr, D. (1966), Model of the Demand for Money by Firms. The Quarterly Journal of Economics 80 (3): 412-455.

Modigliani, F., Miller, M.H. (1958), The Cost of Capital, Corporate Finance and the Theory of Investment. American Economic Review 48: 261-197.

Opler, T., Pinkowitz, L., Stulz, R., Williamson R. (1999), The Determinants and Implications of Corporate Cash Holdings. Journal of Financial Economics 52: 3–46.

Pinkowitz, L., Williamson, R. (2001), Bank Power and Cash Holdings: Evidence From Japan, Review of Financial Studies 14: 1059-1082.

Pinkowitz, L., Williamson, R. (2004), What is a Dollar Worth? The Market Value of Cash Holdings, Working Paper, Georgetown University