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**Original Research Article**

# Bank Health and Cash Flow Sensitivity of Cash: Evidence from TSE Listed Firms

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Achieving a strong and efficient monetary cycle is of great importance and necessity due to the dependency of corporates on banks in Iran. Owing to the importance of cash management in firms, this study assesses the impact of bank health on Cash flow sensitivity of cash of listed corporates on Tehran Stock Exchange (TSE) by analyzing 102 firms which have received facilities from 20 active Iranian banks during 2015 to 2019. To calculate bank health, CAMELS indicators have been used. Two main hypotheses along with related sub hypotheses have been considered and tested by estimating panel data models. Results show that the quality of assets, as an indicator of Bank health, has a negative effect on sensitivity of cash held which is consistent with the bank power hypothesis ؛and the liquidity index as another bank health indicator negatively affects the sensitivity of the cash held, which is consistent with the hypothesis of financial constraint.

**Keywords:** Bank Health, Cash Held, CAMELS, Financial Constraint, Bank Power
**JEL Classification***:* C40, E31, I32

## 1 Introduction

Liquidity management is one of the most important tasks of financial managers. Banks are the main source of financing for firms in Iran. The relationship between a bank and a firm is affected by several factors and it can affect the performance of firms. On the other hand, the favorable financial situation of the firm can also help the firm to find high quality facilities with lower financial costs. The purpose of liquidity management is to maintain a

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sufficient level of cash and other current assets such as accounts receivable and inventories (Jensen, 1986).

One way to finance firms is using bank facilities. Particularly as we are facing a bank-based system in Iran, banks have a key role in financing firms. consequently, more and more Iranian firms have become dependent on the banks. Therefore, bank performance is important for the country's financial and economic system. A Healthy banking system is significantly important and has a special place in the economy due to its important role in financial intermediation and the circulation of money and wealth of the society.

Since banks can help their lending firms encountering financial constraints, they would exert power over them. If the bank's health deteriorates, banks will be unable to rescue a firm, consequently decreasing the levels of bank power. These relationships comprise the bank power (Sasaki & Suzuki, 2019).

The consequences of financial constraints can be obtained by the firms' desire to save cash from incremental cash inflows (the cash flow sensitivity of cash hereafter referred to as CFSC). Constrained firms should have a positive CFSC, while unconstrained firms' cash savings should not link to cash flows systematically (Sasaki & Suzuki, 2019).

The experience of the 2008 financial crisis and the devastating effects of the transition from monetary sector to real sector of the economy revealed the importance of paying attention to the impact of banking health on corporate economic activity. Bankruptcy in the banking system has a contagious effect on the real economy, and the failure of the bank will potentially lead to widespread system failures, also known as systemic risk (Fenech et al. 2014). Considering the bank-based market in Iran, the bankruptcy of banks has a significant impact on the risk of firms which need to finance from banks; because bank is the main source of financing these firms in times of crisis. As a result, the importance of cash management increases for financial managers and this issue of how they would manage cash will raise to them according to the increasing credit risk and bank nonperforming loans which damages the bank health.

Therefore, the purpose of this study is to investigate that as bank health deteriorates, do financial constraints on bank-dependent financing firms make firms decide to save more cash flows (increase in CFSC)? -Which is in accordance with the financial constraints hypothesis- or do they decide to save less cash from cash flows which react negatively to CFSC? - Which is consistent with the bank power hypothesis? In other words, the present study examines the effect of bank health on the cash flow sensitivity of cash in TSE-listed firms.

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This issue has been studied in few kinds of research globally so far. Also, it has not been mentioned in the Iranian money and capital market as yet. Therefore, testing these two hypotheses in Iran are considered as the research contribution of this study.

The first section is dedicated to the introduction. The next section includes the theoretical and research background. In the third section, the research methodology, model, and variables are introduced. The fourth section includes model estimation results and research findings and the fifth and sixth section of the article respectively presents the discussion and conclusion.

## 2 Theoretical and Research Background

### 2.1 Bank Health

Banks as financial and service institutions play a crucial role in the circulation of money and wealth in the economy. Therefore, the effective activity of banks can have important effects on the growth of economic sectors and increase the level of quantity and quality of products.

In the banking system of each country, the analysis of banks is done for various purposes such as stock valuation, profitability, performance appraisal, efficiency, etc. while experiencing the recent financial crises and its devastating effects from the monetary sector to the real sector of the economy, the importance of paying more and more attention to the issue of banking Health has been revealed.

Banks raise their funds from sectors which have access to liquidity and direct them to sectors that lack liquidity. Therefore, assisting their health and stability is very important due to the impact that the functioning of these institutions has on the economic growth and development of countries (Babar, 2011). Therefore, the central banks of many countries for monitoring the banking system, evaluates and ranks banks based on banking health and stability so that they can recognize the unfavorable situation before the crisis and bankruptcy in the bank and try to correct its situation, thereby prevent from bankruptcy and destructiveness effects (Trivedi and Elahi, 2015). For examining banking health, determining indicators is one of the key steps. Studies show that the Banks ranking has a long history in the world of banking and specialized and well-known institutions and systems have been created for this purpose, which use various criteria to measure the health and stability of banks and rank them.

The most famous ranking systems offered in the banking industry can be found in a set of ratios called CAMEL, which was used in October 1987 by

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the National Credit Union Administration (NCUA) to assess the health of financial institutions. In 1997, the market risk index added to CAMELS components, the CAMELS rating system was introduced, using which the key dimensions of banks and financial institutions under six important indicators, namely Capital adequacy, Assets, Management Capability, Earnings, Liquidity, Sensitivity is assessed (Sangmi and Nazir 2010).

– Cash Flow Sensitivity of Cash (CFSC)

CFSC tends to save money from cash flows, which is also mentioned in other articles on the sensitivity of cash flows. It seems that not only the use of cash flow sensitivities of cash is theoretically justified, but also it is empirically valid. Almeida et al (2004) define CFSC as the percentage of change in the level of holding cash about changes in cash flows. Their model suggests that there is positive correlation between a firm's financial constraints and CFSC which means that those firms with financial problems are more likely to save cash out of their operating cash inflows. In particular, firms with no financial constraints should not show systematic propensity to save cash out of their operating cash flows. As such, the CFSC provides a theoretically justified, empirically implementable measure of the importance of financial constraints. Also, Sasaki & Suzuki (2019) found that the effect of financial constraints can be captured by a firm’s propensity to save cash out of incremental cash inflows (the CFSC). While constrained firms should have a positive CFSC, unconstrained firms’ cash savings should not be systematically related to cash flows. While constrained firms’ CFSC enlarges during economic depression, unconstrained firms’ cash-cash flow sensitivity is not affected by macroeconomic innovations.

– Hypothesis Development

In this paper, we investigated two hypotheses that conflict with another framework developed by Almeida et al. (2004):

The Bank power hypothesis claims that the deterioration of bank health is conducive to less cash saving out of cash flows, extremely if the firms depend on the main bank. However, the financial constraint hypothesis contradicts this claim.

Pinkowitz and Williamson (2001) state that the firms which are controlled by the banks, hold more cash. Banks use their power to force those firms to hold more cash on deposits at lower rates and to lend to other firms at higher rates. Consequently, banks secure a margin of interest rates. As bank health deteriorates, bank power weakens and cannot make firms hold more cash. These relationships comprise the bank power hypothesis (Sasaki & Suzuki, 2019).

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The deterioration of bank health causes the weakening of bank power and firms' financial constraints (Sasaki & Suzuki, 2019). Almeida et al. (2004) model why and how financial constraints increase firms' cash holdings and find that financially constrained firms save more cash from their cash flow sensitivities than unconstrained firms. Other researchers have found results consistent with those of Almeida et al. (2004) (e.g., Khurana et al., 2006). Most of these studies focus on firm characteristics as a financial constraint factor.

The deteriorating health of banks prevents firms from raising funds and weakens the bank's power over corporate lending, especially in bank-dependent economies (Pinkowitz & Williamson, 2001).

According to a study done in the bank-based market, banks have more power than borrowing firms. And banks can save these firms if they face financial constraints. However, when banking health deteriorates, banks cannot save firms, and the main sources of funding for firms vary from country to country. Fundraising available for firms differs based on the financial system of each country. In countries with bank-dependent financial systems, such as Japan and Germany, banks play a more central role in fundraising than banks in market-oriented countries, and ties between banks and industrial firms remain unchanged over the long term. The deterioration of bank health restricts firms from raising funds and weakens bank power over borrowing firms, especially in bank-dependent economies (Sasaki & Suzuki, 2019).

Pinkowitz & Williamson (2001) examine the relationship between bank power and corporate cash holdings. They found that bank-owned firms had more money, indicating that banks were using their power to force their lenders to keep more money in deposits at lower rates and to lend to other firms at higher rates. Hence, banks guarantee interest rates margins. When the health of the bank deteriorates the power of the bank weakens and cannot cause firms to make more money. In another explanation of this relationship, Cui et al. (2020) have pointed out that in line with the relationship between monetary policy, the bank and the firm the health of the bank affects the cash held by the firm, and a healthy bank can lead to more (due to the power of the effective) or less (due to prudent motivation) to keep the fund to the firm level. Accordingly, healthy banks encourage growing firms (Firms with growing investment) to hold more money, while declining firms (firms with declining investment) hold more money when they borrow from unhealthy banks. Findings on the impact of banking health on corporate assets are controversial.

Fazzari et al. (1987) argued when the difference between the cost of internal and external financing increases, the sensitivity of the use of cash flow

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will increase. Theoretical foundations of financial management show that based on the firms' needs in terms of cash, they strongly retain cash which can highly affect the process of using cash and related decisions. Cash storage helps to avoid the high cost of external financing in a cash shortage.

Cui et al. (2020) conducted a study entitled Cash policy and the bank-firm relationship. This article examines whether banking policy determines the cash level of the firm. Using data of a Japanese corporate from 2000 to 2014, It has been found that the difference in the bank health affecting on the firm is due to the situation of the corporate investment. It is concluded that healthy banks stimulate growing firms to keep more money, whereas declining firms keep more money when they borrow from unhealthy banks. In addition, banks with more liquidity forcing their growing borrowers to have more money.

Madanizadeh & Ebrahimi (2018) have conducted a study on the Bank-Firm Relationships: The Case of Iranian Listed Firms. In this research, the data of more than 260 listed firms in the TSE in the period 2004-2007 have been used. The findings of the study show that firms with lower liquidity risk and better financial ratios can access the loan with better quality and lower costs. Moreover, the regression results indicate that the share of the private banks' loans is higher for firms with poor liquidity conditions. Moreover, loans in the firms with higher cash flow are more concentrated to a few creditors. In addition, an increase in the size of firms is positively correlated with the share of the private banks' loans and the number of creditors.

Machokoto & Areneke (2021) find significant asymmetry in the cash flow sensitivity of cash conditional on cash flow and financial constraints. Firms with positive cash flow save while those with negative cash flow dissave. These differences are more apparent in the presence of financial constraints. Their result affirms the asymmetry in the cash flow sensitivity of cash and highlight the impact severity of financial constraints on corporate decisions in emerging markets.

Lozano & Yaman (2020) investigate firms' cash flow sensitivity of cash (CFSC) in a European setting. They examine various effects of financial constraints and income and substitution effects on CFSC in the context of the family ownership structure. When examining the shareholders' behavior within the ownership structure of family firms, they find a positive CFSC level for our full sample. Results show a significant connection between the family ownership structure and CFSC's determinant factors: the higher (lower) sensitivity of the firms with more (fewer) financial constraints suggests that family firms are financially less constrained than non-family firms.

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Additionally, opposed to prior literature, income and substitution effects have a nonnegative impact on CFCS.

## 3 Methodology

In this study, for testing the effect of the (main) bank health on the cash assets of firms, the health index was used for the bank from which the firm received the most loans. Also, when firms have used several main banks, the average of this index is used for firms. The statistical population of this study is all the firms listed on the Tehran stock exchange in five years from the beginning accounting year of 2015 to the end of the accounting year of 2019, which met the following conditions:

1) The end of the firm's fiscal year leading to the end of March of each year (to create comparability).
2) The corporate has not changed the financial year or activity during this period.
3) The activity of the firm is not in the field of financial intermediation.
4) Corporate data are available to calculate research variables.

By applying the above mentioned restrictions, the statistical population is equal to 338 firms. However not all of their data are available, so the statistical sample includes 102 firms.

Bank health information has also been collected from the Iranian banking institute and the financial statements disclosed on the Codal website.

In line with the purpose of the research, the hypotheses are codified as follows:

1) Bank health of corporates main bank has a significant effect on the CFSC of corporates.
2) Corporate cash flow mediates the relationship between bank health and CFSC.

### 3.1 Research Models and Variables

**The Dependent Variable: Δcash holding**

The dependent variable of the study is the CFSC of firms, which is measured by the difference between the total cash and negotiable securities at times *t-1* and *t*.

$$\Delta Cash\ holding\ =\ Cash\ holding_t\ -\ Cash\ holding_{t-1}$$

Cash holding is calculated by summing the cash and negotiable securities divided by the book value of the assets in period t for the corporate.

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$$Cash\ holding\ = \frac{Cash}{Book\ Asset}$$

**Independent Variable: Bank Health**

To calculate the bank health, the CAMELS index and sub-indexes has been used which includes six indicators.

Capital adequacy, Asset quality, Management quality, Earnings, Liquidity, Market risk Sensitivity follows:

**Capital adequacy *(CA)*:** Capital adequacy is calculated by dividing bank capital by risk-weighted assets. The risk-weighted asset is a detailed issue calculated according to the instructions of the central bank of Iran which is not relevant in this study. It should be noted that it is disclosed in the notes of the banks' financial statements.

$$CA = \frac{Capital}{Risk\ Weighted\ Assets}$$

**Asset quality (*AQ*)**: It is equal to dividing the non-performing loans by the total loan

$$AQ\ = \frac{non{-}performing\ loans}{total\ loan}$$

**Management quality (*MQ*):** It is calculated by dividing the net profit by the number of employees.

$$MQ\ = \frac{net\ profit}{employees}$$

**Profit:** It is calculated by dividing the net profit by the book value of assets (return on assets ROA)

$$Profit\ = \frac{net\ profit}{bookvalue\ of\ assets}$$

**Liquidity:** It is calculated by dividing the liquid assets by the book value of the total assets

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$$LIQ = \frac{liquid\ assets}{book\ value\ of\ the\ total\ assets}$$

**Market risk sensitivity (*SMR*)**: It is calculated by dividing the open foreign exchange status by the bank's capital base[1] . Open foreign exchange status is calculated from the difference between the sum of foreign exchange assets and foreign currency debts.

$$SMR = \frac{currency\ asset - currency\ debt}{BaseCapital}$$

**Bank health:** To calculate this index, each of the above indicators is divided by the average of the same indicator, and the average number obtained for six indicators are considered as the bank health index.

The noteworthy point of this section is that some firms only borrow from one bank referred to as the main bank, which for calculating the bank health index for that corporate, only the main bank health index is considered. But in some other firms that have borrowed from more than one bank, the weighted average is taken from the indexes of those banks. If the weight of each index is equal to the share of the bank from the total facilities received by the corporate.

**Moderator Variable**

**Cash flow:** Is equal to the sum of ordinary dividends at amortized cost from which taxes and dividends are deducted.

Cash flow = EBIT + Dep – TAX – Div

**Control Variable**

*Asset* denotes the value of book assets, and this study uses the natural logarithm for Asset to control firm size. *MTB* is the sum of the market value of equity and the book value of debt divided by book assets. *CapEx* is calculated as fixed assets in *t-1* minus those in *t-2* plus depreciation in *t-1* scaled by book assets in *t-1*. *ΔNWC* is the difference in the networking capital ratio of t and *t-1*. *ΔLeverage* is the difference in Leverage between *t* and *t-1*, and Leverage is the sum of short- and long-term debt divided by book assets. These control variables are expected to have a positive effect on CFSC.

[1] The capital base is a term used by individual investors, publicly traded companies, and banks to refer to a base level of funding. ... For banks, capital base is synonymous with bank capital and represents the value that results when a bank's liabilities are subtracted from its assets.

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## 3.2 Research Model

The following models are used to test the hypotheses based on Sazaki and Suzuki (2019).

$$\Delta Cash\ holdings_{\ i,t} = \alpha + \beta_1 \ln(Bank\ health_{\ i,t}) + \beta_2 Cashflow_{\ i,t} \times \ln(Bank\ health_{\ i,t}) + \beta_3 Cashflow_{i,t} + \beta_4 \ln(Asset_{i,t}) + \beta_5 MTB_{i,t} + \beta_6 CapEx_{i,t} + \beta_7 \Delta NWC_{i,t} + \beta_8 \Delta Leverage_{i,t} + \beta_9 Cash\ holdings_{i,t-1} + \varepsilon_i$$

The variables of the above model are described in detail in table 1 which is briefly as follows:

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Table 1
*Definitions of variables*

| Variable | Symbol | Information | Calculation |
|---|---|---|---|
| CASHHOLDING | CASH HOLDING | Summing the cash and negotiable securities divided by the book value of the assets in period t for the corporate. | Cash holding=$\frac{Cash}{Book\ Asset}$ |
| CFSC | ΔCASHHOLDING | difference between the total cash and negotiable securities at time t-1 and t | ΔCash holding = Cash holding $_t$ – Cash holding $_{t-1}$ |
| Bank health | BANKHEALTH | To calculate the bank health the CAMELS index and sub-indexes has been used which includes six indicators | $BH = \frac{CA + AQ + MQ + PROFIT + LIQ + SMR}{6}$ |
| Capital adequacy | CA | dividing bank capital by risk-weighted assets | $CA = \frac{Capital}{Risk\ Weighted\ Assets}$ |
| Asset quality | AQ | It is equal to dividing the non-performing loans by the total facilities | $AQ = \frac{non-performing\ loans}{total\ facilities}$ |
| Management Quality | MQ | It is calculated by dividing the net profit by the number of employees | $MQ = \frac{net\ profit}{employees}$ |
| Profitability | PROFIT | It is calculated by dividing the net profit by the book value of assets (return on assets ROA( | $Profit = \frac{net\ profit}{bookvalue\ of\ assets}$ |
| Liquidity | LIQ | It is calculated by dividing the liquid assets by the book value of the total assets | $LIQ = \frac{liquid\ assets}{book\ value\ of\ the\ total\ assets}$ |
| Sensitivity market risk | toSMR | It is calculated by dividing the open foreign exchange status by the bank's base capital. Open foreign exchange status is calculated from the difference between the sum of foreign exchange assets and foreign currency debt | $SMR = \frac{currency\ asset - currency\ debt}{basic\ capital}$ |
| Cash flows | CF | Is equal to the sum of ordinary dividends at amortized cost from which taxes and dividends are deducted. | Cash flow = EBIT + Dep – TAX - Div |
| Asset | LNASSET | Book value of assets | Firm size = $ln(asset)$ |
| Market value book Value | toMTB | Total Stock market value and debt value divide the book values of assets | MTB=$\frac{MRKET\ VALUE\ EQUITY+BOOK\ VALUE\ DEBIT}{BOOK\ ASSETS}$ |
| Cost of Capital | CAPEX | Fixed assets on the t-2 time subtract from fixed assets on the t-1, add period Depreciation t-1, divided by the book value of assets | CAPEX= $\frac{Fixasset(t-1)\ -Fixasset(t-2)+Dep\ (t-1)}{Book\ Assets}$ |
| Net changes working capital | inΔNWC | The ratio of net working capital to the book value of assets. ΔNWC= $NWC_t$ -$NWC_{t-1}$ | NWC t= $\frac{\text{current assets (t) – debit assets(t)}}{\text{Book assets}}$ |
| Financial leverage ratio | ΔLEVERAGE | Total long-term and short-term liabilities divided by the book value of assets | Leverage =$\frac{SHORT-TERM\ DEBT+LONG-TERM\ DEBT}{\text{Book assets}}$ |
| Interactive variable | Cash flow ln(Bank health | Is an endogenous variable. Although the impact of the corporate's cash does not affect the banks' health, unknown variables may affect the banks' health. | $Cash\ flow\ (i,t) \times ln(Bank\ health(t))$ |

*Source*: Research Findings

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# 4 Findings

## 4.1 Descriptive Statistics

Before testing the research hypothesis, the research variables are briefly examined in the table.2, this table contains descriptive statistics of the research variables.

Table 2
*Descriptive statistics*

| Variable | Symbol | Average | Middle | MAX | MIN | Standard deviation |
|---|---|---|---|---|---|---|
| CASHHOLDING | CASHHOLDING | 0.039 | 0.025 | 0.145 | 0.002 | 0.04 |
| CFSC | ΔCASHHOLDING | 0.003 | 0.001 | 0.078 | -0.07 | 0.032 |
| Bank health | BANKHEALTH | 0.77 | 0.294 | 8.962 | -5.183 | 3.224 |
| Capital adequacy | CA | 3.543 | 3.83 | 13.2 | -6.3 | 5.136 |
| Asset quality | AQ | 0.117 | 0.109 | 0.22 | 0.049 | 0.049 |
| Management Quality | MQ | 0.1 | 0.071 | 3.553 | -3.432 | 1.548 |
| Profitability | PROFIT | -0.0009 | 0.0004 | 0.017 | -0.021 | 0.01 |
| Liquidity | LIQ | 0.099 | 0.092 | 0.192 | 0.055 | 0.036 |
| Sensitivity to market risk | SMR | 0.108 | 0.362 | 2.624 | -6.253 | 1.926 |
| Cash flows | CF | 0.132 | 0.035 | 1.226 | -0.285 | 0.331 |
| Asset | LNASSET | 14.567 | 14.238 | 18.158 | 11.688 | 1.792 |
| Market value to book Value | MTB | 2.077 | 1.499 | 5.812 | 0.482 | 1.548 |
| Cost of Capital | CAPEX | 0.054 | 0.024 | 0.291 | -0.015 | 0.08 |
| Net changes in working capital | ΔNWC | 0.002 | 0 | 0.287 | -0.299 | 0.138 |
| Financial leverage ratio | ΔLEVERAGE | 0.004 | 0.003 | 0.237 | -0.202 | 0.106 |

*Source*: Research Findings

As shown in table 2 the average retained cash is 0/039. This shows that on average, 3.9% of the corporate's assets are held in cash. In fact, this number indicates that the amount of cash held in the sample firms is concentrated around this point. The middle of this variable also shows that half of the firms hold more than 2.5% of their assets in cash and the other half hold less than this amount of cash. The maximum and minimum amount of cash kept were 14.5% and 0.2%. Similarly, the standard deviation which shows the scatter of observation relative to the mean indicates a relatively moderate scatter. So that the firms held cash is 4% scattered. Similarly, the average retained cash

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change is 0.003. In fact, firm's cash holdings have changed by an average of about 0.3 percent over the years. The highest and lowest changes were a 7.8% increase and a 7% decrease in retained cash.

It should be noted that the research variables were normalized at the level of 5% error before estimating the estimation.

Similarly, the average bank health was 0.77. As mentioned above, this index was calculated based on six indicators. Also, due to the difference in the mean values of various indicators, first, the desired variables are normalized with average, then the average of the desired indicators is considered as their health index of the bank. Actually, increasing the desired index is considered as higher health of the bank. In this regard, by examining the indicators in the table.4-1, it is observed that the average capital adequacy is 3.543. Also, the assets quality has an average of 0.117 and shows that non-performing loans to the total facilities are approximately 11.7%. The quality of management is also 10% on average. As a matter of fact, the profit is 10% of the number of workers. Liquidity, which is calculated based on the ratio of cash assets to total assets, should also indicate that banks' lending to the studied firms has 9.9 % liquidity. Likewise, the profitability of the banks was approximately 0. Finally, the market risk sensitivity is 0.108. This variable is calculated based on the differences between foreign exchange assets and foreign currency debt to the foreign exchange base capital of Banks.

The average cash flow is 0.132. The lowest and highest rates are 1.226 and -0.285, respectively. The average size of firms based on their natural logarithm of assets is 14.56. The ratio of market value to book value is 2.077 on average and shows that the market value of a stock is almost twice as its book value. Also, the average cost of capital is 5.4%. In this regard, the average financial leverage is 0.624 and it states that about 62% of corporate assets come from debt. Changes in financial leverage also show that there is a 0.4% Change in corporate debt's assets each year.

## 4.2 Hypotheses Testing

Based on the results of the table.2 it can be observed that the probability of F-statistic for all models is equal to 0.000. Therefore, it can be said that the models of the first hypothesis are generally significant. Also, R2 shows that on average about 48% of changes of the dependent variable are explained by independent and control variables.

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Table 3
*Model estimation results*

| variable | Symbol | Bank health (composite) | Capital adequacy | Asset quality | Management Quality | Profitability | Liquidity | Sensitivity to market risk |
|---|---|---|---|---|---|---|---|---|
| Bank health[1] | BANKHEALTH | 0.0001 | 0.0002 | -0.054* | -0.001 | -0.067 | -0.109** | -0.0002 |
| | | (0.216) | (0.468) | (-1.856) | (-0.54) | (-0.418) | (-3.68) | (-0.309) |
| Cash flows | CF | 0.003 | 0.003 | -0.019* | 0.002 | 0.003 | -0.0002 | 0.002 |
| | | (0.472) | (0.696) | (-1.663) | (0.337) | (0.409) | (-0.015) | (0.396) |
| Cash flows*Bank health | CF*BANKHEALTH | -0.001 | -0.0004 | 0.164* | 0.001 | 0.233 | 0.02 | -0.0003 |
| | | (-1.044) | (-0.469) | (1.869) | (0.781) | (0.526) | (0.359) | (-0.284) |
| Asset | LNASSET | 0.007** | 0.007** | 0.006 | 0.007** | 0.007** | 0.006** | 0.006** |
| | | (2.963) | (3.643) | (1.43) | (2.803) | (3.002) | (3.107) | (3.016) |
| Market value to book Value | MTB | 0.001** | 0.001** | 0.001 | 0.001** | 0.001** | 0.001** | 0.001** |
| | | (3.987) | (4.565) | (1.196) | (4.804) | (5.378) | (5.9) | (7.332) |
| Cost of Capital | CAPEX | -0.032** | -0.035** | -0.034** | -0.033** | -0.033** | -0.035** | -0.033** |
| | | (-7.048) | (-7.279) | (-2.787) | (-6.263) | (-6.991) | (-6.961) | (-5.241) |
| Net changes in working capital | NWCΔ | 0.045** | 0.046** | 0.044** | 0.044** | 0.044** | 0.045** | 0.044** |
| | | (4.542) | (4.329) | (4.712) | (4.645) | (4.381) | (5.036) | (4.288) |
| Financial leverage ratio | ΔLEVERAGE | 0.005 | 0.005 | 0.003 | 0.004 | 0.005 | -0.0004 | 0.004 |
| | | (0.428) | (0.385) | (0.296) | (0.352) | (0.371) | (-0.039) | (0.34) |
| Cash holding | CASHHOLDING(-1) | -0.769** | -0.771** | -0.777** | -0.771** | -0.769** | -0.759** | -0.769** |
| | | (-7.137) | (-7.185) | (-4.568) | (-7.21) | (-6.982) | (-6.78) | (-7.186) |
| Constant | C | -0.073** | -0.068** | -0.046 | -0.073* | -0.069** | -0.055* | -0.064** |
| | | (-2.021) | (-2.472) | (-0.844) | (-1.921) | (-2.003) | (-1.833) | (-1.987) |
| F | | 2.859 | 2.856 | 2.928 | 2.864 | 2.863 | 2.991 | 2.859 |
| prob | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| $R^2$ | | 0.481 | 0.481 | 0.486 | 0.481 | 0.481 | 0.492 | 0.481 |

**Significance at 95% Probability level and *signification at 90% probability level.
*Source*: Research Findings

By examining the bank health variable in the first model, it is observed that its coefficient is 0.0001, and its related statistics is 0.216. Therefore, it can be said that this coefficient is not significant at the 95% probability level. Thus, it can be argued that banking health does not affect the liquidity and storage of cash flows. Consequently, the first hypothesis of the research in this case that "banking health affects cash flow reserves" is rejected.

By examining other research models, it is observed that only the banking health coefficient based on assets quality index at the level of 90% probability has a negative and significant effect on changes in cash holdings. Liquidity also has a significant negative effect on changes in cash holdings.

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Accordingly, the first hypothesis of the research is proved only on the basis of two indicators of asset quality and liquidity. In fact, when the quality of bank assets and liquidity of lending banks to firms increases, the liquidity reserve of the cash flow will decrease.

To study the moderator role of cash flow, it is observed that the role of cash flow is not significant in any of the research models. Therefore, the second hypothesis of the research is rejected in all cases and it can be said that cash flows do not affect the relationship between Bank health and cash flow sensitivity.

By examining other research variables, it is perceived that in most models related to the first hypothesis, asset, market-to-book value, and net changes in working capital, there is a positive and significant effect on changes in cash holding, and cost of capital and cash holding lag has a negative effect on cash holding changes.

## 5 Discussion

In the first hypothesis, the indicators of asset quality and liquidity had a negative effect on the CFSC and other indicators did not have any significant effect on the CFSC. In fact, the higher the liquidity and quality of bank assets the lower the firm's cash flow sensitivity of cash. The results of the liquidity hypothesis are consistent with the financial constraints hypothesis of Sasaki and Suzuki (2019) according to said as the bank health is reduced, the sensitivity of the retained cash is increased. Thus, the higher the quality of the assets, the lower the health of the bank and also the lower the sensitivity of cash flow which are consistent with the bank power hypothesis and they confirm the results of Weinstein & Yafeh (1998) and Pinkowitz & Williamson (2001). According to the results, the following suggestion is presented:

According to the hypothesis of the effect of bank assets quality on the CFSC and their negative relationship, it can be analyzed that the more the bank’s non-performing loans increases, the less the bank health is which leading to low CFSC and finally it is not possible to borrow easily from banks. Accordingly, corporate finance managers and other financial decision-makers will expect that the bank will not be able to easily finance its affiliate due to the high arrears of the bank. Also, the bank will not have the power to persuade firms to keep their cash in banks at low-interest rates and to lend to other firms at higher interest rates, so firms will save less cash.

According to the financial constraint hypothesis, liquidity reserves from cash flows are expected to increase when cash flows are unfavorable. But in this article, studies show that Cash flow as a moderator does not affect the

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relationship between bank health indicators and the cash flow sensitivities of cash.

## 6 Conclusion

In this research, we studied how banks' health affects firms' CFSC. In this regard, two hypotheses named *bank power* and *financial constraints* have been proposed and tested with the data of 102 listed corporates at TSE during 2015-2019. It is concluded that as the bank's liquidity index inversely affected by the bank's health and since firms' CFSC have a positive impact on bank health, the financial constraint hypothesis will be accepted. Also, if the bank's asset quality index increases, the bank's health will decrease due to the increase in non-current deferred claims, which is in line with the bank's power hypothesis.

Summarily, the findings showed that the asset quality and liquidity indices have negative effect on CFSC. It means that, the higher the liquidity and asset quality of banks increase, the CFSC of their dependent corporates will decrease. The result of liquidity hypothesis and financial constraint hypothesis (Sasaki & Suzuki (2019) is consistent with the fact that reducing the bank health will increase CFSC. The findings also indicated that the higher the quality of assets, the lower the health of the bank and cash flow sensitivity which is consistent with Bank power hypothesis. These findings are consistent with Weinstein & Yafeh (1998), Pinkowitz & Williamson (2001) and Machokoto & Areneke (2021) researches.

As a result, according to the financial constraint hypothesis when the bank's liquidity declines financial managers and decision-makers are advised to maintain more cash in order to avoid the risk of capital shortages and inability to repay debts. And if the quality asset index of the bank and bank's overdue receivables increases, according to the hypothesis of the bank's power it is better to keep less cash and use it for instance on investments.

In addition, studying the issue of "the effect of bank health on firms' investments" will be a useful, practical and intriguing study for financial decision-makers.

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