The Fiscal Dominance through Banking System:
A Case Study on the Relationship between Government and Banking System in Iran's Economy[1]

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Abstract

Iran's economy still has a two-digit inflation rate with high fluctuations, mainly caused by fiscal dominance. According to the relevant literature, borrowing from the central bank is the most critical fiscal dominance mechanism. After prohibiting direct borrowing from the Central Bank of Iran's government, the budget deficits are partially addressed by off-budgeting operations achieved by the banking system. In addition to introducing the Off-budgeting mechanism of fiscal dominance through the banking system, this study aimed to detect whether fiscal dominance in Iran resulted from the government's borrowing from the banks and, consequently, its indirect borrowing from the Central Bank. The bank ledgers data from March 2007 to June 2018 was used in this study, and it was revealed that an increase in the government's debts to the banks had a significant positive effect on the bank's debt to the Central Bank; the result is more highlighted in specialized and privatized banks, respectively. This finding is robust when the banks' balance sheet, banking health, and macroeconomic status have controlled.

Keywords: Budget Deficit, Off-budget Operations, Banking System, Fiscal Dominance, Money Supply.

JEL Classification: E62, H62, G21, E51.

1. Introduction

The high inflation rate is one of the fundamental problems in Iran's economy. Inflation makes the poor poorer, increases inequality, causes fluctuations and uncertainties in the economy, and consequently decreases investments by the private sector. Even

though most countries have overcome the inflation phenomenon, unfortunately, Iran's economy has a two-digit inflation rate with high fluctuations.

The monetary authority, central banker, plays a critical role in controlling inflation. Regarding the type of inflation, Central Bank can choose to conduct active or passive monetary policy operations. In an active monetary policy, the fiscal policy and monetary policy are assumed to be independent of each other, and the Central Bank can choose an inflation target and use the tools in hand. In a passive monetary policy, however, monetary policy is considered to have a close relationship with fiscal policy, and they are interconnected by the budget deficit. In this regard, fiscal dominance, which is the focus of this paper, appears. By definition, "fiscal dominance refers to a situation under which the fiscal authorities do not commit to balancing expenditure and revenues, so the monetary authorities will be forced to balance government revenues and expenditure. Accordingly, "monetary policy must adjust to deliver the level of seigniorage required to balance the government's budget" (Walsh, 2010). In other words, monetary authority by using different means has to finance the budget deficit of the government.

According to the relevant literature, the most important fiscal dominance mechanism is to finance budget deficits by the Central Bank. The Central Bank finances budget deficits in two ways: (1) government's direct borrowing from the Central Bank, and (2) the Central Bank's intervention in the official debt market to purchase government-issued bonds via open-market operations.

For many years, fiscal dominance has been a concern in developing countries with governments having low budget disciplines and continuous budget deficits, which would finally get monetized and financed by the Central Bank resources. Some examples of studies addressing this issue are Gardea et al. (2012) in Argentina, Blanchard (2004) in Brazil, Ersel and Özatay (2008) in Turkey, and Fratianni and Spinelli (2001) in Italy. In this regard, numerous studies have shown how fiscal dominance in these countries has led to inflation and decreased rates of trade, consumption, and production and has finally challenged political stability in these countries.

However, fiscal dominance is not restricted to the developing

countries and is a more complex phenomenon in developed economies, as these countries have access to developed financial markets and their governments can issue securities with various maturities and finance deficits using non-monetary means. In these countries, the main point of concern about fiscal dominance is not abolishing debt by creating inflation but raising uncertainty about the long term interest rate of the government debts. In these countries, the Central Bank's policies cannot be independent of the fiscal policy when the Central Bank's balance sheet expands. Issuing debts by the government has turned it to the largest issuer of debt securities and demander of funds, and at the same time, it has turned the Central Bank into the largest buyer of the debt securities and supplier of funds. Under the shadow of the high ratio of debts to GDP, the interrelationship between the monetary policy, fiscal policy, and debt management would be of high importance, necessitating a high level of cooperation and a mutual understanding among the entities in charge (Blommestein, 2011).

Additionally, in countries with vast natural resources, another means that may lead to fiscal dominance is the foreign-currency income, which emerges as the Central Bank exchanges the government's natural resources; as such the Central Bank's exchange rate is affected by the government's actions. Such countries usually prefer to follow a fixed exchange rate regime so that they usually have to deal with fiscal dominance and inflation is thus a major problem in these countries. The inflation resulting from fiscal dominance and fixed exchange rate regimes make these countries adopt procyclical fiscal policies. Elbadawi et al. (2017) explain that the mere fact of having a resource-dependent income does not lead to achieving procyclical fiscal policies. In other words, structures and rules set in the economy may maintain countercyclical conditions (e.g. Norway).

In Iran's economy, more than 70 percent of the government's expenditure is financed by foreign currency income and money creation, thereby leading to lower levels of production and jobs versus higher inflation rates (Tavakolian, 2015). In such a situation, there is another means for changes in the monetary base, i.e. changing the foreign assets of the Central Bank. Thus, the standard way of fiscal dominance determination, that is the significance of the relationship

between the government debt and monetary base, cannot be clearly defined; however, the adoption of other indicators has proved the existence fiscal dominance in Iran's economy during the years after the Revolution (Asgharpour et al., 2016).

In Iran, due to poor development of domestic financial markets, the lack of an effective taxation system, and the existence of limitations on borrowing from foreign countries, the government's budget is often financed by selling the foreign currency of oil exports to the Central Bank of Iran (oil dominance) or borrowing from the CBI (fiscal dominance). Both methods increase the monetary base, and thus, increasing the inflation rate. Consequently, the share of seigniorage in the government's finances increases. Additionally, due to the current structural weaknesses, another means of financing the government's budget deficits is borrowing from the banks, which is restricted to Iran in terms of scale and quality and also leads to a shift in the banks' debt to the CBI (fiscal dominance). Accordingly, in addition to the direct dominance of fiscal policy over the monetary base, there is also an indirect dominance through the banking system.

Fiscal dominance in Iran has disabled the CBI to use monetary tools in reaching the inflation target, which makes the monetary policy undisciplined, and leads to the procyclical fiscal policy. It can be concluded that an expansionary fiscal policy financed by debts to the CBI leads to a business cycle in the real economy as well as an increase in the inflation rate (Zamanzadeh et al., 2013).

This study aimed to explain the off-budget mechanisms of fiscal dominance and detect whether fiscal dominance is the result of borrowing from the banks and consequently indirect borrowing from the Central Bank. The mechanisms of fiscal dominance through the banking system are discussed in the second section of this paper. The third section describes the adopted dataset and introduces the variables. In the fourth section, the model specifications are presented. The estimation results of the model are reported in Section 5, and the study is concluded in the sixth section.

2. Fiscal Dominance Mechanisms through Banking System

This section classifies fiscal dominance mechanisms in Iran into two categories of conventional mechanisms and off-budgeting

mechanisms, while the institutional constructs of the country are also considered.

Figure 1 presents four fiscal dominance channels, which are discussed in the literature and appear to be active in Iran's economy.

1. Increasing the government's direct debt to the Central Bank,
2. Increasing the government's debt to the Central Bank by loans received from banks,
3. Increasing net foreign asset of the CBI by oil foreign currency revenue,
4. Increasing net foreign assets of the CBI by exchanging the foreign currency of the National Development Fund (NDF).

Only the first two channels that are activated by the banking system are analyzed in this study.
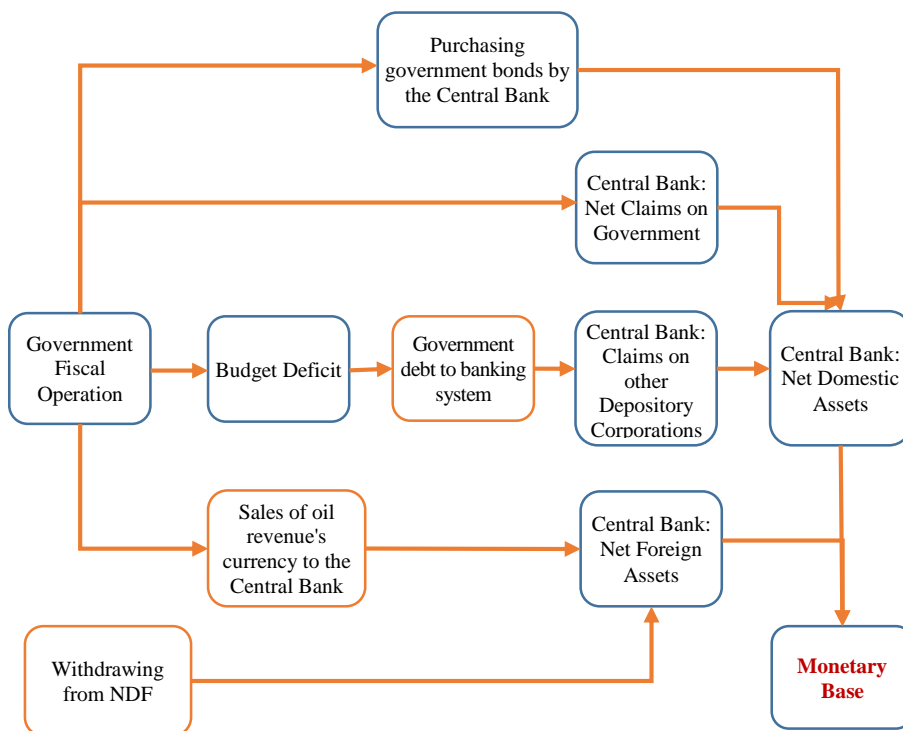

Figure 1: Fiscal Dominance Mechanisms in Iran

2.1 Conventional Fiscal Dominance Mechanisms: Direct Borrowing from the Central Bank

One of the conventional fiscal dominance mechanisms is direct

government borrowing from the Central Bank, which was of concern for many years in developing countries and would eventually finance their continuous budget deficits by the monetary base. If direct borrowing from the Central Bank becomes coupled with worsening production capacity in the economy, it leads to hyperinflation. As the most recent example, this happened in Zimbabwe during 2008-2009. For this reason, most countries have banned direct government borrowing from the Central Bank. For example, this prohibition is expressed in the Maastricht Treaty which is the foundation of the European Union's fiscal management. In Iran, this technique to finance budget deficit was possible until the enactment of the Third Development Plan; however, according to Article 69 of this Act, it is prohibited and currently has no legal basis.

As shown in figure 2, in this process budget deficit boosts the monetary base by increasing net government debt to the Central Bank.
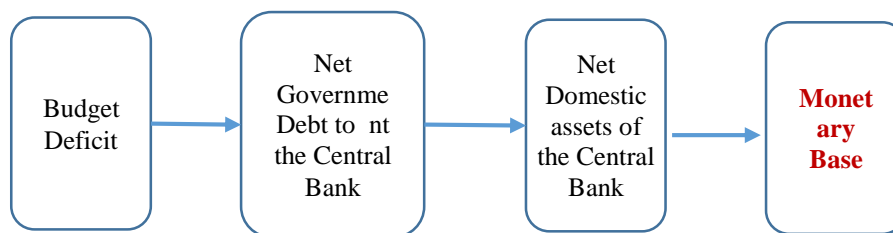

Figure 2: Fiscal Dominance by Government's Direct Borrowing from the Central Bank

When the government borrows from the Central Bank to finance its budget deficit, as long as the borrowed money is at the government's deposit account in the Central Bank, the net claims on the government and the monetary base do not change in the Central Bank's balance sheet. As soon as the government moves money out of its deposit account, the net government debt to the Central Bank and consequently the domestic assets of the Central Bank increase. On the other side of the Central Bank's balance sheet, the liabilities equally increase by transferring money to the commercial bank's account and the currency in circulation. Therefore, the government's borrowing from the Central Bank expands both sides of CB's balance sheet, and this leads to an increase in the monetary base. Regarding the velocity of money, it would also lead to an increase in broad money and

eventually increase the total demand and price levels.

2.2. Off-budgeting Fiscal Dominance: Creating Debt to the Banking System

Given the lack of sufficient and sustainable resources, the government annually finances some part of its budget deficit by off-budget means. In reality, the lack of sufficient and sustainable resources has made some part of the government expenditures to be financed from off-budget resources. This method of financing from unsustainable resources of other entities causes fiscal dominance and is finally reflected in the Central Bank's balance sheet. Government's off-budget operations are emanating from sovereign duties, the acts of parliament, and government policies which are not reflected in the annual budget Tables but financed by debt. In other words, if the reported budget deficit and the increase in debt are not equal in a fiscal year, the difference would be equal to the government's off-budget fiscal operations (Irwin, 2015). Implementing off-budget operations would result in government liabilities to an entity beyond the government's budget. Off-budget operations may not appear in the budget annual reports; however, they would finalize these debts and make the government refund since they are reflected in the lenders' audited financial statements as the government's debts.
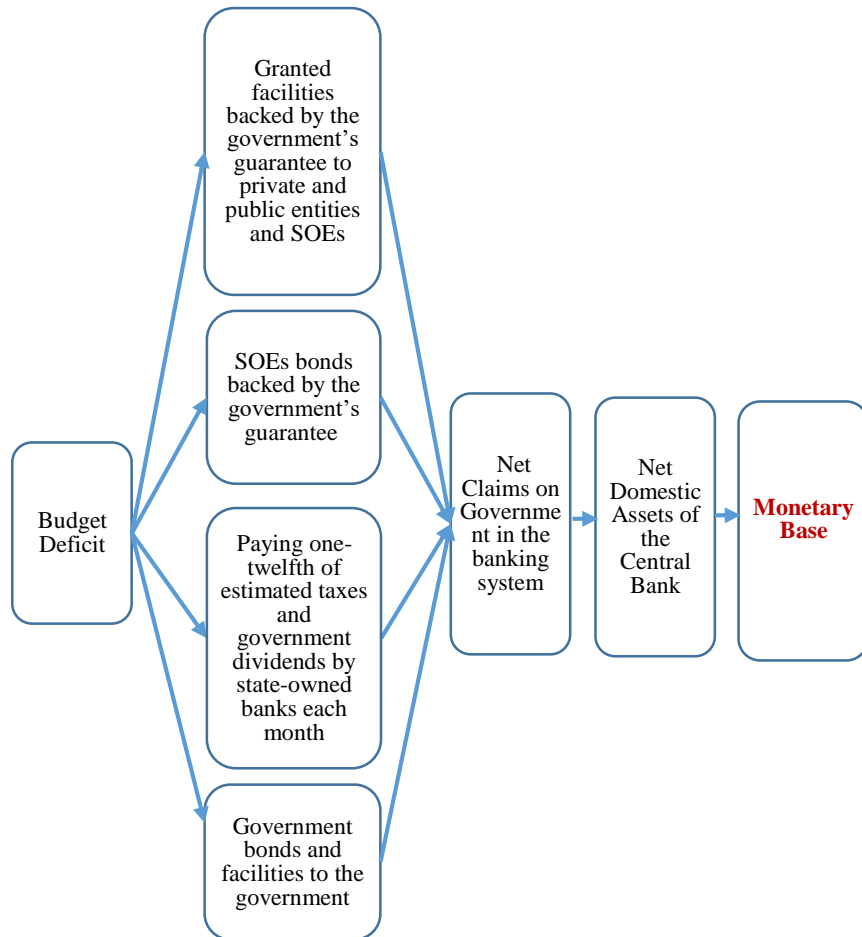
Figure 3: Fiscal Dominance through the Banking System

The government's main off-budget operation in Iran is to borrow from the banking system (excluding CBI). Some parts of the government's subsidizing policies, which are approved in the parliament or the executive instructions passed by the cabinet, the Economic Council, or the Money and Credit Council, are annually financed by the banking resources. Furthermore, sometimes imbalances in the government's cash flow for some inevitable expenditure forces the government to borrow from the banks. High levels of government commitments and insufficiency of resources usually disable the government to pay back the facilities it has borrowed upon its maturity.

In addition to the facilities that the government directly receives

from the banking system, some of the state-owned enterprises (SOEs) and legal or personal entities and contractors (in line with article 56 of the Law on the Administration of Certain Financial Regulations of the Government, 2005) borrow from the banking system backed by the government's guarantee. Since these facilities are known as the government's contingent liability, due to moral hazards, the borrower in many cases has refused to pay back the facilities upon maturity; therefore, they have been realized as the government's debt. Additionally, the execution of development projects the government and contractors issue bonds (backed by the government guarantees and in some cases SOEs guarantees) leads to fiscal dominance.

In some cases, the Market Adjustment Committee, disregarding the available financial resources of the government, makes the government finance the difference between the planned and the market price of some basic goods to adjust the market. In most cases, SOEs such as Government Trading Corporation of Iran (GTC), State Livestock Affairs Logistics (S.L.A.L), and Central Organization Rural Cooperatives of Iran (CORC) handle such operations on the behalf of the government. In many cases, the government borrows from the banking system to finance such expenditures.

Furthermore, the government receives one-twelfth of the estimated taxes and government dividends from state-owned banks before the end of the fiscal year, following the approved numbers in the budget law, which in some cases are more than the amount of the tax and dividends to be received according to the financial performance of these SOEs. This also reflects the existence of fiscal dominance between the government and the banking system (the details of Off-budgeting fiscal dominance in the bank's balance sheet are presented in Appendix 1).

In short, the government's commitments to banks can be categorized under two general groups:

A. Government's commitments (Above the line Items in the government's balance sheet): most important of which are listed below.
- securities and bonds;
- Facilities for buying basic commodities, such as wheat, tea and other crops following the Law on Guarantees for the

Purchase of Essential Agricultural Products (1989) and Article 36 of the Law on Administration of Certain Governmental Financial Regulations (2014);

- Agricultural insurance following the Agricultural Insurance Law (1983);
- Opening letter of credit (LC) for ministries and SOEs following Article 62 of the General Auditing Law;
- Reconstruction and renovation of rural houses following Article 11 of the Organizing and Supporting the Housing Production and Supply Law (2008);
- Unexpected events following Section 6 of the Acceleration of Reconstruction of Damaged Areas in the Disaster Law (2013) and Article 33 of the fifth Law on the Five Year Development Plan (2016);
- Subsided interest of facilities, for which the government is responsible, including:
  - Interest rate subsidy for Mehr Housing facilities, approved by the Council of Ministers on 2001-11-20;
  - Interest rate subsidy for rural housing facilities;
  - Interest rate subsidy for facilities related to Article 56 of the Law on the Administration of Certain Financial Government Regulations (2005);
  - Government's debt to the state-owned banks for payment of taxes and government dividends following Article 224 of the fifth Law on the Five Year Development Plan (2016), Article 4 of the Law on the Administration of Certain Financial Government Regulations (2014) and Annual Budget Laws.

B. Government's contingent liabilities such as guarantee (Below the line items in the government's balance sheet), the most important of which are as follows:

- Unexpected events based on Article 13 of Establishing a Disaster Management Organization Act;
  - Providing governmental organizations and SOEs with government-supported facilities under article 62 of General Auditing Law and article 56 of the Law on the Administration of Certain Financial Government Regulations (2005).

- Rial-bonds or foreign currency bonds of SOEs;
- Natural gas lanes to rural areas and cities without gas, guaranteed by Petroleum Ministry in annual budget laws;
- Granting foreign currency facilities to transportation sectors following budget laws.

The aforementioned commitments and guarantees resulted from the laws discussed above have faced the government with a high flow of debt to the banking system every year. Since paying back such a level of debt is not possible for the government, on some occasions, the government settles and barters the debts above. In the beginning, barters and settlings are done by relying on the government assets, unsettled funds in the banks, and resources gained from the loan repayment of the Oil Stabilization Fund (OSF). During the exchange rate shocks, some of the government's debts, especially debts caused an increase in the bank's debts to the CBI, have been settled by the foreign exchange asset revaluation of CBI. In recent years, type one and type two of Treasury Clearance Documents[1] have been used to repay government debts. Fiscal dominance may occur when type two of treasury documents are used. However, when tangible assets are transferred from the government to the banks, this is not the case. This claim should be examined in future research.

3. Iran's Micro Data on Banking System
3.1 Data Sources
The following data resources have been used for the analysis here:
- Bank ledgers: Bank self-reported data, March 2007 to June 2018;
- National accounts (SNA) of the Statistical Center of Iran: Quarterly, Constant 2004;
- Government's fiscal statistics (GFS) of the Central Bank: Quarterly, Spring 2005- Spring 2018.

Since the government has no debts to private banks during almost all periods, these banks are excluded from the study. Accordingly, the remaining banks are:

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1. According to the treasury clearance documents – in type 2, the government debt to contractors will be offset against a part of their bank debt. In turn, the banks reduce their borrowings from the CBI by an equal amount. Once completed, government debt to contractors will decline by the same amount of increasing the government's debt to the CBI, leaving total outstanding government deb constant.

- State-owned commercial banks: Melli, Sepah, and Post Bank;
- Privatized commercial banks: Mellat, Tejarat, Saderat, and Refah;
- Specialized banks: Maskan, Keshavarzi, Industry and Mine, Export Development, and Tose'e Ta'avon.

Since the audited bank statements are reported annually, the available bank ledgers in the monthly sequence have been used in this research.[1] To find how an increase in the government debt to the bank affects the bank debt to the CBI, government debt calculated by bank ledger accounts are shown in Table 1. These accounts can be classified into three main groups: the first group includes all claims on the government and the public sector which is above the line items of the government's balance sheet. The second group is the explicit contingent liabilities of the government, which are instructed and granted facilities to the non-governmental sector upon the government's order or guarantee. They remain on the balance sheet of the original debtor until they default and they are termed as the government debts. The third group encompasses the government bonds that are in banks' balance sheets.

Table 1: Accounts Related to the Government

	Category	**Accounts**
1	Claims on Government and public sector	Claims on government account The government instructed[2] granted facilities account Government non-instructed granted facilities account Non-performing loan account
2	Claims on the non-governmental sector	Non-governmental instructed granted facilities account
3	Government bonds	Bond, Musharekat and Sukuk account

Notes: Accounts corresponding and related to the government's debts are classified into three groups concerning the relationship between the bank and the government. Instructed granted facilities refer to the loans which the banks are obliged to grant under budget laws and other regulations. If such facilities are granted to the non-governmental sector (such as Mehr Housing), they will be placed in the second group.

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1. Bank ledgers consist of 433 accounts that are classified according to the "Bank Accounting" book by Saeed Jamshidi.

2. Instructed facilities are all facilities that banks are obliged to grant without economic considerations under specific laws and regulations.

The bank debt to the CBI is derived from the sum of the accounts classified under the "debt to the CBI" category. Although there are numerous accounts of this kind, only four accounts play significant roles in this regard. For state-owned banks the account "debt to the CBI in the current account," for the privatized banks "foreign currency deposit of CBI," and for the specialized banks "facilities received from the CBI" are dominant.

The data were cleaned and irregularities[1] of certain accounts were addressed. The variables also have some outliers. These may be due to an experimental error or show significant changes in some accounts. For example, capital raising of the banks is usually recorded at the end of the year and sometimes doubles the accumulated capital account. To solve this problem, ±0.5 percent of the high and low ends are winsorized[2].

3.2 Summary Statistics

The Debt of the specialized banks to the CBI has increased greatly since 2009, which is the result of the Mehr Housing Plan credit line. Bank claims on non-governmental instructed facilities' growth in this period confirm it as well. The debt of the privatized banks to the CBI has increased since 2013 onwards and become more dramatic after 2016 when the bank claims on the public sector have increased as well. For the state-owned commercial banks, no obvious long-run trend in debt to the CBI is observed since the government in some periods has raised their capital in the form of settling their debts to the CBI; however, the banks' claims on public sector have increased continuously. Government bonds as a whole are considered minor in comparison to the other granted facilities even though there are certain times in which the government bonds show a substantial increase. Hence, one might consider its effect on the CBI claims negligible. The effect of government debt on the banks on the banks' debt to the CBI is discussed in Section 5.

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1. The irregularities either happen in the form of one or two month surges in the balance of accounts when they are zero or when the accumulated profit/losses account for two banks have a large adjustment at the end of the year; in these conditions, the average amount of few months has been replaced.
2. For example, replacing at 1% means that, instead of all observations of the first to fifth percentiles, the average of the fifth percentile is set. Likewise, instead of all observations of 95th to 100th percentiles, the average of 95th percentile is replaced.

Bank debt to CBI

Claim on Public Sector

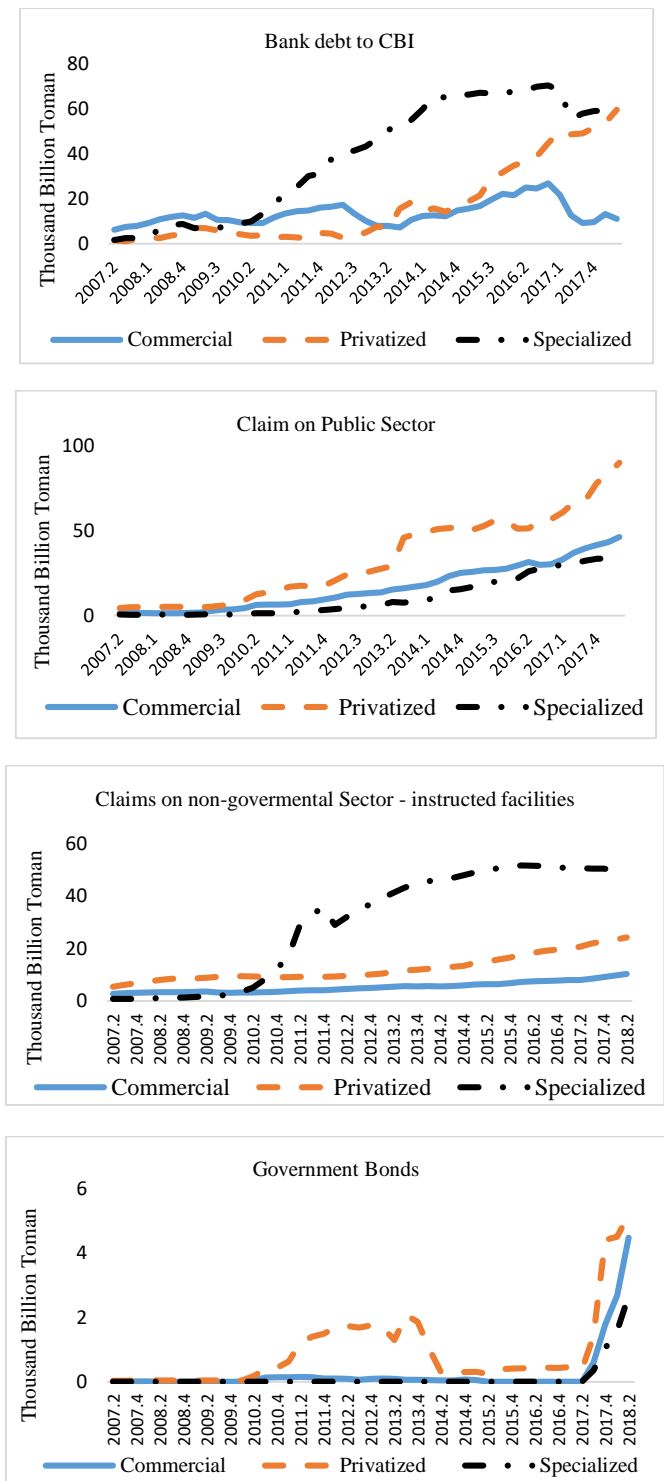**Claims on non-govermental Sector - instructed facilities**

Government Bonds

Figure 4: Trends of Main Variables in the State-owned Commercial, Privatized and Specialized Banks, quarterly data has been used.

Table 2 shows the share of each account in the banks' balance sheet. The largest share of instructed granted facilities to the Non-governmental sector is in the specialized banks, especially in Bank Maskan. That is why the debt to the CBI also has the largest share in these banks. In privatized banks, there are more claims on the government and the public sector than others.

Table 2: Share of Each Account to Total Assets in Bank Categories (Percentage)

Variable		State-owned Commercial banks	Privatized Commercial banks	Specialized Banks
Debt to CBI	Total Avg.	9.4%	5%	23.8%
	2017	3.5%	8.7%	17.9%
Claims on Government and public sector	Total Avg.	8.2%	10.2%	5.1%
	2017	11.5%	13.6%	10.2%
Instructed granted facilities to Non-governmental sector	Total Avg.	3.4%	5.1%	16.8%
	2017	2.6%	3.8%	15.2%
Government bonds	Total Avg.	0.1%	0.3%	0.0%
	2017	0.7%	0.7%	0.5%

Notes: The total average is the mean of monthly variables from April 2007 to June 2018.

As Table 3 shows, the banks' debt to the CBI on average increased by almost 80 billion Tomans per month and has a high standard deviation. Banks claims on the government on average increase by 162 billion Tomans per month.

Table 3: Summary Statistics of the Variables

row	variable	Number of observations	mean	median	St. Dev.	Min	Max
		Dependent Variable					
1	Delta debt to CBI	1568	79.080	0.00	935.7	-4909.8	4884.6
		Explanatory Variables					
2	Delta claims on the government and public sector	1568	104.28	2.34	400.9	-1285.1	3424.8
3	Delta granted facilities to the non-governmental sector	1568	48.95	0.00	184.1	-214.0	1402.3

row	variable	Number of observations	mean	median	St. Dev.	Min	Max
4	Delta government bonds	1568	4.72	0.00	51.4	-140.7	575.2
5	Delta total claims on government	1568	162.53	10.09	513.4	-1441.1	4122.8
Bank's Balance Sheet Status Indicators							
6	Delta claims on CBI	1568	0.056	14.77	521.6	-2266.7	2721.9
7	Delta claims on the other banks	1568	0.046	8.04	728.3	-3936.2	3990.1
8	Delta debt to other banks	1568	0.025	0.00	728.5	-3716.2	4574.8
9	Facilities to deposits ratio	1580	1.374	0.985	0.847	0.574	4.569
Bank's Financial Health Indicators							
10	Liquid assets to total assets ratio	1580	0.015	0.011	0.013	0.000	0.081
11	Capital to asset ratio	1580	0.104	0.058	0.117	-0.033	0.670
12	Profit to asset ratio	1580	0.126	0.107	0.084	-0.013	0.460
13	Non-performing loan to total facilities ratio	1580	0.152	0.157	0.067	0.009	0.324
Macroeconomic Indicators							
14	Exchange rate standard deviation	45	0.07	0.018	0.061	0.001	0.476
15	Deposit market concentration rate	45	0.084	0.088	0.018	0.061	0.109
16	GDP growth rate	45	3.126	2.79	5.19	-7.68	15.02
17	Budget balance	45	-0.118	-0.109	0.132	-0.479	0.115
18	Oil sector value-added growth rate	45	-0.016	0.776	15.84	-35.701	43.38

Notes: The unit of variables in rows 1 to 8 is a billion Tomans, and the unit of standard deviation is a thousand Tomans. GDP growth rate and oil sector value-added growth rate are reported in percentages. In this Table, the private banks' data are excluded.

4. Model

The model aims to investigate the interrelationship between the government's debt to the banks and the banks' debt to the CBI and to examine whether the government's loans from the banks from the CBI make banks borrow from CBI. In this study, the changes in the banks' debt to the CBI concerning the changes in claims on the government are examined. Accordingly, the changes in the value of the abovementioned accounts are used as dependent and explanatory variables. The corresponding regression relationship is shown in Equation (1):

$$\Delta DebtCbi_{it} = \alpha + \mu_i + \beta\,\Delta Govern_{it} + \eta\,X_{i.t-1} + \zeta\,Z_t + \varepsilon_{it} \qquad (1)$$

where $\Delta DebtCbi_{it}$ shows the changes in the debt level of bank i to the CBI in period t, compared to period $t-1$. In the same way, $\Delta Govern_{it}$ is the total change in claims on the government for bank i in period t compared to period $t-1$. Variable $Govern$ is calculated using the sum of the accounts in Table 1 by Equation (2):

$$Govern_{it} = ClaimGov_{it} + ClaimNonGov_{it} + GovBond_{it} \qquad (2)$$

where $ClaimGov_{it}$, $ClaimNonGov_{it}$ and $GovBond_{it}$ show the claims on the government and public sector, the instructed granted facilities to the non-governmental sector and the government bonds. Since the relationship between the government and the banks can be different in each of these accounts, the model can also be written and analyzed as Equation (3):

$$\Delta DebtCbi_{it} = \alpha + \mu_i + \beta_1 \, \Delta ClaimGov_{it} + \beta_2 \, \Delta ClaimNonGov_{it} + \beta_3 \, \Delta GovBond_{it} + \eta \, X_{i.t-1} + \zeta \, Z_t + \varepsilon_{it} \qquad (3)$$

where, $X_{i.t-1}$ is the control variables vector for bank i in period $t-1$. These variables include the bank's financial health indicators and the bank's balance sheet status variables. To decrease the endogeneity that arises from being simultaneous, the first lag of these variables is entered into the model. Z_t is the macroeconomic variables vector that is similar for all banks for any value of t. To control other features of the banks that are not observable or measurable, banks' fixed effects μ_i are included in the model, as presented in Table 4.

Table 4: Control Variables

Group	Variable	Explanation
Financial Health Indicators	Liquid assets to total assets ratio	Monthly, as an index of the bank's liquidity management quality. Liquid assets are the sum of several accounts under the same title in the bank's balance sheet.
	Capital account to total assets ratio	Monthly, The capital account includes the payable capital account, other (including legal) reserve account, and accumulated profit (loss) account.
	Profit to total assets ratio	Monthly.

Group	Variable	Explanation
	Non-performing loans to total facilities ratio	Monthly, as an index of the bank's asset quality. Non-performing loans include all accounts under the same title in the banks' claim accounts. Total facilities are the sum of banks' claims (current and non-current) on the government, public sector, and the private sector.
Balance Sheet Status Indicators	Facilities to deposits ratio	Monthly, Facilities are the total claims of the bank on the credit side of the balance sheet.
	Net claims on CBI	Monthly, to control the relationship between the bank's balance sheet and CBI.
	Debt to other banks	Monthly, to control the bank's alternative ways when facing a liquidity shortage.
	Net claims on other banks	Monthly, to control the decrease of the bank's resources caused by borrowing from other banks.
Macroeconomic Indicators	GDP growth rate	Quarterly.
	Exchange rate standard deviation (US dollar)	Monthly, as an index of the economy's risk.
	Deposit market concentration rate	Monthly, to control competition in the banking system. Sum of the squared share of each bank in total bank deposits.
	Budget balance to the total budget ratio	Quarterly, to control the government budget deficit. To eliminate the effect of inflation, it is divided by the government's total budget.
	Oil sector value-added growth rate	Quarterly, as an index of the government's oil income.

Notes: To calculate some of the control variables (such as banking health indicators) it is necessary to calculate the size of the balance sheets (total assets/liabilities). The precise size of the balance sheet cannot be calculated by the bank ledger data because of the "transit Items". However, as an index of the balance sheet size, all items on both sides of the balance sheet except Transit Items and expense/income items were added up. To enhance accuracy, the average of total assets estimation and total liabilities estimation is used as an index. This index is acceptable in comparison with the actual size that is annually published by the Iran Banking Institute.

Several points are noteworthy in model specification: First, it should be noticed that different banks (state-owned commercial, privatized commercial, and specialized) may behave differently, due to different relations with the government. This hypothesis must first be tested and, if confirmed, be controlled in the model.

Second, Bank Melli, Bank Keshavarzi and, Bank Maskan have had two rounds of capital raisings from foreign exchange asset revaluation of the CBI, which led to a reduction in their debt to the CBI. This effect has been controlled by a dummy variable.

Third, the existence of co-integration between the delta government's debt to the banks and delta banks' debt to the CBI should be tested. Kao and Westerlund's test indicates these delta form variables are stationary (I (0)); hence, there is no concern about their co-integration.

5. Results

This model is a Fixed Effects model with imbalanced panel data, in which changes in the debt to the CBI is the dependent variable, and the changes in total claims on the government are the explanatory variable. Table 5 shows the explanatory variable coefficient; in the first and the second columns the control variables are not included in the model specification. As it can be noticed, without controlling the banks' capital-raising periods, the coefficient of the "changes in claims on the government" would not be significant.

As mentioned earlier, sometimes the state-owned and specialized bank's capital has been raised by foreign exchange asset revaluation and their debt to the CBI has settled. During this period, the bank's claims on the government have increased while the bank's debt to the CBI has decreased. This is why the coefficient becomes significant at a 5% level when the capital raising periods in Column 2 is controlled.

The third column presents the main specification of the fixed effects model using an imbalanced panel dataset. The results show that each 1-billion-Toman increase in the claims on the government causes a 200million-Toman increase in the banks' debt to the CBI.

Table 5: Fixed Effects Models Estimation Results

variable	FE regression excluding control variables		FE regression including control variables (main specification)
	1	**2**	
Delta total claims on government	0.165	0.216*	0.208*
	(1.23)	(2.2)	(2.95)
Dummy variable for state-owned and specialized banks' capital raising periods		✓	✓
constant	52.17*	50.99**	-23.67
	(2.38)	(3.35)	(-0.16)
Number of observations	1568	1568	1520

Notes: * represents the significance at the 0.05 level, and the numbers in parentheses are t-statistics.

5.2 Sensitivity Analysis

Table 6 shows the sensitivity analysis for the estimation methods and the variables. The first column encompasses the main specification using the Fixed Effects model for all banks, and the second column shows the result of Ordinary Least Squared Regression, controlled for bank categories. In the other columns, the Fixed Effects model is estimated by bank categories (state-owned, privatized, and specialized banks) separately. In all columns, capital raisings are controlled. It is observed that the coefficients of the changes in claims on the government in Columns 1 and 2 are positive and significant.

In Column 3, which is corresponding to the state-owned banks, the coefficient of the explanatory variable is negative and significant; however, in Columns 4 and 5, the coefficients are positive and significant for the privatized and specialized banks. Accordingly, the relationship between changes in claims on the government and changes in debts to the CBI in state-owned banks is rather different from other banks.

The two-way relationship between the banks and the CBI has been controlled by the bank's claims on the CBI variable; if banks hold enough balance on their reserve account with the CBI, they can borrow much more easily from the CBI. Bank's claims on the other banks and bank's debt to other banks are also included in the model. As can be observed, the coefficient of changes in debts to other banks is negative and significant; indicating that borrowing from the CBI and the other banks are substitutes. The coefficient of claims on the other banks is positive and significant. This finding was expected result since the claims on the other banks reduce the banks' resources and the bank refers to the CBI to solve the liquidity shortage.

The macroeconomic indicators are not significant. This is probably because such variables affect the dependent variable by the bank's financial health indicators and have no independent effect.

Table 6: Model Estimation Results

	variables	(1) FE regression (main specification)	(2) OLS regression	(3) FE regression state-owned banks	(4) FE regression privatized banks	(5) FE regression specialized banks
Explanatory Variables	Delta claims on government and public sector	0.208* (2.95)	0.221** (2.69)	-0.187** (-14.96)	0.247* (2.54)	0.210** (4.71)
Bank's Balance Sheet Status Indicators	first lag of delta claims on CBI	-0.169*** (-4.63)	-0.164** (-2.80)	-0.165 (-2.59)	-0.196* (-3.63)	0.0490 (1.01)
	first lag of delta claims on the other banks	-0.0255 (-0.58)	-0.0231 (-0.50)	0.0797 (1.41)	-0.0760 (-2.57)	0.0721 (0.73)
	first lag of delta debt to other banks	0.297*** (4.74)	0.297*** (4.33)	0.323** (16.98)	0.338* (5.62)	-0.0401 (-0.56)
	first lag of facilities to deposits ratio	38.83 (1.07)	42.30 (1.94)	-120.8 (-2.00)	-561.2 (-0.74)	77.87** (5.68)
Bank's Financial Health Indicators	first lag of liquid assets to total assets ratio	-3551.0 (-1.55)	-2421.7 (-1.19)	-3401.0 (-2.46)	2310.4 (0.59)	-7941.8 (-1.50)
	first lag of capital to total asset ratio	-68.44 (-0.15)	-35.64 (-0.16)	-328.1 (-0.17)	-180.8 (-0.06)	-918.5 (-1.97)
	first lag of profit to total asset ratio	273.2 (0.18)	236.0 (0.61)	5584.3 (2.30)	1511.6* (3.22)	-1510.6 (-1.23)
	first lag of non-performing loan to total facilities ratio	-637.7 (-1.68)	-568.0 (-1.69)	-816.6 (-1.08)	728.0 (2.43)	-425.5 (-1.33)
Macroeconomic Indicators	Exchange rate standard deviation	222.6 (0.42)	226.8 (0.47)	-485.9 (-0.79)	-4.447 (-0.00)	636.4 (1.37)
	Deposit market concentration rate	2264.1 (0.81)	2164.1 (1.25)	-3542.1 (-1.39)	-3605.3 (-3.07)	6350.6 (2.59)
	GDP growth rate	-4.185 (-1.21)	-3.847 (-0.63)	0.271 (0.06)	0.823 (0.14)	0.153 (0.06)
	Budget balance	304.1 (1.89)	300.7 (1.51)	388.7 (1.40)	520.6 (1.53)	249.0 (0.89)
	Oil sector value-added growth rate	3.564 (2.13)	3.570* (1.97)	3.985 (0.76)	4.994 (2.65)	0.318 (0.49)
	constant	-23.67 (-0.16)	-19.50 (-0.12)	190.5 (1.27)	633.9 (0.78)	-92.43 (-0.74)
	dummy variable for capital raising periods	✓	✓	✓	✓	✓
	dummy variable for bank categories		✓			
	Number of observations	1520	1520	390	520	610

Notes: * represents the significance at 0.05 level, and the numbers in parentheses are t-statistics.

Model estimation by different types of claims on the government is presented in Table 7.

The changes in instructed granted facilities to the non-governmental sector are significant at the 5% level in the main specification, indicating that granting instructed facilities to the non-governmental sector leads to an increase in banks' debt to the CBI. This result is robust when outliers are controlled at the 1% level. The coefficient for specialized banks is significant at 10% level; however, this is not true for the state-owned and privatized banks.

Table 7: Model Estimation by Different Types of Claims on the Government

	variables	(1)	(2)	(3)	(4)	(5)	variables
		FE regression	OLS regression	FE regression state-owned banks	FE regression privatized banks	FE regression specialized banks	FE Regression, omitting outliers, 1%
Explanatory Variables	Delta claims on government and public sector	0.157	0.169	-0.123	0.218	0.131	0.100
		(1.22)	(1.47)	(-0.59)	(1.33)	(0.61)	(0.65)
	Delta instructed granted facilities to non-governmental sector	0.761***	0.597***	-2.669	1.027	0.535	0.750***
		(10.33)	(4.27)	(-1.16)	(1.68)	(2.58)	(14.09)
	Delta government bonds	0.489	0.517	-0.00615	1.387	1.568	1.186
		(0.56)	(0.57)	(-0.00)	(1.46)	(1.03)	(0.82)
Bank's Balance Sheet Status Indicators	first lag of delta claims on CBI	-0.165**	-0.163**	-0.167	-0.197*	0.0702	-0.0158**
		(-3.91)	(-2.76)	(-2.07)	(-3.34)	(1.47)	(-3.79)
	first lag of delta claims on other banks	-0.0277	-0.0266	0.0609	-0.0803	0.0764	-0.0365
		(-0.60)	(-0.57)	(1.95)	(-2.62)	(0.74)	(-0.78)
	first lag of delta debt to other banks	0.297***	0.294***	0.304*	0.341*	-0.0459	0.289***
		(4.73)	(4.29)	(8.19)	(5.54)	(-0.75)	(4.45)
	first lag of facilities to deposits ratio	-9.946	25.12	-261.0	-539.0	48.91*	-11.51
		(-0.42)	(1.13)	(-1.14)	(-0.77)	(3.67)	(-0.53)

variables	(1)	(2)	(3)	(4)	(5)	variables
	FE regression	OLS regression	FE regression state-owned banks	FE regression privatized banks	FE regression specialized banks	FE Regression, omitting outliers, 1%

		(1)	(2)	(3)	(4)	(5)	(6)
Bank's Financial Health Indicators	first lag of liquid assets to total assets ratio	-2225.9	-1848.7	-2381.9	1481.5	-6190.9	-1635.5
		(-1.13)	(-0.91)	(-1.01)	(0.32)	(-1.01)	(-0.88)
	first lag of capital to total asset ratio	217.6	84.35	-353.5	-644.7	-671.5	203.2
		(0.61)	(0.38)	(-0.16)	(-0.18)	(-1.15)	(0.60)
	first lag of profit to total asset ratio	1286.3	184.4	5557.5	1388.1	-649.0	11973.4
		(1.04)	(0.50)	(1.69)	(2.50)	(-0.45)	(1.02)
	first lag of non-performing loan to total facilities ratio	-435.7	-166.3	-920.2	726.2	-353.6	-459.0
		(-1.15)	(-0.52)	(-1.29)	(1.55)	(-1.20)	(-1.36)
Macroeconomic Indicators	Exchange rate standard deviation	379.4	323.8	-228.7	34.83	659.2	481.0
		(0.77)	(0.68)	(-0.38)	(0.02)	(1.47)	(1.00)
	Deposit market concentration rate	1037.4	1363.7	-3957.5	-2800.4	5491.1	719.4
		(0.46)	(0.75)	(-1.68)	(-1.35)	(1.55)	(0.34)
	GDP growth rate	-3.818	-3.850	-0.0000506	-0.255	-0.741	-1.489
		(-0.92)	(-0.66)	(-0.00)	(-0.04)	(-0.21)	(-0.40)
	Budget balance	288.5	284.5	489.1	442.1	214.5	259.7
		(1.83)	(1.47)	(1.53)	(1.34)	(0.93)	(1.78)
	Oil sector value-added growth rate	4.416*	4.218*	4.049	5.233	1.178	4.172*
		(2.67)	(2.37)	(0.94)	(2.28)	(1.23)	(2.54)
	constant	-87.54	-20.81	404.8	559.5	-189.4	-58.31
		(-0.60)	(-0.12)	(2.37)	(0.69)	(-1.70)	(-0.42)
	dummy variable for capital raising periods	✓	✓	✓	✓	✓	✓
	dummy variable for bank categories		✓				
	Number of observations	1520	1520	390	520	610	1520

Notes: represents significance at the 0.05 level, and the numbers in parentheses are t-statistics.

When the government's debt to the bank increases or bank grants instructed facilities, the bank may confront the liquidity shortage problem. In this situation, the bank has a few solutions: borrowing from the other banks, borrowing from the CBI, sales of assets, and attracting deposits. If borrowing from the CBI is the only choice or it

costs less, the bank goes to the CBI. Since borrowing from the CBI may not occur at the same time as increasing the government's debt, it seems necessary to consider the variable lags in the model. So first the correlation coefficients between lags of claims on government and delta debt to the CBI are calculated. Then, the model is estimated with different lags, and significant lags are determined.

In Table 8, the correlation between debt to the CBI and explanatory variables' lags is shown. The current and forth lags of delta claims on the government and public sector have a significant correlation with debt to the CBI. All the lags are significant for delta instructed granted facilities to the non-governmental sector; however, no lag of delta government bonds is significant. Finally, the first, third, and fourth lags are significant for total claims on the government the current amount.

Table 8: Correlation Coefficients between Lags of Claims on Government and Delta Debt to CBI

	Delta claims on government and public sector	Delta instructed granted facilities to the non-governmental sector	Delta government bonds	Delta total claims on government
t	0.0753*	0.1202*	0.0455	0.1158*
t-1	0.0488	0.1420*	0.0124	0.0984*
t-2	-0.0415	0.1448*	-0.0446	0.0152
t-3	0.0043	0.1286*	0.0346	0.0599*
t-4	0.0831*	0.1478*	0.0443	0.1363*

Notes: * represents significance at the 0.05 level.

In Table 9, the model is estimated as a robustness check to control the effect of lagged explanatory and control variables. In Column 2, the first and third lags of the explanatory variable are added, and the first lag of control variables (i.e. bank's balance sheet status and bank's financial health indicators) is replaced. These lags neither are significant nor decrease the significance of the current amount of delta claims on the government and public sector. Columns 3 and 4 show the third and 12th lags of control variables, respectively. In Column 3, the explanatory variable's coefficient is significant at the 10% level,

and in Column 4, it is significant at the 5% level. Therefore, the lags of explanatory and control variables do not influence the significance of the Delta claims on the government and public sector effectively.

Table 9: Estimation Results to Control for the Effect of Lagged Explanatory and Control Variables

	variables	(1) FE regression (main specification)	(2) first lag of control variables	(3) third lag of control variables	(4) 12th lag of control variables
Explanatory Variables	Delta claims on the government and public sector	0.208* (2.95)	0.194* (2.76)	0.196 (2.07)	0.212* (2.32)
	first lag		0.0674 (1.81)		
	third lag		0.0395 (0.70)		
Bank's Balance Sheet Status Indicators	nth lag of delta claims on CBI	-0.169*** (-4.63)	-0.171** (-4.34)	-0.0857 (-1.90)	0.0442 (0.69)
	nth lag of delta claims on the other banks	-0.0255 (-0.58)	-0.0274 (-0.61)	0.0515 (1.50)	-0.0314 (-0.94)
	nth lag of delta debt to other banks	0.297*** (4.74)	0.295*** (4.74)	-0.0100 (-0.45)	0.131 (1.29)
	nth lag of facilities to deposits ratio	38.83 (1.07)	30.26 (1.01)	12.39 (0.48)	-12.78 (-0.56)
Bank's Financial Health Indicators	nth lag of liquid assets to total assets ratio	-3551.0 (-1.55)	-3275.7 (-1.44)	3058.3 (1.33)	8389.4 (1.60)
	nth lag of capital to total asset ratio	-68.44 (-0.15)	-43.23 (-0.10)	100.6 (0.25)	-77.14 (-0.23)
	nth lag of profit to total asset ratio	273.2 (0.18)	499.4 (0.40)	-352.8 (-0.30)	-1192.8 (-0.89)
	nth lag of non-performing loan to total facilities ratio	-637.7 (-1.68)	-596.2 (-1.53)	-546.3 (-1.35)	-177.7 (-0.52)
Macroeconomic Indicators	Exchange rate standard deviation	222.6 (0.42)	181.9 (0.33)	45.94 (0.09)	-0.686 (-0.00)
	Deposit market concentration rate	2264.1 (0.81)	2398.8 (0.84)	1313.2 (.)	1495.9 (0.73)
	GDP growth rate	-4.185 (-1.21)	-4.590 (-1.31)	-2.650 (-0.77)	-6.202 (-0.98)

variables	(1) FE regression (main specification)	(2) first lag of control variables	(3) third lag of control variables	(4) 12th lag of control variables
Budget balance	304.1	322.7	332.0	264.6
	(1.89)	(1.99)	(1.93)	(1.08)
Oil sector value-added growth rate	3.564	3.764	2.844	4.322
	(2.13)	(2.19)	(1.75)	(1.69)
Constant		-74.63	48.91	52.85
		(-0.46)	(0.42)	(0.59)
Dummy variable for capital raising periods		✓	✓	✓
Dummy variable for bank categories		✓		
Number of observations	1520	1496	1496	1388
n^{th} lag	1	1	3	12

6. Conclusion

Iran's economy still has a two-digit inflation rate with high fluctuations; however, the monetary authorities have not been successful in controlling this problem. Fiscal dominance is the main reason why the Central Bank is unable to control the inflation rate. The most conventional way leading to fiscal dominance is financing the budget deficits by borrowing from the Central Bank, which was prohibited in Iran since the enactment of the Third Development Plan. However, the lack of control over the budget deficits caused by the government's failure to implement the fiscal reform program has made the government borrow from the banking system. Since this way of fiscal dominance is unacceptable in Iran's political economy, the government has not disclosed the debt services of borrowing from the banking system in the annual budget documents. Gradually, this portion of the government's expenditure was taken out from the annual budget documents; hence, off-budget operations were performed by the banking system. While the government's debt to the banks was accumulating, the government would neither disclose nor pay its debts back to the banks.

Government arrears to contractors and banks jeopardize the already fragile banking system. A legacy of government payment arrears,

combined with state-directed lending, and poor risk management practices of banks have left the bank's balance sheets impaired and capital position weak. This, in turn, results in liquidity shortages. To solve this issue, the government sometimes bartered its assets (e.g. foreign assets) as a means to pay its debts.

As discussed, the main items that create the government's debt to the banks include the government-backed guarantees of financial facilities, debt securities issued by the government and SOEs, resolutions of the Market Balance Committee, guaranteed purchase of agricultural commodities, insurance of crops, and collecting taxes and government dividends of state-owned banks before the end of each fiscal year.

Using bank ledgers panel data from March 2007 to June 2018, this study revealed that fiscal dominance through the banks exists and increasing government's debt to the banking system has a significant positive effect on increasing the banks' debt to the Central Bank in the form of an overdraft and credit line. As such each 1 billion-Toman increase in the claims on the government caused a 200 million-Toman increase in the banks' debt to the CBI.

The changes in bank's claims on the government have a significant negative effect on the changes in state-owned banks' debt to the Central Bank; however, it has a significant positive effect on privatized and specialized banks. This effect is more highlighted in specialized and privatized banks, respectively. It is robust to control variables; hence, the relationship in state-owned banks is rather different from that of the other banks.

Proving the significance of this relationship implies the necessity of decreasing the government's structural budget deficits to control the inflation arising from increasing the monetary base. To achieve this goal, various regulations that commit the government to numerous entities should be reviewed and reformed in a manner that such liabilities become temporary commitments. The government should limit them to available permanent resources and stop using the banking system to implement quasi-fiscal policies. For those government commitments that cannot be omitted and can only be financed via bank's borrowing, it should be marketable by issuing debt securities. This would liquidate the government's debt and prevent it

from turning into frozen assets. Consequently, it would prevent the liquidity shortage of the banks; hence, the banks would not need to refer to the Central Bank to confront liquidity shortages. Hence, the banks would sell the government's debt securities in the market and finance the required liquidity needs.

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Appendix:

How Off-budgeting Fiscal Dominance Appear in Bank's Balance Sheet: Case Study of Bank Keshavarzi

The financial statements of Bank Keshavarzi's during 2017 [1]and 2018 are examined to analyze the effects of the government's borrowing from the banking system. Considering the legal duties and statute of Bank Keshavarzi, the off-budget operations constantly take place in this bank, making it an appropriate hotbed for debates and future studies. The government's off-budget operations in this bank are performed in two different ways: 1) granting facilities to the government for guaranteed purchase of wheat, basic commodities, agricultural commodities insurance, and its interest, 2) granting facilities to farmers, backed by the government's guarantee.

In the first type of off-budget operation (granting facilities to the government), Bank Keshavarzi has received a special credit line from CBI for the guaranteed purchase of wheat from the farmers based on laws. In this regard, debts to CBI appear on the debit side of its balance sheet and credit to the government is written down on the credit side of its balance sheet. In this case, since the bank has received a credit line from CBI, the debt is reflected in CBI's balance sheet immediately.

In the second type of off-budgeting operation (government's backed facilities to farmers), the credit side of the balance sheet is initially increased by the claims of the private sector, and the debit side of the balance sheet also increases as a result of increasing reserves for loan creation. After several periods, the farmers' defaulted loans are moved under the claims on the government. Consequently, the composition of the asset side of the balance sheet is changed at the moment; however, the balance sheet of Bank Keshavarzi is already expanded.

When the government's debt to Bank Keshavarzi increases and the bank faces liquidity shortage, the government should clear or barter its debt in different ways. This study is written Bank Keshavarzi's

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1. In Iran we use Shamsi calendar which starts in the month March of Gregorian calendar. So in this article, Shamsi dates have been converted to Gregorian dates, hence the number of the Gregorian year is coordinated with each Shamsi year.

statement 2017-2018, in which the debt was cleared by two types of treasury clearance documents. In the CBI's balance sheet, Bank Keshavarzi's debt to CBI decreases, and the government's net debt to CBI increases. Therefore, even though CBI's balance sheet does not expand at this moment, but it expanded before as a result of this off-budgeting mechanisms.

The composition of CBI's balance sheet changes and the government's debt to CBI, which is more likely to get prolonged increases. With decreasing the Bank Keshavarzi's debt to CBI, it is possible to repeat this cycle once more, and this mechanism can be used once more, causing no harm to the beneficiaries as CBI undergoes more pressure. The existence of fiscal dominance is proved in this way using a fixed-effect model with unbalanced panel datasets.