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Asset Markets and Real Efficiency of Facilities Granted by Banking Network: an Application of Simultaneous Equations Approach

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Abstract

This study investigates the impact of exchange rate, stock index, and oil incomes on the efficiency of facilities or loans granted by the banking network during 2005:1-2022:2 in quarter intervals using the three-stage least squares (3SLS) model. The results show that the efficiency of the loans granted by the banking network has been descending in stimulating the real sector of the economy, and this decline has been more during sanctions. Moreover, the results indicate that an increase in the exchange rate negatively and significantly impacts the efficiency of granted loans. In contrast, the increase in the oil income has a positive and significant effect on this variable. On the other hand, improvement in the efficiency of granted loans and lagged stock index leads to a reduction in exchange rate. Also, improved efficiency of lending and exchange rate has a positive and significant impact with a lag on the stock index in the country. Therefore, the currency reserve fund plays a significant role in the short-term in the country, which can be a factor for exchange rate control preventing its effects on the loans' efficiency and other parallel markets. On the other hand, Iran's economic dependence on oil incomes must be decreased so as not to face problems when any change occurs in the economy and asset markets because these changes may affect the efficiency of loans granted by the banking network.

Keywords: Stock Market Index, Oil Incomes, Exchange Rate, 3SLS Model.

Introduction

The banking network is the most important source for funding businesses in Iran, and the major contribution of finance is made through the banking network. According to the last banking statistics published by the Central Bank, total loans granted in August 2020 equaled 21248237 billion dollars, and the value of attracting and mobilizing resources by the capital market equaled 2314738 billion dollars. At the peak point of the capital market index, the share of this market in finance was about 10%, which

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indicates the crucial role of the banking network in financing various sectors of the economy. The banking network's performance and efficiency of loans granted by the banking network depend on the changes occurring in asset markets, including foreign currency, oil, and stock for creating economic growth and employment in the country. Any change in the oil income of the country indeed leads to a change in one of the most important income resources of the government, which may be effective for government and governmental companies in reimbursing received loans. Moreover, oil income is considered the most important source of exchange supply in Iran, which can be effective in changing the exchange rate. Regarding the high contribution of intermediate and capital products in total imports and their role in domestic production, exchange rate variations can affect the price of products and services, as well as the consuming expenditure and budget of households, which can impact the saving rate of businesses and household, and also their potential for reimbursement of loans. Since most companies listed in the stock market use foreign finance (obtaining bank loans), variations in the stock index may affect the need for their foreign finance by changing the stock return. Therefore, when the royalty rights of these companies are decreased then their tendency is increased for using foreign finance. Therefore, the efficiency of loans granted by the banking network depends on the changes in asset markets in addition to other options in case of stimulating economic growth and employment in the country. By consideration of the effect and mutual correlation between asset markets, this study also examines the mutual impact of asset markets and their effects on the efficiency of loans granted during 2005:1-2022:2 in seasonal intervals by designing a simultaneous equations system. The difference between the present paper and other studies is seen first in the estimation of the efficiency of loans granted by the banking network, which indicates to what extent the granted loans performed efficiently in stimulating economic growth and employment in Iran during the studied period. In the second stage, various asset markets (exchange rate, stock, and oil) are considered and their effects on the efficiency of granted loans and the effect of these markets on each other are assessed in the frame of the simultaneous equations model.

Section 2 of the study expresses a literature review and research background; section 3 presents methodology related to 3SLS, and the fourth and fifth sections present data analysis and conclusion and recommendations, respectively.

Conceptual Review

Exchange rate and credit capacity of the banking network

Financial markets usually use the dollar rate to analyze the stock prices. This is done based on this belief that companies' earning is mainly affected by the exchange rate oscillations. For instance, this case may occur through a change in the net wealth of debtors and subsequent in their access to finance resources (Kim, 2003).

On the other hand, when banks borrow based on the foreign currency and lend

based on the local currency or finance is done following the foreign current and investments are based on the domestic currency (or vice versa), exchange rate variations would lead to the shock and imbalance in the banking and domestic financial markets (Beck et al., 2006). These instabilities in banking and financial markets would affect investment decisions, especially foreign investors. Under such circumstances, moreover, a proper field is provided for speculative activities of profit seekers that, in turn, considerably increases market instability and risk of activity in the market for market participants (Feizi et al., 2024). Therefore, as foreign currency rate risk, exchange rate oscillations can indicate the probability of banking and financial crises. Regarding the role of the banking network in the financial instability of the country, the impact of exchange rate oscillations on the financial instability of Iran occurs through the channels of impact on the consumption, production, and foreign sectors of the economy. The exchange rate oscillations and its growth can indeed result in lower domestic money value and higher export attractiveness (Ramezani et al., 2024). On the contrary, it leads to expensive imports and increased production costs, as well as the decline in competitiveness of products manufactured in the country at the international level due to the import-centered nature of production in Iran (more than 80% of imports in Iran is assigned to capital and intermediate products). In addition to this factor, higher exchange rate oscillations result in rising consumption costs of households; therefore, exchange rate oscillations can affect the real sector of the economy by affecting the demand and supply sides, which its outcome is a change in deposit behavior, lending behavior of banking network, and change in non-performing loans of banking network (Koochakzadeh & Jalaee, 2014).

Stock market and credit capacity of the banking network

The financial system tends towards a bank-centered system in the early stages of development due to a lack of proper infrastructures for market activity. Finance is mainly supported by the banking network in Iran, and the capital market has not played a significant role in this process over recent years. However, it should be noted that the financial market is one of the pillars of the financial system (Aghaeipour Noei et al., 2023). Financial instability and credit capacity of the banking network are affected by some factors, including oil income fluctuations, budget deficit, and institutional components, so oil income change in the countries where natural resources exports make their major income source can affect the credit capacity by changing the government's budget deficit. Furthermore, borrowing from banking networks is mainly considered when a budget deficit occurs. Many structural economic models consider the asset's price as one of the mechanisms for monetary policy transfer; For instance, (Berument & Kutan, 2007) argue that monetary policy affects the economic growth and output that are among the most important outcomes of efficient granted loans- by changing the stock price. Economic theories suggest that an expansionary monetary policy (change in

government borrowing from and debt to the banking network) results in higher stock returns. Interest rate changes that represent monetary policy may directly affect the capital stock cost and dividend expectations. As a policy variable at the macro level and as a part of an individual's portfolio, money can affect the stock index (Khademi Noshabadi et al., 2023). On the other hand, a change in the stock price index can affect the number of economic activities and price stability by affecting consumption expenditures (through wealth effect) and investment expenditures (through Tobin's Q theory). Therefore, understanding the effect of monetary policy on a wider scope of the economy requires knowledge about policy measures' effect on the important financial markets and finding how the price of these assets changes in these markets. The mentioned knowledge, in turn, affects the behavior of households, forms, and other decision-makers (Todirica et al., 2009).

The relationship between the government budget, stock market, and credit capacity of the network

In the opinion of (Klock et al., 1996) and (Blanchard & Wyplosz, 1981), a budget deficit would affect the stock market. In his general equilibrium theory, Tobin designed a pattern in which, both budget deficit and money growth may highly affect the stock price and return. According to this approach, the main channel through which financial policies and incidents affect aggregate demand is a change in evaluating physical assets concerning their substitution costs. By emphasizing the effect of budget deficits on the stock market, Blanchard argues that the government's budget policy may be stimulated by some political and economic considerations not predicted by economic agents. Since the effect of budget deficit on the interest rate is one of the channels affecting the stock price and return in this case, political policy (budget deficit) affects the stock return in the form of a shock (Dindar Rostami et al., 2018). From another viewpoint, the effect of budget deficit on the stock price and return is examined based on the macroeconomic status within general modes. A mode occurs when the economy is in a state of recession (based on Keynesians' theory), and the economy is in full employment state (Neoclassic theory) in another mode. When there is a recession in the economy, an increase in the budget deficit would stimulate economic activities due to a reduction in oil income or a rise in government expenditures. Because the increase in aggregate demand can be covered by the available unused resources (in recession mode), the possible effect on the prices will be minimized. In this case, the budget deficit does not result in a higher inflation rate; however, the interest rate is increased to a certain extent due to expanded activities in the whole economy. Increased aggregate demand (and subsequent increase in aggregate output) would increase the stock price by increasing the cash flows considered by the company. Interest rate also decreases stock prices by increasing the discount rate. Under such circumstances, Keynesians believe that the positive effect of increased aggregate demand overcomes the negative effect of interest rate, and the budget deficit would leave a positive effect on the stock price and

return. However, others believe that if the central bank cannot fix the deficit by increasing the money supply, the gross effect on the stock price remains unknown. Nevertheless, an increase in interest rate can be recovered if the central bank covers the increased deficit by supplying money. Therefore, the positive effects of increased aggregate demand on the stock price and return would probably be positive. Hence, money supply should not make investors more worried about inflation during the economic recession. On the contrary, a budget deficit would decrease stock price and return under the conditions of full employment. In this case, the budget deficit would increase the aggregate demand and interest rate, but an increase in the aggregate demand does not lead to higher output because the economy is in full employment status. In contrast, enterprises would increase their production prices, which results in a higher general level of prices (Dindar Rostami et al., 2018).

On the other hand, economic assessments indicate that the risk-taking rate of financial institutions and entities will be lower during the financial crisis, so they make more mutual relationships with the public sector; therefore, any change in adopted policies and the financial status of the government make the financial intermediaries more vulnerable. In this case, the government's inability to debt settlement provides the field for not paying the debt of financial institutions and governmental companies to the creditors, which causes a lack of capital for compensation. Therefore, countermeasures done by governments (to keep stability in the banking sector and strengthen aggregate demand) may make financial stability risky and cause a financial crisis (Zarei, 2018).

Literature Review

(Touny & Shehab, 2015), investigated the macroeconomic determinants of non-performing loans in some Arab countries during 2000-2012 by using the dynamic panel data (GMM) method. The results of the study on information, economic growth, and investment variables as a percentage of gross domestic production (GDP), unemployment, and government expenditure indicate that inflation rate and improvement in macroeconomic conditions as economic growth, investment as a percentage of GDP and low level of unemployment seemingly have a negative effect on the non-performing loans. The results show that this effect is negative in non-oil countries while is positive in oil-depending countries. However, increased government expenditure is linked to the low level of non-performing loans in both groups of countries. (Partovi & Matousek, 2019), carried out a study titled “Bank efficiency and non-performing loans: Evidence from Turkey" to measure Turkey's bank efficiency from December 2002 to December 2017 under the assumption of constant returns to scale using data Envelopment Analysis (DEA) model with a focus on non-performing loans as an unobservable output. The results of the quantile regression model obtained in this study indicate that non-performing loans have a negative effect on the bank efficiency of Turkey, which confirms the bad

management hypothesis in the banking sector. (Radivojević et al., 2019), Conducted a study titled "Econometric model of non-performing loans determinants" using the GMM model for emerging countries of Latin America. No evidence was observed in this study that could confirm the effect of inflation and microeconomic variables on non-performing loans. (Brancaccio et al., 2020), Investigated the countereffect of real interest rate, inflation, and economic growth on the non-performing loans in the USA quarterly during 1988:1-2016:4 based on the structural vector autoregression (SVAR) model. The results of impulse response functions indicate that inflation has a negative effect on the real interest rate within the short term and midterm, but leaves a positive effect within the long term. Also, economic growth has a positive effect on the real interest rate in the short term and a negative effect in the long term. Moreover, non-performing loans have a negative effect on real interest rates in many periods; however, increased real interest rates and inflation have a positive effect on non-performing loans, and improved economic growth leaves a negative effect only within the short-term, and has a positive effect in the long term. In addition, about 50% of variations in non-performing loans were explained by real interest rates in this country. (Musa & Jun, 2020) examined whether inflation targeting cause's financial instability by using the GMM model and regression of instrumental variables for 104 developed and developing countries during 1980-2017. In this research, two indexes are used for financial instability. The first index is related to banking components that are extracted by using the model of main component analysis among variables of credit growth, liquidity, interest rate margin, current debts, deposits, loans-to-credit ratio, and the ratio of granted loans to the private sector to determine weight and importance of each variable. The banking financial insatiability index is measured based on the mentioned variables. Also, variables related to the financial instability index of the stock market include capital of capital market, value-added of the stock market, capital circulation in the stock market, and stock oscillation. The results of fixed effects models and generalized moments indicate that inflation targeting has a positive effect on both financial instability indexes. Furthermore, the results of the instrumental variable model confirm these findings. Accordingly, inflation targeting in these countries has led to the accumulation of systematic risk, which subsequently leads to financial instability. (Kim et al., 2020), Investigated the relationship between financial crisis, bank diversification, and financial stability in 34 OECD countries from 2002-2012 by using the Multivariate Regression approach. In this research, variables of return on assets (ROA) and Distance-to-Default ratio that indicate possible bankruptcy of the bank are used for financial stability. The Distance-to-Default ratio is obtained from the sum of ROA and capital-to-asset ratio, so the higher Distance-to-Default ratio represents the lower probability of bankruptcy of the bank. The results show that bank diversification has a significant and nonlinear effect (and vice versa) on financial stability. Accordingly, moderate diversification can increase financial stability and a high rate of

bank diversification may lead to lower financial stability. Also, the results show that bank diversification would decrease bank stability before the crisis and increase it during the crisis. Therefore, the bank should focus on its intermediary role during the crisis. (Shakeri et al., 2015), investigated the interaction between non-performing loans and macroeconomic variables in Iran by using panel data from 2002-2013. The research results show that a positive shock imposed on the real interest rate of loans and growth rate of loans would lead to a decline in the bank's non-performing loans ratio, while higher money supply by the central bank (positive shock imposed on the monetary base) would worsen the quality of banks' loan portfolio; meanwhile, the declining effect of economic growth rate on the ratio of non-performing loans to total loans of banks is not statistically significant. Moreover, the interactional effect of non-performing loans on the macroeconomic variables indicated that an increase in non-performing loans of banks would intensify the economic recession, significantly increase the monetary base, and significantly decrease the growth rate of banks' granted loans. However, the real interest rate of loans is not significantly affected by the increased non-performing loans. (Mohammadi et al., 2016), studied the effect of exchange rate volatility on non-performing loans in the banking system of Iran in the frame of the panel data model. They used the symmetric variance heterogeneity model (EGARCH) to extract the exchange rate volatility. The results of this study indicated a positive and significant effect of exchange rate volatility on the non-performing loans in the banking network. (Roudari et al., 2020), studied the effect of exchange rate and stock index fluctuations on the efficiency of agricultural facilities using the wavelet transform model, data envelopment analysis (using the bootstrap method), and Markov Switching method from 2005:1-2017:4. Their results show that short-term fluctuations do not have a significant effect on the efficiency of loans but its long-term fluctuations have negative and significant effects regardless of its efficiency regime. This effectiveness is higher in the high-efficiency regime; also, stock index volatilities leave positive and significant effects only within the long-term and under the high-efficiency regime. In the low-efficiency level and regime, an increase in the stock index cannot improve the loans' efficiency due to its minor share in finance. Business cycles also have negative and significant effects regardless of the efficiency regime. The amount of crop imports has a negative and significant effect on the high-efficiency regime. (Roudari et al., 2010), investigated the correlation between foreign exchange rate fluctuations and business cycles on nonperforming loans with an emphasis on regime changes and time-scale using a wavelet transform model within 2009-2018 monthly. The results show that the more extended the duration of fluctuations, the higher the correlation will be. Accordingly, the lowest positive correlation through time is related to the exchange rate and the government's current expenditure, which increases to 28% in the long term. The correlation between the exchange rate and government debt to the banking network reaches 17% within short-

term to 53% within the long term, and the highest correlation is seen between the government's current expenditure fluctuations and government debt to the banking network that reaches from 32.5% within short term to 76% within long term.
The distinctive aspect of this study compared to available empirical studies is the lack of any study investigating the efficiency of loans granted by the banking network in changing economic growth and employment in Iran, which is an important point regarding the dominant role of the banking network in finance. Moreover, the role of asset markets has not been examined in the state of system consideration and examination of interactions with the efficiency of granted loans. However, an interaction can exist between research variables based on the available reality and theoretical foundations.

Method and Material

This study examined the effect of assets, including exchange rate, stock index, and oil incomes on the efficiency of loans granted by banking networks during 2005:1-2022:2 in seasonal intervals. To do this, the Bootstrap Data Envelopment Analysis was first used considering granted loans as input and economic growth and employment as outputs through an input-centered approach with variable return. It is worth noting that this study followed (Hollingsworth & Smith, 2003) and applied the variable returns to scale (VRS) feature. They pointed out that the model under the VSR hypothesis must be used when adopting ratios in DEA; otherwise, inaccurate results might be acquired. In addition, the input-centered formula of DEA was used because output values would be maximized by keeping inputs constant in this case. The advantage of Bootstrap Data Envelopment Analysis over the common approach to efficiency estimation by consideration of corrected bias values was its application through iteration and re-sampling at a large scale. Ultimately, a simultaneous equation approach was used for analyzing the research result by creating an equations system. When explanatory variables are endogenous in their model, a good reason is provided for using a simultaneous equations model. Under such circumstances, Ordinary Least Squares regression (OLS) provides inconsistent and biased estimates. This problem is more highlighted when endogenous explanatory variables are correlated with residuals. In this condition, instrumental variables can be used to achieve consistent estimates. Endogenous variables are replaced with their estimated counterparts within the two-stage Least Squares method. If the two-stage Least Squares method is used for cross-sectional regression, estimated parameters will be consistent but inefficient. Three-stage Least Squares method provides better results under such circumstances. Both techniques are indeed consistent but the three-stage Least Squares method is asymptotically more efficient than the two-stage Least Squares method. Accordingly, the improvement of asymptotic efficiency by using information related to the correlation between residuals in structural equations was the most important reason for the use of the three-stage Least Squares method (Abou-Ali & Abdelfattah, 2013) and (Hsu et al., 2011). Therefore, this study

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adopted the three-stage Least Squares model. It should be noted that all data were extracted from economic indicators of the Central Bank and financial-economic data websites of the Ministry of Economic Affairs and Finance[1]. The equations used in the extant study were designed based on the theoretical foundations and empirical studies as follows:

$$GEFF = C(1) + C(2)*GEFF(-1) + C(3)*GEXC + C(4)*GOIL + C(5)*GSTOCK \quad (1)$$

$$GEXC = C(6) + C(7)*GEXC(-1) + C(8)*GEFF + C(9)*GEFF(-1) + C(10)*GOIL + C(11)*GSTOCK + C(12)*GSTOCK(-1) \quad (2)$$

$$GSTOCK = C(13) + C(14)*GSTOCK(-1) + C(15)*GEFF + C(16)*GEFF(-1) + C(17)*GEXC + C(18)*GEXC(-1) \quad (3)$$

$$GGDP = C(19) + C(20)*\mathrm{GGDP}(-1) + C(21)*\mathrm{GTCR} + C(22)*\mathrm{GTCR}(-1) \quad (4)$$

$$\mathrm{GEMP} = C(23) + C(24)*\mathrm{GEMP}(-1) + C(25)*\mathrm{GTCR} + C(26)*\mathrm{GTCR}(-1) \quad (5)$$

Where;
GEFF: growth of efficiency in facilities granted by banking networks
GEXC: exchange rate growth
GOIL: oil income growth
GSTOCK: stock market index growth
GGDP: economic growth
GEMP: employment growth
GTCR: growth of loans granted by the banking network

Lagged values and the current period of assets were used in the equations because assets could affect each other with a lag. Also, the loans granted by the banking network might affect the real sector of the economy with a lag. Therefore, the effect of the current period and past period of granted loans on employment and economic growth entered Equations (4) and (5). Because economic growth and employment in the economy usually are affected by effective factors with a lag, the lagged value of loans was used to estimate the efficiency of bank loans. This case was tested in Equations (4) and (5).

Results

Before the estimation of the main model of study, the stationary rate of research variables must be determined to prevent regression fallacy. HEGY seasonal unit root test is used because observations are seasonal, and its results are reported in (Table 1).

[1] See Lashitew & Werker (2020) for more information about the three-stage Least Squares Model.

Table 1. Results of Hegy unit root test

Variable	Null hypothesis (H_0)	Statistic	Prob.
GSTOCK	Seasonal unit root with intercept	7.566	0.002
	Seasonal unit root with intercept and trend	7.585	0.000
GOIL	Seasonal unit root with intercept	8.158	0.000
	Seasonal unit root with intercept and trend	8.198	0.000
GEFF	Seasonal unit root with intercept	5.647	0.004
	Seasonal unit root with intercept and trend	5.523	0.002
GGDP	Seasonal unit root with intercept	10.075	0.000
	Seasonal unit root with intercept and trend	9.85	0.000
GEXC	Seasonal unit root with intercept	10.682	0.000
	Seasonal unit root with intercept and trend	10.948	0.001
GEMP	Seasonal unit root with intercept	13.187	0.000
	Seasonal unit root with intercept and trend	5.695	0.004
GTCR	Seasonal unit root with intercept	7.648	0.000
	Seasonal unit root with intercept and trend	5.376	0.009

Source: Research Findings

According to the results reported in (Table 1), all variables are stationary at the level.

Concurrency bias test

Some variables of study are endogenous and there is a probability of a correlation with residual terms; hence, a concurrency bias test must be done to assess the correlation between endogenous variables and residual terms. If concurrency exists, other methods should be used instead of OLS. Otherwise, the OLS method can be used. The Hausman test is one of the tests used to detect concurrency bias. Hausman test required two separate OLS regressions. In the first regression, the variable that is thought to be endogenous is regressed on all exogenous and instrumental variables and residual is obtained, and then the previous regression is formulated by considering residuals obtained from the first stage as the explanatory variable. When the coefficient of the new explanatory variable (the residual obtained from the first OLS) is statistically significant, concurrency bias exists. The Hausman test done for equations tested in the study confirms the H_1, which indicates the concurrency between the mentioned variables. Hence, the OLS method cannot be used in (Table 2).

Table 2. Concurrency bias test

Variable	Coefficient	P-value
Residual of efficiency growth of loans granted by banking network	0.475	0.0000
Residual of exchange rate growth	0.399	0.0056
Residual of stock market index growth	0.509	0.0176
Residual of economic growth	0.601	0.0000
Residual of employment growth	0.382	0.0009

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According to the significance of the residual term's coefficient of dependent variables, concurrency bias between variables is confirmed.

Diagonality test

The diagonality test of the variance-covariance matrix is used to determine the estimation method in the systematic or single-equation form. This test is done to examine the probability of correlation between residual terms of equations available in the system. Because residual terms probably seem irrelated and equations do not have concurrent bias, a diagonality test is used (Rezaie et al., 2015). The results of the diagonality test indicated that the variance-covariance matrix of residual terms in the system of studied equations is not diagonal. Therefore, systematic estimations can be used to measure the parameters of equations.

Identification problem

Two order and rank conditions are assessed to perform an identification test. In a model with G simultaneous equations having G endogenous variables and K exogenous variables, an equation with g endogenous variables and k exogenous variables is identifiable if the number of predetermined unused variables (K-k) is more than or equal to several endogenous variables of the equation minus 1 (g-1). In other words, the order condition will be K-k≥g-1; moreover, the rank condition exists when, if, and only if, the matrix Δ that consists of coefficients of variables removed from an equation but used in other equations has a rank that equals the number of equations minus 1. In other words, the equation of rank (Δ) = G-1 exists (Lashitew & Werker, 2020). According to the explanations mentioned above, both order and rank conditions are met for the equations system, and the system is identifiable, so the equation can be estimated. After the stationary (unit root test), concurrency bias, and diagonal tests are done and the detection problem is examined, the equations can be estimated systematically. Because 3SLS provides a high efficiency among systematic methods, this method is used. (Table 2) reports the results of the estimated equations. Findings show that most variables have a significant relationship with endogenous variables. Due to R2 variation in the interval from 0 to -∞, $R_{cn}^2 = \left[1 - \frac{MSE}{\delta_Y^2}\right]$ called the Carter-Nagar statistic is used as a good fit index in the system of simultaneous equations. In this index, MSE represents the means square error of the estimated equation and σ2 indicates the variable of dependent variable. The results of the statistical fit indicate a good fit of the examined models. The results of the Durbin-Watson statistic indicate a lack of autocorrelation in residuals. (Table 3) reports the results of the 3SLS model:

Table 3. Results of 3SLS model

Equation (1)				
Variable	**Coefficient**	**SD**	**t-value**	**Prob.**
GEFF(-1)	0.117	0.232	0.506	0.613
GEXC	-0.247	0.114	-2.175	0.026
GOIL	0.202	0.059	3.398	0.000
GSTOCK	-0.172	0.15	-1.147	0.252
Equation (2)				
GEXC(-1)	-0.426	0.221	-1.925	0.055
GEFF	-0.616	0.756	-0.816	0.407
GEFF(-1)-0.338	-0.338	0.078	-4.343	0.000
GOIL	-0.112	0.0517	-2.172	0.026
GSTOCK	-0.238	0.27	-0.884	0.377
GSTOCK(-1)	-0.495	0.254	-1.943	0.053
Equation (3)				
GSTOCK(-1)	-0.325	0.11	-2.958	0.002
GEFF	-2.823	10.031	-0.281	0.778
GEFF(-1)	0.432	0.078	5.529	0.000
GEXC	0.649	4.184	0.226	0.82
GEXC(-1)	0.462	0.164	2.818	0.004
Equation (4)				
GGDP(-1)	-0.212	0.171	-1.237	0.217
GTCR	0.91	1.145	0.794	0.427
GTCR(-1)	0.574	0.273	2.102	0.037
Equation (5)				
GEMP(-1)	-0.103	0.132	-0.78	0.436
GTCR	-0.309	0.292	-1.061	.289
GTCR(-1)	0.245	0.112	2.176	0.026
Carter-Nagar statistic	R^2_{cn}= 0.905			
Autocorrelation D-W statistic	D.W = 1.96			

Source: Research Findings

According to the results of (Table 3), the efficiency of loans granted by the banking network in the past period does not have a significant effect on the amount of the present period. Also, exchange rate growth has a negative and significant effect on the efficiency of bank loans. An increase in exchange rate can indeed result in higher prices of goods and services. The reason is that an increase in the exchange rate makes the imports expensive and due to the high contribution of intermediate and capital product imports that play a significant role in production, an increased exchange rate leads to higher prices, less purchase power, subsequent reduction in consumption, saving, and increase in government's current expenditures. Therefore, banking loan efficiency is reduced for improving economic growth and employment under such circumstances. This issue occurred in Iran during 2010-2013 and 2018, and

despite the increased exchange rate in the country, the balance of trade has decreased over these years and its positive effect has not been seen in the foreign sector of Iran's economy. Non-oil exports of Iran have been reduced from 43975 million dollars in 2011 to 41848 million dollars, and have reached from 46982 million dollars in 2017 to 44310 million dollars in 2018; therefore, the foreign sector of the economy has not been reinforced during periods of the exchange rate rise. An increase in oil income has a positive and significant effect on the efficiency of loans. When oil incomes rise and a boom occurs even temporarily, loan efficiency can improve economic growth and employment because there are low returns on the no generative and speculative activities during these periods when individuals use the received loans and facilities in generative cases. Stock market index growth does not have a significant effect on the efficiency of granted loans for stimulating the real sector of the economy. The reason may be due to the minor role of the capital market in finance and the lack of a supportive role for the banking network. According to the last statistics published by the Central Bank in August 2020, about 21248237 billion Rls loans have been granted by the banking network, and the total value of resources attraction and mobilization in the capital market equaled 2314738 billion Rls in this month. Accordingly, about 10% of finance has been done by the capital market in the peak index of this market. Moreover, the results show a negative and significant effect on loans granted with a lag on the exchange rate. If the received loans are used in the generative and productive sector of the economy, they can indeed prevent the inflationary effects on the economy. Otherwise, inflation rise will increase the exchange rate through the exchange rate and inflation spiral. Increased oil incomes have a negative and significant effect on the exchange rate that may result from the increased foreign currency supply due to more oil sales in the country. In addition, an increased stock index with lag has a negative and significant effect on the exchange rate. When the stock market index and its return rate are improved, a part of foreign currency speculation demand can be decreased and the exchange rate can be reduced in this way. Moreover, many companies in the stock market are export-based; hence, an improved stock market index may be an outcome of higher profitability of these companies that can increase the foreign currency in this market, so the case can be explained from this viewpoint. In Equation (3), the increase in the stock index in the previous period has a negative and significant effect on the present period; moreover, the improved efficiency of loans granted by the banking network has a positive and significant effect on the stock index with a lag. This finding indicates that if the loans received from the banking network can improve economic growth and employment in the country, it can lead to an improvement in the stock market index with a lag. The reason is that when a boom occurs in the economy, the companies listed in the stock market achieve higher sales and profitability, and stock demand attraction is increased under such conditions. An exchange rate rise also has a positive and significant effect on the

stock index with a lag, which results from the net profit growth of export-based companies and spillover effects between exchange and stock markets. Higher exchange rate leads to more expectations for the advent of parallel markets, which may result in transferring liquidity to parallel markets such as the stock market. According to Equation (4), the granted loans have a positive and significant effect on economic growth with a lag, and this case also is true for Equation (5). Therefore, the estimation of loans' efficiency with the lagged input of granted loans is confirmed. The considered equations system is based on the theoretical foundations and interactions between asset markets. The validity of stationary results of residuals obtained from equations in (Table 3) is examined herein.

Table 4. Seasonal unit root test of 3SLS regression residuals

Variable	H_0	Computational statistic	Prob.
Resid 1	Seasonal unit root with intercept	6.715	0.000
	Seasonal unit root with intercept and trend	6.689	0.000
Resid 2	Seasonal unit root with intercept	6.986	0.000
	Seasonal unit root with intercept and trend	7.194	0.000
Resid 3	Seasonal unit root with intercept	7.606	0.000
	Seasonal unit root with intercept and trend	7.392	0.000
Resid 4	Seasonal unit root with intercept	8.808	0.000
	Seasonal unit root with intercept and trend	8.656	0.000
Resid 5	Seasonal unit root with intercept	5.849	0.000
	Seasonal unit root with intercept and trend	5.088	0.000

Source: Research Findings

According to the results of (Table 4). Regression residuals of all equations are stationary at the level; in other words, the results of the equations system are valid.

Conclusions

Banking network plays a vital role in financing business so that these resources can improve the real sector of the economy if they are employed for the actual purpose. On the other hand, the efficiency of loans depends on the changes in asset markets, and changes in exchange rate, stock market index, and also oil incomes can affect the efficiency of loans. Moreover, asset markets can interact with each other. Accordingly, this study has examined the mentioned case seasonally during 2005:1-2022:2 using a simultaneous equations model and 3SLS. The results show that the efficiency of loans granted by the banking network has been totally descending and this decline has been higher when sanctions are intensified. One option that can be effective in improving loans' efficiency is preventing an increase in the exchange rate. Increased exchange rate indeed changes the households' budget, increase the price of goods and services, and decrease competition with similar foreign products. Under such circumstances, granting more loans cannot create the same rate of economic growth and employment in

the country. Moreover, lagged increased efficiency of loans can reduce the exchange rate by preventing the rise of the exchange rate and improving the efficiency of loans. Improvement of the capital market with land can result in a lower exchange rate. Also, improvement in loan efficiency and exchange rate with lag leads to an increase in the stock index. According to the results, prevention from exchange rate rise and improvement of oil incomes can be effective in enhancing the efficiency of loans; however, oil incomes are exogenous and out of the country's authority. When oil incomes face constraints and the currency supply side become problematic in the economy of the country, the exchange rate may rise which can reduce the loans' efficiency through this channel, and this decreased efficiency with a one-period lag can again increase the exchange rate in the country. Therefore, the role of foreign exchange reserve is highly important in the short term and can be a factor for exchange rate control preventing its effects transferred to loans' efficiency and other parallel markets. Furthermore, Iran's economic dependence on oil incomes must be gradually alleviated to prevent the effects of its change on the economy and asset markets. The policies made in Iran must be directed toward business openness to import production knowledge and technology to the industries with high value-added and adopt loans in the productive sector. The results of the study indicate that the mentioned conditions provide the field for improving the efficiency of loans granted by banking networks, promoting the capital market, and stabilizing the exchange rate.

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