

THE EFFECT OF FINANCIAL LIBERALIZATION ON IRAN'S ECONOMIC GROWTH

Khalil Saeedi,

Department of Economic Sciences, Faculty of Accounting and Economics, Islamic Azad University, Tehran South Branch

Iman Moghadamfar,

*Graduated of MSc in Economic Sciences, Faculty of Accounting and Economics, Islamic Azad University,
Tehran South Branch*

Corresponding Author: Iman Moghadamfar

Abstract. In general, financial liberalization refers to any decision made by government of a country, in which the capital flows freely inside or outside the country, leading to increased domestic investment and economic growth. In this research, the relationship between financial liberalization and economic growth in Iran during the period of 1991-2012 was examined using vector auto-regression model (VAR). The KAOPEN financial liberalization index, inflation rate, and foreign direct investment were used as explanatory variables and economic growth was used as a dependent variable in the model of this study. The research results suggest a negative relationship between the economic growth variable and the variables of financial liberalization index (KAOPEN) and inflation. There is also a positive relationship between economic growth and foreign direct investment.

Keywords: financial liberalization, economic growth, vector auto-regression model.

Introduction. According to economic theories developed based on competitive models and market efficiency, it is stated that financial liberalization should lead to faster economic growth and economic development. Experiences suggest that some countries have benefited from financial liberalization and others have suffered from crisis caused by financial liberalization. Most analysts who support financial liberalization, such as Bekaert et al. (2006) argue that financial liberalization would increase the foreign capital, capital market boom, and increase domestic investment and economic growth. Mackinnon and Show (1973) argue that financial liberalization will increase investment efficiency and, as a result, increase economic growth. In fact, financial liberalization will increase the interest rate on deposits and increase savings, leading to increased resources for investment and increased economic growth through the creation of competition in the financial market.

If financial liberalization involves the liberalization of capital account, the flow of capital might increase and investment and growth increase as a result. On the other hand, some critics of the liberalization of the financial markets, such as Kaminsky and Reinhart (1999) and Demirguc-kunt (2001) argue that financial liberalization creates a financial crisis and it cannot solve the problem of information asymmetry, and this might affect the efficiency of financial institutions. Financial liberalization might decrease the profit margins of banks and increase the bank bankruptcies (Kashani, 2004). The main objective of this research is to evaluate the effect of financial liberalization on Iran's economic growth during the period of 1991-2012. In the second section of the research provides theoretical foundations of the subject and previous studies conducted in this regard. The third section of the research estimates the model and analyzes the results. Finally, the research results are presented.

2-Theoretical foundations

2-1- Financial liberalization

In general, financial liberalization refers to any decision made by the government of a country, which allows capital to flow freely inside or outside the country. To grant licenses for domestic investors to access foreign bank loans, international stock markets and direct investment in other countries, and to grant licenses for foreign investors to invest in financial markets and direct investment in that country are among the conditions for financial liberalization (Hosseini, Salah Manesh and Sohrabi, 2006). Based on neoclassical theoretical framework, the liberalization of capital flows leads to flow of capital from high-capital economies to low-capital economies. These capital flows should complete the domestic savings in low-capital countries and lead to an increase in investment in these countries. Capital flow can improve the transfer of technology. There are indirect ways through which financial liberalization can increase growth.

Hence, improving the allocation of resources through the division of income risk leads to increased productivity and economic growth simultaneously. Financial flows can accelerate the domestic financial development by applying appropriate macroeconomic policies and creating stability at macro level. Capital account liberalization in countries with developing financial market plays major role in creating a financial crisis. Thus, macroeconomic stability should be ensured in order to achieve the benefits of financial liberalization (Mojtahed and Ahmadian, 2009).

2-2-The relationship between financial liberalization and economic growth

The relationship between financial liberalization and economic growth is one of the great and important issues among growth and development economists. It is usually expected financial flow to transfer towards higher returns as a result of financial liberalization, but in practice, increase in liberalization costs might have a negative impact on economic growth. In order to achieve better understanding of the flows of international capital in this section, an economic growth

analytical framework is introduced, in which foreign investment is considered as a potential input growth source. A micro economy characterized by complete competition, fixed returns to scale, and complete employment are assumed. Output (National Product (Y)) is characterized by a Cobb-Douglas production function as follows:

$$Y(t) = K(t)^\alpha L(t)^{1-\alpha} \quad (1)$$

K is the used capital investment used, L is the level of labor, and α is the output elasticity relative to capital. Thus, the internal rate of return on capital is $(\alpha Y(t)) / (K(t))$. In addition, if it is assumed that the domestic savings is the fixed ratio γ of national income and that the labor force with fixed rate n increases, without capital mobility, the ratio of output to capital in the equilibrium growth path is n / γ , so the profit rate is equal to $\alpha n / \gamma$.

Now, if the economy moves from zero capital mobility to the full capital mobility and if the external rate of return on capital is called r^* and if $r^* < \alpha n / \gamma$, the economy immediately introduce the capital. If $K_T(t)$ is the total domestic capital stock and K^* is the foreign capital stock, the following equation will be obtained (Borts G. Kopecky, 1972):

$$K_T(t) = K(t) + K^*(t) \quad (2)$$

Then, by moving towards complete capital mobility, domestic returns on capital would be equal to foreign returns on capital, so it can be shown that:

$$Y_t = \alpha K_T t \quad (3)$$

When $L(t) = L(0) \cdot e^{nt}$, by differentiation from equations 1 and 3, it can be written:

$$K_T(t) = K_T(0)e^{nt};$$

$$K_T(0) = L(0) \left(\frac{\alpha}{r^*}\right)^{\frac{1}{1-\alpha}} \quad (4)$$

As net national income ($Y_n(t)$) is the difference between the output and Interest paid out:

$$Y_n(t) = Y(t) - r^*k^*(t) \quad (5)$$

Finally, the saving-investment imbalance is shown as follows:

$$\gamma Y_n(t) + \frac{dK^*(t)}{dt} = \frac{dK_T(t)}{dt} \quad (6)$$

By applying equations (3) and (4) and substituting equation (5) in equation (6), the following equation is obtained:

$$\left(n - \frac{r^* \gamma}{\alpha}\right) K_T(0)e^{nt} \quad (7)$$

Equation (7) is a non-homogeneous first-order linear differential equation in $K^*(t)$ whose general solution is as follows:

$$K^*(t) = C_1 e^{nt} + C_2 e^{r^* \gamma t} \quad (8)$$

In which C_1 and C_2 are defined as follows:

$$C_1 = \frac{n - \frac{r^* \gamma}{\alpha}}{n - r^* \gamma} K_T(0);$$

$$C_2 = K^*(0) - C_1 \quad (9)$$

And $C_1 > 0$, since $n > \frac{r^* \gamma}{\alpha}$, that is, when an economy has complete capital mobility and the domestic return of capital is higher than the foreign return of capital, the capital is introduced into the economy and assumed to be $\alpha < 1$. C_2 is represented as follows:

$$C_2 = \frac{\gamma}{(n - r^* \gamma)} \left(\frac{1 - \alpha}{\alpha} r^* K^*(0) - \left(\frac{n - r^*}{\gamma} \right) K(0) \right) \quad (10)$$

If $Y_0(0)$ is the value of national income in the zero period without foreign investment,

$$Y_0(0) = \frac{1}{\alpha} \left(\frac{\alpha n}{\gamma} \right) K(0) < Y_n(0) = \frac{r^*}{\alpha} (K(0) + K^*(0)) - r^* K^*(0) \quad (11)$$

$$\text{or} \quad \frac{1 - \alpha}{\alpha} r^* K^*(0) - \left(\frac{n - r^*}{\gamma} \right) K(0) > 0 \quad (12)$$

In other words, the value of national income in zero periods without foreign investment is less than the value of national income in the n period, taking into account foreign investment. Equations (10) and (12) suggest that $C_2 > 0$. The national income time path is derived from the solution of equations (3), (4), (5) and (8), so the national income growth rate $g(t)$ is defined as:

$$g(t) \equiv \frac{\frac{dY_n(t)}{dt}}{Y_n(t)} = n + \frac{C_2 r^* e^{r^* \gamma t}}{Y_n(t)} (n - r^* \gamma) \quad (13)$$

As $C_2 > 0$, equation 13 suggests that for $0 \leq t \leq \infty$, we have $g(t) > n$.

However, $g(t)$ decreases over time, because $\frac{C_2 r^* e^{r^* \gamma t}}{Y_n(t)}$ decreases. Finally, $g(t) \rightarrow n$ so that $t \rightarrow \infty$. Thus, it can be concluded that with the transition from capital immobility to its complete mobility, the growth rate of national income increases with the growth equilibrium growth rate (n) in the long term (Kemp 1966).

If capital mobility is in a liberalization bed, without meeting its conditions in different sectors, there will be possibility of an imbalance in the input and output of capital, so that instability in financial markets will spread to real sectors. Lack of a sustained growth indicates a fluctuation in the rate of economic growth (Tayebi, Sameti and Toriki, 2009).

2-3- The effect of foreign direct investment on economic growth

Neoclassicists consider foreign investment as privatization of enterprises, encouraging free exports and trade, removing government encumbrance rules and price deviations as a positive factor in the economic growth of the host country and consider foreign direct investment as a factor for transferring the capital, advanced technology and efficient management leading to increased social welfare. According to Patrick (1996), a developed or high-growth community requires modern financial institutions and various services. In addition, in contrast to Mackinnon and Show theory states that developed financial markets are required for high-growth economy, Patrick states that the growth of real economy sectors will contribute to financial markets growth.

Levine and Zervos (1998) argue that one of the most important factors affecting the development of the capital market is economic growth, which need for financial institutions increases by development of this process. This growth in demand leads to the creation of new and complex financial institutions to meet the needs of the community. Economic growth not only affects the market supply and demand through prices, but also increases the level of market confidence, and thus, provides the conditions for domestic and international demand growth. Levine states that economic growth alone cannot meet the needs of all sectors of the market, and another factor, known as financial and economic policies, also affects the market. He realized that liberalization of the market and the removing of investment restrictions could increase liquidity and market value, and financial liberalization has led to privatization in developing countries, resulted in growth in capital market (Vafaei, 2008).

2-4-Inflation and economic growth

Based on Keynesian theory, due to the lack of complete flexibility of wages in the short term, monetary policies can change the level of production. In fact, as nominal wages have less flexibility, increasing the volume of money (or liquidity) increases the level of prices, reduces the level of real wages and, consequently, increases the level of employment and production. Thus, the application of expansionary monetary policy in the short term will increase prices and production levels. The neoclassicists also state that is no relationship between inflation and growth in the short term and long term. Based on their theory, the application of expansionary monetary policy, if predicted by economic decision-makers, is not efficient even in the short term and cannot change the level of production. Thus, unexpected monetary policies in the short term would affect the real sector of the economy.

Referring to characteristics of the economy of developing countries, Structuralisms argues that there is positive relationship between inflation and a minimum growth rate and certain rate of inflation. The high-inflation and variable rates increase the cost of exchange and reduce investment in favor of non-manufacturing activities and thus decrease the economic growth (Fallahi et al., 2010). The impact of inflation on economic growth is ambiguous. Based on Mandel-Tobin hypothesis, mild inflation has a positive impact on economic growth, since the projected inflation leads to lower real interest rate, which in turn causes a modification in the basket of assets from real monetary assets to real physical capital (Ghura, 1995). However, in some models, such as Gregorio model (1995), the increase in the cost of capital goods has a negative impact on capital accumulation, and thus, the real growth. In addition, in developing countries, investment elasticity to make minor changes in rate is slight and change in the basket of assets is towards increase in the share of real physical assets such as land, real estate, foreign currencies and jewelry, so that the outcome of these changes will cause fluctuation in economic growth.

2-5- Review of literature

-Domestic studies

Ebrahimi and Larati (2012) examined the effect of financial and trade liberalization on volatility of production in Iran using autoregressive model with distributed lag model for the period of 1960 to 2007. They used foreign direct investment as a representative for trade liberalization and KAOPEN liberalization index as representative for financial openness. Their research results revealed the positive effect of trade liberalization on the volatility of production and the negative impact of financial liberalization on volatility of production in Iran for the studied period.

Buskha et al (2012) evaluated the effect of trade and financial liberalization on financial development of MENA region countries using panel data and torque generalization methods for the period of 1990-2008. Their results suggest

different effects of two types of financial and trade liberalization methods on financial development of the studied countries. They argue that trade liberalization increases the volume of financial transactions and thus has a positive impact on financial resources through elimination of barriers of tariffs, but inefficiency of financial institutions in providing optimal financial resources in MENA countries lead to undesirable effects of financial liberalization on these countries.

Mojtahed and Ahmadian (2012) examined the interaction of financial liberalization and inflation and the interaction between financial liberalization and financial development of MENA countries in the period of 1996-2009 using panel data method. The results indicated that the dummy variable of the interaction of financial liberalization and inflation on economic growth has a negative effect, and the virtual variable of interaction between financial liberalization and financial development on economic growth has positive effect. This suggests that as economic instability increases, financial liberalization can be a barrier to growth. Additionally, as financial markets of a country are more developed, financial liberalization and capital flows would lead to economic growth.

Seyfipour (2011) examined the effect of financial liberalization on group growth of developing and developed countries with an emphasis on the effects of financial liberalization on economic growth, using data of 37 countries including 23 low and moderate-income countries and 14 high-income countries during the period 1980-2000. The results showed that the effect of capital market liberalization on long-term growth is negative in low and moderate-income countries, and positive in high-income countries. However, the effect of capital inflows on high and low and moderate-income countries is positive and significant.

Khoshnevis, Ahmadian and Mehrabani (2010) examined the effect of financial liberalization on the economic growth of the MENA countries during the period of 1996 to 2007, in their paper entitled "The Relationship between financial liberalization and economic growth in the Middle East and North Africa". Their research results showed that the relationship between financial development and economic growth is one-sided, and its direction is from economic growth to financial development. In addition, no causal relationship was found between financial development and financial liberalization, and financial liberalization showed positive effect on economic growth.

Tayebi, Sameti and Toriki (2009) in their paper entitled "the effect of financial liberalization on the fluctuations of economic growth in developing countries" examined the effect of the financial liberalization process on the growth of 43 selected developing countries during the period of 1996-2005 by generalized least squares method and panel data. Their results showed that financial liberalization reduces the fluctuation of economic growth in selected developing countries.

In a study entitled "the impact of economic suppression on economic growth", Komijani and Pour Rostami (2008) examined the impact of various forms of financial suppression on the economic growth of 92 countries during 1985-2005. Their results showed that the real negative interest rate as a financial suppression indicator had a negative and significant effect on the economic growth of countries.

-Foreign studies

Orji, Imelda and Nwachukwu (2015) examined the effect of financial liberalization on Nigeria's production growth during 1986-2011. They considered the private sector's credits share of GDP as a representative of financial liberalization and used the least squares method to estimate the model. The results revealed a negative relationship between the policy of financial liberalization (which the private sector credits share of GDP was examined as its variable) and production growth in Nigeria during the studied period. Given the very small values of private sector credits of total financial credits in the country's economy, this negative relationship was expected. They argue that the government should encourage banks to grant loans to small and medium-sized enterprises which are able to work in the economy to increase production, in order to strengthen the private sector.

Estrada, Park and Ramayandi (2015) examined financial development, financial openness and economic growth in 108 countries during 1980-2011 using the torque generalization method. They argue that an efficient financial system is an essential component of economic growth. The results of their model estimation suggest a positive relationship between financial development and economic growth and positive relationship between financial openness and economic growth in the countries. They argue that banks and the capital market guide the existing savings to productive investments and thus strengthen the production capacity of the economy and this can only be achieved by adopting a proper integration policy.

Owusu and Odhiambo (2014) examined the relationship between financial liberalization and economic growth in Nigeria using auto-regressive with distributed lag method during the period of 1960-2008. In this research, the gross domestic product (excluding gas and oil) and financial sector services and principal component index (PCA) were used as a representative of financial liberalization. The research results showed that the policy of financial liberalization has a positive and significant effect on Nigeria's economic growth both in the short term and in the long term. They recommended proper policy of financial liberalization in Nigeria in order to achieve economic growth. They argue that adopting a free approach in market can be bridge to achieve appropriate financial reforms, considering the possibility of a financial market failure. Oyovwi, Eshenake (2013) tested this hypothesis that economic liberalization improves the economic growth, focusing on Nigerian economic growth. They introduced the financial depth index, consisting of broad money to GDP ratio as a representative for financial liberalization and introduced the variable of government expenditures and the business openness ratio as explanatory variables in the model. They tested the annual data of the mentioned variables during 1970 to 2010 using the Vector Error Correction Model. Their results showed a positive relationship between financial openness and

economic growth and relationship between government expenditures and the ratio of openness to economic growth. They recommend basic legal and accounting reforms for strong operations in financial sector with more effective central bank monitoring. They argue that by adjusting government policies to major reforms, financial development and speed of economic growth in the country can be improved.

Sulaiman, Oke and Azeez (2012) examined the effect of the financial liberalization on developing economies in developing countries with an emphasis on Nigeria. Mackinnon and Show hypothesis states that financial liberalization is essential for economic growth, so this study examines this issue using critical approach. In this research, the variable of gross domestic product as a dependent variable and the variables of exchange rate, lending rate, inflation rate, and degree of financial openness were introduced as indicators for financial liberalization in the model. The annual data of 1987-2009 was fitted using error correction mechanism. The results suggest that financial liberalization has a stimulant effect on economic growth. They argue that economic stability should be maintained before any corrective action on financial liberalization.

Hauner and Parti (2008) evaluated the effect of financial liberalization on economic growth using the panel data method for the period of 1973-2005 for 91 countries. In this paper, the capital account liberalization and interest rate liberalization indices were used as financial liberalization indicator. Based on this paper, financial liberalization in short term may lead to an increase in inflation and reduction in investment and reduction in economic growth, but in the long term, the positive effects of financial liberalization would emerge with the completion of financial institutions and financial development,

In a paper entitled "financial liberalization, economic growth and macroeconomic variables fluctuations, Rincon (2007) examined the effect of financial liberalization on economic growth and fluctuations of macroeconomic variables in 43 countries between the years 1984 and 2003, with an emphasis on Latin American countries. His results suggest that financial liberalization in countries with low and middle income can contribute to development of economic growth, but it has little effect on changes in macroeconomic variables. One of the main reasons for the low impact of financial liberalization on changes in macroeconomic variables is the high insurance coverage of Latin American countries.

Hermes and Robert (2007) evaluated the effect of financial liberalization on savings and investment and economic growth. Their results suggest that financial liberalization has no effect on total investment, but it increases private sector investment and reduces public sector investment, and reduces private savings, which might be due to capital flows at international level. Financial liberalization also leads to increased economic growth.

Fratzher and Bussiere (2004) stated that countries would benefit from the liberalization of the financial market in the short term, but might not benefit or even lose in the long term. Their investigation on financial markets of 45 countries suggests that the economic growth after liberalization immediately leads to an increase in investment and stock market transactions. In contrast, the foreign investment flow in the medium to long term would have a positive impact on economic growth. Mackinnon and Show (1973) examined financial liberalization (interest rate liberalization) and its impact on the economy and concluded that the removal of controls from the financial system and the liberalization of interest rate would lead to the development of the financial sector and increased economic growth.

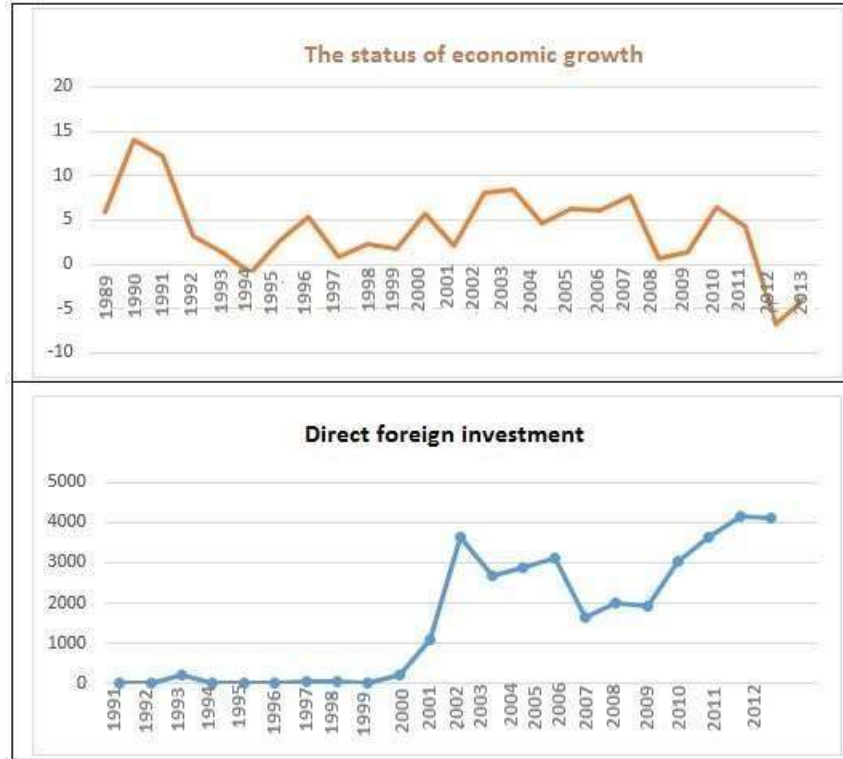
Arestis, Demetridis, Fattouh and Mouratidis (2002) examined financial restrictions such as restriction on interest rate of deposits and facilities, bank reserves and liquidity controls on financial development Using econometric techniques in Greece, Thailand, the Philippines, South Korea, India and Egypt,. The results show that financial liberalization is a very complicated process, which its impact on financial development is somewhat ambiguous. However, it showed that in the long term, real interest rate would have a positive and significant impact on financial development in four countries mentioned above. Differences in the effectiveness of financial policies represent an institutional difference in the implementation of policies such as monitoring quality, relevant laws and regulations, and so on.

Mckinon and Pill (1997 and 1999) argue that the improvement in foreign capital in the short term might lead to high loans and investment, leading to high temporary growth. Thus, initial bubbles may lead to an increase in financial crisis and economic restrictions and cause economic instability. The results of these researchers suggest that financial liberalization in the short and long term can be beneficial and, but it might lead to loss in the medium term.

2.6. Per capita output performance and Iran's economic growth rate

The study of the historical process of per capita output and the economic growth rate in Iran, as well as its comparison with that of other countries, represent important problems in the economy. Given the potentials of the country, the first problem concerns the low per capita output of Iran reflecting the low levels of economic well-being of the people in Iran. The second problem is that in addition to the low output levels, the output growth rate and, consequently, the speed of economic prosperity are not as well suited. Finally, the third problem concerns the instability of the economic growth. Figure (1-2) reports on the economic growth of Iran as well as the status of direct foreign investment.

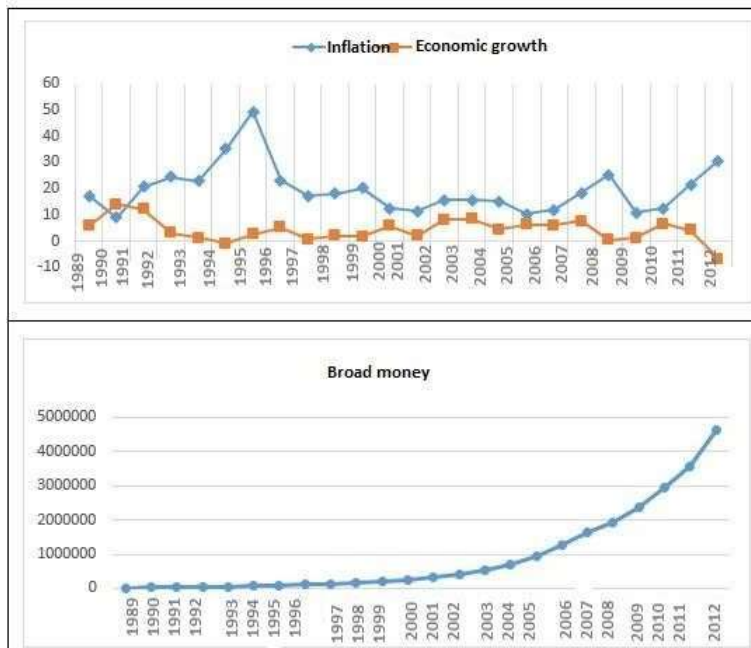
Figure (2-1). The status of economic growth and direct foreign investment development



Source: Time series of the Central Bank of the Islamic Republic of Iran

Figure 2-2 shows the status of economic growth, inflation and broad money. In fact, in periods where the growth rate of money has been increased, paves the ground for the rate of economic growth to be increased as well; however, in the ensuing years, this situation has led to higher inflation and lower growth rates. Conversely, when the growth rate of the volume of money has been decreased, initially, the economic growth rate has also been decreased, but then the inflation has been reduced and the economic growth rate has been increased. In other words, the instability of money has been one of the key factors in creating business cycles and the instability of economic growth.

Figure 2-2. The status of economic growth, inflation and broad money



Source: Time series of the Central Bank of the Islamic Republic of Iran

Some other reasons for the low and unstable economic growth in Iran:

- Limitation and lack of formation of a competitive economy
- Official determination of the interest rate
- Changes in the real exchange rate

3- Introduction of the model, estimation and interpretation of results

3-1- Introduction of the model

This paper examines the effect of financial liberalization on economic growth in Iran during the period of 1991-2012 by Vector Auto-regression Model (VAR). Then, Johansen co-integration method and the variance analysis functions would be used to analyze the data and examine the convergence. The model used in this section is based on the study conducted by Aaristis (2002) and this model has been tested in some of the developing countries with similar to Iran's financial structures. The model framework is as follows:

$$GGDP = F (KAOPEN, INF, FDI) (1-3)$$

Where:

GGDP: Growth of Gross Domestic Production (economic growth)

KAOPEN: financial liberalization indicator (capital control)

INF: rate of inflation

FDI: foreign direct investment

In this model, three indicators of financial liberalization, foreign direct investment and rate of inflation are considered as independent variables and GDP growth (economic growth) is introduced as a dependent variable.

KAOPEN's financial liberalization index (capital control) was derived from the China and Ito Database (2015).The index tries to measure the intensity of capital control, so that this intensity is related to other restrictions in international exchanges. The most important source used to obtain the intensity of capital control is Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), released annually by the International Monetary Fund (IMF) since 1950.

The temporal domain of the test is long terms temporal domain from spring 1991 to winter 2012 and the research population included all the variables used in the model for Iran in the mentioned temporal domain.

3-2- Unit root and stationarity test

One of the issues which should be examined before model estimation is the issue of stationarity of the variables. To examine in the stationarity of variables, Dickey-Fuller unit root or generalized Dickey-Fuller test can be used. Using this test, we can determine the degree of convergence of variables. Table 1 shows the results of the unit root test for all variables in the model. Based on the tests, the null hypothesis does not reject the existence of the unit root for the variables used in the model. However, using this test for the first-order difference of variables indicates that the hypothesis is rejected for all variables. In other words, all the variables used in the model are non-stationary, so that all variables are accumulated; I (1), and have random and unit roots.

Table 1- The results of unit root test for all the model variables

Variable	unit root test statistic	at the level of 0.01	at the level of 0.05	at the level of 0.10
Economic growth GGDP	-2.561014 (0.1051)	- 3.507394	- 2.895109	-2.584738
Financial liberalization index KAOPEN	-1.220601 (0.6625)	- 3.507394	- 2.895109	-2.584738
Foreign direct investment FDI	-0.778513 (0.8199)	- 3.507394	- 2.895109	-2.584738
Inflation rate INF	-2.160362 (0.2222)	- 3.507394	- 2.895109	-2.584738
Financial liberalization D(KAOPEN)	-9.230149)0.0000(- 3.508326	- 2.895512	-2.584952
Foreign direct investment D(FDI)	-9.306577)0.0000(- 3.508326	- 2.895512	-2.584952
Inflation rate D(INF)	-9.171293)0.0000(- 3.508326	- 2.895512	-2.584952

Economic growth (GGDP)D	-9.257491)0.0000(- 3.508326	- 2.895512	-2.584952
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Letter D represents differentiation.

Source: The research findings

3-3-Estimation of vector auto-regression model

In this section, a vector auto-regression model (VAR) variance analysis test were used to examine the interactions of the studied variables and the Johansen co-integration method was used to examine the long term convergence among the variables. The variables of economic growth, inflation, financial liberalization, and foreign direct investment variable with once differentiation were included into regression model and tested.

3-4- determining the number of optimal lags of model

Co-integration analyses require the determination of the optimal lag length in the VAR model, and before it, the optimal lag length should be determined. Different methods are used to measure optimal lag. The most important measurement criteria include Akaike (AIC), Schwarz-Bayesian (SC), Hannan–Quinn (HQC), Maximum Likelihood (LR), Maximum Likelihood Logarithm (L), Final Prediction Error (FPE). In this study, the lag length was estimated using the EVIEWS8 software and the results of these tests are shown in Table (2). Based on this test, it was observed that all of the criteria in the lag to equal one have minimum value. As a result, the lag one was selected as the optimal lag of the model.

Table 2- Determining the optimal lag value using various criteria

HQ	SC	AIC	FPE	LR	LogL	lag
28.6158 4	28.68774	28.56777	2998684 7	NA	1124.427 ⁻	·
24.7792 3*	25.13877 *	24.53891 *	533962.1 *	328.1104	949.2870 ⁻	1
25.3537 2	26.00089	24.92114	785129.8	1.598463	948.3850 ⁻	2
25.9086 1	26.84341	25.28377	1137498.	2.800521	946.7089 ⁻	3
26.3781 5	27.60058	25.56106	1524053.	7.922193	941.6617 ⁻	4
25.7031 0	27.21316	24.69374	656423.7	73.79778 *	891.4029 ⁻	5
26.2747 8	28.07247	25.07316	996135.4	1.384666	890.3900 ⁻	6
26.8343 3	28.91965	25.44046	1517650.	1.888506	888.8981 ⁻	7
27.0002 2	29.37317	25.41409	1591586.	19.84576	871.8566 ⁻	8

Source: The research findings

3-5- Johansen test

In this section, to ensure the long-term relationship between the variables, we can determine the degree of co-integration of model variables using the Johansen method and through the statistic of the trace tests (λ Trace) and maximum likelihood (λ Max). In the λ Trace test, the hypothesis H_0 states that the number of convergence vectors is less than or equal to r . In fact, the hypothesis of the maximum number r of the co-integration vector versus the hypothesis of presence of more than r co-integration vector is tested. If the test statistic is more than the critical value at a certain level of confidence, the hypothesis H_0 on presence of maximum r co-integration vector is rejected. In the λ Max test, the hypothesis H_0 states that the number of convergence vectors is equal to r , and the opposite hypothesis is the presence of $r + 1$ number of the convergence vector (Anders, 2005). The output of this test is presented in Table (3). According to the λ Trace and λ Max statistics, the presence of long-run relationships between model variables is proved.

Table 3- convergence test of co-integration vectors among the variables

hypotheses	eigenvalue	Statistic λ_{Trace}	Critical value at the level of	Probability at the level of 0.05
zero	0.367093	87.53643	47.85613	0.0000
Maximum of vector	0.349098	48.65466	29.79707	0.0001
Maximum 2 vectors	0.118136	12.15598	15.49471	0.1496
Maximum 3 vectors	0.017145	1.469962	3.841466	0.2254
hypotheses	eigenvalue	Statistic λ_{max}	Critical value at the level of	Probability at the level of 0.05
zero	0.367093	38.88177	27.58434	0.0012
Maximum of vector	0.349098	36.49868	21.13162	0.0002
Maximum 2 vectors	0.118136	10.68602	14.26460	0.1707
Maximum 3 vectors	0.017145	1.469962	3.841466	0.2254

Source: The research findings

After co-integration tests between the model variables and by determining the optimal lag, based on the previous criteria, the long term normalized relationship between the model variables is presented in Table (4).

Table 4: Long term relationship between the variables

	GGDP	FDI	INF	KAOPEN
Long term normalized relationship	1/000	0.096094 (0.01442)	-1.199103 (1.24170)	-4.535192 (4.24254)

Source: The research findings

Based on table above, the co-integration equation is stated as follows:

$$GGDP = 0.096094 FDI (0.01442) - 1.199103 INF (1.24170) - 4.535192 KAOPEN (4.24254)$$

The numbers within the parentheses represent the t-statistic for each of the variables.

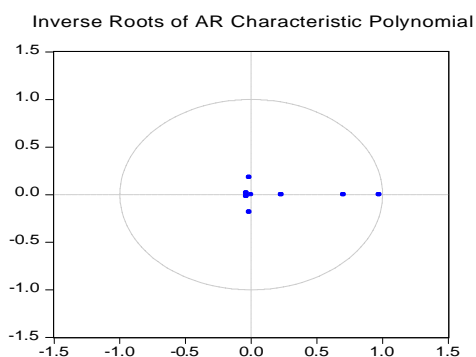
Given the above equation, it is observed that long-term equilibrium relations between model variables are acceptable based on economic theories and statistical data. The above equation indicates that the financial liberalization index has a negative relationship with Iran's economic growth in the years 1991-2012. Given the values of this index as well as the presence of control and determination of the rate of interest, the financial suppression in the Iran's economy is confirmed and suggests the lack of providing proper conditions with regard to financial liberalization policy, so that one percent change in this index reduces GDP growth by 4.53%.

The relationship between inflation rate and GDP growth in Iran is negative in the studied period. Given the increasing trend of inflation in the Iran's economy, the efficiency of many economic and production enterprises has decreased, leading to reduced production growth. In addition, inflation reduces private consumption by affecting purchasing power, and thereby, it affects GDP components, so that one percent change in inflation reduces economic growth by 1.19%. The relationship between foreign direct investment and GDP growth in Iran's economy is positive. The flow of capital among countries leads to the growth of economic activities, followed by the stimulation of economic growth, so that one percent increase in foreign direct investment, economic growth will increase by 0.096%.

3-6- Model reliability and stationary

an auto-regression equation vector is reliable when the value of all roots is less than one or all roots are in a circle with a unit radius. The model also uses the inverse roots of AR characteristic polynomial to examine the stationary of the VAR estimated system. Based on the results of Graph (1), absolute value of all inverse roots is less than unit. Thus, the estimated VAR system is reliable.

Graph 1- The inverse roots of AR characteristic polynomial



Source: The research findings

-7 –Variance analysis.

Analysis of variance is one of the important tools for dynamic performance among variables. Analysis of variance differentiates variations in an endogenous variance to the shocks of other endogenous variables. Table 5 shows the results of variance analysis of prediction error in 10 periods for the economic growth variable. The first column represents the prediction error in the test periods. The source of this error is the change in the current values and future shocks. The prediction error is 2.21 in the first period and 2.94 in the second period, that is, it increases over time. The next column shows the percentage of variance due to shock or a sudden change. The results of the above table show that in the first period, one hundred percent of the economic growth variations are due to this variable. In the second period, 99.93 percent of the variation in economic growth is due to change in this variable, 0.02 percent of the variations were due to financial liberalization variable and 0.02 percent and 0.01 percent of the variations were due to inflation and foreign direct investment variables, respectively.

Table 5- The results of analysis of variance for economic growth

Period	SD	DGGDP	FDI	DINF	DKAOPEN
1	2.215913	100	0	0	0
2	2.944279	99.93751	0.010637	0.027444	0.024412
3	3.295868	99.62115	0.008652	0.246042	0.124153
4	3.469045	99.29598	0.010872	0.391111	0.302038
5	3.557835	98.95109	0.016213	0.485317	0.547386
6	3.605946	98.58228	0.023596	0.550029	0.844096
7	3.634115	98.19524	0.032348	0.597113	1.175300
8	3.652334	97.79886	0.041938	0.633046	1.526156
9	3.665467	97.40153	0.051952	0.661572	1.884947
10	3.675902	97.00984	0.062087	0.684981	2.243092

Source: The research findings

In the fifth period (medium term), it is observed that 98.95% of variation in economic growth is due to this variable, 0.54% is due to financial liberalization variable, 48.4% is due to inflation variable and 0.01% is due to foreign direct investment variable. In addition, in the tenth period (long-term), 97% of the variation in the economic growth is due to this variable, 2.24% is due to financial liberalization variable, 0.68% is due to inflation variable, and 0.06% is due to foreign direct investment. It should be that among these variables, economic growth accounted for the highest percentage of explanation during the periods studied.

Conclusion. The current research was conducted to identify the relationship between financial liberalization and economic growth in Iran. In this research, the time series data of 1991 to 2012 and the vector auto-regression model (VAR) were used. Then, for analyzing the data and examining the convergence, co-integration test through Johansen method and variance analysis functions were used. The model variables included GDP growth, financial liberalization index (capital control), inflation rate and foreign direct investment. The model's estimation equation represents a negative relationship between the financial liberalization index and Iran's economic growth during the studied period. If the financial liberalization reforms are implemented correctly, the positive effects of economic growth would be observed in the country. KAOPEN financial liberalization index for Iran has negative and small values, which might be due to non-integration of Iran's financial marker with global financial markets. These values also indicate financial suppression and control during the studied period. Table 6 shows the KAOPEN financial liberalization index for Iran during the period studied. Moreover, the relationship between inflation and GDP growth is negative. In general, inflation in the Iran's economy, intensified as a result of increased liquidity, has had a decreasing effect on the growth of Iran's economic activity. The relationship between foreign direct investment and GDP growth is positive, and the mobility of capital among countries provides economic growth. It has a positive relationship with economic growth, indicating the mobility of capital flows in line with financial liberalization policy.

Table 6- KAOPEN estimated index for Iran

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Index value	-1/89	-1/89	-1/89	-1/89	-1/89	-1/89	-1/89	-1/89	-1/89	-1/19	0/04
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Index value	0/04	0/04	0/04	0/04	0/04	0/04	0/04	0/04	0/04	-·/66	-·/66

Sourc: China and Ito Database, 2015

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