



THE EFFECT OF INFLATION ON FINANCIAL DEVELOPMENT INDICATORS IN IRAN (2000-2015)

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Abstract:

Inflation and financial development are among the factors that influence economic growth and the interaction between them is a major issue in developing countries. The aim of this paper is to investigate the effect of inflation on financial development indicators in Iran using seasonal data over 2000-2015. To achieve the research objectives, time series data were collected from World Bank and seasonal inflation rate, with 5 financial development indicators were used to measure the research variables. Then I applied Johansen Co-integration Test and Vector Error Correction Model to estimate the proposed model. The results show that inflation has a negatively significant effect on financial depth and also positively significant effect on the ratio of total deposits in banking system to nominal GDP in Iran during the observation period. Also the existence of an equilibrium relationship between inflation and other 3 indicators of Iran's financial development used in this study was rejected.

Key words: *Inflation; Financial Development; Iran; Johansen Co-integration Test; Vector Error Correction Model (VECM).*

1. Introduction

The literature on economic development suggests that financial development is a key driver of economic growth in different countries and also plays an important role in reducing income inequality (Levine, 1997). That's why financial development is often considered by economic policymakers. As a definition, financial development refers to a situation that the quality, quantity and the efficiency of financial intermediation services improves (Choong and Chan, 2011) and all of individuals benefit from the comprehensive services of financial institutions. Financial institutions and financial markets play an important role in the process of allocation of funds and savings of individuals to production by reducing the information asymmetry, transaction costs and also reducing financial constraints (Khan, 2002). Financial institutions also can affect welfare through the minimizing of macroeconomic shocks (Kim et al, 2010).

Optimum performance of any economic system depends on the efficient real part and the financial part together, therefore the identification of factors affecting financial development in any economy is of great importance. On the other hand, inflation has always been a concern for the researchers as it creates uncertainty in the economic systems that may adversely affect growth. Inflation generally considered as a disproportionate increase in the general level of prices and the irregular increasing trend of prices in macroeconomic. The concern with inflation stems not only from the need to maintain overall macroeconomic stability, but also from the fact that inflation hurts low-income individuals (Hanif and Batool , 2006). Studies show that inflation affects the relationship between the financial sector and growth. That's why the interaction between inflation and financial development is an important issue in less developed countries (Ozturk and Karagoz, 2012). However, the direct effect of inflation on financial development is taken into consideration less than its effects on growth.

Many empirical and theoretical studies have addressed the relationship between inflation and financial market variables in recent years, but most of them focused on the role of inflation and financial development in growth models and a few studies can be found which examined the direct relationship between these two variables. On the other hand, limited studies examined the effects of inflation on financial development indicators in Iran and most of them have sufficed to study on one or two indicators of financial development. So, this paper using 5 financial system's development indicators in Iran presents a better understanding of the effects of inflation on financial development. In the present paper, first background and theoretical basis will be mentioned and then the research hypothesis will be defined as "Inflation has a significant effect on financial development indicators in Iran". Then this hypothesis will be tested by an application of Vector Error Correction Model (VECM) using seasonal data during the 2000-2015. The final parts of this paper will be dedicated to empirical results and conclusion.

2. Background

Boyd et al (2001) using data for 100 selected countries during 1960-1995 and applying panel technique investigated the relationship between inflation and financial development and showed that there is a negatively nonlinear relationship between inflation and bank sector development.

Al Nasser and Garza (2009) using panel technique for 15 selected countries of Latin America during 1978-2003 reported a negatively significant relationship between inflation and bank sector development. They also found out that high rates of inflation in this countries has led to depression in stock markets.

Salimifar et al (2012) using Quantile econometric method examined the effect of inflation on the performance of financial markets in Iran during 1973-2007 and showed that inflation has a negatively significant effect on financial development in Iran.

Kim et al (2010) using the Pooled Mean Group estimator studied the long- and short-run relationship between inflation and financial development for 87 countries over the 1960-2005 period and found a negative long-run relationship between inflation and financial development coexist with a positive short-run relationship.

Bittencourt (2011) using panel technique examined the impact of inflation on financial development in Brazil during 1985-2002 and showed that inflation caused deleterious effects on financial development at the time.

Abbey (2012) examined the impact of inflation on financial development in Ghana using quarterly time series data for 1990-2008 and reported a positive relationship between the two variables in the short run and no relationship at all in the long run.

Ozturk and Karagoz (2012) in their study using ARDL method and co-integration test analyzed the effect of inflation on financial development in Turkey over the period 1971-2009 and the results indicated the negative impact of inflation on financial development.

Aboutorabi (2012) using a multilateral index and implementing ARDL approach studied the effect of inflation on bank sector performance in Iran during 1973-2007 and reported the negative impact of inflation on financial sector in Iran.

Odhiambo (2012) introducing a multi variable model and estimate it with ARDL approach examined the effect of inflation on financial development in Ghana using annually data over the period 1980-2011 which the results indicated a negative relationship between inflation and financial development.

3. Inflation and Financial Development

Although several studies have examined the relationship between inflation and financial development, the exact cause of the nexus between these two variable has remained unknown so far and a comprehensive explanation in this regard has not been provided yet. For example, Tobin (1965) states that inflation turn portfolio allocation from money to capital assets which can lead to lower real return on investment and yet be a positive effect on economic growth. One of the indirect channels of the negative effect of inflation on economic growth is through its effects on the development of financial sector. High inflation is often in associated with different forms of financial depression. Credit rationing and interest rate ceilings in order to financing government are examples of financial repression which has negative impact on financial deepening indicators. In terms of inflation, financial intermediation is more difficult because the flow of information about actual return on investments is less available. This causes to lenders focus on short-term goals when creating their own portfolio and eventually the bulk of the loans will be used to cover the operational costs (Rousseau and Yilmazkuday, 2009). Smith (2003) referred the inflation as a way of influencing on financial system through the disruption in financial markets and the activities of financial intermediaries. English (1999) believes that in terms of inflation, households attempt to replace the exchange services in order to balance their own

money which could lead to an increase in financial intermediary services as well as the size of the financial sector.

According to Choi et al (1996) in higher rates of inflation efficiency savings reduces, information friction increases and consequently accumulation of funds for the financial system will reduce and Khan et al (2006) believes that this inflationary effect will be a long-term effect. On the other hand, theoretical models explain that higher rates of inflation, results in the dispersal of financial information flows and the rationing of credits to private sector and ultimately to exacerbate the gaps in credit markets. Also increase in inflation rate may reduce the ability of financial sector in allocation of resources and stimulate economic growth through capital accumulation. In this regard, English (1999) provides some evidences from selected countries which show a positive effect of inflation on the size of the financial sector while other researchers such as Boyd et al (2001) have reported even a nonlinear and negative relationship between inflation and financial development. Altig (2003) theoretically shows that higher inflation rate leads to a decline in return on investment and resulting in decline incentives for investments. Thus, high inflation can cause limitations and uncertainties in the financial system. Inflation is also associated with the financial depression and rising inflation has a negative effect on the development and activities of the financial sector, but with inflation rate above the threshold rate of inflation, this relationship seems to be fragile (Haslag and Koo, 1999). Some believe that inflation rates higher than 3 to 6% can have serious negative effects on the development of the financial sector (Khan et al, 2006). Among the reasons of the negative effects of inflation on financial development, I can point on the rising of interest rate due to inflation and increase of the cost of attracting foreign credits by banks. According to theories and presented evidences, it seems that inflation has a long run negative effect on the financial development indicators and therefore I are going to test this nexus in Iran`s economy at following.

4. Methodology

4-1- Hypothesis

Inflation has a significant effect on financial development indicators in Iran.

4-2- Data Source

All time series used in this study was extracted from the World Bank Database over the period 2000 to 2015.

4-3- Research Variables

4-3-1- Inflation Rate

INF: Seasonal inflation rate (Seasonal growth rate of price of goods and services).

4-3-2- Financial Development Indicators

Based on existing literature, studies on financial development in different countries often used different proxies to show the development of the financial system. Due to the specific characteristics of any financial system, various indicators have been proposed to measure financial development and selected indicators depend on size, efficiency and relative importance of financial intermediaries (Choong and Chan, 2011). To measure financial development, many researchers considered a set of indicators such as liquidity, credits and deposits as a percentage of GDP. Studies on Iran's economy show that Iran's financial system is a highly bank based system (Moayedi and Aminfard, 2012) and banks play the main role in allocating the savings of individuals to production. Also recent decades have been witness to negligible share of stock market in Iran's financial system so that total value of the traded stocks during the recent years was a very small share of GDP. So it seems that using of financial development indicators in bank sector or indicators relating to the role of fiscal policies can better represent the level of development of the financial system in Iran. Due to mentioned items and using the maximum available data, in the present study, the following 5 indicators were used to measure financial development in Iran:

FD1: Financial depth (Liquidity to nominal GDP ratio): This ratio is a common criteria for measuring the depth of the financial system and the size of financial intermediation (Levine et al, 2000) and frequent use of this measure is due to easy access to its data.

FD2: The ratio of deposits in private banks to total deposits in banking system: This indicator shows the share of private sector in the banking industry and is an important indicator of development in the banking sector (Levine, 1997).

FD3: The ratio of private sector debt to banking system to nominal GDP: This indicator is another measure to represent financial intermediation and credits provided to the private sector (Demetriades and Hussein, 1996).

FD4: The ratio of private sector debt to total of public and private sector debts to banking system (Structural indicator of financial development): Increase in this ratio means that the private sector has attracted more funds (Ang and McKibbin, 2007).

FD5: The ratio of total deposits in banking system to nominal GDP: In developing economies there is a large amount of currency outside the banking system and the ratio of volume of money to GDP could represent a wider use of currencies rather than the increase in the volume of bank deposits. Therefore the ratio of total deposits in banking system to GDP can be a proper indicator to show the development of banking sector (Demetriades and Hussein, 1996).

4-4- The Model

In this paper, using seasonal data over the period of 2000-2015, I used Vector Error Correction Model (VECM) to estimate the proposed model. Vector Error Correction Model (VECM) which is based on the existence of co-integration between economic variables, creates the possibility of the study of long-term relationship between endogenous variables and also relates the behavior of variables in short-run

to their values in long-run. Using Vector Error Correction Model (VECM) in studying the relationship between economic variables, obviates the weaknesses of traditional econometric methods in case of time series are not stable (Yahyazadehfar et al, 2014). The general assumption in the proposed model is that the value of each dependant variable can be defined as a function of past values of the dependent variable, past values of the independent variable and error term as follow:

$$(1) FDi = f (FDi_{(-1)}, FDi_{(-2)}, \dots, FDi_{(-n)}, INF_{(-1)}, INF_{(-2)}, \dots, INF_{(-n)}, e)$$

Using Vector Error Correction Model (VECM) in empirical studies requires to determine the numbers of lags included, stationary of the time series and the results of the co-integration test. Thus using Schwarz (1978) Information Criterion (SIC), two optimal lags considered to specify the model as the following linear relation:

$$(2) FDi = \alpha_1 FDi_{(-1)} + \alpha_2 FDi_{(-2)} + \alpha_3 INF_{(-1)} + \alpha_4 INF_{(-2)} + \alpha_5 e + c$$

Which FDi , $i = \{1,2,3,4,5\}$ and INF represent financial development and inflation measures respectively, α_j , $j = \{1,2,3,4,5\}$ are unknown coefficients and e is error term.

5. Empirical Results

Using econometric methods in empirical studies is based on the stationary of the variables. That's why before using the estimation methods we must ensure that all used variables are stable. In this paper, using Eviews6, Phillips–Perron (1988) Unit Root Test applied to test the stationary of the variables in level.

Table 1. The results of Phillips–Perron Unit Root Test for variables in level.		
Variable	Adj. t-Stat	Probe
<i>INF</i>	-4.23	0.01
<i>FD1</i>	-4.94	0.00
<i>FD2</i>	-1.86	0.66
<i>FD3</i>	-5.63	0.00
<i>FD4</i>	0.01	0.99
<i>FD5</i>	-5.52	0.00
Test Critical Value In %5 Level= -3.50		

The results on Table 1 show that variables $FD2$, and $FD4$ are unstable in level and other variables are stable in level, thus Phillips–Perron (1988) Unit Root Test applied for these three variables in 1st difference which the results are shown in Table 2.

Table 2. The results of Phillips–Perron Unit Root Test for variables in 1st difference.

Variable	Adj. t-Stat	Probe
<i>D(FD2)</i>	-7.29	0.00
<i>D(FD4)</i>	-7.63	0.00
Test Critical Value In %5 Level= -3.50		

The results indicate both two remained variables are stable in 1st difference in %5 level. Stationary of the variables at the same level could indicate the existence of a long-run relationship between them (Hami, 2014). Second step in estimating the proposed model is to ensure of existence of an equilibrium relationship between the variables. Examining the co-integration between times series variables is performed by different methods such as Engle and Granger (1987), Stock and Watson (1988) and Johansen (1988), which Johansen’s approach has clearly better properties than the other two estimators in situations where there is more than one co-integration vector (Gonzalo, 1994). Therefore in the next step I applied Johansen Co-integration Test using Eviews6 to examine the long-run relationship between inflation and financial development indicators which the results are shown in Table 3.

Table 3. The results of Johansen Co-integration Test for variables

Series	Trace Statistic	Probe	Existence of Co-integration
<i>INF-FD1</i>	16.21	0.04	Confirmed
<i>D(INF)-D(FD2)</i>	9.78	0.30	Rejected
<i>INF-FD3</i>	13.66	0.09	Rejected
<i>D(INF)-D(FD4)</i>	12.92	0.12	Rejected
<i>INF-FD5</i>	20.51	0.01	Confirmed
Critical Value in %5 Level=15.49			

According to the Table 3, Johansen’s trace statistic is greater than critical value for series INF-FD1 and INF-FD5 at the %5 level which indicates that there is at least one long-run co-integration vector among the variables and also the existence of co-integration for the rest of 3 series rejects. Examining co-integration between variables provides the basis of using estimation methods. As mentioned earlier, in this paper I applied Vector Error Correction Model (VECM) which has a wide range of application in empirical studies. The results are shown in Table 4.

Table 4. The results of Vector Error Correction Estimates for variables

Coefficient	Value in equation <i>FD1 = f₁(INF)</i>	Value in equation <i>FD5 = f₂(INF)</i>
α_1	-0.11 (0.12) [-0.86]	-0.08 (0.08) [-0.94]
α_2	-0.60 (0.12)	-0.80 (0.08)

	[-4.90]	[-9.34]
α_3	-0.02 (0.02) [-1.29]	0.01 (0.01) [1.70]
α_4	-0.03 (0.02) [-1.48]	0.01 (0.01) [0.19]
α_5	-0.05 (0.05) [-2.67]	-0.10 (0.05) [-2.06]
C	0.04 (0.03) [1.32]	-0.01 (0.01) [-1.24]
Standard Errors in () and T-Statistics in []		

Based on the estimated coefficients, the general linear relation can be described as follow:

$$(3) \quad FD1 = -0.11FD1_{(-1)} - 0.60FD1_{(-2)} - 0.02INF_{(-1)} - 0.03INF_{(-2)} - 0.05e + 0.04$$

$$(4) \quad FD5 = -0.08FD5_{(-1)} - 0.80FD5_{(-2)} + 0.01INF_{(-1)} + 0.01INF_{(-2)} - 0.10e - 0.01$$

According to the results of Vector Error Correction Estimates for variables (shown in Table 4), coefficients of $\alpha_5 = -0.05$ in equation (3) and $\alpha_5 = -0.10$ in equation (4) which called error correction coefficients, appeared in the models with negative sign and their significance approve in %5 level. Negative sign of error correction coefficients indicates the tendency for long-run equilibrium relationship among inflation and financial development variables and show that in each period a percentage of short-term imbalance adjust to achieve long-run equilibrium. Also the significance of $\alpha_3 = -0.02$ and $\alpha_4 = -0.03$ in equation (3) which indicate the effect of inflation on financial depth indicator in Iran approves in %2 level and the significance of $\alpha_3 = 0.01$ and $\alpha_4 = 0.01$ in equation (4) which indicate the effect of inflation on the ratio of total deposits in banking system to nominal GDP in Iran approves in %1 level.

6. Conclusion

The aim of this paper is to investigate the effect of inflation on financial development indicators in Iran using seasonal data over 2000-2015. To achieve the research objectives, time series of research variables extracted from World Bank database and then I estimated the proposed model using Vector Error Correction Model (VECM). The results show that inflation has a negatively significant effect on financial depth indicator and a positively significant effect on the ratio of total deposits

in banking system to nominal GDP in Iran during 2000-2014 and so we can say that inflationary effect on the indicators of Iran's financial sector was not the same. This finding is consistent with the results of the studies of Bittencourt (2011) and Ozturk and Karagoz (2012) for selected countries. The findings of this study suggest that the effects of inflation on financial development indicators in Iran was negligible which can be due to changes in operating costs of financial intermediaries, adoption of inflation targeting in macro level or minor changes in household savings due to increased prices of goods and services. Therefore, in the opinion of the author, inflation control by controlling the money supply, adopting proper monetary policies by Central Bank of Iran and make some reforms on the structure of taxing system of Iran can decrease the negative effects of inflation on financial development in Iran.

7. References

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