The Role of Financial Development in Economic Growth-Inflation Nexus: Evidence from Iran

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Abstract
It is widely known that high rates of inflation are detrimental to economic growth performance directly. However, much less attention exists about the mechanism in which inflation affects growth by financial development as an indirect channel. The main contribution of this paper is to estimate the effects of financial development and inflation on growth. The data availability permit us to cover the period between 1965 and 2011 for Iran. The results of 3SLS estimation show that, financial development is viewed as an important channel through which inflation can adversely affect growth. Also, the level of financial development is strongly associated with per capita GDP growth and openness. The results of Engle-Granger causality test confirm the existence of bidirectional causality between economic growth and financial development indicator. Furthermore, investment as a share of GDP, financial indicator and population act as influential factors on economic growth.
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1. Introduction

A large and expanding literature tries to shed some lights on the role of policy or ancillary variables in the determination of economic growth. Most of these literature has mainly focused on the role of macroeconomic stability, inequality, income and wealth, institutional development and financial market. Among these factors the role of financial markets in the growth process has received recently considerable attention (Christopoulos and Tsionas, 2004). Financial development not only has a significant growth-enhancing effect, but also an inequality-reducing effect. By alleviating informational asymmetries and transactions costs and disproportionally relaxing financial constraints of the poor, financial development encourages more productive investment in physical and human capital that substantially facilitates economic growth, narrowing the gap between the poor and the rich. Moreover, since credit market frictions can propagate and amplify business cycle fluctuations, financial development helps mitigate macroeconomic volatility (Kim and Lin, 2010). More developed financial markets and establishments match savers and investors expeditiously, permitting the economy to soak up shocks simply. The financial sector can also facilitate diversification (at each the political economy and economics level) which might scale back risk and volatility. See Denizer *et al.,* (2002), Braun and Larrain (2005) and Raddatz (2006). Overall, countries with well-developed financial systems have higher levels of real activity, and more rapid rates of growth.

The last decades were the explosion of research in growth-financial development-inflation nexus. Rousseau and Wachtel (2001) pointed out that the negative impact of inflation on growth can be due to direct effects and to indirect effects through the financial sector. Direct effects include the higher transactions and information costs in an inflationary environment that inhibit economic development. For example, economic agents will find planning difficult when inflation makes nominal values uncertain. Firms and individuals will be reluctant to enter contracts when inflation is imperfectly predicted and judgments about absolute and relative prices are uncertain. The reluctance to enter contracts over time will inhibit investment and entrepreneurship. Thus, inflation will have a direct effect on resource allocation and economic growth. The indirect channel for the negative effect of inflation on growth is through its effects on financial sector development. Inflation will inhibit the development of the financial sector and financial sector development has a positive effect on growth. High inflation will inhibit any long term financial contracting and financial intermediaries will tend to maintain very liquid portfolios. Thus, in an inflationary environment intermediaries will be less eager to provide long-term financing for capital formation and growth. High inflation is often associated with various forms of financial repression as governments take actions to protect certain sectors of the economy. For example, interest rate ceilings and credit allocation are common in high inflation environments. Such controls lead to inefficient allocations of capital that inhibit growth.

Although the empirical findings on this topic are miscellaneous, an outsized body of works had agreement on a negative impact of inflation on growth. It is believed that there exist an accord among economists that high rates of inflation are prejudicial to economic process performance. However, less agreement exists concerning the mechanisms by that inflation affects economic activity. Financial development is viewed as a crucial channel through that inflation will adversely disturb growth. Andres *et al.*, (1999), Naceur and Ghazouani (2005) and

Keho (2009) stated high rates of inflation make the financial system inefficient in allocating resources. The studies of De Gregorio (1992) and Jones and Manuelli (1993) provided evidence suggesting that inflation has a significantly negative impact on financial markets. Haslag and Koo (1999) argued that inflation is related to financial repression and discovered a negative relationship between inflation and financial development. Also, Boyd *et al.*, (1996) and Rousseau and Wachtel (2001) empirically concluded that an increase in inflation causes decreases in various measures of financial depth.

In this paper, we aim at investigating the triangle relationships of growth-financial development-inflation for Iran during the period 1965-2011. The reminder of this paper is as follow: In the next section, we present a brief literature review. Model and description of variables are described in Section 3. Section 4 presents the empirical findings. Section 5 concludes.

2. Literature review

Despite the joint evolution of inflation, financial development attained by an economy and its rate of growth, the empirical growth literature has separately approached the study of the links among these variables by estimating the effect of financial development and inflation on growth (Andres *et al.*, 1999). However, the relationship between inflation and financial development has been focal point of interest. A number of recent empirical works have provided significant contributions to the finance, inflation and growth literature.

Boyd *et al.*, (1996) found that the empirical relationship between inflation and financial market development is highly nonlinear, and in particular, the relationship becomes less pronounced at higher rates of inflation. Also, they provided some evidence in favor of threshold effects. For countries with inflation rates below some critical level, inflation and financial market performance exhibit a strongly negative correlation. Once inflation exceeds some threshold, there is -on average- a discrete decline in the amount of banking and equity market activity. Moreover, for inflation rates above the threshold, inflation and financial market development seem essentially uncorrelated.

Andres *et al.*, (1999) have estimated the effects of financial development and inflation on growth. They aimed to exploit both the cross-section and the time-series dimension of the data on inflation, growth and some banking and stock market indicators over the period 1961-1993 for a sample of OECD countries. Their analysis showed that the negative effect of inflation in growth equations remains significant even after including financial market variables. Additionally, the link between proxies of financial market performance and growth was found to be weak, vanishing when country-dummies were included and endogeneity was accounted for using instrumental variables. Also, controlling for inflation reduced the significance of those indicators.

Khan *et al.*, (2001) explored the relationship between inflation and financial depth is nonlinear with threshold effects. The threshold level of inflation beyond which inflation significantly hinders growth, was estimated to be in the 3-6 percent range. They additionally scrutinized the result of many factors on financial activity. Among them, there are gross domestic product per capita, the degree of openness, the share of public consumption in gross domestic product, and inflation rate.

Pradhan (2011) investigated the finance-growth nexus in India in a tri-variant framework by incorporating inflation. He found that financial development has substantial impact on both economic growth and inflation. While financial development and economic growth are bidirectional, financial development and inflation are unidirectional. The paper finally suggested that financial development is considered as a policy variable to forecast economic growth and inflation in India, especially in the globalization era of 1990s. That means the proper linkage between the three will ensure macroeconomic stability in the Indian economy.

Ozturk and Karagoz (2012) have investigated the relationship between inflation and financial development in case of a developing country, Turkey. As indicators of financial development, they choose the ratio of bank credits used by private firms to GDP and broad money supply to GDP. Using annual data belong to the 1971-2009 period and ARDL co-integration test, it was found out that there is no long-run co-integrating relation between inflation and financial development, in terms of the ratio of money supply to GDP indicator. When the ratio of credit to private sector to GDP is used as a proxy for financial development it is evidenced that a significant long-run relationship exists between inflation and financial depth. Long and short run estimates reveal that inflation has a negative effect on financial development.

Maduka and Onwuka (2013) attempted to explore the link between financial deepening and economic growth in Nigeria. They examined the relationship between financial deepening variables and economic growth variable by analyzing their long run properties and short run dynamics. The econometric results from the error correction mechanisms showed that financial deepening has a negative and significant impact on economic growth in Nigeria. The negative signs of the coefficients of the financial market variables implied that the supply of these financial assets is not enough to raise the economy to the desired level.

3. Model and description of variables

The data set utilizied in this paper covers time series for Iran over the period of 1965-2011 and is mainly taken

from World Development Indicator published by World Bank and Central Bank of Iran. In this paper, we have specified two basic models. The first model scrutinizes the effect of financial development on economic growth. The fundamental reason for this effect is the more efficient undertaking of investment, and more efficient capital allocation because agents can have better information about the nature of shocks (aggregate versus idiosyncratic) that hit particular projects. This is consistent with the classical view on the relation between growth and financial development (Christopoulos and Tsionas, 2004). King and Levine (1993) use IMF data and various financial indicators to conclude that there is a positive relationship between financial indicators and growth, and that financial development is robustly correlated with subsequent rates of growth, capital accumulation, and economic efficiency. They correctly emphasize that policies that alter the efficiency of financial intermediation exert a first-order influence on growth. The model used in this paper has been extracted heavily from a model proposed by Dawson (2003). The construction of this relationship can be specified as:

$$Y_t = \alpha_t + \beta_1 Inv_t + \beta_2 Pop_t + \beta_3 Fin_t + \varepsilon_t$$

In which Y is the growth rate of real GDP, Inv is the ratio of investment to GDP, Pop is population growth rate, Fin is financial depth, which includes various indicators, ε and t represent error term and time respectively.

Investment/GDP ratio: There is a general agreement in growth models that the process of economic growth and investment is closely interconnected. Bothe neo-classical and Marxist economists have placed main emphasis on capital accumulation as the engine of economic growth. Based on the report of World Bank (1989), countries which experience higher investment/GDP ratio have made more GDP growth. Some authors have concluded that investment has been the main factor explaining economic growth. In a study for East Asia, Young (1994) concluded that investment was the main source of growth in the experience of the East Asian economies. Gutiérrez (2005) produced positive evidence about the contribution of investment to the growth process of Latin America during 1960-2002. Also, Reinhart and Khan (1989), Chow (1993), Blomstrom *et al.*, (1996), Patnaik and Chandrasekhar (1996) and Kahn and Kumar (1997) agreed on the importance of investment on economic growth and made useful contribution to understand the role of investment in economic growth.

Population growth rate: It is expected to observe a positive relationship between population and economic growth. Population as a demographic feature can stimulate economic development and promote a rise in living standards. This is because the population growth encourages competition in business activities and, as the country's population grows, the size of its potential market expands as well. The expansion of the market, in its turn, encourages entrepreneurs to set up new businesses (Furuoka, 2009). Simon (1996) has identified the positive effect of population on economic growth. In addition, Furuoka (2005) stressed that there exist a long-run relationship between the population growth and per capita GDP in Malaysia.

Financial depth: Several measures of financial development have been well documented in the literature. For instance, annual growth rate of real liquid liabilities of the financial sector (Odedokun, 1996), ratio of claims on monetary authorities to demand deposits plus other deposits of banking institutions (Haslag and Koo, 1999), the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets (Andres *et al,* 1999), broad money supply as a percentage of GDP (Rousseau and Wachtel, 2001 and Pradhan, 2011) and quasi-liquid liabilities[2] (Boyd *et al.,* 1996). Based on data availability and country structure we construct four indicators for financial development; money and quasi money (M2), domestic credit to private sector (DCP) (The presumption for using this indicator is that greater financial sector development is positively correlated with credit extension to private firms as opposed to the government), liquid liabilities (M3) and quasi-liquid liabilities (QM3)[3]. These measures of financial development are expected to be positively associated with the level and growth rate of real per capita GDP.

The second model inspects the effect of inflation on financial development. Financial market efficiency affects the allocation of savings and investment. In this case, high rates of inflation exacerbate financial market frictions, interfere with the efficiency of the financial system, and thus inhibit long-run growth. Moreover, easily generate development traps and threshold effects. Also, high rates of inflation render the high activity steady state unstable. Finally, these models typically predict that high rates of inflation can induce endogenously arising volatility in all variables, including equity returns, and that high rates of inflation will be associated with low real returns to saving (Boyd, *et al.,* 1996). As Choi *et al.,* (1996) pointed out that inflation reduces real returns to savings and makes more severe the adverse selection problems in capital markets inducing a higher degree of credit rationing. We also enter government expenditure as an explanatory variable, due to the fact that government plays an important role in the provision of financial services, particularly, in the developing world and can help overcome market failures and promote development through lower costs and increased access to finance, particularly in the developing economies. Economic historians have long recognized that governments are central to the development of organized finance. Demetriades and Rousseau (2010) explored the role of

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[2] It is defined as the ratio of liquid liabilities of the financial system to GDP minus the ratio of a country's currency (held outside of the banking system) plus demand deposits to its GDP
[3] All indicators are calculated as a share of GDP

government in the nexus of finance and trade. They found that the government expenditures did have a positive long-run effect on financial development. La Porta *et al.,* (2002) and Andrianova *et al.,* (2008) showed there exist a positive relationship between government size and the efficiency of financial markets. The next explanatory variable is openness. Based on the simultaneous openness hypothesis put forward by Rajan and Zingales (2003), when a country is open to trade, it is more likely to develop its financial system. It is measured as the sum of exports and imports divided by gross domestic products. Furthermore, growth rate of real GDP as an influential factor on financial development is included in the estimation. In line with existence literature (Gillman and Harris 2004, Gillman *et al.,* 2004, Bittencourt 2011) and the goal of understanding the influential factors on financial development the following proposed functional relationship is undertaken:

$$Fin_t = \alpha_t + \beta_1 Inf_t + \beta_2 Gov_t + \beta_3 Opn_t + \beta_4 Y_t + \varepsilon_t$$

In which Inf shows inflation rate, Gov indicates government expenditure as a share of GDP and Opn represents openness. Table 1 provides the correlations between financial development indicators and inflation using time-series between 1965-2011. It is noticed that all measures of financial development are positively correlated with each other and any measures of indicators are correlated negatively with inflation. Table 2 contains descriptive statistics for all variables.

Table 1: Correlation matrix of financial development and inflation, 1965-2011

Variables	M2	DCP	M3	QM3	Inf
M2	1.000				
DCP	0.237*	1.000			
M3	0.990**	0.336*	1.000		
QM3	0.827**	0.599**	0.884**	1.000	
Inf	-0.145*	-0.067*	-0.133*	-0.172*	1.000

Source: Own calculation.

** significant at 5 percent level and * significant at 10 percent level

Table 2: Descriptive statistics, 1965-2011

Variables	Mean	Std Dev	Minimum	Maximum
Y	4.844	7.142	-13.22	17.73
Inv	1.311	0.992	0.301	3.401
Pop	2.531	1.029	1.147	4.077
M2	41.22	12.94	21.22	68.14
DCP	22.67	4.634	16.02	37.27
M3	44.24	12.79	25.07	70.50
QM3	23.61	7.033	9.178	37.45
Inf	18.16	13.12	-1.330	54.28
Gov	16.70	3.755	11.17	25.77
Opn	41.80	13.45	76.77	13.77

Source: Own calculation

As table 2 demonstrates, average GDP growth is 4.84 with volatility from -13.22 to 17.73. Investment ratio and population growth experience less fluctuations, about 3.1 and 2.93 over the study duration. All measures of financial development are unstable with a volatility range of 21.25 to 46.93. Inflation rate is also unstable with an average near 18% and a range of -1.33 to a high of 54.28. Government expenditure is also stable and averaging around 16% and openness has a fluctuation about 63%.

4. Empirical findings

Methods for detecting the presence of a unit root in parametric time series models have lately attracted a good deal of interest in both statistical theory and application. This is because a unit root is often a theoretical implication of models, which postulate the rational use of information that is available to economic agents (Philips and Perron, 1988). Pre-testing for unit roots is often a first step in modeling the above-mentioned relationship. An important econometric task is determining the most appropriate test. In this paper, the so-called Dickey–Fuller unit-root test is employed for that purpose and the results are summarized in Table 3.

Table 3: Results of Augmented Dickey-Fuller unit root test

Variables	ADF	Critical values		
	I(1)	%1 critical values	%5 critical values	%10 critical values
Y	-7.6573 (0.000)	-3.5885	-2.9297	-2.6030
Inv	-5.0977 (0.000)	-2.6225	-1.9490	-1.6118
Pop	-2.2003 (0.0283)	-2.6198	-1.9486	-1.6120
M2	-5.9772 (0.000)	-3.5847	-2.9281	-2.6022
DCP	-6.4810 (0.000)	-3.6055	-2.9369	-2.6068
M3	-6.2404 (0.000)	-2.6289	-1.9501	-1.6113
QM3	-6.2312 (0.000)	-3.5966	-2.9331	-2.6048
Inf	-9.25 (0.000)	-3.5885	-2.9297	-2.6030
Gov	-6.8412 (0.000)	-3.6009	-2.9350	-2.6058
Opn	-4.0867 (0.0027)	-3.6009	-2.9350	-2.6058

Source: Own calculation
* The optimal lag structure is determined by Schwartz Bayesian Criterion
** The p-values are in parentheses

As can be seen, the results of unit root test indicates all variables are integrated of order one. To investigate the presence of long-run relationship between variables we use Engle-Granger co-integration test. The results reject the null of no cointegration and residuals are stationary of order (0) which shows the existence of long run relationship between variables (Table 4).

Table 4: Engle-Granger co-integration test

Residuals	ADF	Critical values		
		%1 critical values	%5 critical values	%10 critical values
Residual 1	-4.39 (0.0003)	-3.596	-2.933	-2.604
Residual 2	-4.25 (0.0019)	-3.62	-2.945	-2.611

Source: Own calculation
* The p-values are in parentheses
** The optimal lag structure is determined by Schwartz Bayesian Criterion

The next stage of the procedure would be to estimate the models with Three Stage Least Squares (3SLS) method in order to obtain more valid results. The results are summarized in table 5.

Table 5: Results of 3SLS for Eq. 1

Variables	Coefficient	t-statistic	Prob
Inv	4.21	2.91	0.0048
Pop	-1.15	-1.10	0.2749
Fin	0.002	2.15	0.0000
Adjusted R^2= 0.79			

Source**:** Own calculation

Table 6: Results of 3SLS for Eq. 2

Variables	Coefficient	t-statistic	Prob
Inf	-0.153	-2.16	0.033
Gov	-0.4526	-2.15	0.034
Opn	0.2185	2.62	0.010
Y	0.6479	3.14	0.002
Adjusted R^2= 0.68			

Source: Own calculation

From the results of R^2, it is obvious that the models fit well and most of variables are consistent with a priori expectation. It is well known in the literature that investment is the key determinant of economic growth. Consistent with expectation, investment shows positive sign in growth equation. Iran as a developing country, should increase the fraction of invest to GDP in order to experience swift growth. It became clear that slowly developing countries are those who fail to invest. The findings of the study clearly suggest that government should provide infrastructural facilities to enhance investment. Population growth show negative and insignificant sign in growth equation which is the opposite of what was expected. This study has also underscored the importance of the financial sector in economic growth. Coincide with Schumpeter (1911), who pointed out the productivity- and growth-enhancing effects of the services provided by a developed financial sector, the findings indicate that economic growth can be stimulated by the increment in financial development indicators. Financial intermediaries play a crucial role in fostering technological innovation and economic growth by providing basic services such as mobilizing savings, monitoring managers, evaluating investment projects, managing and pooling risks, and facilitating transactions (Kargbo and Adamu, 2009)[4]. From policy point of view, we suggest for enhancing economic growth in Iran, government should facilitate the establishment of financial institutions in order to extend credit delivery to sectors which have limited access to financial services and create rooms and legal environment for efficient allocation of credit to the private sector.

As indicated in Table 6, there is a statistically significant negative relationship between inflation and financial development in Iran. As discussed in the introduction, high rate of inflation worsens the efficiency of financial sector through financial market frictions and slows down the economic performance. Inflationary environment deteriorates financial development plausibly through lowering of money supply and thus restricting financial resources for investment projects. This provides support for findings by Huybens and Smith (1999), Rousseau and Wachtel (2002) and Lee and Wong (2005) who claimed financial development could only promote growth under low or moderate inflation rates. Therefore, policy makers should focus more attention on policies which could damp inflation because it is evident that price stability can bring sustainable growth. Low and stable inflation rates allow the private sectors to plan for the future, lead to a lower need for costly price adjustments, prevent tax distortion and thus create a stable business Environment. Therefore, low and stable prices, is a necessary first step to achieving a deeper and more active financial sector that will enhance growth as predicted by Schumpeter (Alimi, 2014). By contrast to our expectation, we find that a one-percent point increase in government expenditure is accompanied with a decrease of 0.45 in financial development and the increase of government expenditure is likely to become an impediment to the Iran's financial market. This is in line with political view which argues that the government, by pursuing its own political objectives is subject to conflicting interests which can lead to less than optimal outcomes, primarily in economies with weak property rights. This in turn can lead to increased inefficiency by way of increasing interest margins and overhead costs (Cooray, 2011). This view has been supported by Lopez de- Silanes *et al*., (1997) and La Porta *et al.,* (2002). Trade openness is another variable that has a positive and significant effect on financial development. A one percent increase in openness leads to about 0.21 percent increment in financial efficiency. Opening to trade will affect demand for external finance, and thus financial depth, in the trading countries. In particular, when a country starts trading, it will naturally increase production of the financially dependent good, and its financial system will deepen (Do and Levchenko, 2004). The positive effect of trade openness on financial development is consistent with the findings of Baltagi *et al.,* (2007).

Financial development-growth nexus has been first discussed by Schumpeter (1911) who pointed out the positive role of financial development in economic growth. Since then, it has attained considerable attention in both theoretical and empirical literature. Two views exist about the causality. The first view suggests that there is positive impact of financial development on the economic growth of a country. This view was supported by Hicks (1969), Thornton (1994), Calderon and Liu (2003), Liu and Hsu (2006), Yang and Yi (2008), Wadud (2009) and Bojanic (2012). Another one is demand side view, which stresses that finance-growth relation exists in inverse causation. The view suggests that the demand for financial services aroused from economic growth is a driving factor for the development of financial sector. In other words, the demand for the financial services increases as the real sector of the economy expands. The findings of Friedman and Schwartz (1963), Jung (1986), Liang and Teng (2006), Wolde-Rufael (2009) and Hassan *et al.,* (2011) point to this view. The result on the effect of economic growth on financial development was in general consistent with our expectation. It shows significant and positive sign in the second equation which is in line with theories and literature. To deepen our results we also use Granger causality test to prove the bidirectional causality between these two variables. Results are illustrated in Table 7.

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[4] Among financial development indicators only DCP shows significant effect and others make no effect in growth equation.

Table 7: Granger causality test

Null hypothesis	F-statistic	Prob
Financial development does not Granger cause economic growth	3.46	0.0756
Economic growth does not Granger cause financial development	5.21	0.0098

Source: Own calculation

5. Conclusion

It is well-established in the literature that there is a positive correlation between the level of an economy's financial development, and its rate of growth. It is also well-documented that inflation and its performance are negatively correlated with economic growth. We have attempted here to investigate the indirect triangle relationship between growth, financial development and inflation. We address this issue making use of a time series covering the period 1965-2011 for Iran. Employing 3SLS procedure and by using instrumental variables to take into account the simultaneity among the considered variables, the main contribution of this paper is that financial development is viewed as an important channel through which inflation can adversely affect growth. We have made use of time series unit root test, and Engle-Granger cointegration analysis to conclude the existence of long run relationship between variables. Also, there is strong evidence in favor of bidirectional causality between economic growth and financial development indicator. To deepen our results, the influential factors on economic growth and financial development have been analyzed. The results show that investment to GDP ratio and population growth have positive and insignificant effect on economic growth respectively. Furthermore, time series evidence is also supportive to the political view which argues government expenditure increased inefficiency in financial markets. In addition openness as an influential factor on financial development shows significant and positive effect.

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