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Investigating Finance-Growth Relationship by Considering Financialization Phenomenon: the Case of USA

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Abstract
Does financial sector develop in line with its nature? Does part of financial development, which is in line with its nature, approve mainstream opinion in regard to finance-growth relationship? By considering financialization phenomenon within an ARDL-Bounds testing approach, this study re-examined the causal relationship between financial development and economic growth in the USA during the period 1961–2012. Using Principal Component Analysis (PCA), indicators of financial sector development (FD) and financialization (FIN) were created. After that, Granger causality test was applied using the ARDL-ECM methodology. According to the results: 1) a bilateral relationship between financial development and economic growth was observed; while financial development had negative and significant impact on economic growth, the influence of economic growth on financial development was not significant although it was positive; 2) financialization significantly affected financial development through efficiency channel. Obtained results can be used by policy makers in different countries, although the study is applied for the USA.

Keywords: Financial Sector Development, Economic Growth, Financialization, ARDL-Bounds Cointegration, Granger Causality.

JEL Classification: O11; O16; O51; G20.

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1. Introduction

The income pattern of Non-Financial-Corporations (NFCs) in the USA shows the share of portfolio income in corporate cash flow increased sharply from about 14 percent in the mid-1960 to over 40 percent in the 1980s and 1990s; a rising trend which indicates that revenues of NFCs from financial sources of income increased according to Figure 1. The same pattern is evidenced in the ratio of financial industry profit to non-financial industry profit. As Figure 2 shows, while the ratio of financial industry profit to non-financial industry profit until the early years of the 1980s had a little variance around 20%, it not only increased and reached to around 40%, but also its fluctuation is elevated. Figure 3 shows the increasing trend of financial payments made by the NFCs as a percentage of their cash flow and indicates that this rising trend is noticeably started from the mid-1970s. Although after 1980 a relatively high fluctuation trend can be observed, the average of total financial payments in this period has been higher than that of the previous era.

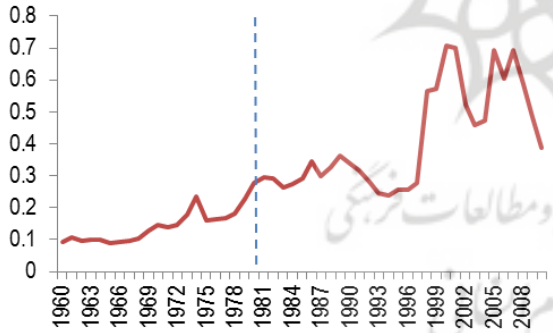

Figure 1. Portfolio Income/Corporate Cash Flow

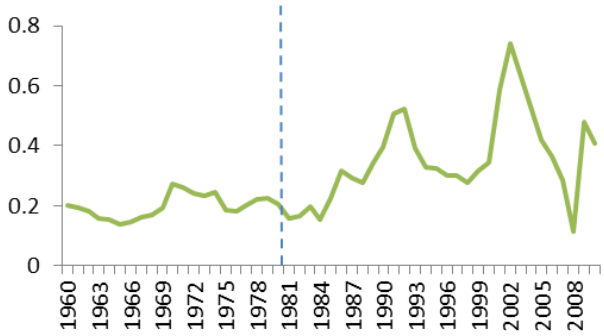

Figure 2. Financial Industry Profit/Non-Financial Industry Profit

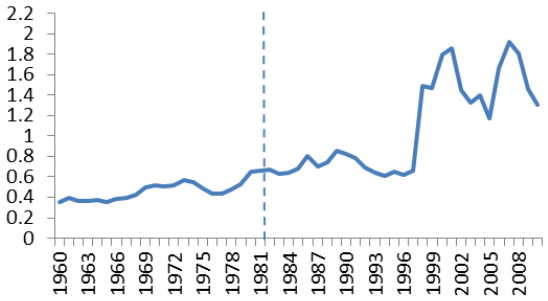

Figure 3. Financial Payments of NFC/Corporate Cash Flow

Two main and common features can be realized among the three above figures. The first one is that while before 1980s, we observe small fluctuations, after this period, variables are fluctuating higher than before. The second characteristic is that the superiority of financial sector over real economy can be found clearly after 1980s. This phenomenon which indicates increase in financial incomes of NFCs and the increasing payments to financial markets, is called "financialization" in literature (Orhangazi, 2008; Krippner, 2005). According to financialization phenomenon, NFCs managers prefer to invest their financial resources in financial markets rather than operational activities due to a variety of reasons such as higher interest rate in financial markets relative to real economy, corporate governance decisions of NFCs to get higher profit with low risk in short run, increasing of reliability to take loan and so on. All these change the way NFCs managers utilize their financial resources. This observed behavior of NFCs causes the development of financial sector since real economy financial resources do not inject into real economy but are transferred to financial sectors.

On the other hand, according to the mainstream opinion about finance-growth relationship, financial development enhances economic growth. Financial sector, by raising the aggregate savings and producing ex-ante information about possible investments, allocates financial resources to real economy to speed up the accumulation of physical capital as a result of economic growth. Financial sector can also affect economic growth through another channel. This channel, through its impact on competition between firms, boosts innovation in them and ultimately

improves their efficiency. Levine (1997) introduced five functions for institutions operating in financial markets to transfer financial resources into real economy. Although, based on this process, financial sector should serve real economy, it is reversed in some parts by financialization phenomenon. As discussed above, part of the financial resources to be invested in real economy, transfers to financial markets by NFCs managers. Hence, we can define financialization as an inverted factor that causes real economy to serve financial sector. Therefore, based on the nature of financial sector, that is, to serve real economy, we can have two types of development in this sector. One type of development is in line with the nature of financial sector and the other one is the opposite of its nature that is accumulated from financialization phenomenon.

While reviewing a huge number of empirical studies shows that researchers assume financial sector to serve the real economy through doing its functions, observed data show that their assumption is violated and hence it is necessary to reassess finance-growth relationship to answer following questions. How do these two different determinants of financial sector development affect economic growth? Does the development of the financial sector through financialization have a positive impact on economic growth? If we control financialization term, has financial sector development positive influence on economic growth? If financial sector development has a positive and significant effect on economic growth, how does it change after including financialization in the model?

Therefore, our attempt in this study is to examine the connection between financial sector development and economic growth as well as their causality in the USA in which financialization is observed.

Since a variety of variables are introduced for both financial sector development and financialization, we constructed the financial sector development index (FD) and financialization indicator (FIN) by employing Principle Component Analysis (PCA) method. Also, for economic growth, three variables are utilized to find their relationships and causalities with FD and FIN. Per capita GDP growth rate and two sources of growth, that is, the growth rate of real per capita capital accumulation, and total factor productivity growth are used (King & Levine, 1993). Then, in the first step, ARDL-Bounds testing approach is used to detect co-integration relationships because of its advantages, particularly its efficiency when the sample size is small and its insensitivity to I(0) or I(1) of the elected variables. In the next step, Granger's causality test is employed to reveal whether FD explains economic growth or vice versa. We selected the United States in the period 1961-2012 due to some reasons: firstly, there are few studies examined individually the USA in finance-growth relationship empirical literature. Secondly, financialization literature for the USA is richer and most developed in comparison to other countries. Thirdly, unlike financial sector development indicators in which long time series data set are usually attainable for all countries; dataset of the selected financialization variables is available for long time series only for the USA.

The structure of the paper is as follows. In Section 2, a review of finance-growth and financialization literatures is presented. In Section 3, the utilized data and the methodology are investigated. This is followed by the presentation of the empirical evidence in Section 4. Concluding remarks are provided in Section 5.

2. Literature Review

2.1. Financial Development and Growth

The prevalent theories in regard to finance-growth relationship assign different levels of importance to financial sector's role in the economy. While on one side of spectrum, significant levels of value are provided by Schumpeter (1911) reinforced by McKinnon (1973) and Shaw (1973). On the other hand, Lucas's view (1988) supported by Modigliani and Miller (1959) and Fama (1980), does not consider any level of value for financial sector. Schumpeter (1911) contends that entrepreneurs require a credit in order to finance the adoption of new production techniques. Based on this view, financial intermediaries by an active role in the economy, can shift the composition of savings toward capital, promote capital investment, offer a higher and safer return, reach efficient resource allocation and hence

raise economic growth. Lucas (1988) does not make an important contribution to the financial sector as he remarks: "… I believe that the importance of financial matters is very badly over-stressed in popular and even much professional discussion..." (p. 6). However, Lucasian's idea dates back to the traditional Arrow-Debreu model of resource allocation; a model in which the market mechanism behaves in such a way that there is no place for the financial sector to increase prosperity (Allen & Santomero, 1997), Schumpeterian's view rejects Arrow-Debreu conditions and gives a significant role for financial sector.

In terms of causality between financial sector and economic growth, there are four main theories. First, Schumpeterian view considers causality from financial sector development to economic growth called "Supply-demand". Second, Lucasian does not consider any causality among these two sectors. Third, Robinson's view (1952) that is supported by Kuznets (1955) contends there is a "Demand-following" relationship between them. The "Demand-following" approach is based on the fact that by creating new financial needs of firms and households as a result of economic development, financial institutions try to provide required financial services by designing financial services and instruments along with increasing their penetration among them. Thereby, the expansion of financial sector occurs. Fourth, some theorists believe that the relationship between them is sequential or simultaneous bidirectional causality. While some of the endogenous growth models such as ones explained by Berthelemy and Varoudakis (1996), Greenwood and Jovanovic (1990), Levine (1992) propose that these two sectors simultaneously influence each other, Patrick (1966) and Lewis (1955) present a sequential bidirectional causality, in which "Demand-Following" view holds in the early stage of development, and "Supply-Leading" view operates in the later stage.

Generally, we can realize three strands of empirical research in this area. The first group is related to studies that try to test the theories of finance-growth relationship by using different approaches and various regions. The results of these studies are inconclusive, although a positive effect on economic growth has been found by a majority of these studies that indicate a non-linear association between finance and growth (Beck, Levine & Loayza, 1999; Demetriades & Hussein, 1996; Hsueh, Hu & Tu, 2013; King & Levine, 1993; Levine & Zervos, 1998; Liang & Teng, 2006; Mavrotas & Son, 2006; Odedokun, 1996; Ram, 1999; Rousseau & Sylla, 2005; Uddin, Sjo & Shahbaz, 2013). The second group tries to find explanations for non-linear relationship between financial development and economic growth through finding threshold point for financial sector development or in connection to other factors (Cecchetti & Kharroubi, 2012; Hung, 2009; Law & Singh, 2014; Shen & Lee, 2006; Shen, Lee, Chen & Xie, 2011). The third strand are those studies that attempt to disclose other neglected aspects of the financial sector made by researchers to explain better finance-growth relationship. Among this group, Beck, Büyükkarabacak, Rioja, and Valev (2012) divided credit into two parts of enterprise and household credits. They showed that while credits to enterprises and economic growth have positive relationship, there is no correlation between growth and household credit. Beck, Degryse, and Kneer (2014) decomposed financial sector's activities to intermediation and non-intermediation activities. Based on the findings, only development of financial sector in its intermediation dimension has positive effect on economic growth in the long-run according to data gathered from a sample of 77 countries for the period 1980–2007. The same approach is made by Bezemer (2014). He decomposed credit financing based on Schumpeter theory into two parts: credit financing development or innovation which he called it "primary wave", and "secondary wave" that is credit financing for purposes of consumption, over-investment, and speculation.

Investigation of empirical studies shows that approximately all studies which examined the finance-growth relationship in the USA are conducted with a cross-sectional framework. While earlier studies support a positive relationship between financial development and economic growth with causality from finance to growth, recent studies indicate that financial sector development either wouldn't have a positive effect on growth or its impact was weak and negligible, although some

determine a threshold point that the positive relationship between finance and growth changes after it. In one recent case made by Beck, et. al. (2014), when they considered only intermediation activities of the financial sector, it had a positive impact on growth.

2.2. Financialization and Growth

The notion of financialization term traces back to the late of 1990s and the early 2000s (Van der Zwan, 2014), although its emergence dates back in the early 1980s (Gonzalez & Sala, 2014; Krippner, 2005; Palley, 2007; Orhangazi, 2008). The latter is the decade that coincides with a new thinking in the field of financial policies called the 'financial liberalization' view presented by McKinnon (1973) and Shaw (1973) in which the Keynesian paradigm of financial repression was challenged (Ang, 2008).

Among different descriptions, Orhangazi (2008) and Krippner (2005) definitions are closer to our idea. According to them, financialization is defined as "increase in financial investments and hence financial incomes of non-financial companies and the increasing payments to financial markets" (Orhangazi 2008, p. 11) and as "a pattern of accumulation in which profits accrue primarily through financial channels rather than through trade and commodity production" (Krippner 2005, p. 174).

Financialization through capital accumulation and productivity can have effects on economic growth. First, funds available in firms can be invested in the financial sector and in the real sector. Because these resources are limited, an increase in investment in one of these sectors will lead to a reduction in investment in the other one. Higher profit in the financial sector relative to the real sector motivates to invest significant share of income in financial assets (Orhangazi, 2008). This effect which is called "preference channel" by Eckhard (2012), can be found in the literature before the financialization phenomenon. Tobin (1965) explained that investment in the financial and real sectors are substitute to each other; what drives a sector's excellence in attracting investment is the rate of return. If financial markets offer higher returns than real investment, more funds will be invested in financial assets, and physical capital accumulation will decrease (Tobin, 1965). In a similar study, Keynes contends that financial instruments could be used as an approach to accumulate wealth rather than real projects for industrial corporations (Akkemik & Ozen, 2014).

A second channel or "internal means of finance" channel (Eckhard, 2012), is to force NFCs to increase payments to financial markets via interest payments, dividends and stock buybacks by the firm (Orhangazi, 2008). Based on Lazonick and O'Sullivan (2000), this phenomenon represents a strategy shift from "retain and reinvest" to "downsize and distribute", that is, with the advent of institutional investors to NFCs in the 1980s, the interests of corporate executives were in line with the interests of this group of investors, which resulted in more profits payments to shareholders than to invest in the real sector. Nevertheless, high financial payment by NFCs has a positive side that should be considered. The behavior of a firm to pay higher returns to financial markets or shareholders can send a signal to creditors that the firm is in a healthy condition. So, by increasing the credibility of the firm, its ability to access finances through financial markets increases and therefore, it can have a positive impact on real investment (Orhangazi, 2008).

While the result of the second channel is ambiguous, it can have two opposite impacts on productivity growth. In the positive side, increasing shareholder power in the company makes the firm managers use financial resources in an optimal manner, and thus reduces the constant problem between the owner and the shareholder. In the negative direction, since productivity growth is capital-embodied, the negative side effect of financialization on capital stock indirectly reduces productivity growth (Eckhard, 2012).

The reduction of the physical investment that is caused by financialization phenomenon has been discussed in different empirical studies. Binswanger (1999) revealed the changes of real investment relative to financial investment in the period of financialization and confirmed the increasing rate of investment in financial markets rather than real economy in the USA. Crotty (2005) explains that NFCs executives were encouraged to invest in financial markets in the 1980s when real return

on investment in the real sector was lower than that of the financial sector. Since the 1970s, American NFCs have increasingly taken profits through financial activities which have increased relative to productive investment (Krippner, 2005; Akkemik & Ozen, 2014). Stockhammer (2004), and Onaran, Stockhammer, and Grafl (2011) found that the increased inclination of NFCs to operate in the financial market and to earn more profit from this market has led to a reduction in the volume of capital accumulation in the United States. The same result was obtained at a macro level by Van Treeck (2008). He showed that investment in the United States has been scaled down as income shares of NFCs through financial markets has increased. A similar result was extracted by Orhangazi (2008). According to his study, a negative and significant connection between financialization and real investment is realized for the United States during the period 1973–2003.

3. Data and Methodology

3.1. Financial Development Indicator

A well-defined set of financial development measurements is the one that exerts financial resources to the production process. So, we employ following variables to compute financial sector development index, including both money and capital markets.

First, the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets. Second, the ratio of credit to the private sector by deposit money banks and other financial institutions to GDP. Third, the ratio of credit to the private sector, to liquid liabilities. Forth, the ratio of gross domestic savings to GDP. Fifth, the ratio of stock market capitalization to GDP. Sixth, the ratio of total value traded in stock market to GDP. Seventh, turnover ratio as indicator of stock market liquidity.

Using these variables, we can create a single indicator for measuring financial development through principal component analysis. Using this method, we eliminated multi-collinearity problems due to utilization of the same variables. The estimated results are reported in Table 1.

Table 1. Eigenvalues and Eigenvectors of different Components of Financial Development Variables

	PC1	PC2	PC3	PC4	PC5	PC6	PC7
Eigenvalues	5.29	0.80	0.52	0.27	0.06	0.03	0.00
% of variance	0.76	0.11	0.07	0.04	0.00	0.00	0.00
Cumulative %	0.76	0.87	0.95	0.98	0.99	0.99	1.00
Variable	Vector 1	Vector 2	Vector 3	Vector 4	Vector 5	Vector 6	Vector 7
DAT	-0.29	0.75	0.39	-0.24	-0.37	0.34	-0.07
PCL	0.37	0.37	-0.32	-0.58	0.50	-0.06	-0.11
PCT	0.42	0.13	0.05	0.03	-0.12	0.25	0.84
GDS	-0.39	0.33	0.04	0.47	0.67	-0.02	0.23
MC	0.36	0.42	-0.44	0.56	-0.29	-0.30	-0.19
TR	0.37	-0.02	0.68	0.04	0.15	-0.61	-0.02
VT	0.41	0.03	0.31	0.26	0.18	0.67	-0.41

Notes: VT = Total value traded/GDP; TR = Turnover ratio; PCT = Credit to the private sector by deposit money banks and other financial institutions/GDP; PCL = Private sector credit/liquid liabilities; MC = Stock market capitalization/GDP; GDS = Gross domestic savings/GDP; DAT = Deposit money bank assets/deposit money bank plus central bank assets.

While about 75% of the data fluctuations are explained by the first principal component and its eigenvalue is more than 1, the marginal information obtained through the remaining principal components is relatively small and their eigenvalues are less than 1. Hence, we employ the first largest principle components as financial development index (FD). This index (i.e. FD) is presented in Figure 4.

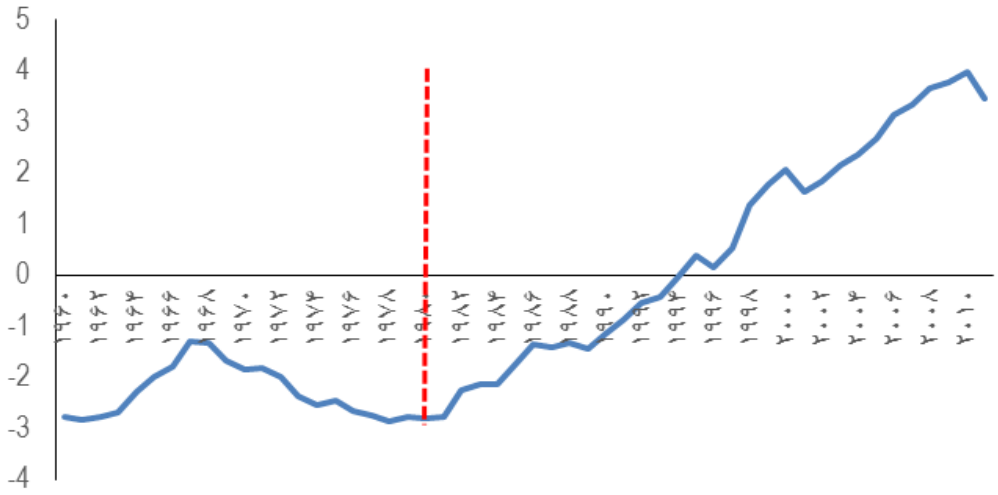

Figure 4. Financial sector development index

3.2. Measures of Financialization

Having different definitions of financialization, there are various indicators to measure it. Due to data availability of the selected period for the USA and relevancy of definitions with this study, we employed the variables defined by Krippner (2005) and Orhangazi (2008). Using following variables, we captured more dimensions of financialization instead of using one variable.

1) Portfolio Income (comprising income from interest payments, dividends and capital gains on investments) of NFCs as a % of Corporate Cash Flow (comprised of profits plus depreciation allowances),

2) Financial payments of NFCs (sum of interest payments, dividend payments and stock buybacks),

3) Financial profits of NFCs (sum of interest income and dividend income),

4) Ratio of financial industry profits to non-financial industry.

While the first three indicators of financialization evaluate the behavior of NFCs, the fourth indicator compares the behavior of a financial sector in relation to a non-financial sector from profit points of view. In other words, the first three variables are based on sector perspective, and the fourth one is used based on extra-sectoral perspective. By these four variables and employing principal component analysis, we created an index of financialization.

The estimated results of the PCA analysis for financialization variables are reported in Table 2, where it is depicted that the first principal component with an eigenvalue greater than one has been able to cover about 82% of the variance. Each of the components from 2 to 4 add less than 13% to explain the variance that is not significant. Therefore, among all the principal components, the first component is used. Also, PC1 called hereafter FIN, shows that it is a roughly-equal Linear combination of all the selected variables.

Table 2. Eigenvalues and Eigenvectors of different components of financialization variables

	PC1	PC2	PC3	PC4
Eigenvalues	3.29	0.55	0.11	0.03
% of variance	0.82	0.14	0.02	0.00
Cumulative %	0.82	0.96	0.99	1.00
Variable	Vector 1	Vector 2	Vector 3	Vector 4
FIN1	0.52	-0.23	0.81	-0.07
FIN2	0.40	0.91	0.01	0.01
FIN3	0.53	-0.24	-0.34	0.73
FIN4	0.53	-0.21	-0.46	-0.67

Notes: FIN1 = Portfolio income of NFCs as a percentage of corporate cash flow; FIN2 = Financial payments of NFCs; FIN3 = Financial profits of NFCs; FIN4 = Ratio of financial industry profits to non-financial industry.

The resulting index is presented in Figure 5. The process of financialization index over time suggests that this phenomenon increased over

time. As it is observable in the figure, the general trend of financialization indicates the separation of NFCs from productivity projects and their tendency to financial sector. However, three main drops in 1991, 2001, and 2005 can be found through this process. While the first two drops returned to their long-run trend, the third one has not remounted after Global financial crisis 2008-09. Changing the sign of financialization in 1986 approximately verifies the time beginning of financialization phenomenon which is considered in 1980s in the literature. Finally, while before 1986, financialization index had a steady smooth rising trend, after that it shows a volatile trend containing of jump and breakdown.

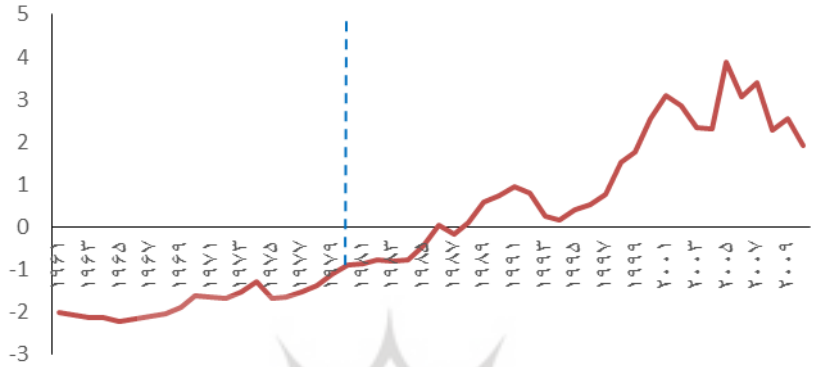

Figure 5. Financialization Index

3.3. Economic Growth and its Sources

In this part, trend of Per capita GDP growth rate (EG) and two sources of growth (i.e. the growth rate of real per capita capital accumulation, and total factor productivity growth) is investigated during the period 1961-2012 in the United States.

Figure 6. Per Capita GDP Growth Rate

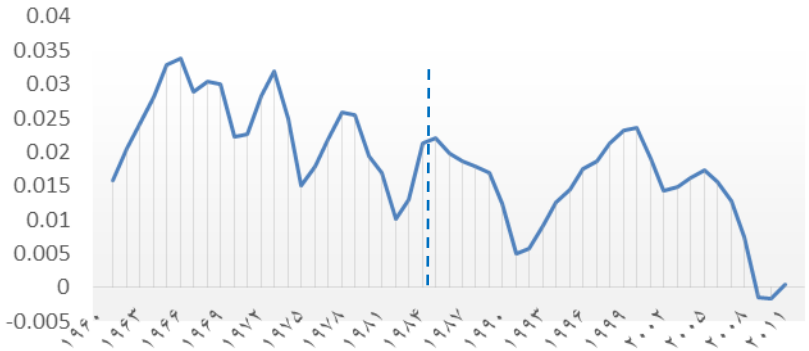

Figure 7. Growth Rate of Capita Capital Accumulation

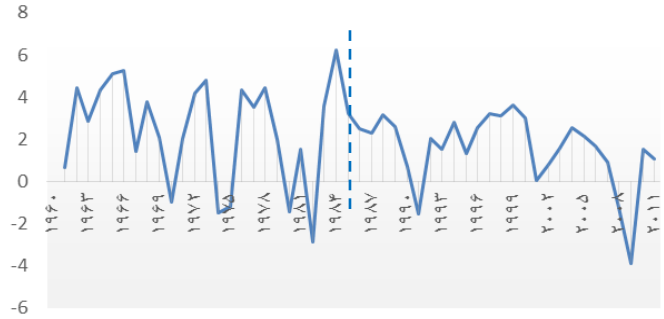

Figure 8. Total Factor Productivity Growth

As Figures 6-8 depicts, long-run movement of economic growth as well as its sources is decreasing from 1961 to 2012. A common feature can be observed by separating the time period into two sections in which financialization starting year (i.e. 1980) is considered as a separator. That is before financialization, fluctuation of economic growth, capital accumulation growth; and productivity growth is more than after the beginning of financialization phenomenon. While real GDP per capita growth after 1961 is changing around 2 percent per year, capital accumulation growth and efficiency growth are fluctuating around 0.01 and 1.99 percent, respectively. Moreover, economic growth and efficiency growth were more volatile than capital accumulation growth.

3.4. Variables and Data Source

According to the aim of the study, the main variables are: Financial development (FD), Per capita GDP growth rate, growth rate of real per capita capital accumulation,and total factor productivity growth. Moreover, interest rate spread (IRS) was added to the model as a control variable. IRS is utilized in different studies as a proxy for financial market efficiency. It is the interest rate charged by banks on loans to prime customers minus the interest rate paid by commercial or similar banks for demand, time, or savings deposits. Empirical literature shows that low interest rate spreads are the result of financial market efficiency. Since the focus is on the relationship between financial development and economic growth by considering financialization phenomenon, we did not analyze the estimated results obtained for IRS variable although they are reported. The data used in this study were annually and covered the years 1961–2012. The data were extracted from a variety of sources, including various issues of the IRS (Internal Revenue Service), Statistics of Income, Corporation Income Tax Returns, International Financial Statistics (IFS) Yearbooks published by the International Monetary Fund (IMF), World Bank Statistical Yearbooks, Federal Reserve Flow of Funds Accounts database, the Penn World Table (PWT) and National Income and Product Accounts (NIPA).

3.5. Econometric Methodology

3.5.1. Cointegration: ARDL-bounds Testing Procedure

Autoregressive distributed lag (ARDL) or Bounds testing method introduced and developed by Pesaran, Shin, and Smith (2001) is a modern approach to investigate the long-run relationships among variables. The existence of various advantages in this method has led to the use of this technique in the study among existing methods. First, the cointegrating relationship can be estimated by employing OLS after choosing the optimal lags of the model. Second, it does not matter to have variables that are I(0) or I(1) or mutually co-integrated, although the existence of I(2) variables in the model is not accepted. Fourth, endogenous problem does not cause to get biased coefficients of obtained variables. Moreover, efficiency and consistency of ARDL model is very high when the sample size is small (Ang, 2010).

Since we are trying to find relationship between FD, EG and two economic growth sources (i.e. GK, and EFF in the presence of FIN), we construct the ARDL model as three different models:

Model A: FD, FIN, EG, IRS[1]

[1] As noted in variables and data source section, IRS variable is added as a control variable. However, to save the space, this variable is not shown in the models although the estimated results are reported in tables in next sections.

$$\Delta FD_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \Delta EG_{t-i} + \alpha_4 FD_{t-1} + \alpha_5 FIN_{t-1} + \alpha_6 EG_{t-1} + \varepsilon_{1t} \quad (A.1)$$

$$\Delta FIN_t = \beta_0 + \sum_{i=0}^{p} \beta_{1i} \Delta FD_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \beta_{3i} \Delta EG_{t-i} + \beta_4 FD_{t-1} + \beta_5 FIN_{t-1} + \beta_6 EG_{t-1} + \varepsilon_{2t} \quad (A.2)$$

$$\Delta EG_t = \gamma_0 + \sum_{i=0}^{p} \gamma_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \gamma_{2i} \Delta FIN_{t-i} + \sum_{i=1}^{p} \gamma_{3i} \Delta EG_{t-i} + \gamma_4 FD_{t-1} + \gamma_5 FIN_{t-1} + \gamma_6 EG_{t-1} + \varepsilon_{3t} \quad (A.3)$$

Model B: FD, FIN, GK, IRS

$$\Delta FD_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \Delta GK_{t-i} + \alpha_4 FD_{t-1} + \alpha_5 FIN_{t-1} + \alpha_6 GK_{t-1} + \varepsilon_{1t} \quad (B.1)$$

$$\Delta FIN_t = \beta_0 + \sum_{i=0}^{p} \beta_{1i} \Delta FD_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \beta_{3i} \Delta GK_{t-i} + \beta_4 FD_{t-1} + \beta_5 FIN_{t-1} + \beta_6 GK_{t-1} + \varepsilon_{2t} \quad (B.2)$$

$$\Delta GK_t = \gamma_0 + \sum_{i=0}^{p} \gamma_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \gamma_{2i} \Delta FIN_{t-i} + \sum_{i=1}^{p} \gamma_{3i} \Delta GK_{t-i} + \gamma_4 FD_{t-1} + \gamma_5 FIN_{t-1} + \gamma_6 GK_{t-1} + \varepsilon_{3t} \quad (B.3)$$

Model C: FD, FIN, EFF, IRS

$$\Delta FD_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \Delta EFF_{t-i} + \alpha_4 FD_{t-1} + \alpha_5 FIN_{t-1} + \alpha_6 EFF_{t-1} + \varepsilon_{1t} \quad (C.1)$$

$$\Delta FIN_t = \beta_0 + \sum_{i=0}^{p} \beta_{1i} \Delta FD_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \beta_{3i} \Delta EFF_{t-i} + \beta_4 FD_{t-1} + \beta_5 FIN_{t-1} + \beta_6 EFF_{t-1} + \varepsilon_{2t} \quad (C.2)$$

$$\Delta EFF_t = \gamma_0 + \sum_{i=0}^{p} \gamma_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \gamma_{2i} \Delta FIN_{t-i} + \sum_{i=1}^{p} \gamma_{3i} \Delta EFF_{t-i} + \gamma_4 FD_{t-1} + \gamma_5 FIN_{t-1} + \gamma_6 EFF_{t-1} + \varepsilon_{3t} \quad (C.3)$$

where p is the optimal length of lag (determined by the Schwartz-Bayesian Criterion (SBC)), α_0, β_0 and γ_0 are drift components and Δ refers to the first difference of variables.

Following Pesaran et al. (2001), the F-test which is called bounds cointegration test is applied to examine the number of long-run relationships. For example, in order to do F-test in equation (A.1), the null hypothesis $H_0: \alpha_4 = \alpha_5 = \alpha_6 = 0$ is tested against the alternative hypothesis $H_1: \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq 0$. If the null hypothesis is not rejected, it means that there is no long-run level relationship and the testing procedure is terminated. But, if the alternative hypothesis is confirmed, then we find that there is a long-run relationship among three variables (FD, FIN and EG) by considering that FIN and EG are forcing variables to explain FD. The similar procedure

can be used for other equations in all the specified models.

After obtaining F-statistic, we compare it with two asymptotic critical value bounds. If it is above the upper critical value, then it is determined that the hypothesis can be rejected and we take a result that there is a long-run relationship.

3.5.2. Granger Causality Test

After we ensure the long-term relationship exists between the variables, the next step is to examine the short-run and long-run Granger causality relationship between them using the following models:

Model A': FD, FIN and EG, IRS

$$\Delta FD_t = \omega_0 + \sum_{i=1}^{p} \omega_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \omega_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \omega_{3i} \Delta EG_{t-i} + \omega_4 ECT_{t-1} + \varepsilon_{1t} \quad (A'.1)$$

$$\Delta FIN_t = \vartheta_0 + \sum_{i=0}^{p} \vartheta_{1i} \Delta FD_{t-i} + \sum_{i=1}^{p} \vartheta_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \vartheta_{3i} \Delta EG_{t-i} + \vartheta_4 ECT_{t-1} + \varepsilon_{2t} \quad (A'.2)$$

$$\Delta EG_t = \varphi_0 + \sum_{i=0}^{p} \varphi_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \varphi_{2i} \Delta FIN_{t-i} + \sum_{i=1}^{p} \varphi_{3i} \Delta EG_{t-i} + \varphi_4 ECT_{t-1} + \varepsilon_{3t} \quad (A'.3)$$

Model B': FD, FIN and GK, IRS

$$\Delta FD_t = \omega_0 + \sum_{i=1}^{p} \omega_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \omega_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \omega_{3i} \Delta GK_{t-i} + \omega_4 ECT_{t-1} + \varepsilon_{1t} \quad (B'.1)$$

$$\Delta FIN_t = \vartheta_0 + \sum_{i=0}^{p} \vartheta_{1i} \Delta FD_{t-i} + \sum_{i=1}^{p} \vartheta_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \vartheta_{3i} \Delta GK_{t-i} + \vartheta_4 ECT_{t-1} + \varepsilon_{2t} \quad (B'.2)$$

$$\Delta GK_t = \varphi_0 + \sum_{i=0}^{p} \varphi_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \varphi_{2i} \Delta FIN_{t-i} + \sum_{i=1}^{p} \varphi_{3i} \Delta GK_{t-i} + \varphi_4 ECT_{t-1} + \varepsilon_{3t} \quad (B'.3)$$

Model C': FD, FIN, and EFF, IRS

$$\Delta FD_t = \omega_0 + \sum_{i=1}^{p} \omega_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \omega_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \omega_{3i} \Delta EFF_{t-i} + \omega_4 ECT_{t-1} + \varepsilon_{1t} \quad (C'.1)$$

$$\Delta FIN_t = \vartheta_0 + \sum_{i=0}^{p} \vartheta_{1i} \Delta FD_{t-i} + \sum_{i=1}^{p} \vartheta_{2i} \Delta FIN_{t-i} + \sum_{i=0}^{p} \vartheta_{3i} \Delta EFF_{t-i} + \vartheta_4 ECT_{t-1} + \varepsilon_{2t} \quad (C'.2)$$

$$\Delta EFF_t = \varphi_0 + \sum_{i=0}^{p} \varphi_{1i} \Delta FD_{t-i} + \sum_{i=0}^{p} \varphi_{2i} \Delta FIN_{t-i} + \sum_{i=1}^{p} \varphi_{3i} \Delta EFF_{t-i} + \varphi_4 ECT_{t-1} + \varepsilon_{3t} \quad (C'.3)$$

where ECT_{t-1} is the error correction term derived from the long-run equilibrium relationship.

In order to understand the direction of the short-run and long-term causal relationship between the variables, we need to examine the t-statistic of the ECT and the F-statistic of the explanatory variables. The significance of t-statistics indicates that there is a short term causal relationship and the significance of F-

statistics indicates a long-term causal relationship (Narayan & Smyth, 2005). It is noteworthy that although the ECT is presented in all the equations $A'.1 - C'.3$, only those were estimated in which the null hypothesis of the absence of a long-term relationship has been rejected.

4. Empirical Findings

4.1. Unit Root and Co-integration Tests

To investigate the degree of integration of the selected variables, we employ three unit-root tests– the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Dickey-Fuller-GLS (DF-GLS) tests. The null hypothesis of all these tests is having a unit root series against the alternative of stationarity. The results, which are available upon request, showed that all variables are either stationary, i.e., I(0), or integrated at degree one, i.e., I(1). Since all the variables are integrated at degree one or less than one, cointegration method can be used.

Then, to do cointegration tests, we regress the conditional ECM equations $A.1 - C.3$ at maximum two lags. In order not to lose more degree of freedom, we do not increase lags higher than two. We need to use the F-test to ensure that there is a long-term relationship between the variables. Table 3 gives the ARDL bounds F- test for two different cases. While Panel A gives the results when FIN is included in the models, Panel B is presented to compare the results when FIN is excluded from the models. It should be noted that because trend term in cointegration analysis was insignificant, we report only the results of unrestricted intercept and no trend models. Corresponding critical values for two cases K=2 and K=3 are reported in Table 4.

Table 3. Cointegration Test (F-statistic)

Models	P = 2	P = 1
Panel A: FIN included		
F_{FD}(FD|FIN, EG, IRS)	5.59**	5.72**
F_{FIN}(FIN|FD, EG, IRS)	1.69	1.74
F_{EG}(EG|FD, FIN, IRS)	9.64**	9.90**
F_{FD}(FD|FIN, GK, IRS)	5.46**	5.58**
F_{FIN}(FIN|FD, GK, IRS)	1.20	1.14
F_{GK}(GK|FD, FIN, IRS)	2.04	1.29
F_{FD}(FD|FIN, EFF, IRS)	5.74**	5.85**
F_{FIN}(FIN|FD, EFF, IRS)	1.57	1.58
F_{EFF}(EFF|FD, FIN, IRS)	6.40**	4.86**
Panel B: FIN not-included		
F_{FD}(FD|EG, IRS)	5.40**	5.49**
F_{EG}(EG|FD, IRS)	11.31**	11.50**
F_{FD}(FD|GK, IRS)	5.28**	5.40**
F_{GK}(GK|FD, IRS)	1.46	0.99
F_{FD}(FD|EFF, IRS)	5.41**	5.54**
F_{EFF}(EFF|FD, IRS)	9.51**	7.15**

Notes: 1) P is the lag length. 2) The test statistics of the bounds tests are compared against the critical values reported in Pesaran et al. (2001). Since the number of explanatory variables is not equal in two panels, corresponding critical values are not the same. 3) ** significant at 5% critical value.

Table 4. Critical Values (Restricted Intercept, and No Trend)

Critical value (k=3)	Lower bound value	Upper bound value
1%	3.42	4.84
5%	2.45	3.63
10%	2.01	3.10
Critical value (k=2)	Lower bound value	Upper bound value
1%	3.88	5.30
5%	2.72	3.83
10%	2.17	3.19

Source: Pesaran et al (2001), Table CI(iii) Case III.

According to the Panel A, when EG and EFF are used as dependent variables, F-statistic value goes beyond bounds critical values for both cases (lags=1,2). The same result is obtained when FD is used as a dependent variable irrespective of the number of lags. Also, an interesting result is that no co-integration relationships between the selected variables were found when FIN and GK are used as dependent variables. Panel B (FIN is not included) shows that there are five long-run relationships between EG and FD as well as between FD and EFF. Comparing the results of panels A and B indicates that there is no long-run relationship between GK and FD even in the case of including FIN in the models.

4.2. Long-run Analysis

Now that the long-run relationships between the financial development, financialization and economic growth indicators have been realized, we estimate the long-run coefficients.

Tables 5 and 6 present the results using the ARDL estimator. According to Table 5 in which FIN variable is included in the models, the main results are: 1) FIN has positive and

significant effects on FD in the long-run irrespective of using economic growth indicators in the specifications. The effect of FIN on FD in all specifications is estimated higher than 2.00. It means that in long-run we can expect to have financial sector development at least twice of increasing financialization. In other words, it shows that NFCs incentive to invest in financial markets results in enhancing financial sector; 2) all economic growth indicators have positive insignificant long-run impact on FD; 3) by controlling FIN impact on EG and EFF, it is shown that FD has negative and insignificant influence on EG and EFF; 4) while, FIN has negative and significant effect on EG, it has insignificant impact on EFF; 5) estimated coefficients of IRS indicates that financial market efficiency has positive impact on FD, EG and EFF, although it is significant only on EG.

If FIN variable is not included in the models (Table 6), the major obtained findings are: 1) the impact of EFF and GK on FD is shown to be significant and negative. This result is against the ones that were obtained when FIN is included in the models; 2) the coefficients of FD on EG and EFF depict interesting finding. The size and signs of the coefficients are so close to the ones that were obtained in Table 5, when FIN is included in the specifications. FD has negative and significant effect on EG and EFF irrespective of including FIN in the models.

Table 5. Long-run ARDL Estimate (FIN is included)

Dependent variable	FD	FD	FD	EG	EFF
FIN	3.67*	2.73*	4.47*	-1.25*	0.24
	(1.78)[0.13]	(1.98)[0.11]	(2.08)[0.09]	(-1.86)[0.07]	(0.26)[0.79]
EG	7.19				
	(0.46)[0.96]				
GK		49.93			
		(0.14)[0.88]			
EFF			1.33		
			(0.12)[0.90]		
IRS	19.06	4.98	9.71	1.29**	0.49
	(0.45)[0.96]	(0.24)[0.81]	(0.13)[0.90]	(4.05)[0.00]	(1.12)[0.27]
FD				-0.15	-0.87
				(0.31)[0.76]	(-1.24)[0.22]
Diagnostic tests:					
Serial correlation LM test	2.39 [0.12]	3.50[0.06]	3.80[0.05]	0.56[0.45]	0.02[0.86]
Heteroscedasticity ARCH test	1.63 [0.20]	1.85[0.17]	1.90[0.16]	0.51[0.47]	0.10[0.75]

Note: t-statistics and p values are in parentheses and brackets respectively. *significant at 10% critical value, ** significant at 5% critical value.

Table 6. Long-run ARDL Estimate (FIN is excluded)

Dependent variable	FD	FD	FD	EG	EFF
GK	-24.52*				
	(1.73)[0.16]				
EFF		-1.64**			
		(2.08)[0.08]			
EG			-2.44		
			(-0.57)[0.57]		
FD				-0.66**	-0.57**
				(-3.59)[0.00]	(-2.45)[0.01]
IRS	14.89	24.90	-5.29	0.89**	0.68**
	(0.19)[0.85]	(0.13)[0.89]	(-0.47)[0.64]	(4.44)[0.00]	(2.78)[0.00]
Diagnostic tests:					
Serial correlation LM test	4.21[0.04]	3.57[0.05]		0.24[0.62]	0.18[0.66]
Heteroscedasticity ARCH test	0.44[0.50]	1.13[0.28]		0.50[0.47]	0.63[0.42]

Note: t-statistics and p values are in parentheses and brackets respectively. *significant at 10% critical value, ** significant at 5% critical value.

4.3. Granger Causality Analysis

Tables 7 and 8 present the short-run dynamic results using the ARDL-ECM estimator. According to Table 7 in which FIN is included, the main finding is that the sign of the ECT coefficients, which indicates the rate of moderation to the long-term equilibrium value, is negative, which means that the model is correct although in some specifications they are not statistically significant. This implies that from five long-run relationships that were estimated in the previous part, in two of them an error-correction mechanism exists: EG|FIN, FD and EFF|FIN, FD. These outcomes emphasize the cointegration results reported in Table 3 earlier. Comparing the coefficients of ECT_{t-1} that are found to be in the range of 0.01-0.60, reveals that the speed of adjustment among EG, FIN and FD is generally greater than others; 2) The combination of all aforementioned results support the strong unidirectional causality from FIN to EG, FD to EG and from FD to EFF.

The main results based on the models without financialization (Table 8) show that: 1) there are long-run Granger causality among FD and EG as well as among FD and EFF supported by negative and significant coefficients of error correction terms in the specifications. Also, the speed of adjustment among FD and EG with coefficient equal to -0.66 is higher than among FD and EFF, which is equal to -0.60; 2) there is a unidirectional weak exogeneity from FD to EG, and from FD to EFF which is significant and negative; 3) the upper findings confirm existence of the strong exogeneity between FD and economic growth indicators (EG, EFF).

Comparing the results reveals that adding FIN in the specifications enhances the results when it is not considered. In other words, adding FIN in the models did not change considerably the relationship between FD-EG and between FD-EFF.

To test the stability of the models structurally, we used CUSUM tests. The results of the test (not reported) show that the statistics totally stand within the 5% confidence interval, indicating no structural instability.

Table 7. Short-run Dynamics (FIN is Included)

Model: EG, FIN, IRS and FD#					
Dependent variable	D(EG)	D(FIN)	D(FD)	D(IRS)	ECT_{t-1}
D(EG)	-------	0.84(-1.97) *	0.10(2.31) **	-1.81(-2.70) **	-0.67(-5.79) **
D(FD)	0.03(2.20) **	0.05 (0.83)	-----	0.04(1.21)	-0.01(-0.05)
Model: GK, FIN, IRS and FD					
Dependent variable	D(GK)	D(FIN)	D(FD)	D(IRS)	ECT_{t-1}
D(FD)	0.60(0.17)	0.03(0.53)	-------	0.06(1.40)	-0.01(-0.27)
Model: EFF, FIN, IRS and FD					
Dependent variable	D(EFF)	D(FIN)	D(FD)	D(IRS)	ECT_{t-1}
D(EFF)	-------	0.13(0.26)	-0.47(-1.35) *	0.27(1.01)	-0.55(-3.84) **
D(FD)	0.08 (0.53)	0.02(0.48)	-------	0.06(1.95) *	-0.06(-0.13)

Note: t-statistics are in parentheses. # since the result is insensitive to the number of lags, the result of lag equal to 2 is not reported. *significant at 10% critical value, ** significant at 5% critical value, *** significant at 1% critical value

Table 8. Short-run Dynamics (FIN is Excluded)

Model: EG, IRS and FD				
Dependent variable	D(EG)	D(FD)	D(IRS)	ECT_{t-1}
D(EG)	-------	-0.44(-3.18) **	-2.08 (-3.12) **	-0.66(-5.67) **
D(FD)	0.02(1.45) *	-------	0.05(2.47) **	-0.00(0.50)
Model: EFF, IRS and FD				
Dependent variable	D(EFF)	D(FD)	D(IRS)	ECT_{t-1}
D(EFF)	-------	-0.34(-2.17) **	0.41(2.28) **	-0.60(-4.44) **
D(FD)	0.04(0.26)	-------	0.06(3.14) **	-0.03(0.13)
Model: GK, IRS and FD				
Dependent variable	D(GK)	D(FD)	D(IRS)	ECT_{t-1}
D(FD)	0.11(0.03)	-------	0.06(2.30) **	-0.04(-0.19)

Note: t-statistics are in parentheses. *significant at 10% critical va lue, ** significant at 5% critical value.

5. Conclusions

This paper re-investigated the long-run relationship and Granger causality between financial sector development and economic growth for the United States using yearly data for the period 1961 to 2012. Unlike the existing studies, we attempted to assess this relationship by controlling the situation in which financial sector is in the service of real sector. A phenomenon called "financialization" in the literature is the closest concept to our story that can be found.

By using PCA, we constructed financial sector development and financialization indicators. Also, by applying ARDL-Bounds approach, we estimated long-run relationship extracted Granger causality based on ARDL-ECM. To have a reliable conclusion of the effect of considering financialization on the finance-growth nexus, we estimated two general models: the first type in which financialization index (FIN) is included, and the second type in which FIN is not included.

Theoretically, financialization could have influence on capital accumulation and efficiency through two channels. The obtained results showed that there is a long-run relationship between FIN and efficiency with a positive and significant level. But, no long-run relationship between FIN and capital accumulation was found. The same result is achieved for short-run relationship between FIN and two economic growth indicators (i.e. efficiency, and capital accumulation). The positive effect of FIN on efficiency indicates that the positive side of FIN on efficiency dominated its negative side. It suggests NFCs managers to increase payment to shareholder to achieve higher efficiency. This result is in contradiction with current studies which investigated the nexus between financialization and real physical investment.

All the models specifications indicated that FIN has positive and significant impact on financial development (FD). This relationship is one-sided from FD to FIN. In other words, one of the determinants of financial sector development can be attributed to decreasing of production actions by NFCs and their incentives to invest in financial markets.

As the results showed, there was a bilateral connection between economic growth (EG) and FD in long-run and short-run. Whereas EG had a positively insignificant effect on FD, FD had a negatively significant effect on EG. This result on the one hand confirms Robinson's Theory of Finance-growth Connection in which financial development responds passively to economic growth as a result of higher demand for financial services, and on the other hand, it verifies Lucasian's view that financial sector's impact on economic growth is over-stressed. This result is similar to some other studies, although the reason of finding negative relationship is different. De Gregorio and Guidotti (1995) found negative effect of financial development on economic growth in a panel data for Latin America. They argued that this finding is the result of financial liberalization in a poor regulatory environment. Mhadhbi (2014) showed the measure that reflects the negative relationship between financial deepening of the economy and the level of country development. Ductor and Grechyna (2015) suggested that the effect of financial development on growth becomes negative, if there is a rapid growth in private credit not accompanied by growth in real output.

Finally, although FIN had a positive impact on efficiency variable, it cannot explain economic growth significantly in long-run and short-run. Therefore, it suggests to reassess FIN-FD-EG by considering more control variables in future studies.

We suggest researchers to investigate the relationship between financial sector development and economic growth in Iran by considering Financialization phenomenon. The political implications of the suggested subject will be useful for policymakers in central bank and Ministry of Economic Affairs and Finance to be careful about expanding financial markets and financial behavior of NFCs.

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