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Abstract
This paper examines and investigates the linkage between financial development and economic growth in Jordan. Economists have done a lot of investigations on the topic of economic growth. They have created many theories explaining mechanisms of this growth, for instance there are very well known models of economic growth. There are some examples of empirical researches which show that financial market development is not only correlated with economic growth but it causes this growth. This mechanism results from the fact that financial market (mainly through stock exchange and banking sector) extends capital for realization of various investment undertakings in economy. The main purpose of this paper is to investigate the mutual relationships between economic growth (GDP) in Jordan and development of market financial system. We mean a system in which at least one part of concluded transactions is a private one. We will present a simultaneous econometric model based on the annual sample of 2001-2012 which was built in order to estimate these mutual relationships.

Keywords: Jordan stock market development; Economic Growth; Financial Growth

1- Introduction
A positive influence of financial system development for economic growth has been pointed out by J. Schumpeter already in 1912 (King and Levine 1993a). He said that services delivered by financial intermediaries, such as: gathering savings, risk management and facilitating of transactions, were a necessary condition for innovations and economic growth. Modern growth theory identifies two specific channels through which financial system might influence long-run economic growth (Policy Division Working Paper 2004), namely:

a) through its impact on capital accumulation (both physical and human capital);
b) through its impact on the rate of technological progress.

These effects arise from the intermediation role provided by financial institutions. Levine (2004) indicates five following fundamental functions of financial intermediaries which give rise to these effects:

1. Producing information ex ante about possible investments and allocating capital. Before choosing where to invest one needs to have a lot of information, first of all in order to evaluate an investment project, what means that there are large costs associated with this process. An individual investor may not have money and time as well as ability to collect, process and compare information on many different projects, managers and market conditions. Thus high information costs may prevent capital from flowing to its highest value use. Financial intermediaries, especially such as banks and investment funds, which want this information and collect it also on behalf of many individual investors, may reduce the costs of acquiring and processing information and thus improve resource allocation and increase investments. On the basis of analysis of collected information a capital flows to the most profitable investment projects, so it is optimally allocated what we can observe on developed stock markets.
2. Monitoring investments and exerting corporate governance after providing finance. Corporate governance is a key problem for understanding the role of financial factors influencing economic growth. First of all equity and debt holders influence managers to maximize firm value what in turn will improve the efficiency of allocation of the firm’s resources. This means that savers will get higher returns and they will invest more willingly in investment projects, i.e. production and innovations. The corporate governance helps to ensure that investors obtain revenues properly reflecting the firm’s performance and it creates the right incentives for the managers who wanted to gather or borrow capital to perform well. In terms of economic growth some models point out that well functioning financial intermediaries influence the growth by developing corporate governance as was reported by Singh (1997).

3. Facilitating the trading, diversification and management of risk. Levine (2004) distinguishes here three questions: cross-sectional risk diversification, inter temporal risk sharing, and liquidity risk. Investing in an individual project is more risky than investing in a wide range of projects. Financial market may mitigate the risks connected with different investment projects (e.g. firms, branches, regions, countries) since financial intermediaries (banks, mutual funds, stock exchanges) create tools that facilitate the trading, pooling and diversifying risk. Because individual savers generally dislike risk, financial intermediaries enable them to choose more risky projects with higher expected returns. Thus, financial market by easing risk diversification tends to induce an investment portfolio shift toward higher returns. This means that financial market can affect long-run economic growth by changing allocation of resources Yartey (2008). Besides cross-sectional risk diversification, financial markets may improve inter temporal risk sharing. They can help to diversify some kinds of risk across generation which cannot be diversified at a particular point in time. The third type of risk mentioned above is liquidity risk. This type of risk is connected with uncertainties associated with converting assets into a medium of exchange. The standard relation between liquidity and economic growth comes from the fact that some investment projects bringing the relatively higher returns require a long-run commitment of capital, whereas most savers prefer their savings to be available earlier or to move them into another investment. This means that savers want their savings to be liquid.

4. Mobilizing and pooling savings. This function of financial system is perhaps the most obvious and important one. The financial system enables savers to store money in secure places and allows this money to be allocated in productive projects, i.e. to lend this money individuals or enterprises to finance investments, what further encourages capital accumulation and promotes private sector development. According to Levine (2004) mobilizing savings involves (a) overcoming the transaction costs associated with collecting savings from different individuals and (b) overcoming the informational asymmetries associated with making savers feel comfortable in relinquishing control of their savings. Financial systems being more and more effective at mobilizing the savings of individuals can profoundly affect economic growth by increasing savings, exploiting economy of scale and overcoming investment indivisibilities. The better savings mobilization the better capital allocation, what further accelerates economic growth.
5. Ben Naceur, Ghazouani and Omran (2007) stated that the financial system facilitates transactions in the economy, both physically by providing the mechanisms to make and receive payments, and by reducing information costs. So by delivering financial intermediation in this way, the financial system influences the diminishing of transaction costs and easing the trading of goods and services between households and economic units. By this the financial system enables greater specialization which in turn raises productivity gains, what further allows more technological innovations and growth. The relations between exchange, specialization and innovations were modeled by Greenwood and Smith (1996). They say that more specialization require more transactions and since each transaction is costly, financial arrangements that diminish transaction costs will facilitate greater specialization. In this way markets that promote exchange encourage productivity gains which in turn affect financial market development.

Now a problem arises how financial system development influences economic growth. For example Ahmed and Ansari (1998) distinguish the following channels of such an influence:

1. financial markets help to gather savings;
2. financial markets extend the set of financial instruments, what stimulates savings;
3. financial markets allocate savings to the most effective branches of economy, what augments country wealth;
4. financial markets stimulate specialization of production, development of entrepreneurship and adaptation of new technologies.

In the literature one can find the examples of researches in which their authors examine the dynamic interactions between finance and growth by developing models where the financial system influences growth, and growth transforms the operation of the financial system. We will discuss the empirical evidence of such studies in the next section.

2. Empirical Evidence
A lot of empirical works have been done for assessing the linkages between financial system development and economic growth. They examine a question whether the impact between these quantities is economically large and whether banks and stock markets, i.e. substantial components of financial system, play a particularly important role in stimulating economic growth depending on economic development. One can stress that a vast majority of these researches provide the empirical evidence supporting this relationship. A first study was made by Goldsmith (1969). Using data on 35 countries in the period of 1860–1963 he showed a positive correlation between the financial system development and the level of economic activity. He pointed out that in some long sub periods of the above sample a rapid economic growth was often accompanied by an above average rate of financial development.

Especially a lot of empirical studies about relationship between financial development and economic growth have been made since the beginning of 1990s of 20th century. The works by R. Levine and his co-workers, such as R. King, N. Loayza, T. Beck, S. Schmukler and S. Zervos, are particularly well known. For example King and Levine (1993a), using data for 77 countries over the period of 1960–1989, found a strong positive relation between the different indicators of financial development (expressed as: (1) the size of financial intermediaries, (2) the ratio of bank credit divided by bank credit plus central bank domestic assets and (3) the credit to private enterprises divided by GDP) and economic growth. Taking into account the three alternative indicators of economic growth, namely: (1) the average rate of real per capita GDP growth, (2) the average rate of growth in the capital stock per person, and (3) total
productivity growth, as an endogenous variable in an econometric model they showed that a country that augmented the size of financial intermediaries in the economy from the mean of the slowest growing 25% of countries to the mean of the fastest growing 25% of countries would have raised its per capita growth rate by almost 1% a year. They also proved that the relationship between the initial level of financial development and economic growth was economically sufficient. However they did not consider the mutual relationship between those two quantities. They only explained the potentially long-term economic growth implied by changes in financial development factors. Another study, e.g. by Levine, Loayza and Beck (2000), also confirmed that financial development exerted a large positive impact on economic growth.

Other researchers have examined the mutual relations between financial development and economic growth, among other things also the problem of causality between those two quantities. For instance Calderon and Liu (2003), using data for 109 countries over the period of 1960–1994 and econometric models, stated that:

a) there was bi-directional causal relationship between financial development and economic growth;

b) the impact of financial development on economic growth was more important than the impact of growth on financial development, particularly in developing countries;

c) the longer examined period, the greater the influence of financial development on economic growth was observed;

d) the impact of economic growth on financial development become insignificant over long periods (even in developed countries).

The above-mentioned studies are based on the cross-country data. They use the averaged or panel data or even the instrumental variables to assess the impact of financial development on economic growth. All of them point out the significant influence of financial development on economic growth but some of them raise a question that the impact of economic growth on financial development can be overestimated, however this overestimation is likely to be very small in developing countries, since only a small part of the overall impact is caused by economic growth. Another problem connected with the studies based on the cross-country data consists in the fact that they produce the estimates which are interpreted as an average effect of financial development on economic growth, while the relationship may vary, even often considerably, between countries. This question has led some researchers to investigate the finance-growth relation using time-series data. We would like to present the results of such kind of studies briefly below.

A characteristic feature of these studies consists in using better measures of financial development and more sophisticated econometric techniques, for example Granger-type causality tests and vector autoregressive (VAR) procedures. They also examine individual countries much deeper than studies using the cross-country data. As far as the measures of financial development are concerned we can meet here such indicators as: (1) the ratio of money to GDP, (2) the value-added provided by the financial system, and (3) the assets of both banks and non-banks. Using the third measure the Rousseau and Wachtel (1998) underline that the dominant direction of causality runs from financial development to economic growth. Others, e.g. Arestis, Demetriades and Luintel (2001) the financial development expressed by measures of both stock market and bank development. Their study confirmed that the effect of banking sector development on economic growth was substantially greater than the impact connected with stock market development.
3. Econometric Model

The focus of this model is on the estimation and analysis of relationships between the economic growth and development of the financial sector in Jordan. It is the first attempt to estimate and analyze such relationships in Jordan. The estimation of the model was made based on the time-series sample in the years 2001-2012 and the all variables, besides interest rate and dummies (denoted by U), are expressed in constant prices. The model is a seven-equation interdependent model with the following equations (below we present the estimation results obtained by OLS method):

1. The first equation is a classical function of production (JDP) is a gross domestic product being a measure of an economic growth). Among basic explanatory variables are fixed assets (K) and employment (EM). This equation contains also variable, which R. Levine (2004) studied in his works corresponding to the development of the financial sector (RF) explaining how it affects the economic growth. Variable U9596 is a dummy variable taking values 1 in 2002-2003. The estimation results are as follows: (c.f. Figure 1)

\[
\text{ln}(JDP_t) = -1.8545 + 0.3128 \text{ln}(RF_{t-1}) + 0.8458 \text{ln}(K_t) + 0.1628 \text{ln}(EM_t) - 0.2148(U9596_t) \\
\text{(t-student)} (0.63) (2.53) (12.13) (0.2) (5.05)
\]

\[R^2 = 0.978 \quad DW = 2.692 \quad JB = 0.881 \quad F = 78.332\]

![Fig 1. Empirical and theoretical values of gross domestic product (JDP) according to the model (1)](image)

The structural parameter estimates obtained can be interpreted as elasticity. And thus for example, an increase in financial sector development by 1% may result in JDP increase by 0.31% in the subsequent period. JDP elasticity coefficients relating to fixed assets amounts to 0.85 and to employment 0.16 what seems to us that the first value is to high and the second one too low. The equation is highly explanatory and the variables (except for EM) have a statistically significant effect on JDP. Furthermore, no autocorrelation can be seen in the equation and there are no grounds for rejecting the hypothesis of normal distribution of stochastic disturbance.

We decided to estimate next equation in the same way as previously with only this exception that RFt-1 variable was replaced by RFt. variable to check whether there is a simultaneous dependence between the financial market representing variable (RF) and
gross domestic product (JDP). A symbol U means a dummy variable talking values 1 in 2002-2008, respectively. The equation estimation results are presented below (Figure.2):

\[
\ln (JDP_t) = 0.9033 + 0.4105 \ln (RF_t) + 0.5703 \ln (k_t) + 0.3221 \ln (EM_t) - 0.1300^* (U2002) + 0.0918^* (U2008)
\]

\[
(t\text{-student}) = (0.37) (4.03) (6.12) (0.42)
\]

\[
R^2 = 0.972 \quad DW = 1.357 \quad JB = 1.621 \quad F = 41.205
\]

They suggest that a simultaneous impact of the financial market on GDP is greater (which is understandable) than the impact with a delay of one period because GDP elasticity coefficient for RF is 0.41. Also a lower GDP elasticity coefficient for fixed assets (0.57, formerly 0.85) and a higher value of GDP elasticity coefficient for employment were obtained. The latter is now 0.32 and was 0.16. As previously, the (EM) variable is also insignificant from the statistical point of view. A similar value of determination coefficient \(R^2 = 0.972\) and no autocorrelation of disturbance term are characteristic for the equation described.

2. The second equation describes how the amounts of credits and loans extended to enterprises and individuals by commercial banks (CB) vary depending on: (1) an endogenous variable with a delay of one period – in order to explain a process of inertia resulting from the credit renewals, which are particularly sought by enterprises, and (2) a volume of gross domestic product (JDP) – in order to explain how economic growth stimulates a demand for new credits. Thus the equation explains a mechanism of commercial banks credit campaign, while its explained variable may be treated as a proxy for variable assets of the bank sector (as it mobilizes all its assets for a credit campaign
being its core business). T means t-Student statistics. Estimation results for the equation in question are as follows (of Figure.3):

\[
\ln(CB_t) = -2.3678 + 0.2844 \ln(CB_{t-1}) + 0.9336 \ln(JDP_t) + \\
(\text{t-student}) \quad (5.25) \quad (3.42) \quad (7.44) \\
+ 0.2620 (U_{2009}) \quad (6.72)
\]

\[R^2 = 0.992 \quad DW = 2.120 \quad JB = 0.122 \quad F = 323.799\]

A high level of explanation, statistical significance of an impact of the explained variables introduced and an absence of autocorrelation disturbance term are characteristic for the equation presented. The structural parameter estimates obtained indicate that 1% GDP growth results in a more intensive credit campaign of banks by 0.93%, while credit renewals grow by 0.28% as compared to the year. U2009 dummy variable was introduced to explain a significant growth in the bank credit campaign that year.

3. The third equation describes a mechanism how non-bank financial sector assets (NBFS) vary depending on: (1) gross domestic product generated (JDP) in order to explain how people’s personal income, immediately depending on GDP, affect their savings deposited in capital funds (which are directly raised by insurance companies), also in pension schemes and investment funds, and (2) a real interest rate (RiR) defined as a difference between a weighted average discount rate of the central bank and inflation rate

1. NBFC variable – Off – bank financial sector assets – is a sum of net assets of insurance companies offering life insurance, pension and investment funds.
variable stands for a dummy variable assuming value 1 in 2004. The results of this equation are as follows (cf. Figure 4):

\[(NBFC_t) = -201.8028 + 0.4483(JDP_t) - 7.4577(RiR_t) + 25.6844(U_{2004})\]

\[
\begin{align*}
(t &- \text{students}) \quad (14.3) \quad (19.49) \quad (10.8) \quad (2.43) \\
R^2 & = 0.981 \quad DW = 2.352 \quad F = 134.794 \quad JB = 0.340
\end{align*}
\]

A high level of explanation, statistical significance of an impact of the explained variables introduced and an absence of autocorrelation disturbance term are also characteristic for the equation presented. GDP variable-related structural parameter estimate means that a growth of gross domestic product by 1 billion resulted in a growth of non-bank financial sector assets by 448 million on average in the years 2001-2012, while other conditions unchanged, and elasticity coefficient was 5.54. In turn, a negative value of RiR variable-related structural parameter estimate means that when a real interest rate grows, deposits are withdrawn from the non-bank financial sector assets and deposited in banks, with a focus on investment funds, i.e. safe saving is preferred (a change in savers’ preferences). Elasticity coefficient of NBFC variable in relation to RiR variable was -0.84%.

4. \(ASF_t = BCL_t + NBFC_t\), where a variable ASF denotes the net assets of the financial sector.

5. The fifth equation describes how the average yearly stock exchange capitalization proceeds depending on the assets of the financial sector (ASF), the shares issue at the Amman Stock Exchange (ASE) and the economy's investment expenditures (EIE). All these variables positively affect the market value of stock exchange. The estimation results are as follows (cf. Figure 5.):
\[
\begin{align*}
\ln(K_G_t) &= -19.3554 + 1.8988 \ln(ASF_t) = 0.1427 \ln(ASE_t) + 2.6321 \ln(t - \text{students}) \\
R^2 &= 0.984 & DW &= 1.629 & F &= 108.805 & J-B &= 1.637
\end{align*}
\]

From a factual and statistical viewpoint, the equation estimation gave satisfactory results (however the t–Student statistics at the variable ASE and dummy U2008 might have been a bit higher). Based on the values of elasticity coefficients obtained, it can be stated that 1% growth of each explanatory variable encourages an increase in the Amman Stock Exchange(ASE ) average yearly capitalization by 1.90%, 0.14% and 2.63%, respectively.

6. \( RF_t = ASF_t + KG_t \), where a variable RF is a measure of financial sector development.

7. The seventh equation in the model presented provided an explanation how the investment expenditures (EIE) depend upon expenditures made in the previous year (for the explanation of the investment process inertia) and gross domestic product (for the explanation of demand for new investments in economy). Thus it is a classical equation of investment expenditure in national economy (Welfe 1992). The estimates for this equation are as follows (cf. Figure 6):

\[
\begin{align*}
\text{EIE}_t &= -19.3888 + 0.3462 \text{EIE}_{t-1} + 0.1912 \text{JDP}_t \ast U_{0105} \\
R^2 &= 0.978 & DW &= 1.78 & F &= 116 & J-B &= 0.849
\end{align*}
\]

U0105= for the years between 2008-2011 and 0 for the remaining years.
From a factual and statistical viewpoint, the estimation gave satisfactory results. They indicate that the marginal propensity to invest in Jordan economy in the years subject to the study was a 0.19 and was lower by 0.04 in the years 2008–2012. In turn, the value of EIE elasticity coefficient to JDP meant that 1% growth of gross domestic product brought about an increase in the economy's investment expenditures by 0.9%.

The model recorded shows that its operation scheme is as follows (a solid line stands for simultaneous dependency, a broken line stands for the dependency delayed by one period, and a variable in the circle is an exogenous variable) Figure.7.

As it appears from the scheme, the model is simultaneous and dynamic. The feedback is between JDP through BCL and NBFC to ASF and KG. Both these variables influence RF which in turn affect JDP in the subsequent period. In addition JDP determines EIE which through ASE influences RF which in the next period affects JDP. Exogenous variables in the model are: fixed assets (K), employment (EM), stock exchange shares issue value (ASE) and real interest rate (RIR). The scheme illustrates two versions of the model. The first version with RF variable affecting GDP with a delay of one period (an arrow number 1) presents a recursive model; while the other with RF variable affecting GDP in the same period (an arrow number 2) presents an interdependent model.

![Fig. 6. Empirical and theoretical values of stock exchange capitalization (KG)](image)

**Fig. 7.** The operation scheme of the macro model with financial sector for Jordan
References


**Further reading**


