The Impact of Economic Growth on Credit Market Development in Jordan

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Abstract

This study investigated the impact of economic growth on credit market development in Jordan for the period 2000 - 2009, using a Vector Error Correction Model (VECM). This study aimed to investigate the short - run and the long - run relationship among bank lending, gross domestic product and inflation rate applying the Johansen cointegration analysis. For this purpose unit root tests were carried out according to Dicky - Fuller (1979)[1], and Johansen cointegration analysis was applied to examine whether the variables are cointegrated of the same order[2], taking into account the maximum eigenvalues and trace statistics tests. Finally, a vector error correction model was selected to investigate the long - run relationship between growth and credit market development. The results suggested that a short - run increase of economic growth per 1% induced an increase of bank lending 0.4% in Jordan, while an increase of inflation rate per 1% induced a relative decrease of bank lending per 0.56% in Jordan. The estimated coefficient of error correction term was statistically significant and had a negative sign, which confirmed that there was not any problem in the long - run equilibrium between the examined variables. The empirical results indicated that economic growth had a positive effect. Bank development was determined by the size of bank lending directed to private sector at times of low inflation rates leading to higher economic growth rates.

1. Introduction

The study of relationship between financial development and economic growth is a much debated issue in the empirical literature. The question that whether financial development proceeds or follows the economic growth has been an extensive subject of empirical research since last few decades. This paper is thus an attempt to contribute to the empirical literature on the relationship between financial development and economic growth in Jordan.

A relatively developed credit market improves the efficiency of resource allocation there by contributing to higher economic growth of a country. Conversely, a growth push makes credit markets valuable for participants, stimulates financial development and strengthens the initial growth effect.

The literature on financial liberalization encourages free competition among banks as the way forward to achieve economic growth. However, it has largely over-

(1) David A. Dickey and Wayne A. Fuller, «Distributions of the Estimators for Autoregressive Time Series with a Unit Root,» *Journal of the American Statistical Association*, vol. 74, no. 366 (June 1979), pp. 427-431.

(2) Soren Johansen, «Statistical Analysis of Co-integration Vectors,» *Journal of Economic Dynamics and Control*, vol. 12 (1988), pp. 231-254.

looked the possibility that endogenous constraints in the credit market, such as imperfect information, could be a significant obstacle to efficient credit allocation even when assuming that banks are free from interest rate ceilings. Stiglitz and Weiss (1983)[3] were the first to consider the importance of banks in allocating credit efficiently, particularly to new and innovative investments. A high risk premium would only encourage the riskier borrowers, as the higher the risk the higher the expected return from investment. The expected return of the borrowers is an increasing function of the riskiness of their projects. This fact would discourage less risky investments from taking place, although they could be more productive (selection effect). Safe borrowers, which deal with banks only, will be left with no other choice. At times of high interest rates, investors would favour investments with a high probability of default (incentive effect). Reducing opportunities to innovate will have a negative impact on economic growth in the long run. King and Levine (1993)[4] use different measures of bank development for several countries and find that banking sector development can spur economic growth in the long run. Jayratne and Strahan (1996)[5] show that when individual states in USA relaxed interstate branching restrictions, bank lending quality increased significantly leading to higher growth. Government restrictions on banking systems through interest ceilings on deposits and high reserve requirements create a shortage of funds and reduce the efficiency of capital. Government ownership of banks is another form of intervention in financial systems which may have adverse impact on financial development.

Privatizing government-owned banks can enhance credit allocation and thereby increase quantity and quality of investment. Levine (2002)[6] emphasizes the critical importance of the banking system in economic growth and highlight circumstances when banks can actively spur innovation and future growth by identifying and funding productive investments. In a modern economy, banks and stock markets constitute a major part of the financial system. Although they may perform different roles in the process of economic development, their uniqueness is hardly emphasized within the framework of economic growth. Mishkin (2007)[7] emphasizes a better functioning credit system which alleviates the external financing constraints that impede credit expansion, and the expansion of firms and industries.

(3) Joseph E. Stiglitz and Andrew Weiss, «Credit Rationing in Markets with Imperfect Information,» *Journal of the American Statistical Association*, vol. 71, no. 3 (June 1981), pp. 383-410.

(4) Robert G. King and Ross Levine, «Finance, Entrepreneurship and Growth: Theory and Evidence,» *Journal of Monetary Economics*, vol. 32, no. 3 (1993), pp. 513-542.

(5) Jith Jayratne and Philip Strahan, «The Finance and Growth Nexus: Evidence from Bank Branch Deregulation,» *Quarterly Journal of Economics*, vol. 111 (1996), pp. 639-670.

(6) Ross Levine, «Bank Based or Market-based Financial Systems: Which is Better?,» *Journal of Financial Intermediation*, vol. 11, no. 4 (October 2002), pp. 398-428.

(7) Frederic S. Mishkin, *The Economics of Money, Banking and Financial Markets* (Pearson: Addison Wesley, 2007).

Kasekende (2008)[8] argued that countries with better/efficient credit systems grow faster while inefficient credit systems bear the risk of bank failure.

The development of stock markets is necessary to achieve full efficiency of capital allocation if the government is to liberalize the financial system. While banks finance only well-established, safe borrowers, stock markets can finance risky, productive and innovative investment projects. As far as physical accumulation is concerned, both stock markets and banks provide sources of external financing for firms. For the purpose of resource allocation, they both create information to guide the allocation of resources. They differ only in the way the information is transmitted. Information in stock markets is contained in equity prices, while loan managers collect that in banks. Dow and Gorton (1995)[9] argued that if the main role of the stock markets is to signal information for evaluation, financing and monitoring, banks may be equally effective at efficient resource allocation.

This paper is an attempt to investigate the relationship between credit market development and economic growth in Jordan for the period spanning from 2000 to 2009. The rest of the paper is organised as follows. Section 2 discusses the credit market in Jordan. Section 3 reviews the related literature. Section 4 discusses the data and methodology. Section 5 makes the analysis. Section 6 concludes.

2. Credit Market in Jordan

The Jordanian banking system comprises the Central Bank of Jordan and the licensed banks which consist of all Jordanian banks (commercial and Islamic) and foreign banks (non Jordanian) that operate in Jordan and accept deposits. This definition does not cover financial institutions.

A.Development of credit facilities extended by banks operating in Jordan in Jordanian dinars and in foreign currencies

- The overall balance of credit facilities extended by banks operating in Jordan increased from JD4.6 billion in 2000 to JD13.2 billion at the end of 2009. The JD8.6 billion rise represents a 187 percent surge at an annual growth rate of 12.89 percent.
- Credit facilities extended by banks operating in Jordan in Jordanian dinars went up from JD3.9 billion in 2000 to JD11.6 billion at the end of 2009. The JD7.7 billion rise represents a 197 percent surge at an annual growth rate of

(8) Louis Kasekende, «Developing a Sound Banking System,» paper presented at: IMF Seminar, Tunisia (2008).

(9) James Dow and Gary Gorton, «Stock Market Efficiency and Economic Efficiency: Is There a Connection,» *Journal of the American Finance Association*, vol. 52 (1995), pp. 1087-1129.

13.3 percent. Credits in foreign currencies increased by the equivalent of JD929 million at an annual average growth of 12 percent.

- Credit facilities in local currency at the end of 2009 represented 88.3 percent of the overall credit facilities extended by banks operating in Jordan. Credit facilities in foreign currencies represented around 11.7 percent of total credits facilities, from 13.4 percent in 2000 to 13.2 percent as of the end of 2008 to the gross domestic product at current market prices from 75.8 percent in 2000 to 96.4 percent in 2007.

- The continued growth in the percentage of credit facilities to the gross domestic product (GDP) can be well noticed especially in the last years, as it exceeded the 85 percent mark of GDP. This substantiates the importance of the banking system in the Jordanian economy (see Table (1)).

Table (1)
Total credit facilities extended by banks operating in Jordan and its ratio to GDP

Year	Total Credit facilities	Domestic Credit Facilities		Foreign Credit Facilities		Percentage Change of Total Credit facilities	Total Credit Facilities/ GDP
	JD Million	JD Million	In percent of Total Credit Facilities	JD Million	In percent of Total Credit Facilities		
2000	4546.5	3936.8	86.59%	609.7	13.41%	1.80%	75.80%
2001	4948.9	4251.9	85.92%	697.0	14.08%	8.90%	77.77%
2002	5130.0	4311.9	84.05%	818.1	15.95%	3.70%	75.51%
2003	5262.4	4333.0	82.34%	929.4	17.66%	2.60%	72.80%
2004	6189.2	5227.9	84.47%	961.3	15.53%	17.60%	76.61%
2005	7744.3	6887.4	88.94%	856.9	11.06%	25.10%	86.77%
2006	9761.9	8761.8	89.76%	1000.1	10.24%	26.10%	94.07%
2007	11295.6	10199.7	90.30%	1095.9	9.70%	15.71%	93.69%
2008	13044.3	11370.1	87.17%	1674.2	12.83%	17.39%	86.63%
2009	13163.9	11625.4	88.31%	1538.5	11.69%	0.92%	84.15%

Source: Central Bank of Jordan.

B. Development of credits according to type

The rate of loans to total facilities went up progressively from the year 2000 until 2009, climbing from 59.6 percent in 2000 to 85 percent at the end of 2009. This rise reflects the fact that retail banking is gaining more ground in the operations of banks operating in Jordan, and the rate of overdrafts and advances under current accounts to overall credits declined markedly dropping from 31.2 percent in the year 2000 to 12.6 percent at the end of 2009. (see Table (2)).

C.Distribution of credits on economic sectors

Three main economic sectors (general trade, construction and industry) accounted for 52 percent of the credit facilities extended by banks operating in Jordan during the 2000 - 2009 period. 22.6 percent went for general trade, 16.5 percent benefited the construction sector and 12.9 percent was the share for industry. The mining, agriculture, financial services, transport services and tourism sectors did not get more than 17.8 percent of the tota l facilities extended by banks between 2000 and 2009. The remaining 30.2 percent of the total facilities were «other credits». (see Table (3)).

Table (2)
Development of types of credit facilities extended by licensed banks (2000 -2009)

Year	Overdraft		Loans & Advances		Bills Discounted		Total
	JD Million	%	JD Million	%	JD Million	%	
2000	1419.8	31.20	2711.4	59.60	415.3	9.10	4546.5
2001	1368.2	27.60	3115.1	62.90	465.3	9.40	4948.6
2002	1304.2	25.40	3428.6	66.80	397.2	7.70	5130.0
2003	1304.7	24.80	3620.5	68.80	337.2	6.40	5262.4
2004	1343.4	21.70	4499.6	72.70	346.2	5.60	6189.2
2005	1572.9	20.30	5813.9	75.10	357.5	4.60	7744.3
2006	1580.5	16.20	7722.1	79.10	459.3	4.70	9761.9
2007	1658.6	14.68	9199.8	81.45	437.2	3.87	11295.6
2008	1769.6	13.60	10859	83.20	415.7	3.20	13044.3
2009	1652.8	12.60	11196.5	85.00	314.6	2.40	13163.9

Source: Ibid.

Table (3)
Distribution of credit facilities extended by licensed banks over economic sectors (2000 -2009)

JD Million

Sectors	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Agriculture	128.0	10505	102.9	98.8	113.6	110.9	140.9	156.2	210.0	231.2
Mining	100.7	77.7	95.3	78.0	77.7	56.5	42.8	65.3	48.3	60.2
Industry	683.4	728.6	789.8	801.4	895.3	981.6	1093.1	1348.1	1597.6	1631.2
General Trade	1112.5	1206.1	1250.9	1327.3	1472.9	1585.0	1916.3	2434.7	2897.5	3195.4
Construction	744.9	728.9	764.9	804.5	953.2	1172.1	1560.8	1942.1	2293.1	2582.5
Transportation Services	134.2	132.1	163.6	166.6	174.1	219.6	291.0	352.3	370.5	453.1

to be continued

Continued

Tourism,Hotels,-Restaurants	155.2	171.0	173.5	172.8	154.9	181.2	196.1	255.8	366.6	427.9
Public Services	240.0	326.4	349.7	349.0	494.3	554.1	637.3	733.7	870.3	909.6
Financial Services	152.8	150.9	139.7	133.1	97.2	176.1	242.1	390.1	437.7	434.1
Other	1094.8	1321.7	1299.7	1330.9	1756.0	2717.2	3642.2	3616.9	3952.7	3392.1

Source: Ibid.

3. Literature review

The relationship between the size of a country's financial sector and its rate of economic growth has been the subject matter of research since last few decades. However, the empirical evidence on the impact of finance upon economic growth has been mixed and remained a debated subject.

King and Levine (1993)[10] used different measures of bank development for several countries and found that banking sector development can spur economic growth in the long run. Jayratne and Strahan (1996)[11] showed that when individual states in USA relaxed interstate branching restrictions, bank lending quality increased significantly leading to higher growth. Levine (2002)[12] emphasizes the critical importance of the banking system in economic growth and highlight circumstances when banks can actively spur innovation and future growth by identifying and funding productive investments. Favara (2003)[13] found a strong relationship between domestic credit by banks and other financial institutions as a percentage of GDP and economic growth after controlling the effect of inflation, government consumption to GDP, initial GDP per capita, domestic investment to GDP, average years of school of the population aged 15 and over, trade openness to GDP, black market premium and dummy legal origin variables. The sample consisted of 85 countries for the period 1960-1998. However, this strong relationship weakens when an instrumental variable estimation method is applied with dummy variables of the origins of the legal system of each country used as instruments. When moving to annual data, the effect of domestic credit by banks and other financial institutions as a percentage of GDP is negative when real domestic investment as share of real per capita GDP is included. But it is still positive without the real domestic investment. However, no variables capturing the effect of financial

(10) King and Levine, «Finance, Entrepreneurship and Growth: Theory and Evidence».

(11) Jayratne and Strahan, «The Finance and Growth Nexus: Evidence from Bank Branch Deregulation».

(12) Levine, «Bank Based or Market-based Financial Systems: Which is Better?».

(13) Giovanni Favara, «An Empirical Reassessment of the Relationship between Finance and Growth,» *International Monetary Fund*, vol. 3, no. 123 (June 2003), pp. 1-46.

markets were included. Beck and Levine (2004)[14] initially constructed a panel with data averaged over five-year intervals over the period 1986-1998 for 40 countries. The averaging was aimed at removing the effect of the business cycle. This study found that both financial markets and banks did indeed play a positive and significant role in influencing economic growth, even when selected control variables were added to the model. However, the relationship between financial variables and economic growth broke down, in particular for the banking variable when using annual data (Beck and Levine, 2004)[15].

They tentatively suggested that this was due to «credit surges» that had also been found to be good predictors of banking crises and subsequent economic slowdowns. In a recent paper, Loayza and Rancière (2006)[16] empirically investigated and provided supportive evidence to this apparent debate, and put forward a number of possible explanations backed up by some empirical evidence. First, they empirically proved that the relationship between financial variables and economic growth is significant and positive in the long-run by means of a model with domestic credit by banks and other financial institutions as a percentage of GDP as their financial development variable and a number of other well established control variables. The technique they have used is a panel error-correction model that allows the estimation of both short and long-run effects from a general Autoregressive Distributed Lags (ARDL) model. Their sample consisted of annual data with 75 countries over the period 1960-2000. The dependent variable is rate of growth of GDP per capita, while the control variables (always included) are government consumption to GDP, volume of trade over GDP, inflation rate and initial GDP per capita. However, they incorporated only domestic credit by banks and other financial institutions as a percentage of GDP as a financial variable ignoring the stock market. Unlike Beck and Levine (2004)[17], Loayza and Rancière (2006)[18] do not average the data but they estimate both short- and long-run effects using a data field composed of a relatively large sample of countries and annual observations. They suggest that averaging hides the dynamic relationship between financial intermediation and economic activity. Saci, Giorgioni and Holden (2009)[19] estimated

(14) Thorsten Beck and Ross Levine, «Stock Markets, Banks and Growth: Panel Evidence,» *Journal of Banking and Finance*, vol. 28 (2004), pp. 423-442.

(15) Ibid.

(16) Norman Loayza and Romaine Rancière, «Financial Development, Financial Fragility, and Growth,» *Journal of Money Credit and Banking*, vol. 38 (2006), pp. 1051-1076.

(17) Beck and Levine, Ibid.

(18) Norman Loayza and Romain Rancière, «Financial Development, Financial Fragility, and Growth,» *Journal of Money Credit and Banking*, vol. 38 (2006), pp. 1051-1076.

(19) Karima Saci, Gianluigi Giorgioni and Ken Holden, «Does Financial Development Affect Growth?,» *Applied Economics*, vol. 41, no. 13 (May 2009).

the relationship for 30 developing countries with annual data over the period 1988-2001 applying two-step GMM. They found that the variable, domestic credit by banks and other financial institutions as a percentage of GDP has a significantly negative coefficient with stock market traded value over GDP. When stock market traded value over GDP is replaced by, stock market turnover ratio, the effect of domestic credit by banks and other financial institutions as a percentage of GDP became insignificant. However, in each case the effect of the stock market variables on growth is positive and significant. Vazakidis and Adamopoulos (2009)[20] investigated the relationship between credit market development and economic growth for Jordan for the period 1965-2007 using a Vector Error Correction Model (VECM). The empirical results indicated that economic growth had a positive effect on credit market development, while inflation rate had a negative effect. Bank development was determined by the size of bank lending directed to private sector at times of low inflation rates leading to higher economic growth rates.

This survey and review of related studies infers that the causal relation between credit market development and economic growth is still a moot point in the literature. It is also found that the empirical literature is thin, regarding similar studies including Jordan economy. Furthermore, the literature is impaired in not having the studies covering the period of recent global financial crisis. Therefore, this paper is an attempt to fill such gaps in the finance-growth nexus literature.

4- Data and Methodology

The objective of this paper is to analyse the causal relationship between the credit market development and economic growth in Jordan. In this study the method of Vector Autoregressive (VAR) model is adopted to estimate the effects of economic growth on credit market development through the effect of consumer price index. The use of this methodology predicts the cumulative effects, taking into account the dynamic response among credit market development and the other examined variables.

In order to test the long-run relationships, the following model is to be estimated:

BC = f (CPI, GDP) (1)

Where:

BC = The domestic bank credits to private sector

CPI = The consumer price index

GDP = The gross domestic product

(20) Athanasios Vazakidis and Antonios Adamopouslos, «Credit Market Development and Economic Growth,» *American Journal of Economics and Business Administration*, vol. 1, no. 1 (2009), pp. 34-40.

Following the empirical study of the variable of economic growth (GDP) is measured by the rate of change of real GDP, while the credit market development is expressed by the domestic bank credits to private sector (BC) as a percentage of GDP. This measure has a basic advantage from any other monetary aggregate as a proxy for credit market development. Although it excludes bank credits to the public sector, it represents more accurately the role of financial intermediaries in channelling funds to private market participants Vazakidis (2006)[21]. The data that are used in this analysis are annual, covering the period 2000-2009 for Jordan. All time series data are expressed in their levels and are obtained from central bank of Jordan report, and estimated by using econometric computer software Eviews 5.0.

A. Stationarity Test

The pre-requisite of cointegration test is the stationarity of each individual time series over the sample period. In this study, we relied on Augmented Dickey-Fuller unit root test to investigate stationarity of each time series as proposed by Dickey and Fuller. This ADF unit root test requires the estimation of the regression Seddighi (2000)[22]:

$$\Delta X_t = \alpha 0 + \alpha t_1 + \sum_{j=1}^{p} \beta j \Delta x t_{-j} + \varepsilon t \quad (2)$$

Where ΔX_t is the first differences of the X_t ; $\alpha 0$ is the intercept; $\alpha 1$ is the trend coefficient; β_i is the coefficient of the lagged term; t is the time or trend variable; p is the number of lagged terms chosen to ensure that ε_t is the white noise. The optimal lag length of p is selected by using the Akaike Information Criteria (AIC).

The hypotheses of this test are:

$H0 : \beta_i = 0$, there is a unit root (the time series is non-stationary).

$H1 : \beta_i \neq 0$, there is no unit root (the time series is stationary).

If the calculated ADF test statistic is higher than McKinnon's critical values, then the null hypothesis (H0) is accepted and the time series is considered non-stationary or not integrated of order zero, I(0). Alternatively, the rejection of the null hypothesis implies stationarity of the underlying time series. Failure to reject the null hypothesis leads to conducting the test on the difference of the time series, so

(21) Athanasios Vazakidis, «Testing Simple Versus Dimson Market Models: The Case of Athens Stock Exchange,» *International Research Journal of Finance Economics*, vol. 2 (2006), pp. 26-34.

(22) Hamid Seddighi, Kevin Lawler and Anastasios Katos, *Econometrics: A Practical Approach* (London: Routledge, 2000), pp. 251-347.

further differencing is conducted until stationarity is achieved and the null hypothesis is rejected (Katos, 2004)[23]. If the time series are stationary in their first differences, then they can be said integrated of order 1, i.e., I(1); if stationary in their second differences, then they are integrated of order two I(2).

B.Cointegration Test

In financial economics, two variables are said cointegrated when they have long-term, or equilibrium relationship between them (Engle and Granger, 1987)[24]. Thus, in this study cointegration analysis has been performed to investigate long term relationship between cross-border capital flows and real economic growth in Jordan. The purpose of the cointegration test is to determine whether a group of non-stationary series are cointegrated or not. We implement VAR-based cointegration test, using the methodology developed by Johansen (1991, 1988)[25]. The vector autoregressive (VAR) model as considered in this study is:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + A_3 Y_{t-3} + A_p Y_{t-p} + B X_t + \varepsilon_t \quad (3)$$

Where Y_t is a k -vector of non-stationary I(1) endogenous variables, X_t is a d -vector of exogenous deterministic variables, A_1, A_2, A_3, A_p *and* B are matrices of coefficients to be estimated, and ε_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables. Since most economic time series are non-stationary, the above stated VAR model is generally estimated in its first-difference form as:

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i Y_{t-1} + B X_t + \varepsilon_t \quad (4)$$

$$\Pi = \sum_{i=1}^{p} A_i - I \quad \text{, and} \quad \Gamma_i = -\sum_{j=i-1}^{p} A_j$$

Granger's representation theorem asserts that if the coefficient matrix Π has reduced rank $r < k$, then there exist $k * r$ matrices α *and* β each with rank r such that $\Pi = \alpha \beta$ *and* βY_t is I(0). r is the number of co-integrating relations (the *co-integrating rank*) and each column of β is the co-integrating vector. α is the matrix of error correction parameters that measure the speed of adjustments in ΔY_t.

(23) A. Katos, *Econometrics, Theory and Practice* (Zygos: Thessaloniki, 2004), p. 1223.

(24) Robert Engle and Clive Granger, «Co-integration and Error Correction: Representation, Estimation and Testing,» *Econometrica*, vol. 55, no. 2 (1987), pp. 251-276.

(25) Soren Johansen: «Estimation and Hypothesis Testing of Co-integration Vectors in Gaussian Vector Autoregression Models,» *Econometrica*, vol. 59 (1991), pp. 1551-1580, and «Statistical Analysis of Co-integration Vectors,» pp. 231-254.

The Johansen approach to cointegration test is based on two test statistics, viz., the trace test statistic, and the maximum eigenvalue test statistic, as suggested by Johansen (1988).

a.Trace Test Statistic

The trace test statistic as suggested by Maddala (1992)[26] can be specified as:

$$\lambda_{trace}(r) = -T\sum_{i=r+1}^{p}\ln(1-\hat{\lambda}_i) \qquad (5)$$

Where λ_{trace} is the *i th* largest eigenvalue of matrix II and T is the number of observations. In the trace test, the null hypothesis is that the number of distinct cointegrating vector(s) is less than or equal to the number of cointegration relations (r). In this statistic λ_{trace} will be small when the values of the characteristic roots are closer to zero.

b. Maximum Eigenvalue Test

The maximum eigenvalue test as suggested by Johansen examines the null hypothesis of exactly r cointegrating relations against the alternative of r. 1 cointegrating relations with the test statistic:

$$\lambda_{\max}(r, r+1) = -T\ \ln(1-\hat{\lambda}_{r+1}) \qquad (6)$$

Where λ_{r+1} is the $(r+1)^{th}$ largest squared eigenvalue.

In the trace test, the null hypothesis of r . 0 is tested against the alternative of r 1 cointegrating vectors. If the estimated value of the characteristic root is close to zero, then the λ_{trace} will be small.

C.Vector Error Correction Model

Since the variables included in the VAR model are found to be cointegrated, the next step is to specify and estimate a Vector Error Correction Model (VECM) including the error correction term to investigate dynamic behavior of the model. Once the equilibrium conditions are imposed, the VEC model describes how the examined model is adjusting in each time period towards its long run equilibrium state. Since the variables are supposed to be cointegrated, then in the short run, deviations from this long-run equilibrium will feed back on the changes in the dependent variables in order to force their movements towards the long-run equilibrium state. Hence, the cointegrated vectors from which the error correction terms are derived are each indicating an independent direction where a stable meaningful long-run equilibrium state exists. The VEC specification forces the long-run behaviour of the endogenous variables to converge to their cointegrated relationships, while

(26) G. S. Maddala, *Introduction to Econometrics*, 2nd ed. (New York: Macmillan, 1992), p. 663.

accommodates short-run dynamics. The dynamic specification of the model allows the deletion of the insignificant variables, while the error correction term is retained. The size of the error correction term indicates the speed of adjustment of any disequilibrium towards a long-run equilibrium state. Engle and Granger (1987)[27]. The final form of the Error-Correction Model (ECM) was selected according to the approach suggested by Maddala (1992)[28]. The general form of the Vector Error Correction Model (VECM) is the following one:

$$BC_t = \beta_0 + \sum_{i}^{n} \beta_1 \Delta CPI_{t-1} + \sum_{i}^{n} \beta_2 \Delta RGDP_{t-1} + \sum_{i}^{n} \beta_3 \Delta BC_{t-1} + \lambda EC_{t-i} + \varepsilon_t \quad (7)$$

Where:

Δ = The first difference operator

ECt-1 = The error correction term lagged one period

λ = The short-run coefficient of the error correction term ($-1<\lambda<0$)

εt = The white noise term

5. Empirical Analysis

First, we have conducted the ADF unit root test to investigate whether the time series of this study are stationary and thereby to find the order of their integration. The results of the ADF unit root test are summarised in Table (4).

Table (4)
Results of Unit Root Test

Variables	ADF Test Statistic	Critical Values 1%	Accept/Reject	Stationarity	Order of Integration
BC	-4.1395	-3.9116	Accept	Stationary	I(1)
GDP	-5.5701	-2.3740	Accept	Stationary	I(1)
CPI	-4.4015	-2.8835	Accept	Stationary	I(1)

The results of ADF unit root test show that the null hypothesis of the presence of a unit root is rejected for all the variable of study when they are transformed into their second differences. Therefore, all the variables are stationary and integrated of order two, I(2). Since it has been determined that the variables under

(27) Engle and Granger, «Co-integration and Error Correction: Representation, Estimation and Testing».
(28) Maddala, *Introduction to Econometrics*.

study are integrated of order 2, then the Johansen cointegration test is performed to see whether there exists a long-run equilibrium relationship among them. The testing hypothesis is the null of non-cointegration against the alternative of existence of cointegration. It is well known that Johansen's cointegration tests are very sensitive to the choice of lag length. Thus, we have fitted a VAR model to the given data set to find an appropriate lag structure.

Table (5)
Johansen and Cointegration Tests

hypothesis	λ_{trace}	Critical Values 1%	λ_{max}	Critical Values 1%
H0: r = 0 and r = 1	31.20	20.11	16.18	10.01
H0: r £ 1 and r = 2	9.17	13.36	5.28	9.12
H0: r £ 2 and r = 3	2.89	3.55	2.89	3.55

The results which the VECM shows in Table (6) suggest that the number of statistically significant cointegration vectors for Jordan is equal to 1 and is the following:

BC = 1.18 - 3.35 CPI + 4.45 GDP

The cointegration vector of the model of Jordan presented in Table (5) has rank r < n (n = 3). The process of estimating the rank r is related with the assessment of eigenvalues, which are the following for Jordan:

Table (6)
Vector Error Correction Model

Independent Variable	Estimated Coefficients
Constant	-0.1112 [0.095]
Δ CPI t – □	-0.5591 [0.095]
Δ GDPt	-0.3901 [0.095]
ECT t – □	-0.0541[0.095]
R2	-0.1244
DW	2.113
Serial Correlation	2.2051 [0.095]
Functional Form	4.6883 [0.095]
Normality	0.6212 [0.095]
Heteroscedasticity	2.3245 [0.095]

[ ]: I denote the probability levels. Δ : Denotes the first differences of the variables

Critical values for the trace statistic defined by Eq. 6 are 20.11 for Çï: r = 0 and 13.36 for Çï: r£1, 3.55 for Çï: r£2 at the significance level 5, while critical values for the maximum eigenvalue test statistic defined by Eq. 6 are 10.01 for Çï: r = 0, 9.12 for Çï: r£1, 3.55 for Çï: r£2. The error-correction model with the computed values of the regression coefficients in parentheses is reported in Table (6). The dynamic specification of the model allows the deletion of the insignificant variables, while the error correction term is retained. From the results of Table (6) we can see that a short-run increase of economic growth per 1% induces an increase of bank lending 0.40% in Jordan, while an increase of inflation rate per 1% induces a relative decrease of bank lending per 0.56% in Jordan. The estimated coefficient of ECt-1 is statistically significant and has a negative sign, which confirms that there is not any problem in the long-run equilibrium relation between the independent and dependent variables in 5% level of significance, but its relatively value (-0.05) for Jordan shows a satisfactory rate of convergence to the equilibrium state per period.

6. CONCLUSION

This study employs in the relationship between credit market development and economic growth for Jordan, using annually data for the period 2000-2009. The empirical analysis suggested that the variables that determine credit market present a unit root. Once acointegrated relationship among relevant economic variables is established, the next issue is how these variables adjust in response to a random shock. This is an issue of the short-run disequilibrium dynamics. The short run dynamics of the model is studied by analysing how each variable in a cointegrated system responds or corrects itself to the residual or error from the cointegrating vector. This justifies the use of the term error correction mechanism. The Error Correction (EC) term, picks up the speed of adjustment of each variable in response to a deviation from the steady state equilibrium. The dynamic specification of the model suggests deletion of the insignificant variables while the error correction term is retained. The VEC specification forces the long run behaviour of the endogenous variables to converge to their cointegrating relationships, while accommodates the short-run dynamics. A short-run increase of economic growth per 1% induces an increase of bank lending 0.40% in Jordan, while an increase of inflation rate per 1% induces a relative decrease of bank lending per 0.56% in Jordan.

Therefore, it can be inferred that economic growth has a direct positive effect on credit market development, taking into account the negative effect of inflation rate on credit market development. Economic growth spurs credit market development at times of low inflation rates. This fact will encourage more risky investments from taking place, while safe borrowers who deal only with banks will become more effective. Increasing opportunities to innovative products will favour new investments from domestic and foreign investors leading to higher economic growth in the long-run period.