

**SCHOOL OF BUSINESS ADMINISTRATION WORKING PAPER SERIES**

SBAWPS: 18-04/2014

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Economic Growth: Case of Jordan

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Working Paper 18-04/2014

School of Business Administration  
Working Paper Series (SBA WPS)



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## **On the Causal Link between Financial Development and Economic Growth: Case of Jordan**

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## **ABSTRACT**

This paper empirically examines the causal relation between financial development and economic growth in the case of Jordan for the period 1965 to 2004. That is, the paper attempts to provide answers to the following questions: a) Does financial development promotes economic growth? Or b) Does economic growth promotes financial development? Using Toda and Yamamoto (1995) Granger-no-causality model, the results reveal that there is a uni-directional Granger causality from economic growth to financial development (as defined by  $\log(DC/GDP)$ ).

## **INTRODUCTION**

The relationship between financial development and economic growth has been investigated extensively in the literature. This investigation of such a relationship has been initiated by Schumpeter (1911) and followed by more recent work of McKinnon (1973) and Shaw (1973). Literature shows that two hypotheses are used to explain the direction of causality between financial development and economic growth. First, the supply-leading hypothesis that supports the argument that financial development promotes economic growth (see, for example, Levine and Zervos (1998), McKinnon (1993), and Shaw (1973)). Second, the demand-following hypothesis which supports the argument that economic growth promotes financial development (see, for example, Robinson (1962) and Stiglitz (1994)).

This link between financial development and economic growth became under further empirical investigation where more of such investigations have focused mainly on the developed countries with little performed on developing countries. These studies include, among others, Jung (1986), Lynch (1996), Ahmed and Ansari (1998), Darrat (1999), Ghali (1999), Shan et al (2001), Al-Yousif (2002), Chang (2002), Shan and Morris (2002), Calderon and Liu (2003), Ghirmay (2004), Al-Awad and Harb (2005), Atindehou et al (2005), Hondroyiannis et al (2005), Chang and Caudill (2005), and Shan (2005).

## **DATA AND METHODOLOGY**

To investigate the causal link between financial development and economic growth in the case of Jordan, the paper will use annual data for the period 1965-2004 on real gross domestic product (RGDP), and two proxies for financial development: the ratio of broad money (M2) to GDP (M2/GDP) and the ratio of domestic credits to the private sector (DC) to GDP (DC/GDP). Data on real GDP are extracted from Groningen Growth and Development Center (2006) and

data on both (M2/GDP) and (DC/GDP) are extracted from the World Bank, World Development Indicators.

The methodology used in this study follows Toda and Yamamoto (1995) procedure in order to test the Granger causality between economic growth and financial development. As an advantage of this method, Toda and Yamamoto (1995) stated that “Our method is applicable whether the VAR’s may be stationery (around a deterministic trend), integrated of arbitrary order, or cointegrated of an arbitrary order. Consequently, one can test linear or nonlinear restrictions on the coefficients by estimating a levels VAR and applying the Wald criterion, paying little attention to the integration and cointegration properties of the time series data in hand (Toda and Yamamoto (1995), p.227)”. This procedure involves two steps. First, to determine the lag length ( $k$ ) of the VAR model and augment that with the maximum order of integration ( $d_{max}$ ) of the variables used in the model. We used Schwarz criterion (SC) to determine the optimal lag structure ( $k$ ) of the VAR model. We also used the Augmented Dickey-Fuller (ADF) test to determine the order of integration ( $d_{max}$ ) of the variables used in the model. Second, to test for Granger causality by using the Modified Wald (MWALD) test in order to test the coefficients of the first  $k$  coefficients of the VAR ( $k+d_{max}$ ). This test, according to this procedure of causality developed by Toda and Yamamoto (1995), has an asymptotic Chi-square distribution when a VAR ( $k+d_{max}$ ) is estimated (given that  $d_{max}$  is the maximum order of integration that is suspected to occur in the system). Zapata and Rambaldi (1997) argued that the MWALD test requires no priori knowledge of cointegration or no cointegration of the system and it can be applied regardless of the order of integration (i.e.,  $I(0)$ ,  $I(1)$ , or  $I(2)$ ) of the series as long as  $k \geq 1 = d$ .

Here, let  $Y_t$  represents economic growth (measured by real GDP) and  $FD_t$  represents financial development (measured by two proxies:  $X_t$  and  $M_t$  be  $\log(\text{DC}/\text{GDP})$  and  $\log(\text{M2}/\text{GDP})$ , respectively).

Rambaldi and Doran (1996) have explained that the MWALD test used for testing Granger non-causality can be more efficient when using a Seemingly Unrelated Regression (SUR) method. Thus based on Toda and Yamamoto (1995) procedure, the Granger non-causality between economic growth and financial development can be tested using the following VAR system given in equations (1-2):

$$Y_t = \alpha_1 + \sum_{i=1} \alpha_{2i} Y_{t-i} + \sum_{i=1} \alpha_{3i} FD_{t-i} + \varepsilon_{1t} \quad (1)$$

$$FD_t = \beta_1 + \sum_{i=1} \beta_{2i} Y_{t-i} + \sum_{i=1} \beta_{3i} FD_{t-i} + \varepsilon_{2t} \quad (2)$$

For example, when using Toda and Yamamoto (1995) approach to test the Granger non-causality from  $FD$  to  $Y$ , we need to test the  $H_0: \alpha_{3i} = 0$  for all  $i \leq k$  in equation 1 and causality from  $FD$  to  $Y$  can be established through rejecting the null hypothesis stated above. A similar procedure can be used to test the causality from  $Y$  to  $FD$ , i.e., to test  $H_0: \beta_{2i} = 0$  for all  $i \leq k$  in equation 2 and causality from  $Y$  to  $FD$  can be established if  $\beta_{2i} \neq 0$  for all  $i \leq k$ .

## **EMPIRICAL RESULTS**

Following Toda and Yamamoto (1995) method, before testing for the non-causality between economic growth and financial development, we need to establish the lag length ( $k$ ) of the VAR model and the order of integration ( $d_{\max}$ ) of the variables used in the model. We used Schwarz Information Criterion (SC) to establish the lag length ( $k$ ) of the VAR model. According to the SC, the optimal lag length ( $k$ ) for the VAR was established at 1, i.e.  $k=1$ . For the order of

integration (dmax) of the variables used, the ADF test was used. The ADF results given in Table 1 show that all the variables are integrated of order of one (i.e.,  $I(1)$ ).

**Table 1**  
**ADF Unit Root Test**  
(The null hypothesis: Y, X, and M have a unit root)

Country/Period	Variables	Level	First Difference
Jordan (1965-2004)	Y	-2.643 (2)	-2.897* (2)
	X	-1.643 (0)	-7.023*** (0)
	M	-2.507 (0)	-5.252*** (0)

Notes: Y, X, and M as defined above. Optimal lags according to Schwarz Information Criterion (SIC) are given in parenthesis.

\*\*\*, \*\*, and \* indicate significance levels of the 1%, 5%, and 10%, respectively.

Table 2 reports Chi-square statistics and the p-values for the purpose of testing the Granger-no causality. The results show that the null hypothesis of Granger-no-causality from financial development to economic growth cannot be rejected. The results also show that the null hypothesis of Granger-no-causality from economic growth to financial development (defined as  $\log(M2/GDP)$ ) cannot be rejected. However, the null hypothesis of Granger-no-causality from economic growth to financial development (defined as  $\log(DC/GDP)$ ) is rejected lending support to one-way Granger causality from economic growth to financial development.

**Table 2**  
**Granger Causality Test Results Based on Toda-Yamamoto Method**

Ho	Lag Length/Var order	MWald Statistics(d.o.f.)	p-value
$X \nRightarrow Y$	1/2	2.61 (1)	0.1064
$Y \nRightarrow X$	1/2	3.42 (1)	0.0645*
$M \nRightarrow Y$	1/2	0.53 (1)	0.4685
$Y \nRightarrow M$	1/2	0.51 (1)	0.4735



Notes: Y, X, and M as defined above. Optimal lags are determined according to Schwarz Information Criterion (SIC). Degrees of freedom are given in parentheses.  
\*\*\*, \*\*, and \* indicate rejection of the null hypothesis at significance levels of the 1%, 5%, and 10%, respectively.

## **CONCLUSION**

This study empirically examines the causality relationship between financial development and economic growth in Jordan using the Granger-no-causality method developed by Toda and Yamamoto (1995). The empirical results give no support to the hypothesis that financial development causes (in the Granger sense) economic growth. It was economic growth that Granger causes financial development. The results support the demand-following hypothesis for Jordan. This suggests that reforms in the financial sector may not lead to promoting economic growth. The results should, however, be interpreted with cautious due to omission of some variables. It should also be noted that the results may be sensitive to the choice of the measures that are used as proxies for financial development.

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