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The Financial Development and Economic Growth Nexus for Turkey

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Abstract

This study investigates the validity of the demand-pulling and the supply-leading hypotheses using annual data from 1968 to 2005. The bounds testing approach to cointegration is conducted to establish the existence of a long-run relationship between financial development and economic growth. An augmented form of Granger causality analysis is implemented to identify the direction of causality among the variables both in the short-run and the long-run. The empirical findings suggest uni-directional causation from financial development to economic growth.

Keywords: Growth, financial intermediation, causality, cointegration, Turkey

JEL classifications: C22, F40, O52

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1. Introduction

The relationship between the financial development and economic growth has been debated quite extensively in the literature in the recent years. Patrick (1966) made the first attempt at evaluating the relationship between financial and economic development and proposed the two competing hypotheses: the supply-leading and the demand-pulling. The first hypothesis contends that financial deepening causes real economic growth, while the latter argues for a reverse causal ordering from real economic growth to financial development.

The pioneering studies of Goldsmith (1969), McKinnon (1973) and Shaw (1973) emphasized the role played by financial liberalization in increasing savings and, consequently, investment. These studies presumed that the direction of causation runs from financial intermediaries to economic development and not vice versa. The endogenous growth theory also argues that financial intermediaries improve the efficiency of investment; see, for example, Bencivenga and Smith (1991), and King and Levine (1993). On the other hand, Robinson (1952) and Friedman and Schwartz (1963) argued that financial development was induced by economic growth, such that the demand for financial services increased. This argument is essentially based on the ratio of the broad money stock to nominal national income and a positive relationship between the level of financial development and real national income. However, it is nowadays more widely accepted that the development in the financial sector should have a positive impact on the economic growth.

The financial sector can stimulate economic growth through three different channels: (i) it results in an increase in the marginal productivity of capital by collecting information to evaluate alternative projects and by risk sharing; (ii) it raises the proportion of savings channelled to investments by means of financial development and thus increases the efficiency of financial intermediation; and (iii) it increases the private saving rate; for more details, see Aziz and Duenwald (2002).

The validity of the supply-leading and demand-pulling hypotheses has been investigated extensively in the last decade despite data scarcity on national accounts, especially in the case of developing countries. In recent years, there appears to be more time series than cross-section studies in order to implement causality tests on individual country cases. The econometric procedures adopted in the literature range from simple OLS to multivariate cointegration. The results obtained on the nature and direction of causal relationships between financial development and economic growth are mixed and inconclusive as a consequence of using a variety of financial development proxies in the empirical studies. The literature suggests a wide range of choice for the measurement of financial development. They consist of monetary aggregates such as M1, M2, M3; and financial liquid liabilities such as credits, deposits, the size of financial intermediates as a percentage of GDP or GNP; see for details, Arestis and Demetriades (1997) and Shan (2005).

Shan (2005) outlines neatly the findings and methodologies of some of the recent sixteen time series studies. In addition to the listed studies in Shan (2005), one may acknowledge the following contributions to the literature: Ghali (1999) for Tunisia; Shan and Morris (2002) for twenty countries; Liang and Teng (2006) for China; Bhattacharya and Sivasubramanian (2003) for India; Dawson (2003) for thirteen central and east European countries; Fase and Abma (2003) for nine Asian countries; Thangavelu and Ang (2004) for Australia; Atindehou, *et al*. (2005) for sixteen West African countries; Chang and Caudill (2005) for Taiwan; Liu and Hsu (2006) for Taiwan, Korea, and Japan; Ang and McKibbin (2007) for Malaysia; and Abu-Bader, and Abu-Qarn (2007) for Egypt.

As for the empirical evidence on the financial development and growth nexus in the case of Turkey, the results obtained from three previous studies seem to be inconclusive, mainly due to employing different financial development proxies. Demetriades and Hussein (1996) employed the ratio of bank deposit liabilities to nominal GDP and the ratio of bank claims on the private sector to nominal GDP as financial development indicators and their results indicate the direction of causality from economic growth to financial development. Darrat (1999) used the currency ratio, currency to M1 and the ratio of M2 to GNP as the financial development proxies and concluded that financial development has a positive impact on the economic growth. On using real GDP, real government spending, and real M1, Al-Awad and Harb (2005) reports that causation runs unilaterally from economic growth to financial development

The motivation of this study is two fold: the financial development and economic growth nexus have not been investigated for Turkey on its own, and the cointegration procedure of Pesaran *et al*. (2001) has not been implemented previously in the financial development and economic growth nexus.

The objectives of this study are as follows: i) to investigate the supply-leading and demand-pulling hypotheses using recent advances in time-series econometrics; and ii) to establish the direction of causal relationships between financial development and economic growth both in the short-run and long-run.

The remainder of this paper is organized as follows. Section 2 sets out the model and explains the bounds testing approach to cointegration. Section 3 presents and discusses the empirical results, and finally Section 4 concludes.

2. The model and econometric methodology

All the existing empirical studies on financial development and economic growth estimate essentially the following function:

Economic growth = *f*(financial development) (1)

Function (1) may be extended occasionally into multivariate analysis but the under pinning of the function remains the same. In search of finding measures of financial development in Turkey for function (1), this paper employs two competing alternatives of financial deepening to that end. The first proxy is the ratio of broad money stock to nominal national income, which is a standard measure of financial development. The second proxy selected is the ratio of bank deposit liabilities to nominal national income, which is a more direct measure of financial intermediation. Thus, an increase in the ratios may indicate a situation of a more financial deepening. Following standard practice, one can identify the real income per capita to be the most plausible variable for economic growth.

The cointegration methodology of this work is adopted on the basis of the following considerations. Mah (2000) discussed that the cointegration methods of Engle and Granger (1987), Johansen (1988), and Johansen and Juselius (1990) are not reliable for studies that have small samples. Kremers *et al*. (1992) provides empirical evidence that, in the case of a small sample, no cointegration can be established amongst the variables that they are integrated of order one, $I(1)$. Hakkio and Rush (1991) proves that increasing the number of observations by using monthly or quarterly data will not improve the robustness of the results in cointegration analysis, unless the length of the period under consideration is extended to an appropriate level. Therefore, the bounds testing approach to cointegration, developed by Pesaran *et al.* (2001), is considered to be the most appropriate procedure for the aims of this study. This approach has some econometric advantages over the other main alternatives. They are as follows: i) endogeneity problems and inability to test hypotheses on the estimated coefficients in the long-run associated with the Engle-Granger cointegration method are avoided; ii) the long and short-run parameters of the model in question are estimated simultaneously; ii) the ARDL approach to testing for the existence of a long-run relationship between the variables in levels is applicable irrespective of whether underlying regressors are purely I(0), purely I(1), or fractionally integrated; iv) the small sample properties of the bounds testing approach are far superior to that of the Johansen and Juselius's cointegration approach. The bounds testing approach of Pesaran *et al.* (2001), also known as autoregressive distributed lag (ARDL) to cointegration, is conducted to test the existence of a long-run relationship between the variables. This approach is based on the estimation of a dynamic error-correction representation for the variables involved by testing whether or not the lagged levels of the variables are statistically significant. The Pesaran *et al.* procedure involves investigating the existence of a long-run relationship in the form of the unrestricted error-correction model (UECM) for the each variable concerning the respective models as follows:

$$\Delta y_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta y_{t-i} + \sum_{i=0}^{n} b_{1i}\Delta x_{t-i} + d_1 y_{t-1} + d_2 x_{t-1} + v_{1t} \tag{2}$$

$$\Delta x_t = b_0 + \sum_{i=1}^{n} c_{1i}\Delta x_{t-i} + \sum_{i=0}^{n} e_{1i}\Delta y_{t-i} + d_3 x_{t-1} + d_4 y_{t-1} + v_{2t} \tag{3}$$

$$\Delta y_t = f_0 + \sum_{i=1}^{n} g_{1i}\Delta y_{t-i} + \sum_{i=0}^{n} h_{1i}\Delta z_{t-i} + d_4 y_{t-1} + d_5 z_{t-1} + v_{3t} \tag{4}$$

$$\Delta z_t = k_0 + \sum_{i=1}^{n} l_{1i}\Delta z_{t-i} + \sum_{i=0}^{n} m_{1i}\Delta y_{t-i} + d_6 z_{t-1} + d_7 y_{t-1} + v_{4t} \tag{5}$$

where y is the logarithm of per capita real income, x is the logarithm of ratio of broad money to national income, z is the logarithm of ratio of total bank deposits to national income, and Δ is the first difference operator. Equations (2) and (3) demonstrate representation of the first bivariate UECM, whilst equations (4) and (5) stand for the second UECM.

The F-tests are used to test the existence of long-run relationships. The F test used for this procedure, however, has a non-standard distribution. Thus, the Pesaran *et al*. approach computes two sets of critical values for a given significance level. One set assumes that all variables are $I(0)$ and the other set assumes they are all $I(1)$. If the computed F-statistic exceeds the upper critical bounds value, then the H_0 (null hypothesis) is rejected. If the F-statistic falls into the bounds then the test becomes inconclusive. Lastly, if the F-statistic is below the lower critical bounds value, it implies no cointegration. When a long-run relationship exists, the F-test indicates which variable should be normalized. The null hypothesis of equation (2) is (H_0: $d_1 = d_2 = 0$). This is denoted as $F_y(y|x)$. In equation (3), the null hypothesis is (H_0: $d_3 = d_4 = 0$). This is represented by $F_x(x|y)$. In equation (4), the null hypothesis is (H_0: $d_5 = d_6 = 0$). This is demonstrated by $F_y(y|z)$. Finally, the null hypothesis of equation (5) is given by (H_0: $d_7 = d_8 = 0$) with the following function, $F_z(z|y)$.

Causality tests analyses the causal effect amongst a set of variables by testing for their predictability based on past and present values. This study uses the standard Granger type test augmented with a lagged error-correction term, providing that the variables in concern are cointegrated. The Granger representation theorem suggests that there will be Granger causality in at least one direction if there exists a cointegration relationship among the variables in equations (2)-(5), so long as they are integrated order of one. Engle-Granger (1987) cautions that the Granger causality test, which is conducted in the first-differences of variables through a vector autoregression (VAR), will be misleading in the presence of cointegration. Therefore, an inclusion of an additional variable to the VAR system, such as the error-correction term, would help us to capture the long-run relationship. To this end, an augmented form of Granger causality test involving the error-correction term is formulated in a bivariate pth order vector error-correction model (VECM), in the case of two different development proxies, as follows:

$$\begin{bmatrix} \Delta y_t \\ \Delta x_t \end{bmatrix} = \begin{bmatrix} \varphi_1 \\ \varphi_2 \end{bmatrix} + \sum_{i=1}^{p} \begin{bmatrix} \gamma_{11i} \gamma_{12i} \\ \gamma_{21i} \gamma_{22i} \end{bmatrix} \begin{bmatrix} \Delta y_{t-i} \\ \Delta x_{t-i} \end{bmatrix} + \begin{bmatrix} \lambda_1 \\ \lambda_2 \end{bmatrix} \left[EC_{yxt-1} \right] + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \tag{6}$$

$$\begin{bmatrix} \Delta y_t \\ \Delta z_t \end{bmatrix} = \begin{bmatrix} \phi_1 \\ \phi_2 \end{bmatrix} + \sum_{i=1}^{p} \begin{bmatrix} \theta_{11i} \theta_{12i} \\ \theta_{21i} \theta_{22i} \end{bmatrix} \begin{bmatrix} \Delta y_{t-i} \\ \Delta z_{t-i} \end{bmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \end{bmatrix} \left[EC_{yzt-1} \right] + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \tag{7}$$

EC_{t-1} is the error correction term, which is derived from the long-run relationship, and it is not included in equations (6) and (7) if one finds no cointegration amongst the variables in question. The Granger causality test may be applied to equations (6) and (7) as follows: i) by checking statistical significance of the lagged differences of the variables for each vector; this is a measure of short-run causality; and ii) by examining statistical significance of the error-correction term for the vector that there exists a long-run relationship.

3. The empirical results

Annual data over 1968-2005 period were used to estimate equations (2)-(7). Data definition and sources of data are cited in the Appendix. While the ARDL bounds testing approach to cointegration allows regressors to be either $I(0)$ or $I(1)$, it is still necessary to ensure that the dependent variable is $I(1)$ and that none of the regressors is $I(2)$ or higher. To this end, the traditional unit root tests, such as the augmented Dickey and Fuller (1979) and the Phillips and Peron (1988), were employed. The results of the unit root tests are not reported here due to space considerations; however, the variables in question are integrated of order one and visual inspections show no structural breaks in the time series.

Equations (2)-(4) were estimated in two stages. In the first stage of the ARDL procedure, the order of lags on the first–differenced variables for equations was obtained from unrestricted VAR by means of Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC), which indicated the optimal lag level as one and two, respectively. The results of this stage are not reported here for brevity. Then, an F deletion test was applied to equations (2)-(5) in order to test the existence of a long-run relationship, by using lags from one to two, following Bahmani-Oskooee and Goswami (2003), as they have shown that the results of this stage are sensitive to the order of VAR. The summary results of bounds tests are presented in Table 1. As can be seen from Panel A and B of Table 1, it is clear that there is a long-run relationship amongst the variables when y is the dependent variable because its F-statistic exceeds the upper bound critical value at the 5% and 10% levels. The null hypothesis of equations (3) and (5), however, cannot be rejected.

Table 1. The Results of F-test for Cointegration

Calculated F-statistic for different lag lengths					
Panel A			Panel B		
Relationship	1 lag	2 lags	Relationship	1 lag	2 lags
$F_y(y\|x)$	14.69	13.42	$F_y(y\|z)$	17.44	14.87
$F_x(x\|y)$	0.63	0.57	$F_z(z\|y)$	0.60	2.02

The critical value ranges of F-statistics with two explanatory variables are 4.94 - 5.73 and 4.04 – 4.78 at 5% and 10% level of significances, respectively. See Pesaran *et al.* 2001, pp.300-301, Table CI, Case III.

The short-run causal effects are tested by means of the F-statistics on the explanatory variables in equations (2)-(5). Panel A and B of Table 2 display the results of short-run and long-run Granger causality tests within the VECM frame work. Given the results of the bounds test in Table 1, the only long-run Granger causality test with an error-correction term was conducted to equations (2) and (4) in which the dependent variable is the real per capita income.

Table 2. Results of Granger Causality

Panel A			
	F statistics (probability)		
Dependent Variable	Δy_t	Δx_t	EC_{yxt-1} (t-statistics)
Δy_t	-	0.52 (0.59)	-0.13** (1.95)
Δx_t	0.34 (0.70)	-	-
Panel B			
	Δy_t	Δz_t	EC_{yzt-1} (t-statistics)
Δy_t		-18 (0.83)	-0.14* (2.07)
Δz_t	0.66 (0.52)	-	

* and ** denote significance at 5% and 10 % respectively, the lag length selected on the basis of SBC criterion.

Regarding the long-run results, one can ascertain that the coefficient on the lagged error-correction term is significant with the expected sign in the economic growth equations at 10% and 5% respectively, which also reaffirm the result of the bounds test for cointegration. Therefore, the direction of causality runs interactively through the error-correction term from financial development to real growth in the long-run. This situation does not alter in the case of two different financial development proxies although the second financial development proxy slightly performs better in terms of statistical significance. However, there exists no causality among variables in the short-run; in other words, the variables are neutral to each other. The implications of these results for policy making are quite clear in a sense that the Turkish government should intensify her efforts to deregulate the financial sector further. The earliest financial liberalization attempts in the 1980s improved significantly the efficiency of financial intermediaries but the severe financial crises in 1994, 1999 and 2001 ending with a number of banks being declared bankrupt, led to strict regulations for the banks and other financial intermediaries in terms of deposit reserve requirements, capital adequacy, licensing and corporate governance; see for details in Ertugrul and Selcuk (2001) and Akyurek (2006). The other aspects of linkages between the financial intermediaries and real economic growth in Turkey are accounted from different perspectives in Yeldan (1997), Esen (2000), and Us (2004).

4. Concluding remarks

The objective of this article was to analyse the demand-pulling and the supply-leading hypotheses in the case of Turkey. To establish the direction of causality among financial development and economic growth, the bounds testing approach to cointegration was employed. This methodology has not been previously used to investigate the financial development and economic growth nexus. The findings of this study are in line with that of Darrat (1999) but more robust in regards to the econometric methodology and more comprehensive as two alternative financial proxies, the ratio of broad money to GNP and the ratio of bank deposit liabilities to GNP, were utilized.

Empirical evidence from the bounds testing approach to cointegration suggested that there existed only one long-run relationship between the alternative financial development proxies and economic growth. Augmented Granger causality tests revealed that changes in the financial sector, through the error-correction term, resulted in changes in real economic growth in the long-run, implying the policies designed for further financial deregulation and promotion of the financial sector are likely to improve economic growth.

Appendix

Data definition and sources

The data set used in this study cover the period 1968 to 2005. All data come from International Financial Statistics (IMF), Central Bank of Turkish Republic (CBTR) Annual Statistical Reports, and State Institute of Statistics (SIS).

y is the per capita real income in 2000 prices. Sources: IMF and SIS.

x is the ratio of broad money (M2) to nominal GNP. Sources: IMF and CBRT

z is the ratio of bank deposit liabilities to nominal GNP. Sources: IMF and CBRT.

All variables are transformed into their natural logarithms.

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