Financial Development and Economic Growth in Turkey: An ARDL Bounds Testing Approach

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Abstract

This research paper aims to investigate the impact of financial development on economic growth in Turkey over the period 1970-2006. Using the ARDL bounds testing approach to cointegration, the results suggest that financial development plays an important role in enhancing economic growth in Turkey. The estimated equation remains stable over the period of study as indicated by stability tests. The results of the Granger causality tests indicate that the Turkish case supports the supply-leading phenomenon in the long run, whereas both the supply-leading and the demand-following phenomena in the short run.

Keywords: Financial development, Economic growth, Turkey, Granger causality
JEL Classification Codes: O11, O16, O52, F36

Özet

Bu araştırmanın amacı finansal gelişmenin 1979-2006 yılları arasındaki dönem boyunca Türkiye'nin ekonomik büyümesi üzerindeki etkisini araştırmaktır. Eşbütünleşmeye ARDL testi modeli kullanılarak elde edilen sonuçlar finansal gelişmenin Türkiye'nin ekonomik büyümesini güçlendirmede önemli rol oynadığını göstermektedir. Kararlılık testleri tahmini dengenin dönem boyunca istikrarını koruduğuna işaret etmektedir. Graanger nedensellik testleri de Türkiye'deki durumun uzun dönem için arz-öncüllü olduğu olgusunu desteklemekte iken kısa dönem için hem arz-öncüllü hem de talep-takipli olduğuna işaret etmiştir.

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Anahtar Kelimeler: Finansal Gelişme, Ekonomik büyüme, Türkiye, Granger nedenselliği

1. Introduction

The importance of financial development for economic growth can be traced back as Bagehot (1873), Schumpeter (1911), Patrick (1966) and Hicks (1969). Patrick (1966) suggests that financial development causes economic growth by channeling economic resources into more productive sectors. He further argues that there exist two possible relationships between financial development and economic growth. First, as the economy grows, it generates demand for financial services, which is called a demand-following phenomenon. According to this view, the lack of financial institutions in developing countries is an indication of lack of demand for their services. Second, the establishment and the widespread expansion of financial institutions in an economy may actively promote development, which is called supply-leading phenomenon. This latter view, which has been dubbed the financial-led growth hypothesis, has been popular among governments in several developing countries as a mean to promoting development (Habibullah and Eng, 2006). Aziz and Duenwald (2002) argue that financial development can affect growth through three main channels: (1) it can increase the marginal productivity of capital by collecting information to evaluate alternative investment projects and by risk sharing; (2) it can raise the proportion of savings channeled to investment via financial development by reducing the resources absorbed by financial intermediaries and thus increasing the efficiency of financial intermediation; and (3) it can raise the private saving rate.

An extensive amount of empirical investigations have been conducted, aimed at testing the theoretical developments using different techniques. The results of these studies provide evidence of strong connection between the exogenous component of financial development and economic growth. This is more or less consistent with the classical view on the relation between growth and financial development. Gurley and Shaw (1955) were the first to study the relationship between financial markets and real activity. Much of the literature on the relationship between financial markets and real output suffered the lack of evidence until the 1970s when studies by Goldsmith (1969), Shaw (1973) and McKinnon (1973) found that development of financial markets was significantly

correlated with the level of per capita income. Some of the recent studies find evidence of positive impact of financial development on economic growth [e.g. Bencivenga and Smith (1991); De Gregorio and Guidotti (1995); Greenwood and Jovanovic (1990); King and Levine (1993); Levine (2004); Levine (1997); Demetriades and Hussein (1996); Rousseau and Wachtel (1998); Rousseau and Vuthipadadorn (2005); Unalmis (2002); Acaravci et al. (2007)].

The motivation of this study is twofold: the recent financial market reforms in Turkey provide a good rationale to revisit the relationship between financial development and economic growth; and the ARDL bounds testing procedure to cointegration (see Pesaran et al., 2001) has not been used previously in studying the relationship between financial development and economic growth in Turkey. The present paper differs from the existing studies in two different ways. Firstly, the results from the ARDL bounds testing approach are considered to be more robust than those of multivariate cointegration in the case of small samples. Secondly, this study attempts for the first time to test the stability of the estimated regression equations in contrary to the previous studies for Turkey. Following the introduction, we discuss the ARDL approach to cointegration and present some results, finishing with the conclusions.

2. Empirical Results

An ARDL representation of the equation is formulated as follows

$$\Delta \ln GDP_t = \alpha_0 + \sum_{i=1}^{m} \alpha_{1i} \Delta \ln GDP_{t-i} + \sum_{i=0}^{m} \alpha_{2i} \Delta \ln DC_{t-i} + \alpha_3 \ln GDP_{t-1} + \alpha_4 \ln DC_{t-1} + v_t$$

(1)

where GDP is real GDP and DC is domestic credit stock provided by the banking sector as a ratio of GDP and is used as a proxy for the financial market development (all variables in logarithms). The data series was obtained from TURKSTAT, Statistical Indicators, 1923-2006. Eq. (1) was estimated in two stages. Firstly, the order of lags on the first-differenced variables for Eq. (1) was obtained from unrestricted VAR by means of Schwarz Bayesian Criterion (SBC), whilst ensuring there was no evidence of serial correlation, as emphasized by Pesaran et al. (2001). Secondly, the bound F-test was applied to Eq. (1) in order to establish a long-run

relationship between the variables. As we use annual data, all tests include a minimum of two lags and maximum of four to ensure lagged explanatory variables are present in the ECM.

The results are contained in Table 1. The F-tests indicate that there exists only one cointegrating relationship without a time trend in which the dependent variable is real GDP. Evidence of cointegration relationship between variables also rules out the possibility of estimated relationship being spurious.

Table 1: F-statistics for cointegration relationship

k	90% level		95% level		99% level	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
1	4.04	4.78	4.94	5.73	6.84	7.84
Calculated F-statistics						
$F_{GDP}(GDP|DC) = 5.7912$						
$F_{DC}(DC|GDP) = 1.7481$						

Note: Critical values are obtained from Pesaran *et al*. (2001).

In the next step the ARDL cointegration procedure was implemented to estimate the parameters of Eq. (1) with maximum order of lag set to 2 to minimize the loss of degrees of freedom. This stage involves estimating the long-run and short-run coefficients of Eq. (1). The long-run results of Eq. (1) based on SBC are reported Table 2. The results indicate that the estimates possess expected signs and plausible magnitudes, and are statistically significant at the 5 percent level of significance. The overall results are in accordance with the prediction that banking sector development and financial policies have a positive impact on real GDP. These results also imply that financial liberalization policies enhance economic growth rather than growth inducing liberalization. The results indicate that domestic credit moves first when a common stochastic shock hits the system. Then, real GDP follows the changes in domestic credit. This implies that development of the banking sector in Turkey allows market forces to channel resources towards relatively productive sectors and hence leads to a rise in efficiency. It also leads to proliferation of financial assets and generates economies of scale.

Table 2: Estimated long-run coefficients using the ARDL approach: ARDL (1, 0) selected based on the Schwarz Bayesian Criterion, 1970–2006

Dependent variale: $\ln GDP_t$			
Regressor	Coefficient	Standard error	*t*-ratio
$\ln DC_t$	0.1587	0.0621	2.5541**
Intercept	16.8610	0.0013	30.9570***

*** refers statistical significance at 1% level and, ** refers statistical significance at 5% level.

Table 3: Error correction representation for the selected ARDL Model

Dependent variable: $\Delta \ln GDP_t$			
Regressor	Coefficient	Standard error	*t*-ratio
$\Delta \ln DC_t$	0.0883	0.0380	2.3215**
$\Delta Intercept$	9.3807	2.4860	3.7734***
ECM_{t-1}	-0.5563	0.1467	-3.9626***
Diagnostic tests			
RESET	$\chi^2(1)$ = 1.5984	R^{-2}	0.7916
LM	$\chi^2(1)$ = 0.4165	*S.E. of Regression*	0.0370
Normality	$\chi^2(2)$ = 1.1342	*DW-statistics*	1.8496
Heteroscedasticity	$\chi^2(1)$ = 0.7118	RSS	0.0426

*** refers statistical significance at 1% level and, ** refers statistical significance at 5% level. The critical values for $\chi^2 (1)$ = 3.84 and $\chi^2 (2)$ = 5.99 at 5% significance level.

In search of finding the short-run dynamics of the above models, their error-correction representations were estimated as auxiliary models. The error-correction term is statistically significant with plausible magnitude (Table 3). The reported diagnostic test results appear to be statistically significant and do not suffer from any statistical problem. The feedback coefficient is − 0.55 with the expected sign, suggesting 55 percent of the disequilibria of the previous period's shock adjust back to the long run equilibrium in the current year. Thus, the speed of adjustment is considerably fast in the case of any stochastic shock to the real GDP.

The existence of a cointegrating relationship among GDP and domestic credit suggests that there must be Granger causality in at least one direction, but it does not indicate the direction of temporal causality between the variables. The short-run causal effects can be obtained by the F-test of the lagged explanatory variables, while the t-statistics on the coefficient of the lagged error-correction term indicates the significance of the long-run causal effect. Beginning with the short-run effects, domestic credit is significant at the 1% level in the real output equation (Table 4). This implies that domestic credit Granger-causes real GDP in the short run. In the domestic credit equation, real GDP appears to be statistically significant, implying real GDP Granger-causes domestic credit in the short run.

Turning to the long-run results, the coefficient on the lagged error correction term is significant with the correct sign in the real GDP equation, which confirms the results from the bounds test for cointegration. The lagged error correction term is negative and significant that implies the series is non-explosive and long-run equilibrium is attainable. Thus, in the long run domestic credit Granger-causes real GDP, meaning that causality runs interactively through the error correction term from domestic credit to real GDP.

Table 4: Results of Granger Causality F-tests

Dependent Variable	$\Delta \ln GDP_t$	$\Delta \ln DC_t$	ECM_{t-1} (*t-statistics*)
$\Delta \ln GDP_t$	_	9.3664 (0.05)***	-0.3162 [7.8882]***
$\Delta \ln DC_t$	5.0385 (0.13)**	_	_

*** refers statistical significance at 1% level and, ** refers statistical significance at 5% level. The probability values are in brackets. *t*-ratio of ECM_{t-1} is in square bracket.

Pesaran *et al*. (1997) suggest applying the cumulative sum of recursive residuals (CUSUM) and the CUSUM of square (CUSUMSQ) tests proposed by Brown *et al.* (1975) to assess the parameter constancy. The models were estimated by OLS and the residuals subjected to the CUSUMSQ test. Figure 1 and Figure 2 plot the CUSUMS and CUSUMSQ statistics when real GDP is the dependent variable. The results indicate no instability in the coefficients as the plots of the CUSUM and

CUSUMSQ statistics are confined within the 5% critical bounds of pa-
rameter stability.

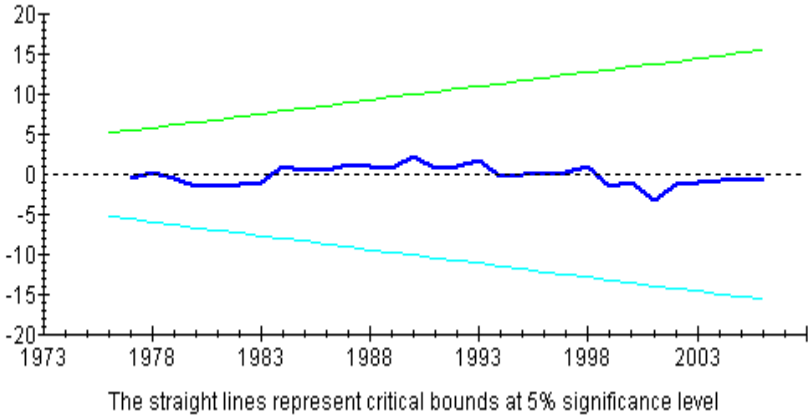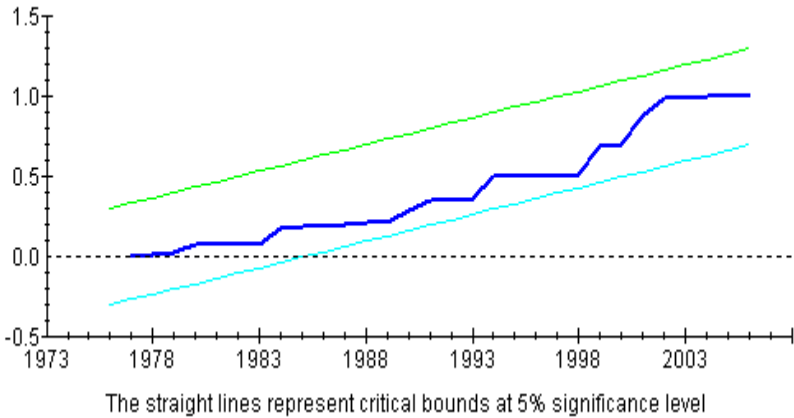Figure 1. Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

Figure 2. Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

3. Conclusion

In closing, we found that there is one cointegration relationship be-
tween the variables when real GDP is dependent variable. Second, to
cover for the robustness of our findings, we find that domestic credit had
a positive and statistically significant impact on Turkey's GDP. Third, we

investigated the direction of causation among the variables using the Granger causality testing procedure and found bi-directional causality running from domestic credit to GDP in the short run and a uni-directional causality running from GDP to domestic credit in the long run. Our findings lead to the following policy implication. In the long run economic growth positively Granger-causes financial development, suggesting that financial development is a long-run process which is stimulated by economic prosperity. The short-run causality results suggest that the domestic credit provided by banking sector and healthy banking sector has been assumed to contribute to the growth of the Turkish economy. Finally, the findings of the causality tests indicate that, as suggested by Patrick (1966), Turkish case supports the supply-leading phenomenon in the long run, and both the supply-leading and the demand-following phenomena in the short run.

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