Does Financial Development Increase Private Savings? The Case of Turkey

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Abstract

The paper aims to analyze the nature of causality between financial development and private savings for the period of 1970 -2008. A composite index of three alternative financial development measure is constructed. We use bounds tests of Pesaran et al. (2001) due to mixed integration orders of the variables and small sample size. Long-run levels relationships are estimated using autoregressive distributed lag (ARDL) method. We check the robustness of the results using the estimates from fully modified ordinary least squares (FM-OLS) and dynamic ordinary least square (DOLS). Both short-run and long run-causality tests are performed for the pairs of variables conditioning on the control variables. We found that private savings have been positively and significantly affected not only by the composite index of financial development that we constructed but also by each one of the respective three components of this index. As theoretically expected the estimated effect of the ratio of private sector credit to GDP is negative but it is highly insignificant suggesting that financial development might not have relax the liquidity constraint in any significant manner in Turkey.

I. Introduction

The real effects of financial sector development have continued to be the focus of empirical and theoretical research for over a decade. In particular, the effects of financial liberalization policies and financial sector development in general on key macroeconomic variables such as income growth, private and national rates of saving and investment, growth of efficiency in resource allocation and total factor productivity have been extensively analyzed for a variety of countries and time periods using different econometric methodologies. One fundamental insight that has emerged from the mixed and contradictory findings of this literature is that the nature of the effects could vary from one country to another depending on a variety of factors.

The severity of the effects of recent global crises has reconfirmed the lessons learned by the earlier Mexican Peso Crises in 1995, East Asian Crises in 1997, and Turkish Crises in 2001; The liberalization policies in general and financial liberalization in particular may not automatically ensure financial and real stability and generate sustainable economic growth. In other words, the critical role that Mc Kinnon (1973) and Shaw (1973) has envisioned for a market based, competitive financial system in terms of both mobilization of savings and their pareto-optimal (welfare maximizing) allocation among alternative uses (projects) may not be easily attained simply by the precence of a competitive financial sector. The real social costs resulting from the problems of moral hazard and adverse selection and increased frequency of crises, particularly caused by reversals in capital flows, have been unexpectedly high in some of the countries in post liberalization era.

The purpose of this paper is limited to the investigation of the real effects of financial development on a single macroeconomic variable, namely, the private savings. Given the conflicting nature of the results of past research for different countries, we focus on investigating the financial development and private savings nexus for one country only, Turkey, whose financial sector development has accelerated particularly after 1980 with the onset of an ambiguous macroeconomic stabilization package that was largely imposed by the IMF as part of its conditionality program. We believe that continuation of structural imbalances of Turkey particularly in terms of dependence on foreign savings to finance high current account deficits resulting both from relatively low level of private savings and relatively high levels of public deficits renders this issue critical in terms of policy making for sustainable economic growth.

The organization of the rest of the paper is as follows: In section II we present the theory linking the financial development and private savings. Section III summarizes previous studies. In section IV we give a brief account of financial liberalization and financial sector development in Turkey. In section V, we explain the estimation methodology. Empirical results are presented and discussed in section VI and the last section concludes the paper with fundamental policy implications.

II. The Theory

Financial development mainly refers to the increase in the quality and the quantity of financial services with lower transaction costs. Levine (1997) defines financial development focusing on its functions and states that it leads to better mobilization of savings in the form of accumulated liquid assets, acquiring information about investments and allocation of resources, exercising corporate control by monitoring the managers, facilitation of risk management, and facilitation of trade and contracts. The development of these services by the financial sector is channelled into growth through capital accumulation and technological innovation. Furthermore, Rajan and Zingales (2003) defines financial development as the availability of the finance to any entrepreneur for sound projects in which an adequate return is anticipated and the risk of these projects are shared by the financial market with low costs.

Financial development is likely to affect the volume of private savings through different channels over time. In order to be able to identify (at least) the most important ones of these channels, it is critical to identify first the most likely variables or factors that are theoretically expected to affect the volume of private savings. The most important ones of these factors that have been suggested in the literature are discussed below (Hondroyiannis, 2006; Kuijs, 2006) .

Theoretically, life-cycle model predicts a positive effect on the ratio of private saving to income in response to an increase in growth of per capita income which has been supported empirically by numerous studies (Modigliani, 1966, 1970; Rodrik, 2000; Carroll et al. 2000; Loazya et. al 2000). However, Bandiera et.al.(2000) argued that the level of per capita income is also likely to affect private saving rate positively due to a variety of factors such as minimum subsistence consumption, precautionary considerations and liquidity constraints. The role played by the last two of these factors has been analyzed in detail by Deaton (1992). The well known prediction of economic theory regarding the ambiguous effect of an increase in real interest rate on private saving rate is due to the opposing effects of its substitution and income effects on saving-consumption decisions of households. The impact of higher inflation on the volume of private savings is also theoretically ambiguous. On the one hand higher inflation can induce households to raise their precautionary savings through its adverse effects on macroeconomic uncertainty and at the same time it can affect private savings adversely if the agents' expectations about future inflation rate are affected positively leading them to increase the rate of present consumption. Higher inflation will affect private savings also through the real interest rate channel (to the extent that it reduces the real interest rate) which has an ambiguous effects on private savings as we noted earlier.

The share of industrial sector in GDP may exert positive effect on the volume of private savings through a mechanism that has not received much attention in the literature. The rate of technological progress and therefore total factor productivity growth has been historically higher in manufacturing relative to services which typically produce non-traded products. This, in turn, implies that changes in sectoral composition of GDP and employment in favor of industrial sector could increase the growth rate of national income through its positive effects on total factor productivity growth. Higher income growth, as noted earlier, is expected to increase the private saving rate through the mechanism predicted by the life-cycle model.

A significant variable having impact on private saving is the public sector (dis)saving. The theoretical expectation regarding the effects of public (dis)saving on private saving has been largely based on Ricardian Equivalence Hypothesis which predicts a negative effect. This is based on the hypothesis that rationally forward looking households will respond to additional government deficits financed by borrowing from the public by increasing their savings by an equivalent amount leaving the level of domestic savings unaltered. However this hypothesis rules out the possibility of positive growth effects of higher public saving that may operate through a reverse "crowding out" (crowding in) mechanism which allows higher rate of private investment and therefore faster rate of capital accumulation.

There are several possible mechanism through which the financial development, which is usually highly correlated to financial liberalization as Schmidt-Hebbel and Servén (2002) pointed out, can affect private savings. Financial liberalization have had two major dimensions; one involving "internal financial liberalization" and the other one relating to "external financial liberalization". Liberalizing financial sector internally usually meant lifting restrictions on interest rates (both for deposit and lending), reduction in reserve requirements, the provision of market based system of credit allocation through the easing of entry restrictions for new banks (including foreign banks), encouraging competition among banks and other financial intermediaries, privatization of state banks and allowing banks to offer new financial instruments (including foreign currency denominated assets and liabilities), development of more efficient capital market through the development of bond and equity markets, and the reduction in the size of directed and subsidized credit programs of the government. External financial liberalization usually meant removal of the restrictions on current account and capital account transactions which is usually termed as capital account liberalization.

The channels through which both internal and external financial liberalization, and the ensuing financial sector development could affect private savings are diverse which, potentially, could have opposing effects over time. According to Mc Kinnon (1973) and Shaw (1973), a switch to a competitive market-based financial system will lead to an increase in the volume of private savings particularly due to the increase in real interest rates that result from competition of banks to attract deposits. However this hypothesis is based on the assumption that substitution effect dominates the income effect of a given increase in real interest rate in post liberalization era. One of the most compelling arguments for a possible negative effect of financial sector development on private savings is based on the idea that financial sector development is likely to lower the degree of liquidity constraints (also known as borrowing or financing constraints) faced by the households and firms.

In other words, the emergence of a more competitive financial system and fewer restrictions on credit allocation by banks and other financial intermediaries implies a reduction in the percentage of households and firms facing constraints in borrowing against future income. Households who are unable to borrow freely in the financially repressed regime prevailing before liberalization are practically forced to consume less and save more than their intertemporally optimizing levels that would maximize their life-time utility (Mavrotas 2005). Even though this is what one intuitively expect to observe as financial sector develops, it is critical to allow for the opposite scenario as well: The process of financial liberalization under certain conditions may worsen the degree of liquidity constraints both for households and firms. If the increase in real interest rates (especially in terms of lending rates) in post liberalization era happen to exceed some critical threshold levels, relatively higher percentage of households and firms could effectively be constrained from borrowing. In addition to this, if the macroeconomic instability worsens following financial liberalization due to the possible increase in the frequency and severity of both financial and real crises, this could provide another channel through which a competitive financial sector can change its credit policies in ways that, effectively, means worsening of liquidity constraints. In response to worsening of macroeconomic stability, banks and other financial intermediaries can consider the credit demand of an average household or a firm less positively than before due to the increase in the perceived risks based on the increases in the respective volatilities of household incomes and cash flows of firms. This, in turn, can effectively raise the percentage of households and firms that are liquidity constrained above the levels prevailing in pre-liberalization era. Under these conditions, private saving rate can increase in post liberalization period.

Two of the other channels through which financial development can affect private savings are the changes in income and inflation rate that it may cause through alternative mechanisms over time. Credit extension to private sector, as financial sector develops, can boost income growth both through its short-run expansionary demand-side effects and also through its positive supply-side effects that can come about as a result of increased rate of domestic investment and improved efficiency in resource allocation.

Another mechanism through which financial liberalization could affect real variables including private savings is its possible influence on inflationary dynamics. Particularly capital account liberalization can affect inflationary process through the capital inflows if the monetary effects of these capital flows are not totally sterilized by the central bank. Following external financial liberalization if the increased rate of capital inflows leads to domestic monetary expansion, the inflation rate may increase which, in turn, can affect real variables including the volume of private savings.

All the points raised above suggest that financial development can affect the volume of private savings both in the short-run and long-run through a variety of channels rendering the net effect of financial development on the volume of private savings theoretically ambiguous. And the implication of this insight is that this issue is ultimately an empirical matter for each country.

III. Empirical Evidence

The relationship between financial sector development and savings has been analyzed extensively in the literature with mix results. It is important to underline the fact that the relationship between financial development and private savings can be studied (at least most of the time) in an indirect manner by investigating the relationship between financial development indicators and consumption behavior of households. In this context some of the empirical work that have reported a positive effect of financial liberalization on current consumption growth include (King, 1986), (Ludvigson, 1996), (de Brouwer, 1996) and (Bachetta and Gerlach, 1997). The common finding of all of these studies is that the relaxation of liquidity constraint following financial liberalization has exerted a positive impact on consumption growth. However, it is hard to draw from this finding the conclusion that financial development leads to lower volume of private savings or a lower ratio of private savings to disposable income simply because of the possibility that observed increase in consumption growth could be largely due to positive affects of financial development on income growth. And this, in turn, can lead to growth of savings as well or even an increase in the share of private savings in disposable income. In this respect, some studies that analyzed the direct effect of financial development on private savings and found a negative impact include de Melo and Tybout (1986), Muellbaver and Murphy (1993), Japelli and Pagano (1994), Ostry and Levy (1995), Loazya et.al (2000), and Hondroyiannis (2005).

One of the studies that has reported mixed findings regarding the effect of financial liberalization on private savings is Bandiera et.al (2000). Their results have produced evidence of a positive and significant long-run effects on private savings in Turkey and Ghana whereas for Korea and Mexico evidence has pointed out a negative effect. Furthermore their empirical work has provided evidence that in some countries financial development may be weakly correlated with borrowing constraint and therefore it may have insignificant effects on private savings through that channel. It is worth to note their empirical results regarding the effects of other explanatory variables on private saving as well. They could not detect a positive significant effect of real interest rate on savings for all the countries in their sample. On the contrary, for most countries they obtained a negative effect. On the other hand their empirical results have shown a positve effect of income on private saving, whereas government saving has been found to lower private savings as predicted by Ricardian Equivalence.

Quarty (2005) has applied Granger causality tests to investigate whether or not financial sector development Granger cause savings mobilization in Ghana. His results suggested that financial development does not Granger cause domestic savings (measured as percentage of GDP) and similarly domestic savings measured does not Granger cause financial development. This is measured as domestic credit to the private sector as a percentage of GDP. On the other hand Kelly and Mavrotas (2003) investigated the relationship between financial development and the volume of private savings for Sri-Lanka by developing a composite index of financial development which is constructed based on three alternative indicators of financial development given by the respective measure of relative size of financial sector, the absolute size of the financial sector, and the activity of financial intermediaries. The estimated coefficient of the index is positive and substantially significant lending support to the original McKinnon (1973) and Shaw (1973) hypothesis regarding the positive saving mobilization effect of financial development. Sancak (2002) investigated the effects of financial liberalization on investment decisions of firms using both a dynamic panel data methodology and time series analysis. Her empirical results based on both micro and aggregate data have indicated that financial liberalization in Turkey that started in 1980 has not relaxed the borrowing constraint for Turkish firms which have faced a higher premium and increased credit rationing in post liberalization period.

IV. The Major Liberalization Policies in Turkey

Turkish financial sector, prior to 1980, was mainly operating under financial repression. The interest rates were under control of the central government, foreign exchange controls were in practice, tax rates on financial earnings were substantially high, liquidity and reserve requirements in banking sector were regulated and held very high and entry into banking sector was limited by regulations (Günçavdı and Küçükçiftçi, 2002). Capital markets were very weak and shallow (Denizer et. all, 2000).Until the beginning of 1980 liberalization period, Turkish external debt accelerated and quickly reduce the credibility of her import substitution – heavily regulated economy. As a result, Turkey found herself insolvent by the end of 1978 (Esen 2000). Both internal and external economic developments in between 1970-1980 forced Turkish economy into the end of financial repression with an inflation overshoot of 71.1 % in 1979 (Sancak, 2002) and with an external debt crises at the beginning of 1980's (Erden 2005).

1. Internal Financial Liberalization

At the beginning of 1980, Turkish government put a comprehensive deregulation programme in force and started a liberalization process that contain a major policy shifts in financial sector all with the assistance of IMF and World Bank. The control on interest rates was removed and replaced by market forces to determine the deposit and lending rates in banking sector. In 1982, The Capital Market Board of Turkey was established as a major regulator and supervisor of the Turkish Capital Markets. A new banking law was enacted in 1985 to regulate the banking sector and this new law made Turkish Treasury of the Ministry of Finance, the major regulator and supervisor of the banking sector. Other than the new Banking Law, Turkish Treasury started to organize weekly auctions for the sale of government securities at the same time. In 1986, İstanbul Stock Exchange started to operate, and in addition to this, The Central Bank of Turkey introduced the Interbank Money Market. Open Market Operations were first conducted by The Central Bank of Turkey in 1987. Establishment of Mutual Funds was also allowed in the same year (Gezici, 2009). Furthermore in 1999, a new and stronger banking law was enacted which provided legal ground for the establishment of Banking Regulatory and Supervisory Agency, which is an independent regulatory and supervisory agency to deal with structural problems of Turkish Banking Sector (Alper and Öniş, 2003). The first decade of the financial sector liberalization was the era of major changes for this particular sector.

2. External Financial Liberalization

The main financial liberalization policies of the internal financial sector was not decoupled from the external financial liberalization policies in Turkey. In 1984, foreign exchange regime was deregulated and banks were allowed to accept foreign exchange deposits from and extend foreign exchange denominated loans to both, Turkish and non-Turkish citizens (and/or corporations). This has established a link between Turkish and foreign interest rates (Denizer et all 2000). One year later, the free float of foreign exchange rates were put in practice in Turkey. In 1989, Turkey liberalized her capital account and enabled the free flow of capital in and out of Turkey. Liberalization of the capital account was followed by the Turkish Lira gaining of full convertibility in 1990 (Gezici, 2009).

The liberalization of Turkish financial markets not only deregulated the domestic markets but also internationalized them. The new era starting with 1990's was the time of more market based financial system both with domestic and foreign players with a more integrated Turkish financial system into the global financial markets.

V. Methodology

The empirical model specification relates the private saving to financial development and other determinants used as control variables and is given by

$$PSAV_t = \alpha + \beta FD_t + \gamma' X_t + \varepsilon_t \quad (1)$$

where *PSAV* is private sector saving, expressed as a percentage of gross private disposable income, *FD* is an indicator of financial development, X_t is a vector of control variables, which affect the private saving, ε_t is the random error term, and *t* is time or trend variable. The control variables we use include logarithm of real per capita disposable income (*LRGDP*), government budget deficit as a percentage of GDP, real discount rate (RDISC), which is used as a proxy for real interest rate, credit to private sector as a percentage of real GDP (PCRED), and inflation rate computed from the consumer price index.

Equation (1) is a long-run level relationship and provides the basis for the models estimated in this study. The major empirical question in this study is the existence of the levels relationship in equation (1) and the impact of financial development indicators on the private saving. We consider three measures of financial development: deposit money bank assets as a ratio of central bank assets (FD1), liquid liabilities as a ratio of GDP (FD2), and private credit by deposit money banks and other financial institutions as a ratio to GDP.

Since these three measures of financial development are highly correlated and our data contains only 49 observations we convert these three measures into an index of financial development using principal component analysis. Let X be a matrix defined as X=[FD1 FD2 FD3]. The principal components are obtained using the eigenvalues and eigenvectors of the X'X matrix, where X is the 49x3 matrix of 49 annual observations on three measures of financial development, i.e., FD1, FD2 and FD3. First, we obtain the eigenvalues $\lambda_1>\lambda_2>\lambda_3$ of the X'X matrix and corresponding eigenvectors A=[q_1,q_2,q_3]. Using the eigenvector corresponding to the largest eigenvalue λ_1, the financial development index Z is obtained as Z=Xq_1. Z forms the index henceforth referred to as FDIX, and used in the empirical analysis as an indicator of financial development. If the estimate of β is positive and significant this will support the hypothesis that financial development leads to increased private saving.

Our study uses annual time series data on Turkey for the period 1960-2008 and the relationship in equation (1) should be estimated using cointegration or long-run levels relationship estimation methods due to the non-stationarity of the some data. In order test the existence of the levels relationship in equation (1), we use the bounds test proposed by Pesaran et al. (2001)[1]. The bounds testing procedure involves two stages. The first stage is to establish the existence of a long-run relationship. Once a long-run relationship has been established, a two-step procedure is used in estimating the long-run relationship bases on the autoregressive distributed lag (ARDL) approach of Pesaran and Shin (1999).

Suppose the theory predicts that there is a long-run relationship among the variables *PSAV*, *FD*, and *X*. Without having any prior information about the direction of the long-run relationship among the variables, the bounds testing approach estimates an unrestricted conditional error-correction model (UECM) taking each of the variables in turn as dependent variable. For instance, UECM when *PSAV* is dependent variable takes the following form:

$$\Delta PSAV_t = c_0 + c_1 t + \phi_1 PSAV_{t-1} + \phi_2 FD_{t-1} + \sum_{j=1}^{k} \phi_{j+2} X_{j,t-1} + \sum_{j=1}^{p} \lambda_j \Delta PSAV_{t-j} + \sum_{j=0}^{p} \omega_j \Delta FD_{t-j} + \sum_{i=1}^{k} \sum_{j=0}^{p} \theta_{ij} \Delta X_{i,t-j} + \psi' D_t + u_t \quad (2)$$

where D_t is a vector of exogenous variables such as the structural change dummies.[2] The first stage in bounds testing approach is to estimate equation (1) by ordinary least squares (OLS). The null hypothesis of no long-run levels relationship against the alternative of a levels relationship is performed as a Wald restriction test. The null and alternative hypotheses are specified as follows:

$$H_0: \phi_1 = \phi_2 = \cdots = \phi_{k+2} = 0$$
$$H_1: \phi_1 \neq \phi_2 \neq \cdots \neq \phi_{k+2} \neq 0$$

The asymptotic distributions of the *F*-statistics are non-standard under the null hypothesis of levels relationship among the variables in the UECM in equation (2), irrespective of whether variables are purely I(0), I(1), fractionally integrated, or mutually cointegrated.[3]

[1] There are several alternatives one can use to test for long-run relationship among a set of time series, including two step Engle and Granger (1987) and Johansen (1988) full information methods. Compared to other tests, bounds testing approach has better small sample properties and can be applied irrespective of whether the underlying regressors are purely I(0), purely I(1), fractionally integrated, or mutually co-integrated.

[2] The lag length *p* in the UECM model should be specified prior to estimation. We use Shwarz (Bayesian) information criteria to select the lag order parameter *p*.

[3] According to Pesaran et al. (2001), the dependent variable PSAV in equation (2) must be an I(1) variable, but the regressors can be either I(0) or I(1). The critical values given in Pesaran et al. (2001) corresponds to cases where all regressors are I(1), the upper bound, and all regressors are I(0), the lower bound, but the critical values remain valid for a mixture of I(0)/I(1) variables.

Two sets of asymptotic critical values are provided by Pesaran et al. (2001). The first set assumes that all variables are I(0) while the second set assumes that all variables are I(1). We reject the null hypothesis of no levels relationship and conclude that there exists a long-run equilibrium among the variables, if the computed *F*-statistics is greater than the upper bound critical value. On the other had, we cannot reject the null hypothesis of no levels relationship, if the computed *F*-statistics is less than the lower bound critical value. The bounds test is inconclusive, if the computed *F*-statistics falls within the lower and upper bound critical values.

If a long-run relationship has been established in the first stage, a two-step procedure is used in estimating the long-run relationship in the ARDL approach. In the first step, a conditional ARDL(p_1,q_1,…,q_k) long-run model for *FD* can be estimated as:

$$PSAV_t = c_0 + \sum_{j=1}^{p_1} \alpha_j PSAV_{t-j} + \sum_{j=0}^{q_1} \theta_{1j} FD_{t-j} + \sum_{i=1}^{k} \sum_{j=0}^{q_{i+1}} \theta_{i+1,j} X_{i,t-j} + \psi' D_t + u_t \quad (3)$$

where all variables are as defined above and the lag lengths p_1,q_1,…,q_k relating to five variables in the model are selected using the Akaike (AIC) or Schwarz (or Bayesian) (SBC) Information Criterion. The second step of the second stage of bounds testing ARDL approach involves estimating a conditional ECM model. The conditional ECM model is specified as follows:

$$\Delta PSAV_t = \mu + \sum_{j=1}^{p} \lambda_j \Delta PSAV_{t-j} + \sum_{j=0}^{p} \theta_{1j} \Delta FD_{t-j} + \sum_{i=1}^{k} \sum_{j=0}^{p} \theta_{i+1,j} \Delta X_{i,t-j} + \vartheta ECM_{t-1} + \psi' D_t + u_t \quad (4)$$

where λ_i, and θ_{ij} are short-run parameters, ϑ is the speed of adjustment, which determines model's convergence to equilibrium, and the error-correction term ECM_t is defined as

$$ECM_t = PSAV_t - \hat{\beta}_0 - \hat{\beta}_1 FD_t - \sum_{j=1}^{k} \hat{\beta}_{j+1} X_{j,t-1} \quad (5)$$

The long-run parameters $\hat{\beta}_i$ in (5) are obtained from the OLS estimates of the conditional ARDL model in equation (3) as follows:

$$\hat{\beta}_0 = \hat{c}_0 \Big/ \left(1 - \sum_{k=1}^{p} \hat{\alpha}_k\right), \qquad \hat{\beta}_i = \left(\sum_{j=0}^{q_i} \hat{\theta}_{ij}\right) \Big/ \left(1 - \sum_{k=1}^{p} \hat{\alpha}_k\right), \quad i = 1, 2, 3, 4 \quad (7)$$

We compute the standard errors of $\hat{\beta}_i$ using the Delta-method.

It is also interest to investigate the causal relationships among financial development, financial openness and trade openness. Engle and Granger (1987) showed that if two I(1) series maintain a long-run levels relationship then there would be a causal relationship at least in one direction. However, the direction of causality can be detected from the conditional error-correction model. In our case, tests for Granger causality can be made through the following equations:

$$\Delta PSAV_t = \pi_{10} + \sum_{j=1}^{p} \pi_{11,j} \Delta PSAV_{t-j} + \sum_{j=j}^{p} \pi_{12,j} \Delta FD_{t-j} + \sum_{i=1}^{k} \sum_{j=1}^{p} \pi_{1,i+2,j} \Delta X_{i,t-j} + \varphi_1 ECM_{t-1} + u_{1t} \quad (6a)$$

$$\Delta FD_t = \pi_{20} + \sum_{j=1}^{p} \pi_{21,j} \Delta PSAV_{t-j} + \sum_{j=j}^{p} \pi_{22,j} \Delta FD_{t-j} + \sum_{i=1}^{k} \sum_{j=1}^{p} \pi_{2,i+2,j} \Delta X_{i,t-j} + \varphi_2 ECM_{t-1} + u_{2t} \quad (6b)$$

$$\Delta X_{lt} = \pi_{l+2,0} + \sum_{j=1}^{p} \pi_{l+2,1,j} \Delta PSAV_{t-j} + \sum_{j=j}^{p} \pi_{l+2,2,j} \Delta FD_{t-j} + \sum_{i=1}^{k} \sum_{j=1}^{p} \pi_{l+2,i+2,j} \Delta X_{i,t-j} + \varphi_{l+2} ECM_{t-1} + u_{l+2,t} \quad l = 1, 2, \ldots, k \quad (6c)$$

where π's are parameters to be estimated, u_{it} are serially uncorrelated error terms, and ECM_t is the error correction term estimated from equation (5). The *F*-statistics on the lagged explanatory variables in these *ECM*s indicates the significance of the short-run causal effects. The *t*-statistics on the coefficients ϕ_i of the lagged *ECM* indicates the significance of the long-run causal effect.

VI. Empirical Findings

We use annual data from 1970 to 2008 obtained from World Development Indicators and IMF's International Financial Statistics. We first construct the index of financial development using principal component analysis.

Defining X as matrix the 49x3 matrix formed by X=[FD1 FD2 FD3], the eigenvalues and eigenvectors are obtained and reported in Table 1.

Table 1: Eigenvalues of eigenvectors used to form financial development index

Eigenvalues		
λ_1	λ_2	λ_3
34.2746	0.1481	0.06282
Eigenvectors		
q_1	q_2	Q_3
0.93483	0.352657	0.041501
0.29259	-0.6988	-0.65274
0.20119	-0.62234	0.756446

We use the eigenvector in the first column which corresponds to the largest eigenvalue 34.27458113. The first principal component accounts for over 93 per cent of the total variation in the variables.

The second step in our analysis is to establish the trending properties of the variables. In particular, it is important to determine whether variables are I(0) or I(1). If all variables are I(0), then standard estimation methods can be used and there is no need to do bounds tests. In order to determine the order of integration of the data, augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979). According to the ADF test results in Table 2, the *PSAV*, *FDIX*, *FD*1, *FD*2, *FD3*, *RDISC*, and *BD* were found to be first-order stationary series at the traditional significance levels. ADF unit root test results for the *LRGDPI* and *PCRED* series indicated that the series is stationary in the levels. Perron (1989) showed that unit root tests have low power when data has structural breaks. In order to check the effect of structural changes on the unit root test results we use the test developed by Zivot and Adrews (1992). The Zivot-Andrews test results given in Table 2 show that all series are *I*(1) but not *I*(2) when structural changes are taken into account, except PSAV for which the test results indicate that the series is I(0). In summary, these test results show that PSAV, LRGDPI, and PCRED series might be I(0) while all others are I(1). Given that some of the series might be *I*(1) and others *I*(0) due to the mixed evidence, we proceed to test for a long-run levels relationship using the bounds tests.

Table 2: Unit Root Tests

	Level of the series		First difference of the series	
	ADF	ZA	ADF	ZA
PSAV	-1.64	-6.26*	-5.83*	-6.21*
FDIX	-2.72	-4.22	-4.72*	-5.72*
FD1	-2.72	-4.22	-4.72*	-5.72*
FD2	-0.92	-3.37	-5.00*	-5.77*
FD3	-0.80	-2.63	-1.64	-5.08*
LRGDPI	-3.83*	-2.81	-4.30*	-5.33*
RDISC	-2.69	-3.02	-5.16*	-5.56*
PCRED	-3.89*	-3.94	-4.81*	-6.32*
BD	-1.28	-4.21	-2.32	-7.65*
INF	-1.9032	-4.005	-5.8186	-7.257
Critical value				
1%	-4.15	-5.57	-3.58	-5.34
5%	-3.50	-5.08	-2.93	-4.80
10%	-3.18	-4.82	-2.60	-4.58

The first step in ARDL bounds testing approach is to estimate equation (2) by OLS in order to test for the existence of a long-run relationship among the variables. We will estimate the conditional ECM in equation (2) by taking each of one of the variables as the dependent variable. Therefore, a total of 20 conditional ECM model has to be estimated and bounds test for a levels relationship needs to be done in each one. The linear trend term in the ECM model may be a misspecification when the data is not indeed trending. In order to be robust against the misspecification of the linear trend we further estimate each model with or without a linear deterministic trend, leading to additional 10 regressions.

Before estimating the conditional ECMs we need to specify the lag length *p* for each model to be estimated. In order to determine *p* we use AIC and BIC. For each lag length, we also test the first and fourth order residual autocorrelations using the Breusch-Pagan Lagrange Multiplier (LM) statistics, which are distributed as $\chi^2(1)$ and $\chi^2(4)$, respectively. We estimate AIC, SBC, and LM tests for each model.

Optimal lag lengths and corresponding AIC and SBC values as well as the LM tests with their *p*-values are reported in Table 7. The lag lengths chosen by AIC and SBC differ significantly. For some FD_i equations, residual autocorrelation could not be rejected at lag lengths chosen by both AIC and SBC. In order to be robust against the lag length choice, bounds tests are performed at *p* values chosen by both AIC and SBC.

Table 3: Statistics for Selecting Lag Length in Bounds Tests Equation with Constant

p	AIC	SBC	$X^2(1)$	p-val X^2 (1)	$X^2(4)$	p-val X^2 (4)
1	3.358978	4.216612	3.863874	0.0493	31.38683	0.0000
2	2.954755	4.056971	16.44373	0.0001	32.36093	0.0000
3	2.861632	4.213236	15.38384	0.0001	30.97476	0.0000

Lag length selected by AIC: 3
Lag length selected by SBC: 2

We use three variants of the bounds test in Pesaran et al. (2001) when a linear deterministic trend is present. These are (a) *F*-iv, which is the *F*-statistics for testing $\phi_1 = \phi_2 = \cdots = \phi_{k+2} = 0$ and $c_1 = 0$ in equation (2), (b) *F*-v, which is the *F*-statistics for testing $\phi_1 = \phi_2 = \cdots = \phi_{k+2} = 0$ in equation (2), and (c) *t*-v, which is the *t*-statistics for testing $\phi_1 = 0$ in equation (3). When the linear trend is excluded form equation (2) there are two additional tests we report. These are (d) *F*-iii, which is the *F*-statistics for testing $\phi_1 = \phi_2 = \cdots = \phi_{k+2} = 0$ in equation (2) with c_1 set equal to 0, and (e) *t*-iii, which is the *t*-statistics for testing $\phi_1 = 0$ in equation (2) with c_1 set equal to 0.

For brevity we only report the bounds test results when PSAV is the dependent variable According to the results given in Table 4, all bonds tests indicate that there is a long-run levels relationship among the variables we consider at 5% significance level.

Table 4: Bounds F-and t-statistics for the Existence of a Levels Relationship

Without Determintic Trends			
p	F_iii	t_iii	
2	11.27511*	-4.713192*	
With Determintic Trends			
p	F_iv	F_v	t_v
2	9.215227*	10.49120*	-4.559079*

Notes: *F*-iv is the *F*-statistics for testing $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ and $c_1 = 0$ in equation (3). *F*-v is the *F*-statistics for testing $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ in equation (3). *F*-iii is the *F*-statistics for testing $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ in equation (3) with c_1 set equal to 0. *t*-v and *t*-iii are the *t*-ratios for testing $\delta_1 = 0$ in (3) with and without a linear deterministic trend, respectively.

[a] indicates that the statistic lies below the 5% lower bound.
[b] indicates that the statistic falls within the 5% bounds.
[c] indicates that the statistic lies above the 5% upper bound.
For $k = 4$, 5% lower and upper bounds of *F*-iv are [2.81 3.76].
For $k = 4$, 5% lower and upper bounds of *F*-v are [3.12 4.25].
For $k = 4$, 5% lower and upper bounds of *t*-v are [-3.41 -4.52].
For $k = 4$, 5% lower and upper bounds of *F*-iii are [2.62 3.79].
For $k = 4$, 5% lower and upper bounds of *t*-iii are [-2.86 -4.19].The ARDL levels equation estimates are given in Table 5. The results show that there is a significant positive impact from FDIX, RDISC, LRGDPI, and BD to private saving. The coefficients relating these variables are all significant at 5% significance level.

Although estimates show that PCRED and INF have negative impact on private saving, the effects are not statistically significant.

Table 5: ARDL Estimates of the Levels Equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDIX	0.918360	0.232881	3.943477	0.0003
RDISC	0.146771	0.057565	2.549650	0.0145
LRGDPI	0.053327	0.018358	2.904827	0.0058
BD	1.203720	0.277794	4.333132	0.0001
PCRED	-0.033668	0.163735	-0.205624	0.8381
INF	-0.021210	0.043461	-0.488030	0.6281
C	-0.178975	0.102242	-1.750499	0.0873

In Table 6 we report the impacts of FD1, FD2, and FD3 on privates saving, which are obtained using the first eigenvector in Table 1. The largest impact on savings comes from FD1 with a coefficient of 0.86, while FD2 and FD3 have smaller effects with coefficients 0.27 and 0.18, respectively.

The conditional Granger causality test results show that there is a long-run causality running from financial development to private saving.

Table 6: Impact of Financial Development Indicators on Private Saving

Variable	FD1	FD2	FD3
Coefficient	0.86	0.27	0.18

Table 7: Conditional Granger Causality Test

Y / X	FDIX	RDISC	LRGDPI	BD	PCRED	INF	PSAV	ECM(t-1) -- t-stat
		0.546164	4.681215	3.315702*	0.423809	0.820512	0.673345	
FDIX	--	(0.5848)	(0.0170)	(0.0500)	(0.6584)	(0.4498)	(0.5175)	--
	0.313329		1.385493	0.485066	0.162800	1.199465	0.035517	
RDISC	(0.7334)	--	(0.2658)	(0.6204)	(0.8505)	(0.3154)	(0.9651)	--
	1.837538	0.918995		2.818853	0.698196	0.521732	1.417276	
LRGDPI	(0.1767)	(0.4099)	--	(0.0755)	(0.5054)	(0.5988)	(0.2581)	--
	0.333890	1.985679	0.433896		0.710957	1.688241	0.510927	
BD	(0.7188)	(0.1549)	(0.6520)	--	(0.4993)	(0.2019)	(0.6051)	--
	0.106076	6.735601*	0.008510	4.189625*		5.737846*	0.996687	
PCRED	(0.8997)	(0.0038)	(0.9915)	(0.0249)	--	(0.0078)	(0.3810)	--
	0.281592	1.360032	1.061485	0.444710	0.094848		0.030582	
INF	(0.7566)	(0.2720)	(0.3586)	(0.6452)	(0.9098)	--	(0.9699)	--
	0.632234	1.137691	0.995626	0.994363	5.575912*	1.288587		-2.67682*
PSAV	(0.5383)	(0.3340)	(0.3814)	(0.3818)	(0.0087)	(0.2905)	--	(0.01193)

H0: Variable X does not Granger Cause Variable Y
p-values are given in parantheses.

VII. Conclusions

The issue of real effects of financial development has been continuing to be a hot subject for empirical research. In this paper we have investigated the behavior of private savings (as a share of disposable income) in response to financial development and several other explanatory variables including real interest rate, per capita disposable income, the ratio of private sector credit to GDP, inflation and the share of public saving in GDP. A summary of our estimation results are as follows: Private savings have been positively and significantly affected not only by the composite index of financial development that we constructed but also by each one of the respective three components of this index. As theoretically expected the estimated effect of the ratio of private sector credit to GDP is negative but it is highly insignificant suggesting that financial development might not have relax the liquidity constraint in any significant manner in Turkey. Similarly inflation rate has been found to have exerted a negative but insignificant effect on savings. The estimated elasticity of private savings with respect to real interest rate has been found to be positively and highly significant. Also we have produced evidence of a positive (as theoretically expected) and highly significant effect of per capita disposable income on private savings. Probably the most provocative one of our econometric results is the rejection of Ricardian Equivalence Hypothesis; the share of private savings in disposable income has been found to respond positively to an increase in public savings (as a share of GDP).

In other words economic agents in Turkey do consider government bonds as net worth and in the long-run reduction in budget deficits is likely to raise the private savings ratio. The most likely explanation for this result seems to be the positive growth enhancing effects of lower budget deficits that may operate through two complementary channels in the long-run. The first one is the mechanism that operates through the "reverse crowding-out effect" which can be termed as "crowding in". In other words as the need for public borrowing diminishes, this allows for higher rate of private investment and faster rate of accumulation of physical capital which affects income growth positively. To the extend that productivity of private investment is higher than public investment, this "crowding in" effect of higher public saving can entail efficiency gains as the sectoral composition of investment, employment, and output change in favor of private sector. And this could further increase the rate of income growth through its positive effects on growth of total factor productivity. As the rate of income growth rises, the private saving ratio is likely to increase. It is worth to note that rejection of Ricardian Equivalence Hypothesis also may imply that relatively large percentage of households in Turkey might be "myopic" in forming their optimal behavior in terms of consumption –saving decisions.

The recent global economic crises and the increased frequency of crises in post-liberalization periods of many countries (particularly due to capital flow reversals) have shown the critical role that domestic savings can play in generating a sustainable economic growth process. Therefore mobilization of private savings should be one of the priorities of any growth strategy in a developing country. To this end, Turkey's policy-makers should be encouraged to develop both macro and sectoral policies so as to improve the conditions of competition in banking industry particularly through the introduction of new kinds of incentives for the entry of new (particularly foreign) banks into the sector and new regulations that minimize the risk of collusion between a few big banks and possibly set limits for the relative size of each bank in the system. Secondly, further fiscal liberalization through continuous reductions in public sector borrowing requirements (PSBR) and further privatization of state enterprises is likely to boost domestic savings more than proportionately in the long-run as private savings are expected to respond positively and significantly to any reduction in public sector deficits. And this, in turn, can further reduce the dependence of Turkey on foreign savings to finance domestic investment.

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