THE IMPACT OF CAPITAL ACCOUNT LIBERALIZATION ON THE COEFFICIENT OF SAVING RETENTION IN TURKEY

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ABSTRACT

This study is an attempt to test whether the capital mobility interpretation of the domestic saving and investment interaction is plausible in the Turkish case with the emphasis on the effects of two structural turning points: financial liberalization in 1982 and full capital account liberalization in 1989. Using time series techniques and employing annual data from Turkey over 1962-2002, this study found that the saving and investment are cointegrated in the long run; however, the long run coefficient of saving retention turns out to be larger (closer to one) after full capital account liberalization rather than becoming smaller, a result which is not consistent with the capital mobility interpretation of the saving retention coefficient. As a result, the interpretation of the S-I correlation as a measure of capital mobility appears to be dubious at least in the Turkish case.

Keywords: Saving, investment, capital account liberalization, Turkey.

INTRODUCTION

Feldstien and Horioka (1980; F&H hereafter) were the first to interpret the interaction between domestic investment and saving (S-I hereafter) as reflecting the degree of capital mobility. The rationale behind the F&H interpretation of S-I correlation was that there would be no association between the S-I in the case of perfect capital mobility (open economy) because savings would be transferred to wherever the highest return is while the S-I would be related one for one in the case of imperfect capital mobility (closed economy). In a closed economy, domestic saving is used to finance domestic investment and so they are expected to be highly correlated; however, this is not necessarily the case in an open economy. Contrary to this conceptual prediction, the F&H has documented a high correlation between the S-I for 16 OECD nations. They have taken this as some evidence of imperfect capital mobility across these countries, a result that is puzzling because it is

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reasonable to expect a low correlation between the S-I for relatively open economies. Since then, there have been numerous studies in the literature devoted to the F&H puzzle, most of which found the F&H result and interpretation dubious (see Coakley, et al., 1996; Obstfeld and Rogoff, 2000 for an overview).

One line of studies on the subject raised concerns over the econometric method employed in the F&H (e.g., Krol, 1996; Wu Ho, 2002). Using the fixed effect specification, Krol found much lower correlation between the S-I. However, the recent studies by Jansen (2000), Coiteux and Olivier (2000) cast doubt on the robustness of Krol’s result to the different samples of OECD countries, presenting the estimates of saving retention coefficient in between the estimates of Krol and the F&H. Another line of studies focused on the S-I relationship in developing and developed countries, yielding rather mixed results. While, the studies by Dooley et al., (1987), Wong (1990) and Isaksson (2001) found a small saving retention coefficient for developing countries, those by Feldstein and Bacchetta, (1989) and Tesar (1991) found a large coefficient. The other line of studies criticized the F&H interpretation of the S-I correlation as a measure of the degree of capital mobility, arguing that a close association between the S-I may be the manifestation of current account solvency (Coakley et al., 1996; 1998) or of the lack of well-functioning financial structures in developing countries (Kasuga, 2004) or of the policy actions targeting current account balance (Artis and Bayoumi, 1990, Özmen and Parmaksız, 2003). The objective of balancing current account puts restriction on level of capital mobility as well. Thus, during the periods of financial constraints, fixed exchange rate regime and current account targeting, there is some reason to expect that the major bulk of the domestic investment is financed by domestic saving, resulting in a high S-I correlation. Taking into account of the policy shifts, Özmen and Parmaksız (2003) for France found a lower saving retention coefficient in the periods of flexible exchange rate regime than in the periods of fixed exchange rate regime when the current account targeting is more plausible.

Yıldırım (2001) for Turkey examined the effects of structural adjustment reform in 1980 on the savings retention coefficient. Finding a lower saving retention coefficient in the post 1980 period, she concluded that there is a higher degree of capital mobility in this period, an interpretation that is in agreement with the F&H.

Given that accounting for the policy shifts substantially alters the results, this study explores the S-I interaction in Turkey over 1962-2002 periods with the emphasis on the impacts of financial liberalization in 1982 and full capital account liberalization (FKAL) in 1989. The financial liberalization may affect the saving behavior, altering the S-I interaction before and after this period. Also, by totally removing the controls on capital movements, the FKAL may spur substantial flows of external capital and so may influence the S-I relationship. If the F&H interpretation of the relationship between the S-I is correct, one should expect to
find a lower saving retention coefficient in the aftermath of the FKAL when it is likely to observe a larger degree of capital mobility. An implicit assumption underlying this line of reasoning is that capital mobility depends on the current account imbalances (the S-I gap) and is determined endogenously within the system. However, what if capital movements are of autonomous character? In this case, international capital might be highly mobile irrespectively of the S-I interaction or of the current account position. At this point, one might argue that, with the introduction of the FKAL, capital movements may be totally exogenously determined independently of the S-I gap so that the interaction between the S-I may lose its ability to measure the degree of capital mobility. Therefore, controlling for the structural turning points enables us to investigate whether the F&H interpretation of the S-I relationship is plausible or the “puzzle” still continues in the Turkish case.

I. LIBERALIZATION ATTEMPTS IN TURKISH ECONOMY IN 1980s

Turkey was one of the first nations to initiate a far-reaching stabilization programme in an effort to recover from its debt crisis in 1980. Economic structure was totally reshaped based on an open, outward-oriented development strategy. Several measures were taken to reduce government’s involvement in market activities in order to restore fiscal balance and balance of payment, and thus to allow for a more efficiently operating market environment. At the second stage of this major structural adjustment, the financial market was liberalized in 1982, deregulating the interest and credit controls to promote market forces and private sector investment activities. In early 1980s, Turkish economy enjoyed a remarkable recovery partly thanks to the substantial capital inflows and debt rescheduling (Arıcanlı and Rodrik, 1990:1349). However, foreign and domestic private investment did not respond sufficiently positively to these reforms and the recovery in the export sector was not creating enough foreign exchange reserves to finance increasing public sector expenditures. After the mid-1980s, growing competition in the political arena as well as the justified protection of newly developing sectors (e.g., rent seeking behavior) led government to making populist spending, which distorted the fiscal stance even further, triggering an over borrowing phase in the Turkish economy. On the other hand, an analysis of the financial liberalization by Akyüz (1990) showed that no improvement in the savings rate has been realized. Together with low savings rate, the rise in public sector borrowing requirement (PSBR) to fund budget deficits created high rates of interest inhibiting the investment activities of the private sector. Given the low savings rate and the desperate need to revive domestic investment, the Turkish economy experienced the final stage of the liberalization reforms; namely, the full capital account liberalization (FKAL) in August 1989 in which the central objective was to allow for a substantial capital inflows in an effort to close up the
resource disparity between the domestic savings and investment (Günçavdı and McKay, 2003: 1902).

The removal of the controls on the capital mobility has increased external borrowing with mostly the short-term maturity. Unfortunately though, because the fiscal position of the Turkish economy was rapidly deteriorating and the exports were not strong during this period, the substantial capital inflows were channeled into the public sector to fill the gap between public spending and revenues. Although the major burden of external debt appeared to be on the private sector, the public sector played the main role in this major capital inflow because the private sectors (mostly commercial banks) were borrowing from abroad at low interest rates and lending to the Treasury at high interest rates. Thus budget deficits became sustainable largely due to the short-term international capital inflows. In any case, this game played among the foreign short term lenders, domestic private investors and government losing control over fiscal position resulted in major capital flight out of the country, causing the subsequent crises throughout the 1990s (see Demir, 2004:855 and Yeldan, 2001: 156).

At this juncture, if the capital mobility interpretation of the S-I interaction is correct, one expects to obtain a lower correlation between the S-I after the FKAL in 1989 when considerable amount of capital in-and-out flows were observed. However, if the FKAL leads to exogenously determined flows of international capital independently of current account imbalances (the S-I gap) mainly because of the attempt of domestic and foreign investors to collect arbitrage gains from borrowing to the Treasury, then S-I correlation loses its relevance as to the measure degree of capital mobility. In this case, it is possible to obtain a high correlation between S-I with a highly mobile international capital. Therefore, the present study attempts to empirically test whether the capital mobility interpretation of the S-I correlation is conceivable in the Turkish case, taking into consideration the major policy shifts.

II. THE MODEL

A standard regression can be specified to examine the association between domestic saving and investment ratios as the following (Feldstein and Horioka, 1980 and Coiteux and Olivier, 2000).

\[
\text{invt} = \alpha + \beta_1 \text{savr} + \beta_2 t + u_t
\] (1)

where \( \text{invt} \) and \( \text{savr} \) are respectively the ratios of investment and savings to GDP; \( t \) is a time trend and \( u_t \) is the disturbance term. \( \beta_1 \) is called the saving retention coefficient. Estimating this equation with standard OLS method is likely to yield spurious regression bias if the variables are not stationary. However, if the two variables are nonstationary in levels and stationary in first differences, one can test whether there exist any linear combinations of these variables that are cointegrated.
Finding evidence of cointegration means that equation (2) can be regarded as the long run equilibrium relationship between the variables in question and can be estimated using OLS (Engle and Granger, 1987). That is, if the series are cointegrated, the variables form a meaningful and stable relationship in the long run, and so estimating equation (1) with OLS would not lead to spurious regression problem.

According to the Engle and Granger two step procedure, temporarily assuming that the variables are integrated of the order one and are cointegrated, we can specify the short run interaction between \( inv_t \) and \( sav_t \) as an error correction representation,

\[
\Delta inv_t = \alpha' + \beta' \Delta sav_t + \theta (inv_t - \hat{\alpha} - \hat{\beta}_1 sav_t - \hat{\beta}_2 t)_{t-1} + u'_t
\]

(2)

where \( \Delta \) is the first difference operator and \( \theta \) is the error correction coefficient that indicates the speed at which investment adjusts to its long run equilibrium level in each short run period. The term in the parenthesis is the error correction (ec \(_{t-1}\)), which is the first lagged residual from estimating the long run equation (1).

According to Krol (1996) and Sinn (1992), inter-temporal budget constraint does not let the current account deficit/surplus infinitely grow. Thus if the inter-temporal budget constraint holds, the current account imbalances must be bounded, implying that the net capital flow, which is the difference between saving and investment, is a stationary series. That is, if the S-I gap is stationary, the two variables are expected to be cointegrated. An implication of cointegration is that the saving and investment move closely together in the long run so that the link between S-I becomes stronger in the long run than in the short run. Thus \( \beta_1 \) is expected to be greater than \( \beta'_1 \).

III. EMPIRICAL RESULTS

A. TESTING FOR UNIT ROOT

Before testing for cointegration, unit root tests are carried out to determine the order of integration of the variables in question. To this end, the augmented Dickey-Fuller (ADF) tests are performed both on the levels and the first differences of the variables. The ADF unit root tests use the various specifications of the following regression,

\[
\Delta x_t = \delta + \phi x_{t-1} + \lambda t + \sum_{s=1}^{\sigma} \gamma_s \Delta x_{t-s} + \varepsilon_t
\]

(3)

where \( x_t \) is the variables of interest, \( \varepsilon_t \) is the disturbance term and \( t \) is a time trend. The ADF tests are performed sequentially with/out trend and intercept. To select the proper lag length of the augmenting term, we use Akaike and Schwarz
information criteria. These criteria suggest the use of one lag augmenting term for inv and two lags for sav variables. The test results are presented in Table 1.

The figures are the ADF test statistics, which, as seen, lead to the rejection of the null hypothesis of nonstationarity for only the first differences of the variables, but not the levels of them. Thus, both series are integrated of degree one, which enables us to proceed to determine whether the variables are cointegrated and, if so, figure out the number of cointegrating vectors among the variables in question.

Table 1: ADF Unit Root Tests

<table>
<thead>
<tr>
<th>Variables</th>
<th>no intercept</th>
<th>intercept</th>
<th>intercept &amp; trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>sav</td>
<td>-0.016</td>
<td>-2.670</td>
<td>-2.474</td>
</tr>
<tr>
<td>inv</td>
<td>-0.217</td>
<td>-2.277</td>
<td>-1.683</td>
</tr>
<tr>
<td>Δsav</td>
<td>-4.256*</td>
<td>-4.198*</td>
<td>-4.245*</td>
</tr>
<tr>
<td>Δinv</td>
<td>-4.297*</td>
<td>-4.247*</td>
<td>-4.723*</td>
</tr>
</tbody>
</table>

MacKinnon Critical Values at 5%

-1.94 -2.93 -3.53

Note: * shows significant cases at 5% level of significance

B. TESTING FOR COINTEGRATION

Johansen (1988, 1992) suggested a method to test for cointegration by considering the following p variable VAR model,

\[ X_t = \mu + \sum_{i=1}^{k} \phi_i X_{t-i} + \eta_t \]  

where \( X_t \) is \((p \times 1)\) vector of the variables in question, which is a \((2 \times 1)\) vector in our case. \( \eta_t \) is the disturbance term assumed to be an i.i.d Gaussian process with mean zero and variance \( \Omega \). Although these variables are individually nonstationary, if there are linear combinations of these variables that are stationary, then they form a meaningful and stable long run relationship, meaning that they are cointegrated. Johansen used maximum likelihood estimation techniques to develop trace and maximal eigenvalue test statistics in order to test the null hypothesis of no cointegration. Also, it is important to choose the lag length in the VAR system that makes the disturbance term as much white noise as possible. To this end, we use
Akaike and Schwarz information criteria, which suggest the inclusion of only one lag to the system. The results are reported in Table 2.

**Table 2: Johansen Test for Cointegration**

<table>
<thead>
<tr>
<th>$H_0$</th>
<th>$H_1$</th>
<th>Trace Stat.</th>
<th>$H_0$</th>
<th>$H_1$</th>
<th>Max-L</th>
<th>95% CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r=0$</td>
<td>$r \geq 1$</td>
<td>21.24*</td>
<td>$r=0$</td>
<td>$r=1$</td>
<td>18.87</td>
<td>19.96</td>
</tr>
<tr>
<td>$r \leq 1$</td>
<td>$r \geq 2$</td>
<td>7.49</td>
<td>$r \leq 1$</td>
<td>$r=2$</td>
<td>7.25</td>
<td>9.24</td>
</tr>
</tbody>
</table>

Note: * shows significant cases at 5% level.

As can be seen from Table 2, while the maximal eigenvalue test indicates no cointegration, the trace test suggests the presence of at most one cointegrating vector between the variables. Because these tests yield conflicting results, we perform the unit root test on the residuals from the long run equation to see if they are stationary. According to Engle and Granger, if the residuals from the long run equation do not follow a unit root process, then the variables are cointegrated. We checked the robustness of the trace test by carrying out the ADF unit root test on the residuals of cointegrating equation (1). The test results show that the residuals are stationary and thus lead to the conclusion that saving and investment are cointegrated.

**C. RESULTS FROM THE GRANGER’S TWO STEP PROCEDURE**

Since there is some evidence that the variables are cointegrated, first, the long run relationship (equation 1) can be estimated using standard estimation techniques such as OLS to analyze the long run association between investment and saving. Then at the second step, the error correction representation of investment (equation 2) can be estimated to capture the short run saving retention coefficient. The results are presented in Tables 3 and 4.

The first column of Table 3 shows that the long run saving retention coefficient is about 0.60, suggesting that about two-thirds of domestic saving passes trough into financing domestic investment, a result that is in line with Feldstein’s contention (see Coiteux and Olivier, 2000: 536). Further, as predicted by Krol (1996) the short run saving coefficient seen in the first column of Table 4 is found rather smaller (0.40), indicating a weaker association between the S-I in the short run than in the long run. In addition, the estimated error correction coefficient is about 0.25, suggesting that one-fourth of the gap between the S-I closes up within a year. This means that it takes almost 12 years to eliminate 99%
of the diseqilibrium between the S-I, which is quite a slow adjustment speed considering the length of a standard business cycle.

Next, we examine the roles of two qualitative factors in determining the long and short run dynamics of the S-I interaction; namely, the financial liberalization in 1982 and full capital account liberalization in 1989. To this end, two dichotomous variables are created and included into the both long run and the short run equations. While dum82 takes a value of zero in the pre period (1962-1982) and of one in the post financial liberalization period (1983-2002), dum89 takes a value of zero in the pre FKAL (1962-1989) and of one in the post periods (1990-2002). From the start, none of the liberalization attempts affects the short run S-I relationship as seen from the second and third columns of Table 4 where both of the dummy variables are not statistically significant. An examination of Table 3 shows that this is not the case for the long run S-I interaction. The second column of Table 3 indicates no structural breaks in both the intercept and slope coefficients, suggesting that the S-I correlation in the long run remains the same after the

Table 3: Long-run Relationship between Saving and Investment (Equ. 1)

<table>
<thead>
<tr>
<th>Variables Variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>7.493 (2.49)*</td>
<td>6.942 (3.48)**</td>
<td>8.664 (2.61)*</td>
</tr>
<tr>
<td>sav&lt;sub&gt;t&lt;/sub&gt;</td>
<td>0.612 (0.13)*</td>
<td>0.606 (0.18)*</td>
<td>0.508 (0.14)*</td>
</tr>
<tr>
<td>t</td>
<td>0.095 (0.03)*</td>
<td>0.194 (0.05)*</td>
<td>0.169 (0.05)*</td>
</tr>
<tr>
<td>dum82</td>
<td>-4.578 (5.39)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dum82*sav&lt;sub&gt;t&lt;/sub&gt;</td>
<td>0.090 (0.26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dum89</td>
<td></td>
<td>-16.08 (8.48)***</td>
<td></td>
</tr>
<tr>
<td>dum89*sav&lt;sub&gt;t&lt;/sub&gt;</td>
<td></td>
<td>0.677 (0.38)***</td>
<td></td>
</tr>
<tr>
<td>Adj-R&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.521</td>
<td>0.546</td>
<td>0.551</td>
</tr>
<tr>
<td>F-stat</td>
<td>22.76</td>
<td>13.05</td>
<td>13.24</td>
</tr>
</tbody>
</table>

Notes: Figures in parentheses are the standard deviations. Asterisks *,**,*** show 1%, 5%, 10% levels of significance respectively.

structural reforms and financial liberalization in 1982. Furthermore, the last column of Table 3 indicates that the long run dynamics investment equation do differ in the pre and post FKAL periods, presenting evidence of structural changes in both the
constant and slope terms. Quite surprisingly, the long run saving coefficient is approximately 0.51 in the pre FKAL period while rising to 1 in the post period. This finding calls into question the interpretation of the S-I correlation as a measure of the degree of capital mobility. If this interpretation were correct, one

would conclude that the Turkish economy turned into a totally closed one with perfect capital immobility after the full capital account liberalization, an interpretation confirming the F&H’s initial puzzle. This suggests that the F&H puzzle continues in the Turkish case. However, it may be the case that the finding of a high S-I correlation in the post FKAL period is not a “puzzle” per se, but its interpretation as reflecting a low degree of capital mobility is. Despite such a high correlation between the S-I, capital flows may be exogenously determined independently of the level of the current account balance during this period. Particularly, before the FKAL, capital movements were endogenously determined within the system based on the current account position, in which case the S-I correlation may reflect the degree of capital mobility. However, in the aftermath of the FKAL, capital in-and-out flows became totally exogenous, growing independently of the current account deficits (surplus). In this case, the S-I interaction cannot be inferred as a measure of degree of capital mobility.
CONCLUSION

Feldstein and Horioka (1980) argued that domestic saving and investment are likely to be closely related in a closed economy where capital is immobile while they should be weakly correlated in an open economy where capital is relatively mobile. Accordingly, the domestic saving and investment interaction implies the degree of international capital mobility. Their finding of a high correlation between the two for OECD countries considered relatively open economies was quite a puzzle. This controversial result generated numerous studies on the subject, most of which raised concerns over the interpretation of the S-I relationship as a measure of the degree of capital mobility. In this regard, the central objective of the present study was to analyze the S-I interaction in an effort to question the plausibility of the capital mobility interpretation of the saving retention coefficient in the Turkish case, taking into account of the financial liberalization in 1982 and full capital account liberalization in 1989.

To this end, a standard model that links domestic investment to domestic saving was considered, employing cointegration techniques that enabled us to distinctly examine both the long and short run dynamics of the S-I interaction. Using annual data from Turkey over the 1962-2002 periods, the results indicated that, in the long run, approximately two-thirds of domestic saving finds its way into funding domestic investment activities over the whole sample period while this rate is smaller in the short run. Furthermore, while the financial liberalization does not considerably alter the stance of the S-I interaction, the full capital account liberalization causes a major structural shift in both the intercept term and slope coefficient of the long run investment equation. More specifically, the saving retention coefficient rises from 0.51 in the pre FKAL period to almost 1 in the post period. According to the capital mobility interpretation of this finding, one would conclude that international capital became almost immobile after the FKAL. This is a result that confirms the F&H’s initial puzzle. However, the capital mobility interpretation of this finding would be in disagreement with the reality in which we observe a considerable amount of capital inflows in the form of external borrowing during 1990s. Such flows of international capital were present in spite of the high S-I correlation because the nature and the characteristics of the capital mobility became totally autonomous and were determined exogenously and independently of the current account imbalances after the FKAL period. To conclude, interpreting the S-I relationship as reflecting the degree of capital mobility as Yildirim (2001) for Turkey did would be a mistake in the Turkish case, especially in the post FKAL period when the capital in-and-out flows were mainly determined exogenously and irrespectively of the S-I interaction or current account imbalances.
NOTES

1. Public sector borrowing requirement has rapidly grown, reaching to 9% and almost 8% of GDP respectively during 1989-93 and 1994-96 periods (Güncavdı and McKay, 2003:312).
2. Private external debt has radically increased from 795 million dollars to 27,828 million while public external debt from 35 billion dollars to 55 billion in 1989-2000 (Demir, 2004:855)
3. The relationship between the capital mobility and the fiscal position of the Turkish economy during 1990s is well documented by Demir (2004:855) as the following,
   “Although after 1989 the major burden of external debt was on the private sector and the level of external new borrowing was almost stagnant for the public sector, the main actor behind this growing external debt was again the public sector.”
   “… an important portion of the external debt has been realized by domestic banks with an underlying motivation to gain from arbitrage through borrowing abroad and lending to the Treasury at very high interest rates (p.855).”
4. See Boratav (2001 cited in Demir, 2004: 855) “Prior to 1989, capital movements were mostly endogenously determined within the economy. During the 1990s, following the liberalization of capital account, capital in-and-out flows have gained an almost autonomous character. The growth of the external debt stock has gained a momentum independent of the current account. Hence we observe a growing disparity between the capital inflows and current account deficit in the country (p. 855)”
5. The data on saving and investment ratios to GDP were obtained from SPO (2003) Economic and Social Indicators.
6. The results of these tests are not reported and are available upon request.
7. The test of the hypothesis that the saving retention coefficient is equal to 1 in the post FKAL period yields a Wald test statistic of 1.45, which leads to the conclusion that the null cannot be rejected at any conventional level of significance.
REFERENCES


