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SAVING-INVESTMENT CORRELATIONS AND CAPITAL MOBILITY IN DEVELOPING COUNTRIES WITH SPECIAL REFERENCE TO INDIA

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Foreword

This paper examines the evidence on saving-investment correlations in developing economies to gauge the degree of capital mobility in and out of these economies. An error correction model is used to capture the dynamics of the saving-investment relationship and the current account. A non-stationary current account and low saving-investment correlations provide evidence of capital mobility. The role of official foreign borrowing is explored by adding foreign borrowing to savings and studying the correlations. The analysis shows that for majority of the countries the results for capital mobility do not change even after taking foreign borrowing into account. The role of unrecorded capital flows in India is separately examined in the study. The evidence suggests that unrecorded capital flows do perform arbitrage operations between domestic and foreign financial markets.

Research for this study was partially funded by the Reserve Bank of India. Much more work needs to be done in the area of capital mobility and its implications for policy. The finding that many developing countries may be more open than what is generally believed to be the case has implications for the pursuit of macroeconomic policies in developing countries.

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I INTRODUCTION

Although economists have long been interested in empirical tests of international capital mobility (also referred to as the degree of international financial integration), interest in assessing the degree of capital mobility for developing countries is a recent phenomenon.[1] The issue whether actual or incipient flows of private capital can effectively perform arbitrage functions between domestic and foreign financial assets has significant implications for policy making in developing countries. Effectiveness of various stabilization policies such as the effects of devaluation on output and prices; the outcome of monetary policy in influencing aggregate demand and prices; and the extent to which expansionary fiscal policy can crowd out private investment depend on the relationship between domestic and international financial markets. The general belief is that capital mobility has increased in recent years on account of widespread financial sector reforms and the opening up of the capital account to private capital inflows in many developing countries.

In the developing country case, the issue of a closed or open capital account was often resolved by looking at exchange restrictions in a particular country. The extent to which financial intermediation is possible between domestic and international markets was also

[1] Some of the studies, which deal with financial integration in developing countries, are Haque and Montiel (1990), Mamingi (1993), Montiel (1993) and World Bank (1997).

considered limited due to other official regulations, taxes and transactions costs. The presence of exchange restrictions as an indicator of a closed economy has limitations because of the growing evidence on the porosity of capital controls.[2] The evaluation of the degree of capital mobility is broadly classifiable into two categories — the quantity approach and the price approach. The quantity approach literature questions whether shocks to investment are constrained by local supply, or whether they are met by the global supply of capital. The degree of capital mobility can be assessed by analyzing saving-investment correlation. Another variant of the quantity approach, is the consumption-smoothing approach, which examines whether shocks to income are adequately smoothed away i.e., whether international risk sharing works smoothly. The other alternative is to use the price approach, which examines whether rates of return are equalized between countries as a measure of capital mobility.

The saving-investment and price approach are related in that for domestic saving rates to have no effect on domestic investment rates, (perfect capital mobility) it would be necessary, among other things, for real interest parity – not just nominal interest parity to hold. If savings and investment are both endogenous variables, then savings and investment could be correlated even if real interest parity were to hold. A positive correlation is also possible if shocks are specific to savings or investment even if uncovered interest parity holds, although real interest parity does not hold.[3] Frankel (1991) points out that there is not enough integration in goods markets for purchasing power parity to hold and thus capital mobility can only equalize nominal rates of return.

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[2] See for example the survey article on capital controls by Dooley (1996) and estimates of capital flight in Dooley (1988), Lessard and Williamson (1985) and Varman-Schneider (1991).

[3] See the papers by Frankel cited in this paper.

In this paper, capital mobility in a sample of developing countries is evaluated using the quantity criteria pertaining to the relationship between savings and investment. The analysis is based on a procedure in Feldstein and Horioka (1980). They provided the basic insight that in a world with perfect capital mobility, a country can always run current account deficits if its desire to consume and invest cannot be funded domestically. The Feldstein-Horioka (FH) test is to regress the ratio of investment/GDP on the ratio of savings/GDP[4]. If capital is perfectly mobile, FH reason that the estimated coefficient would be zero. The study used data on savings and investment for 21 OECD countries for the period 1960-1974 to assess whether incremental savings were retained in the home country or entered the global pool of capital. Their empirical findings showed that this coefficient was indeed high for their sample of OECD countries (0.8 – 0.9) indicating very low capital mobility.

Studies following the FH study examine the relationship for different time-periods, data sets and country samples. Econometrically, both time-series and cross-section studies exist. The finding that primarily domestic saving finances domestic investment has proved to be robust for the industrialized countries[5]. A suggestion documented in the literature is that the inclusion of the data for the 1980s lowers the saving-investment correlation.[6] An important strand of literature exists around the contention that savings-investment correlations are largely uninformative about capital mobility[7]. Obstfeld (1986, 1995) and

[4] The analysis in the remainder of the paper refers to these ratios as savings and investment only.

[5] See Feldstein and Bacchetta (1991), Obstfeld (1993), Frankel (1991,1992), and Tesar (1991) for surveys of this literature. See also a recent survey by Coakley, Kulasi and Smith (1998).

[6] See Frankel (1991) and Feldstein and Bacchetta (1991. Obstfeld (1993), however, suggests that the coefficient for the period 1986-90 appear higher than those for 1980-85. Dooley et al. (1987) compared the last years of the Bretton Woods system with the first decade of floating was unable to detect the decline.

[7] See the analysis in Harberger (1980), Caprio and Howard (1984), Murphy (1984), Tobin (1983), Summers (1988), Obstfeld (1986), Tesar (1988) and Bayoumi (1990), See also the survey in Coakley, Kulasi and Smith (1998).

Obstfeld and Rogoff (1995) have pointed out possible mechanisms to explain the comovement of savings and investment. Since both investment and savings are functions of the state of the business cycle there is reason to believe that temporary real shocks such as total productivity shocks that are sufficiently persistent can cause a high saving-investment correlation. Mendoza (1991) also suggests this channel. A similar effect would be achieved through prices of imported inputs and world interest rates. Baxter and Crucini (1993) analyze global shocks that impinge on both savings and investment simultaneously. The comovement of savings and investment has another explanation. Governments may respond to incipient current account deficits by contractionary fiscal policy to prevent large sustained large capital flows. This makes gross national savings endogenous because the public saving component is endogenous in this case.[8] Jansen (1996) and Hoffman (1998) rely on the intertemporal approach to the current account to argue that savings and investment can be highly correlated even in the presence of capital mobility.[9] Some of the literature, on the other hand, that accepts the FH view that saving-investment correlations are evidence that domestic saving and investment can indeed have direct effects on each other. These are Penati and Dooley (1984), Frankel (1985), Dooley, Frankel and Mathieson (1987), Feldstein and Bacchetta (1991) and Taylor (1996). Frankel (1986, 1991, and 1992), however, postulate the view that that the FH evidence reflects imperfect integration of goods markets, rather than financial markets. A surprising finding in the literature is that developing countries have lower saving-

[8] See Summers (1988) for some numerical examples and a regression relating public-sector saving to private sector ones.

[9] Long term series of savings and investment can be biased upwards even in the presence of capital mobility if the economy satisfies the inter-temporal budget constraint.

investment results for many developing countries[10] contrary to the expected result in the FH hypothesis.

Although the saving-investment correlation analysis has some limitations as pointed out in some of the studies cited above, in the developing country case, it is more relevant as tests for equalization of rates of return as a measure of capital mobility are problematic. The price approach is intense in data requirements and studies need to focus on identical assets in different markets such as the on-shore and offshore price differential on a given asset and in practice such data are few even for the industrialized countries. In the developing country case, the problem is compounded by the fact that in many developing countries, interest rates are not market determined. There are problems in obtaining the expected exchange rates for uncovered interest parity test and even for the covered parity test there are not many countries where the forward rates are available. The existence of exchange restrictions gives rise to a black market in foreign currency where a sizable chunk of foreign exchange transactions takes place and a time series record of interest rates in this market are difficult to come by. Moreover, there are limited arbitrage opportunities for identical financial assets issued in different political jurisdictions. Even in the industrialized countries, arbitrage holds good only for a limited number of internationally traded assets. Taylor (1996) provides the additional justification for using the FH saving-investment correlation as an indicator of capital mobility as it is based on economic theory namely, whether shocks to investment are adequately smoothed away, that is to say that international risk sharing works smoothly.[11]

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[10] See Montiel (1993) and Mamingi (1993)

[11] Presumptions on consumption smoothing can be tested by looking at quantity data on consumption and income across time to see whether shocks to income are adequately smoothed away, that is to say international risk sharing works smoothly. Income minus consumption is saving which is used in the literature to ask a different question i.e., whether shocks to investment are constrained by local supply are or met by the global pool of capital.

Montiel (1993) and Mamingi (1993) report that middle-income developing countries have generally lower saving-investment correlation than the results reported for the advanced industrialized countries in the literature. The results are somewhat surprising as many of the countries in the sample had restrictions on their capital account. In the developing economy context, the saving-investment relationship is useful in examining whether unrecorded capital flows influence saving-investment correlation in developing countries. It is assumed that in many developing countries with exchange restrictions, unrecorded capital inflows and outflows perform arbitrage operations. The covered and uncovered interest parity criterion cannot be applied, as for many of such transactions identical assets are difficult to identify and interest rates on such transactions are difficult to come by.

In this paper the saving-investment relationship is re-examined for a sample of 61 developing countries.[12] A time series approach is adopted.[13] This paper extends the analysis in Montiel (1993) and Mamingi (1993) by examining the savings-investment correlations in developing countries based on modern macroeconomic theory, which analyses the saving-investment relationship in an inter-temporal approach to the current account. The short run and long run dynamics of the saving investment relationship are estimated in an error correction model because the procedure enables us to capture the dynamics of the saving-investment relationship and the current account. The basic message of this class of models is that savings and investment will necessarily be highly correlated because of the inter-temporal budget constraint. A further extension of this line of thought is that a non-stationary

[12] See Table 1 for the list of countries.

[13] Grundlach and Sinn (1992) point out to some of the flaws with cross-section analysis of savings and investment. The key question of how much of an increase in saving truly ends up in investment is difficult to comprehend when capital mobility estimates are arrived at a point of time. Moreover, it is difficult to assume that capital mobility in different countries is effectively equal.

current account and low saving-invest correlations are evidence of capital mobility. The issue examined is whether a high coefficient in developing countries is accompanied by current account stationarity since the stationarity of the current account drives the savings and investment rates together. Conversely, it is examined whether lower saving-investment correlations in developing countries are accompanied by current account non-stationarity, both of which are indicators of capital mobility. The Indian case study is used to examine why saving-investment correlations are lower for developing countries by exploring the role of unrecorded capital flows. The paper also provides an example of the quality of data that can affect the assessment of capital mobility. The Indian case study demonstrates that a change in data set can give completely different results.

The remainder of the paper is thus organized as follows:

Section II describes the national income accounting identity for an open economy to outline the FH approach. The accounting is further used as a basis to analyze how unrecorded capital flows can affect the relationship between savings and investment. The last part of this section outlines a modern macroeconomic approach to the saving investment relationship based on the intertemporal approach to the current account. Section III presents a time series analysis of the saving-investment correlation for a large sample of developing countries. Time series properties of the data are tested using unit root tests and cointegration tests to make a case for using an error correction model. Results are presented for an error correction model, which captures the short-run and long run relationship between savings and investment and enables interpretations based on the dynamics of the saving investment

relationship and the current account. In Section IV, the Indian case is analyzed. The Indian case is used to explore the role of unrecorded capital flows in explaining the case of a low saving-investment correlation in a developing economy. The paper's main conclusions are summarized in section V.

II SAVING-INVESTMENT CORRELATION AND CAPITAL MOBILITY

An analysis of saving-investment relationship is closely tied to an analysis of capital flows by means of the saving-investment identity. The familiar open economy national income and balance of payments accounting identities are presented here to establish this relationship. Gross domestic product (GDP) is given by

$$GDP = C + I + G + (X-M)$$

If the country' net credit position vis-à-vis the rest of the world is B (-B), and these claims (debts) earn (pay) a world interest rate r, then gross national product GNP is GDP plus (minus) this net factor income from (to) the rest of the world.

$$GNP = Y = C + I + G + (X-M) + rB$$

Rearranging this equation, it is easy to show that the current account is equal to the difference between savings and investment.

$$CA \equiv (X - M) + rB = (Y - C - G) - I = S - I$$

Where $S \equiv Y - C - G$ is gross national saving. It is thus equal to the sum of private saving $S_{priv} = Y - T - C$ and public saving $= T - G$, where T is tax revenue.

In an economy closed to international capital movements, total national saving is equal to total national investment, and in this the current account is zero. For an economy open to external asset trade, savings and investment need not coincide. For example, if there is an excess of domestic savings over domestic investment, the economy is running a current account surplus and accumulating net claims on the rest of the world's future output. Feldstein and Horioka paradox are based on the contention that in a world of capital mobility, movements in savings and investments would be uncorrelated. According to them, " With perfect capital mobility, there should be no relation between domestic savings and investment: saving in each country responds to the worldwide opportunities for investment while investment in that country is financed by the worldwide pool of capital." (Feldstein and Horioka (1980), p.317).

The relationship between saving-investment correlations and unrecorded capital flows

The interpretation of the saving-investment relationship has to be modified to take into account the occurrence of unrecorded capital flows in many developing countries. It is suggested in this section that instances of unrecorded capital outflows leads to under-reported savings data resulting in low saving-investment correlations. An unrecorded capital inflow, which translates into savings, would lead to a higher coefficient. Unrecorded capital flows affect both the current and capital account. The capital account is mis-reported by the amount of capital flight that has taken place. An understated capital account shows up in the current account through investment income receipts on capital flight. Capital flight through misinvoicing of trade data would effect the current account figures. If misinvoicing of trade data is a regular feature, the current account plus investment measure of savings would

reflect a lower level of savings. A current account corrected for misinvoicing would lead to a higher measure of savings and higher saving-investment correlations.

The current account is defined as

$$CA = (X-M) + rB$$

In the above equation the current account is affected through misinvoicing of exports and imports which affect X and M and also through the occurrence of capital flight through other channels affecting both B and the interest income on B.

The dynamic structure of the current account and the credit position is given by the equality of the current account and the capital account (KA) so that

$$B_{t+1} - B_t \equiv KA_t = CA_t$$

Capital flight through misinvoicing and other channels thus affects both the current and capital account through the under-reported stocks of assets that are lost through capital flight. In terms of saving investment correlations then, loss of capital through capital flight would lead to lower saving investment correlations.

The intertemporal approach to the current account and saving-investment correlation

The FH hypothesis is based on national income accounting identities. The analysis of the saving-investment relationship in an open economy macroeconomics framework can improve our understanding of the saving-investment relationship and the interpretation of results for capital mobility. In different variants of intertemporal general equilibrium models of the open economy agents maximize (expected) lifetime utility subject to the intertemporal budget constraint. In a world with capital mobility, agents smoothen consumption by accessing international capital markets. Growth in this class of models can occur because of

both population growth and technological progress, in which case long run saving and investment may differ by a constant, which is a function of the various model parameters.[14] The basic message in this approach is that the external budget constraint implies that in the long run annual current account balances add up to zero. This is also intuitively appealing because for reasons of solvency, governments should avoid indefinitely large international debt positions.[15]

The inter-temporal budget constraint thus imposes stationarity of the current account in the long run that keeps savings and investment rates together. A high coefficient in this analysis is indicative of the intertemporal budget constraint being satisfied and may be consistent with capital mobility.[16] If the current account is a stationary variable around a non-zero mean, then saving and investment are cointegrated.[17] The original FH contention that in a world of capital mobility there should be practically no relationship between a country's domestic investment and its domestic saving is inconsistent with the inter-temporal approach to the current account. FH's analysis in terms of accounting identities interprets high saving investment correlations as indicative of low capital mobility. Modern macroeconomics provides an alternative explanation for this empirical regularity and treats saving-investment dynamics as temporary phenomenon.

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[14] An exposition of intertemporal general equilibrium models is to be found in Blanchard and Fischer (1989). The implications of the inter-temporal model of the current account and saving-investment relationship are analyzed in Sachs (1981) and Obstfeld and Rogoff (1995 and 1996).

[15] At a point of time different countries will be in different half cycles of the current account and therefore for some the current account may be non-stationary. However, non-stationarity of the current account on a permanent basis is only compatible with the inter-temporal budget constraint when there is growth so that interest payments are less or equal to the rate of growth. In the case of developing countries this may not be possible because of the confidence factor. A current account, which is non-stationary on a sustained basis, is indicative of solvency problems in developing countries.

[16] Effective capital controls will reinforce the effect of the intertemporal budget constraint on the stationarity of the current account.

[17] See Jansen and Schulze (1996), Jansen (1996 and 1996a), Coakley, Kulasi, and Smith (1995).

Jansen (1996) points out that since international macroeconomic models typically analyze the behavior of a small single open economy over time, their implications refer to saving-investment correlation that is estimated in a time-series framework. He suggests an error correction model, which is as an attractive statistical representation of saving-investment dynamics, because it is compatible with the results, derived above. The specification of the error correction model takes the form

$$\Delta I/Y_t = \alpha_{ECM} + \beta_{ECM} \Delta S/Y_t + \gamma_{ECM} (S/Y_{t-1} - I/Y_{t-1}) + \delta_{ECM} S/Y_{t-1} + \epsilon_t$$

Where t is a time index. β_{ECM} is a summary statistic of the dynamic properties of the economy as it represents the average contemporaneous comovement of saving and investment in response to shocks, which have hit the economy in the past.[18] Finn (1990) and Tesar (1991) point out that in the short run, all kinds of disturbances can push the system out of equilibrium. Thus short run saving investment correlations maybe positive, negative or zero depending on the size and structure of the economy and the nature of shock. β_{ECM} captures the short-run S-I correlation and shows which part of the increase in savings is at home.

The error correction term $S/Y_{t-1} - I/Y_{t-1}$ captures the long-term relationship between savings and investment. If the coefficient γ_{ECM} is positive, then savings and investment are cointegrated.[19] If $\gamma_{ECM} = 0$, it means that savings and investment are not co-integrated and this constitutes evidence of capital mobility. β_{ECM} then becomes irrelevant.

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[18] Theoretical models need to explain this. See Obstfeld (1986), Baxter and Crucini (1993), Ghosh and Pesenti (1994) and Jansen (1996).

[19] Kremers et al. (1992) show that the t- statistic for γ_{ECM} is approximately normally distributed under the null hypothesis of no co-integration. They show that this co-integration test has more power than the Engel-Granger test.

The long run or cointegrating relation between the saving and investment relation is

$$\alpha_{ECM} + \gamma_{ECM} (S/Y\text{-}I/Y)^* + \delta_{ECM} S/Y^* = 0$$ [20]

where asterisk denote long run values.

If δ_{ECM} is zero, the current account (S/Y – I/Y) time series is stationary around - $\alpha_{ECM} / \gamma_{ECM}$ in the long run and the cointegrating vector is $(1, -1)'$. If $\alpha_{ECM} = \delta_{ECM} = 0$, it fluctuates around zero. However, if the current account is a non-stationary variable the cointegrating vector is $(1 + \delta_{ECM}/\gamma_{ECM}, -1)'$.

In the case of capital immobility or closed economy framework, we expect high values for β_{ECM} and γ_{ECM} and a zero value for α_{ECM} and δ_{ECM}. If the economy is open, one expects β_{ECM} to take on a low value, while we expect γ_{ECM} to be positive or negative (negative means no cointegration and is interpreted as reflecting capital mobility) and δ_{ECM} to be negative. Difference in structures in the sample countries and differences in economic policies should give different values of all the coefficients across countries. In the case of a stationary current account, the long run coefficient cannot be used to gauge capital mobility, as a high saving-investment correlation is compatible with capital mobility. Jansen (1986) points out to the asymmetric interpretation of the coefficient $\beta_{ECM.}$ Regardless of the size and nature of the shocks, limited capital mobility pins down this coefficient to a high positive value, although they are not the only reasons causing co-movements in savings and investment. A high estimate of β_{ECM} conveys no convincing information about capital mobility.

[20] This is equivalent to the original FH specification applied to time series data.

A low estimate of β_{ECM} clearly conveys information about capital mobility because it can be generated in models if capital is sufficiently mobile. Thus high short-term coefficients provide inconclusive evidence on capital mobility, but low coefficients are evidence of capital mobility. Bayoumi (1990), Feldstein and Bacchetta (1991), Leachman (1991), Montiel (1993) and Mamingi (1993) report results based on this parameter.[21] The results show considerable differences across countries.

Jansen (1996 and 1996a) point that the time series version of the original FH estimating equation in terms of levels of saving and investment is conceptually comparable to a long-run relationship. It is also the first step of the two stage Engle-Granger procedure, estimated by Leachamn (1991) and De Haan and Siermann (1994). Jansen (1996) expects this coefficient to be close to one and unfit as an indicator of capital mobility. The error correction specification used by Bayoumi (1990) and others is conceptually equivalent to the equation from Jansen (1996) adopted for this study with the restriction $\gamma_{ECM} = 0$. Their specification has no long-term solution and is subject to specification errors if $\gamma_{ECM} \neq 0$.

Jansen (1996) applied the ECM procedure to 23 OECD countries for the period 1952-91. He finds that generally savings and investment are co-integrated in such a way that the current account is a stationary variable. Grundlach and Sinn (1992) analyze time series data and reject a non-stationary current account for most OECD countries excepting Germany, Japan and the United States. Taylor (1996) analyzes historical data series for a sample of 12 countries, which include Germany, Japan and the United States, and establishes current account stationarity for the entire sample. The differences of this study with Grundlach and Sinn (1992) is probably because Taylor (1996) utilizes a longer time series with data going as

[21] $\Delta I/GDP_t = \alpha + \beta \Delta S/GDP_t + \in_t$

far back as the 1850s. These findings are consistent with the empirical finding of high saving-investment correlation for the industrialized countries.

In the next section, a large sample of developing countries is used to test the long-term relationship between savings and investment and the dynamics of savings, investment and the current account in developing countries.

III EMPIRICAL ANALYSIS OF SAVING-INVESTMENT CORRELATION AND THE CURRENT ACCOUNT FOR DEVELOPING COUNTRIES

Following FH (1980), many studies[22] examined the industrial country case and replicated the high saving-investment coefficient for industrialized countries using mainly cross-section data from the OECD countries.[23] Dooley, Frankel and Mathieson (1986) and Summers (1988), however, included a number of developing countries in their cross-section samples and found that the inclusion of developing countries reduced the strength of the saving-investment correlation. Later Wong (1990), Montiel (1993) and Mamingi (1993)[24]

[22] See for example, Penati and Dooley (1984), Murphy (1984), Feldstein and Bachetta (1990), Bayoumi (1990), and Tesar (1991).

[23] Although similar results were reported in all these studies, there was is no consensus in the literature on the interpretation of these results. The various problems in interpretation include sample bias, endogeneity of saving, capital controls, fiscal policy, country size, productivity shocks and lack of integration of goods markets. See Tesar (1991) for a discussion of different arguments.

[24] Wong utilizes a cross-section approach whereas; Montiel and Mamingi carry out a time series analysis. For Wong's full sample of 45 countries for the period 1975-81 and annual data, the saving ratio has no statistically significant effect on the investment ratio. When five countries were dropped, the coefficient took the value 0.6, indicating a lower coefficient compared to the industrialized countries.

validated that many developing countries had lower saving-investment coefficients compared to the industrialized countries. The result is indeed surprising, because according to the FH criterion, this would indicate capital mobility.

Several explanations have been advanced in the literature to explain the levels in coefficients and the differences across countries. Wong (1990) found that countries with a lower import-GDP ratio exhibited a higher value of beta, a finding consistent with Frankel (1985) interpretation that a high coefficient reflects lack of integration of goods markets. (1993) Goldstein and Mussa (1993) show that some developing countries, with less diversified production and export structures such as oil exporting countries, will find it useful to invest their savings abroad. The correlation in their estimates is consistently lower for fuel exporters compared to non-fuel exporters. The correlations are particularly low in the sub-periods 1974-76 and 1980-82 following the increase in oil prices and export earnings. Murphy (1984) shows that country size matters. Small countries are expected to have lower correlations as they are less diversified and depend on capital inflows to offset domestic shocks. A country that is large in world financial markets is in a position to influence world interest rates and a dip in its saving will raise the world interest rate and lower domestic and world investment. Feldstein and Horioka (1980) and Tesar (1991) find that country size does not matter enough to alter the basic empirical regularities. Vos (1987) makes a distinction between private and official borrowers. Contrary to expectations, Vos (1987) found that the correlations are higher for private borrowers and the highest in the 1973-79 period.

This paper provides two additional arguments why this coefficient may be low. The first relates to the presence of unrecorded capital flows in many developing countries. The occurrence of capital flight and misinvoicing of trade data indicate the possibility of

international arbitrage operations through unrecorded remittances and receipts[25] explaining the low correlation between savings and investment in some developing countries. This proposition is analyzed using the data for India. Another explanation is based on the inter-temporal approach to the current account. If the current account is stationary, then a high savings-investment coefficient is expected. Conversely, non-stationarity of the current account then is identified with low saving investment correlations.

The time series properties of the savings and investment series are checked out before analyzing the saving-investment relationship. Dickey-Fuller tests for stationarity are used to check the stationarity of the time series of savings and investment. In a sample of 61 developing countries, savings and investment series for many countries are non-stationary and integrated to the order of one. Where they are integrated of different orders they are dropped from the data sample.[26] (The results are reported in Table 2 in the appendix). The finding that savings and investment series are non-stationary is not surprising. Taylor (1996) recognizes that the notion of shifts in savings and investment is an important feature of growth and structural shifts in the long run. He points to episodes from history to illustrate this notion and points to it as the key transition at the heart of the development process in Arthur Lewis's analysis. For non-stationary series, the OLS regression of investment on savings is improperly specified unless the saving-investment series are co-integrated so that

[25] Haque and Montiel (1991) and Ghosh and Ostry (1995) refer to the occurrence of capital flight as an indicator of financial integration but do not explicitly incorporate it in their tests of capital mobility. These studies do not analyze the occurrence of capital flight in the context of saving-investment correlations.

[26] Brazil, Colombia, Costa Rica, Jamaica, Paraguay, Sri Lanka, Nepal, India (WDI), Indonesia (WDI), Tonga, Tunisia, Israel, Burundi, Rwanda, Cameroon, Gambia, Lesotho, Niger, Nigeria, Mali, Malta, Mauritius, Morroco, Senegal and Togo are dropped from the sample because the series are not integrated of the same order. India and Indonesia are then given up for further analysis in the World Bank data set, and results for India and Indonesia are examined with the IFS data set in which both the series are integrated of the same order. Results for Chile, Mexico, Korea, Malaysia and the Philippines are presented for both data sets for purposes of comparision.

the error term is μ_{it} is still a stationary I (0) series. In the absence of co-integration, the OLS results are spurious (see Granger and Newbold (1974)). The estimated residual term in the OLS equation was tested for stationarity using the Phillips-Perron test and it was confirmed that it is stationary for all countries except Indonesia (IFS) and Ghana. The presence of cointegration establishes the existence of a long-term equilibrium relationship between savings and investment. The presence of cointegration also allows examination of the short-run and long adjustment dynamics of savings and investment in an error correction model as shown by the Engle-Granger (1987) result.[27]

Results for 38 developing countries based on ordinary least squares for the FH test are reported in column (2) table 3. In line with the findings of other studies, this paper also confirms the finding that developing countries generally have lower saving investment correlations compared to industrialized countries. Judging by the FH criterion, a coefficient of 0.6 derived by Murphy (1984) as well as by Caprio and Howard (1984) as a benchmark, countries can be considered as having capital mobility when the coefficient is below 0.6 and immobile when the coefficient is above 0.6. One of the reasons for high coefficients in the industrialized country case was the endogenity of savings in the OLS regressions. We now correct these results for endogenity. The same instrumental variables as in Montiel (1993) – the share of government consumption in GNP and one minus the population dependency ratio. The use of instrumental variables improves the S-I correlation for some countries. A possible reason for this improvement could be that developing country macro data is considered poorer than that of the industrialized countries and since savings data are

[27] The cointegration approach to the original FH (1980) estimating equation has been discussed in the literature in Miller (1988), Leachman (1991), Jansen and Schulze (1996). The time series used here has 28 observations which is a small sample for the co-integration test and the results may be weak. The co-integration results were further confirmed with the ECM model.

calculated as a residual, savings ratios are probably poor approximations of their true values. This error-in variables has partly been taken care of by using instrumental variables and minimizing the negative correlation between the savings ratio and the error term. The problem with the savings data in developing countries is taken up in more detail with the example of India in the next section. Serial correlation is corrected by adding AR terms to the equation.[28] The corrected coefficients are reported in column (5) table 3. The refinements carried out do not change the results for majority of the countries. For some there is a small change in the coefficient for some a large. However, judging by the benchmark of 0.6, the results change from mobility to immobility only for Congo, Gabon, Zambia and Mauritania. The correlation coefficient becomes insignificant for 15 countries.[29]

Non-market flows might be a possible reason for a low coefficient. This would be the case if aid flows affected the savings rate, particularly if receipt of aid was adding more to consumption and reducing the saving rate. However, if non-market foreign assistance adds to domestic investment, it is orthogonal to savings in the estimating equation and would not affect the savings-investment correlation. The estimated relationship in this case still serves as an indicator of capital mobility. The hypothesis that non-market flows drive the coefficient down but do not indicate capital mobility because it does not represent trade in financial assets is tested out by adding net financial (disbursements minus repayments) received from multi-lateral and bi-lateral creditors to gross national savings. Regression are run for levels, the ECM model (the results for which are discussed with other ECM results) and instrumental variables to take care of endogenity. The results are mixed. See column (2)

[28] See Fair (1984), p. 210-214.

[29] The countries are Algeria, Benin, Central African Republic, Cote d' Ivorie, Ecuador, Egypt, Ghana, Indonesia(IFS), Madagascar, Malaysia(IFS and WDI), Mexico(IFS and WDI), Pakistan, Trinidad and Tobago, Uganda and Zimbabwe.

table 4. In Korea, Malaysia, Algeria and Cote d' Ivorie the coefficient moves from below the benchmark of 0.6 to above the benchmark. For some countries, the coefficient actually goes down further. In cases where it goes up it does not change the interpretation of capital mobility to immobility for the other countries except the four mentioned above. The fact that the coefficient is still low for many countries indicates that the savings-investment coefficient is low because of other sources of finance, which is then indicative of capital mobility. The coefficient becomes insignificant for 12 countries.[30]

In the empirical exercise the estimating equation was also checked for structural breaks in 1991 for increase in private capital flows in some countries and 1983-89 for declines in international lending using the Chow test. In the OLS equation no structural breaks were found. The coefficients in the second sub-period were insignificant for many countries probably due to the small number of observations leading to the lack of evidence on structural breaks. Where significant the coefficient is lower in the second sub period in many countries but not significant enough to cause a structural break. The Chow-forecast test was also tried but this did not improve results.[31]

The stationarity test findings of the current account and the long-term relation between savings and investment are summarized in Table 3. In Argentina, Chile, Honduras, Venezuela, Guatemala, Peru, Algeria, China, Indonesia, Thailand and Turkey high saving-investment correlation estimated with the OLS procedure are associated with a stationary current account. In Mexico, India, S. Korea, Benin, Egypt, Central African Republic, Gabon,

[30] The countries are Benin, Central African Republic, Dominican Republic, Ecuador, Egypt, Ghana, Guatemala, Indonesia(IFS), Madagascar, Mexico(IFS and WDI), Uganda, Zimbabwe

[31] The results are not reported in the paper due to their insignificance.

Uganda, Madagascar, Cote de Ivorie, Mauritania, Haiti and Trinidad and Tobago a low S-I correlation is accompanied with a non-stationary current account. For the remainder of the sample no clear relationship can be seen between the S-I correlation and current account stationarity. This might be due to the quality of data for these countries or the quality of the stationarity test for the current account. This point is further examined in the context of the ECM model. The finding that some countries have stationary current accounts and others non-stationary is not surprising as countries are in different half-cycles of the current account.

Savings-investment correlations are stylized facts. They are best estimated by an ECM procedure, as it is consistent with the inter-temporal general equilibrium model. The results of the error correction model are presented in Table 3. The long run coefficient γ_{ECM} is positive in all the countries in the sample except for Algeria, Uganda, and Ghana. The finding that the two series are cointegrated is consistent with the finding of the Phillips-Perron test except for Algeria, Uganda and Indonesia. A low value for γ_{ECM} indicates weak cointegration. As expected the values of β_{ECM}, and γ_{ECM} vary across countries indicating the differences in economic structures and policies. α_{ECM} is low for almost all countries. Where α_{ECM} is insignificant it is accompanied by high values of β_{ECM}, and γ_{ECM} and $\delta_{ECM}=0$ only for China which one would infer as indicating a closed economy. β_{ECM} is capturing the short-term dynamics of the saving-investment relationship and besides capital mobility captures factors such as productivity shocks and external shocks causing co-movement in the saving-investment relationship. For many countries even when α_{ECM} is insignificant, values of β_{ECM} and γ_{ECM} are not high. We thus conclude looking at values of α_{ECM}, β_{ECM}, and γ_{ECM} and δ_{ECM} that many countries in the sample may not be closed economies.

The ECM approach adopted helps to separate the short-term from the long-term dynamics of the saving investment relationship and relate it to the dynamics of the current account. In the case of low short-term coefficients, the ECM estimation procedure allows interpretations for capital mobility. A low short-term coefficient combined with a non-stationary current account is taken as evidence on capital mobility. Absence of cointegration would also imply capital mobility in the FH sense. Table 5 summarizes the interpretations of the empirical exercise. Evidence of capital immobility is found only in China. For 20 countries in the sample low short term coefficients are accompanied by a non-stationary current account indicating capital mobility. We cannot find any conclusive evidence of capital mobility for the remaining countries.

The ECM model was also run by using savings plus net public and publicly guaranteed debt as the explanatory variable to take care of the argument that low coefficients may be because of non-market flows of capital in developing countries. Our findings show (see table 4) that it is only in the case of Turkey and the Philippines that β_{ECM} changes enough to change the interpretation of mobility to immobility. In the case of Algeria there is a large movement but it does not change the interpretation. The parameter γ_{ECM} becomes insignificant for Malaysia and Indonesia showing lack of co-integration and indicative of capital mobility. The coefficient for Pakistan was earlier significant at 10 percent now becomes insignificant. The coefficient δ_{ECM} which was earlier insignificant for Guatemala, Haiti, Mexico (IFS), Peru, China, Philippines (IFS), Thailand, Kenya, Madagascar, Cote d' Ivorie and Trinidad and Tobago now becomes significant. For Egypt all coefficients are insignificant. The coefficient now gives results consistent with theory for 9 of these

countries. The countries which remain out of these in the conclusive evidence category are China, Philippines (IFS) and Thailand. China now moves out of the conclusive category for capital immobility and is replaced by Turkey. For all other countries in the sample the results are consistent with the earlier ECM estimates.

The ECM model adopted helps to deal with some of the criticism of S-I correlations in the literature. The main criticisms are that productivity shocks, current account targeting and external shocks affect the saving investment correlation. This effect is captured with β_{ECM} and allows γ_{ECM} to be interpreted for the cointegrating relationship. The analysis in the preceding paragraphs shows that the FH hypothesis that a high S-I correlation derived from a regression of levels of investment on levels of savings indicates capital mobility is not the only explanation for the relationship. The cointegration of a single country's savings and investment in a time series captures one relationship that is related to capital mobility and one that is not.

IV CASE STUDY : INDIA

India has had controls on the movement of capital. It is only in the 1990s that partial liberalization of the capital account allowed foreign institutional investors to invest in India. Non-resident Indians have had access to deposits in the banking system for a long time. For all practical policy making, the Indian economy was treated as a closed economy prior to 1991. Since 1991 India has been a recipient of private capital flows. Stringent controls on private capital outflows still exist.

The FH hypothesis was tested for India for two time periods: 1970-1990 and 1970-97.

The following results were obtained:[32]

Period 1970-90:

$I/Y = .06\ (1.89) + 0.82\ (4.97)\ S/Y \qquad R^2 = .52$

Period 1970-1997:

$I/Y = 0.14\ (5.17) + 0.38\ (3.01)\ S/Y \qquad R^2 = .67$

A Chow test was performed for a structural break in 1991. The test did not indicate a structural break. The time series properties of the savings investment series showed that they are integrated to the order of one (See Table 2 in appendix). A cointegration test was performed using Dickey-Fuller test and Davidson and Mckinnon (1993) tables show that the series are cointegrated at one-percent level of significance. This establishes that the regressions presented above can be interpreted even if the saving and time series are non-stationary.[33] It confirms that there is a long-term relationship between savings and investment in India. Judging by the benchmark 0.6 coefficient to decide between capital mobility and immobility, the results for India indicate that it has been a fairly open economy. The ECM model for India also confirms the existence of co-integration and non-stationarity of the current account. Non-stationarity of the current account and a low β_{ECM} is indicative of capital mobility. The hypothesis that non-market flows of capital from abroad may be responsible for driving the saving-investment coefficient down was rejected both in the OLS and ECM estimating procedure. Since capital controls should have led to a higher coefficient for savings and investment, India is an interesting case study to explore the hypothesis that unrecorded capital flows can perform arbitrage operations between domestic and foreign financial assets.

[32] The OLS results reported are corrected for endogenity and autocorrelation.
[33] See Pearman (1991) and Gujarati (1995)

Before we proceed further we need to discuss some of the data problems pertaining to the savings series for India. Earlier Montiel (1993) and Mamingi (1993) found very high coefficients for India, which were interpreted as capital immobility. A time series analysis of the World Bank data set for India showed that the series are integrated of different orders and therefore the results obtained by Montiel and Mamingi are spurious. Gross domestic savings were then calculated from the IFS data as Y-C-G[34]. A time series analysis based on IFS data showed that the series were integrated of the same order and cointegrated at one- percent level of significance. On closer examination it was found that there are large differences between the data on private consumption in the World Bank and IFS series. On comparing the World Bank data to the Economic Survey and Central Statistical Organization data in India it was found that the series are comparable. Several papers have appeared arguing that the savings data in India has error components. Loayza (1996) points out that the aggregate domestic saving in India is obtained by adding up public saving, corporate saving, household financial saving, and household physical saving. The RBI estimates both the accumulation of financial assets by households and corporate saving. The estimate of corporate saving and investment is based on a small and potentially biased sample of balance sheets, provided voluntarily by their respective corporations. The CSO obtains its estimate of household saving by setting it equal to the estimated household investment. In theory, total investment should be equal to the sum of aggregate domestic savings and net capital inflows. When a statistical discrepancy arises, the CSO takes domestic and foreign savings as the controlling

[34] Recently Baxter and Crucini (1998) argue for a basic measure of national saving using national output minus private and government consumption.

total and adjusts the initial estimate of investment to eliminate the statistical discrepancy. This error and omission item has averaged in absolute value 1 % of GDP and has been as large as 2 % of GDP in the period 1950-1995. This methodology is generally regarded as unsatisfactory. Goyal (1996) points that there are problems of both measurement and theory. One view in India is that measured savings are an underestimate. See for example Economic Survey (1994-95) and Athukorala and Sen (1995). The other view is in Economic and Political Weekly Research Foundation (1995) where the argument is on the other extreme that measured savings may well have decelerated, but are still an overestimate. Loayza and Shankar (1998) take into account the redistribution of wealth from the public to the private sector due to erosion because of inflation in the value of public debt held by the private sector. Their findings show that this correction is sizeable -- adjusted public saving as a ratio to gross national disposable income increased by three points while the corresponding unadjusted figure rose by about half as much over the long period 1960-94. The adjusted figures for private saving show a steady increase in the entire period except between 1974-82 and 1983-91 when it remained stable. The unadjusted figures for private savings show a sharper increase. Because of these criticisms of national data sources, the IFS series is adopted for this study. Economic theory also guides to the IFS series as a more plausible series. The analysis carried out in the previous section showed that the Indian current account is non-stationary. The IFS data gives a low savings-investment correlation, which is more in line with a non-stationary current account. It is for this reason too that the IFS data set appears more plausible.[35]

[35] See Table 6 for results based on World Bank, IMF and Economic Survey data set. The estimates gross national savings using the IMF data set may also be subject to measurement errors but as stated earlier it appears more plausible.

According to the national income accounting identities set out in section II, the savings-investment gap should result in a current account deficit. In the Indian case, a structural break is identified in the years 1976-79 when a savings-investment gap is accompanied by a current account surplus. A second structural break is identified in 1990 wherefore an excess of savings over investment is not reflected in a current account surplus. These two structural breaks run counter to our understanding of the savings-investment and current account relationship. (See Graph 1).[36] The current account surplus in the first subset is indeed surprising as many oil importing developing countries were running current account deficits in response to the oil price shock in 1973/74. India is a major oil importer. India was extremely fortuitous to have an exogenous improvement in its balance on the current account because of the surge in workers remittances from abroad because of labor migration to the Middle East. Graph 2[37] shows the India case with current account net of workers remittances. The current account surplus is now in 1976 and 1977. It disappears after 1977.

It is argued here that the behavior of the current account net of workers remittances can be explained with yet another exogenous shock to the Indian economy in the form of the imposition of emergency in mid-1975. The declining black market premium starts rising in 1975 again probably due to the difficulty in conducting black market transactions.(Graph 3). It is also conceivable that the drive against corruption and black marketing had their impact on the illegal trade in goods and capital and led these transactions to be recorded in the legal account. This is possibly the reason why the current account posts a surplus, inspite of the saving-investments gap. In the post-liberalization period, repatriation of past capital flight is

[36] The Economic Survey data provides no major inconsistency between the savings-investment gap and the current account. It is quite possible that the series have been reconciled in the published data. See graph 4.

[37] See graphs 2 and 3.

the likely explanation of the excess of savings over investment and a possible explanation for the current account deficit.

It can be assumed that the fear psychosis generated by the emergency period led to a cessation of illegal trade and illegal capital flows so that the current account in the period 1975-77 reflects an improvement in the reported current account. This is indirect evidence based on the relationship between the savings investment gap and the current account that unrecorded trade and capital flows perform arbitrage operations inspite of controls. Illegal trade[38] leads to a better integration of goods markets. Testing goods market integration with reported data may possibly give other results indicating lack of integration because a sizeable chunk of international trade is carried out illegally.

The other anomaly identified in Graph 1 and 2 is the post 1990 period. The excess of savings over investment should have reflected a current account surplus. Estimates of misinvoicing and the broad measure of capital flight show that repatriation of past capital flight occurred in most of these years.[39] These series do not necessarily pick up all the flight capital that has been repatriated but they are indicative of the occurrence of the phenomenon. Repatriation of past capital flight is also experienced because of financial sector reforms in India since 1991. The return of capital or decline in illegal gold imports (after liberalization) is not captured in the capital account and current account. Earlier capital left the country illegally to finance the illegal gold imports. It is possible that the repatriation of past capital

[38] Taneja (1999) documents some point estimates of the illegal trade of India in the region.

[39] The broad measure of capital flight is estimated by comparing the sources and uses of finance in the balance of payments accounts. The residual obtained is measured as capital flight. The estimates are in millions of US dollars. A minus sign indicates capital flight repatriation.

	1989	1990	1991	1992	1993	1994	1995	1996
CAPFL	11,674	3106	-5353	-2549	-1248	-3391	-4202	-2002
MISINV	-5800	-275	-1432	103	-850	-110.7	NA	NA

flight is for gold consumption in India in the liberalized period. It is expected that if the unrecorded trade and capital flow could be correctly estimated, the true current account in India would tend toward an improvement or even a surplus. The anomaly in two time periods between the savings-investment gap and the current account is indicative of the porosity of capital controls.

The above discussion indicates that unrecorded movements of capital and goods have kept the Indian economy more open than is generally believed in. The error correction model results reported for India in the previous section and also tests on stationarity of the current account are all indicative of openness of the Indian economy.

V CONCLUSION

A surprising result for developing countries is that many developing countries have low saving-investment correlations compared to the OECD countries, which in the FH framework indicates capital mobility. In order to take care of the reasoning that non-market foreign borrowing may be driving the coefficient down, this variable was added to the savings series and the relationship between savings and investment was re-estimated both with the OLS estimating procedure and the ECM model. The results changed from mobility to immobility in the FH criterion only in the case of four countries. The ECM model results changed only in the case of Turkey and the Philippines. In some countries it improved the results and shifted some countries in the conclusive evidence category.

Taking into account some of the suggestions in the literature for the high correlations in industrial countries namely: the comovement in savings and investment due to productivity shocks, external factors or policy induced movements; this paper carries out the

analysis in an error correction model which separates the impact of these factors which affect short-term correlations from the long-term co-integrating relationship between savings and investment. The short-term coefficient is inadequate as a test of capital mobility if it is high as it captures the impact of temporary shocks. A low coefficient for the short-term parameter can only be generated if capital is sufficiently mobile. All the countries in the sample except Algeria, Indonesia, Ghana have positive long-run coefficients indicating a long run equilibrium relationship between savings and investment. A closed economy hypothesis is accepted for China. The findings of this paper are that for some countries a stationary current account is as predicted by theory, combined with high saving-investment correlations. An explanation advanced for the low S-I correlation in some developing countries in this paper is that the current account in these countries is non-stationary. Every individual country is in different phases of the current account half-cycle where as expected some have stationary and the others a non-stationary current account. As expected countries with non-stationary current accounts have low S-I correlations. In the case of perfect capital mobility FH expected no relationship between savings and investment. Because of the interplay of the intertemporal budget constraint and capital mobility it is difficult to assess the degree of capital mobility in the sample when the current account is stationary and the short-term coefficients high. Evidence of capital mobility as seen by low coefficients and current account non-stationarity are found in 20 countries.

An analysis of India shows that saving-investment correlation is low in the entire sample period combined with a non-stationary current account. The series are cointegrated judged by the stationarity in the residual term and a significant long-term coefficient in the ECM estimation procedure indicating that there is a long-term relationship between savings and investment. The

saving-investment correlation goes down further when the post-liberalization period is added to the sample. The explanation put forward for low coefficients for the Indian economy are that unrecorded capital flows performed arbitrage functions leading to low-saving investment coefficients. The non-stationarity of the current account also leads to low S-I correlations. This finding needs to be researched further to see if India is building up unsustainable debt positions leading to problems of solvency. In the Indian case the saving-investment gap and the current account analysis is applied to demonstrate that unrecorded capital flows push this coefficient down. Two time periods are identified in which the current account does not reflect even the direction of the savings-investment gap. The first period is the one following the emergency where one can assume that fear psychosis generated in the country led to unrecorded current account transactions showing up for the first time in the recorded data leading to a current account surplus. The second period is the post liberalization period where excess of savings over domestic investment do not get reflected in the current account as a surplus, because of unrecorded flows which are now being repatriated. Capital market reforms induce a shift in saver's portfolio from flight capital to domestically held asset because of the increase in financial intermediation efficiency.

The implications for policy making in India are that the recorded current account is a biased indicator of the net capital inflow. Liberalization policies leading to a lowering of tariffs and flexibility in capital account transactions to enable legal transfers for the already existing links with the outside world would reduce the incentive to evade official channels. The analysis of the saving-investment correlation with the current account in India reveal that capital has been mobile in India albeit through unofficial channels. This has bearing on macro policy. The effectiveness of the use of monetary policy in controlling aggregate demand is reduced and expansionary fiscal policy does not crowd out all private investment.

DATA NOTES

Two sources of data were compared for the series on gross domestic investment, gross domestic savings and the current account – data from the World Bank Indicators, The World Bank and the International Financial Statistics of the International Monetary Fund. Both these series are comparable for the sample test carried out for Chile, Mexico, the Philippines and Republic of Korea. The series on saving is, however, markedly different for India, Indonesia and Malaysia.

The results for all developing countries are based on data from the World Bank Indicators, the World Bank.

Exceptions are India and Indonesia. Results for these countries are reported in the main text based on IFS data. Results for S. Korea, Chile, Mexico Malaysia and the Philippines are reported on both sets of data.

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Table 1: List of Countries

Latin America and Caribbean
Argentina
Brazil
Chile
Colombia
Costa Rica
Dominican Republic
Ecuador
El Salvador
Guatemala
Haiti
Honduras
Jamaica
Mexico
Paraguay
Peru

South Asia
India
Nepal
Pakistan
Sri Lanka

East Asia and Pacific
China
Fiji
Indonesia
Korea, Republic of
Malaysia
Philippines
Thailand
Tonga

Rest of Europe
Malta
Turkey

North Africa
Algeria
Egypt
Morocco
Tunisia

Middle East
Israel

East and Southern Africa
Burundi
Kenya
Lesotho
Madagascar
Malawi
Mauritius
Rwanda
Uganda
Zambia
Zimbabwe

West Africa
Benin
Burkina Faso
Cameroon
Central African Republic
Congo
Cote d' Ivorie
Gabon
Gambia
Ghana
Mali
Mauritania
Niger
Nigeria
Senegal
Togo
Trinidad and Tobago

Table 2: Stationarity Test for Savings/GNP, Investment/GNP series and Cointegration Test (1970-1997)

LATIN AMERICA AND CARIBBEAN			
1	**2**	**3**	**4**
Country	**Savings (Level of Significance)**	**Investment (Level of Significance)**	**@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)**
Argentina	I(1) (5%)	I(1) (1%)	Co-integrated (1%)
Brazil	I(0) (1%)	I(1) (1%)	Co-integrated (5%)
Chile	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Chile #	I(1) (1%)	I(1) (1%)	Co-integrated (5%)
Colombia	I(1) (1%)	I(0) (1%)	Co-integrated (1%)
Costa Rica	I(1) (1%)	I(0) (5%)	Co-integrated 1%
Dominican Republic	I(0) (10%)	I(0) (5%)	Co-integrated (1%)
Ecuador	I(1) (1%)	I(1) (1%)	Co-integrated (5%)
El Salvador	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Guatemala	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Haiti	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Honduras	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Jamaica	I(1) (1%)	I(0) (10%)	Co-integrated (5%)
Mexico	I(1) (1%)	I(1) (1%)	Co-integrated (5%)
Mexico #	I(1) (1%)	I(1) (1%)	Co-integrated (5%)
Paraguay	I(0) (10%)	I(1) 1%	Co-integrated (5%)
Peru	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Venezuela	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
SOUTH ASIA			
Country	**Savings (Level of Significance)**	**Investment (Level of Significance)**	**@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)**
India	I(0) (5%)	I(1) (1%)	Co-integrated (10%)
India #	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Nepal	I(0) (5%)	I(1) (1%)	Co-integrated (1%)

Table 2 (contd.)

Country	Savings (Level of Significance)	Investment (Level of Significance)	@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)
Pakistan	I(1) (1%)	I(1) (1%)	Co-integrated (10%)
Sri Lanka	I(0) (10%)	I(1) (1%)	Co-integrated (10%)
EAST ASIA AND PACIFIC			
Country	**Savings (Level of Significance)**	**Investment (Level of Significance)**	**@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)**
China	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Fiji	I(1) (1%)	I(1) 1%	Co-integrated (5%)
Indonesia	I(0) (5%)	I(1) (1%)	Co-integrated (5%)
Indonesia #	I(1) (1%)	I(1) (1%)	Not Co-integrated
Korea, Republic of	I(1) (1%)	I(1) (1%)	Co-integrated (5%)
Korea, Republic of #	I(1) (1%)	I(1) (1%)	Co-integrated (5%)
Malaysia	I(1) (1%)	I(1) (5%)	Co-integrated (5%)
Malaysia #	I(1) (1%)	I(1) (1%)	Co-integrated (5%)
Philippines	I(1) (1%)	I(1) (5%)	Co-integrated (1%)
Philippines #	I(1) (1%)	I(1) (5%)	Co-integrated (5%)
Thailand	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Tonga	I(0) (1%)	I(1) (1%)	Not Co-integrated
REST OF EUROPE			
Country	**Savings (Level of Significance)**	**Investment (Level of Significance)**	**@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)**
Malta	I(1) (1%)	I(0) (1%)	Co-integrated (1%)
Turkey	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
NORTH AFRICA			
Country	**Savings (Level of Significance)**	**Investment (Level of Significance)**	**@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)**
Algeria	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Egypt	I(1) (1%)	I(1) (1%)	Co-integrated (10%)

Table 2 (contd.)

1	2	3	4
Country	**Savings (Level of Significance)**	**Investment (Level of Significance)**	**@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)**
Morocco	I(0) (1%)	I(1) (1%)	Co-integrated (1%)
Tunisia	I(0) (1%)	I(1) (1%)	Co-integrated (5%)
MIDDLE EAST			
Country	**Savings (Level of Significance)**	**Investment (Level of Significance)**	**@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)**
Israel	I(0) (1%)	I(1) 1%	Not Co-integrated
EAST AND SOUTHERN AFRICA			
Country	**Savings (Level of Significance)**	**Investment (Level of Significance)**	**@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)**
Burundi	I(0) (1%)	I(1) (1%)	Co-integrated (5%)
Kenya	I(0) (5%)	I(0) (5%)	Co-integrated (1%)
Lesotho	I(0) (10%)	I(1) (1%)	Co-integrated (1%)
Madagascar	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Malawi	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Mauritius	I(1) (1%)	I(0) (5%)	Co-integrated (1%)
Rwanda	I(0) (1%)	I(1) (1%)	Co-integrated (1%)
Uganda	I(1) (1%)	I(1) (5%)	Co-integrated (5%)
Zambia	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Zimbabwe	I(0) (10%)	I(0) (5%)	Co-integrated (1%)
WEST AFRICA			
Country	**Savings (Level of Significance)**	**Investment (Level of Significance)**	**@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)**
Benin	I(0) (1%)	I(0) (5%)	Co-integrated (1%)
Burkina Faso	I(0) (10%)	I(0) (5%)	Co-integrated (1%)
Cameroon	I(0) (1%)	I(1) (1%)	Co-integrated (5%)
Central African Republic	I(0) (5%)	I(0) (10%)	Co-integrated (5%)

Table 2 (contd.)

Country	Savings (Level of Significance)	Investment (Level of Significance)	@Phillips Perron Test of Stationarity on the Residual Term (Level of Significance)
Congo	I(1) (5%)	I(1) (1%)	Co-integrated (5%)
Cote d' Ivorie	I(1) (1%)	I(1) (5%)	Co-integrated (5%)
Gabon	I(1) (1%)	I(1) (1%)	Co-integrated (1%)
Gambia	I(0) (10%)	I(1) (1%)	Co-integrated (5%)
Ghana	I(1) (1%)	I(1) 1%	Not-Cointegrated
Mali	I(0) (5%)	I(1) (1%)	Co-integrated (10%)
Mauritania	I(0) (10%)	I(0) (10%)	Co-integrated (1%)
Niger	I(0) (5%)	I(1) (1%)	Co-integrated (1%)
Nigeria	I(1) (1%)	I(0) (5%)	Co-integrated (1%)
Senegal	I(0) (10%)	I(1) (1%)	Co-integrated (5%)
Togo	I(0) (10%)	I(1) (1%)	Co-integrated (1%)
Trinidad and Tobago	I(1) (1%)	I(1) (1%)	Co-integrated (5%)

Source: Estimates based on data from the IFS Yearbook, International Monetary Fund, 1998
@ The series was tested for cointegration by testing the residual term for stationarity applying the Augmented Dickey-Fuller tests. The results are consistent with the Phillips-Peron test results reported here.

Table 3 : Estimation results based on OLS and ECM Procedures and Phillips-Perron Test for Current Account Stationarity for 1970-1997

LATIN AMERICA AND CARIBBEAN											
	OLS Estimates			OLS_C				Error Correction Model			
1	2	3	4	5	6	7	8	9	10	11	12
Country	b_{OLS} (t-stat)	R^2	DW	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)	Current Account Stationary/Non-stationary
Argentina	0.73 (14.00)*	0.88	1.42	0.72 (11.68)*	0.92	1.82*	0.05 (2.90)*	0.60 (4.92)*	0.73 (3.73)*	-0.20 (-2.74)*	Stationary***
Chile	0.66 (9.92)*	0.79	1.21	0.70 (5.87)*	0.82	1.91*	0.06 (2.53)**	0.60 (6.53)*	0.61 (3.18)*	-0.17 (1.78)***	Stationary***
Chile #	0.67 (8.02)*	0.71	0.73	0.69 (4.92)*	0.83	2.02*	0.36 (1.76)***	0.63 (6.31)*	0.38 (2.40)**	-0.09 (-0.94)****	Stationary***
Dominican Republic	0.17 (2.04)**	0.14	1.30	0.42 (1.89)**	-0.16	1.62*	0.12 (3.14)*	0.07 (0.78)****	0.73 (4.16)*	-0.46 (-2.59)**	Stationary*
Ecuador	-0.19 (-1.77)***	0.11	0.65	0.06 (0.08)****	0.57	2.61*	0.10 (2.35)**	-0.31 (-2.92)*	0.35 (2.38)**	-0.44 (-2.29)**	Stationary*
El Salvador	0.34 (3.84)*	0.36	0.90	0.48 (2.85)*	0.53	1.96*	0.06 (2.63)*	0.20 (1.28)****	0.46 (2.73)*	-0.29 (-2.19)**	Stationary*
Guatemala	0.60 (4.31)*	0.42	1.21	0.54 (2.37)**	0.53	2.14*	0.05 (2.38)**	0.21 (0.86)****	0.60 (3.43)*	-0.17 (-1.20)****	Stationary*
Haiti	0.37 (4.74)*	0.46	1.52	0.56 (5.48)*	0.39	2.07*	0.04 (1.63)***	-0.05 (-0.47)****	0.31 (1.70)***	-0.18 (-1.55)***	Non-stationary
Honduras	0.95 (7.47)*	0.68	0.97	1.16 (3.99)*	0.74	1.38 *	0.04 (1.71)***	0.86 (4.92)*	0.51 (2.83)*	0.06 (0.48)****	Stationary**
Mexico	0.16 (1.33)****	0.06	0.86	0.06 (0.26)****	0.36	1.50*	0.08 (1.76)***	0.01 (0.05)****	0.37 (1.97)**	-0.32 (-1.69)***	Non-stationary
Mexico # (1970-1996)	0.25 (1.46)***	0.08	0.68	0.83 (0.66)****	0.26	1.56*	0.06 (1.35)****	0.22 (1.08)****	0.34 (2.13)**	-0.23 (-1.19)****	Non-stationary
Peru	0.63 (5.00)*	0.49	1.11	1.05 (2.04)**	0.38	1.81*	0.06 (2.10)**	0.42 (2.94)*	0.61 (3.75)*	-0.12 (-0.94)****	Stationary**
Venezuela	0.72 (4.18)*	0.40	1.20	0.75 (2.60)*	0.47	1.70*	-0.01 (-0.26)****	-0.10 (-0.44)****	0.51 (3.52)*	-0.04 (-0.26)****	Stationary**

Table 3 Contd.

SOUTH ASIA											
	OLS Estimates			OLS_C			Error Correction Model				
1	2	3	4	5	6	7	8	9	10	11	12
Country	b_{OLS} (t-stat)	R^2	DW	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)	Current Account Stationary/Non-stationary
India #	0.40 (6.08)*	0.59	1.22	0.38 (3.01)*	0.67	2.15*	0.10 (3.30)*	0.28 (2.12)**	0.63 (3.38)*	-0.40 (-3.23)*	Non-stationary
Pakistan	0.23 (2.34)**	0.17	0.47	0.10 (0.36)****	0.64	1.45*	0.04 (1.69)***	0.17 (1.39)****	0.20 (1.42)***	-0.23 (-1.82)**	Stationary*
EAST ASIA AND PACIFIC											
	OLS Estimates				OLS_C		Error Correction Model				
Country	b_{OLS} (t-stat)	R^2	DW	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)	Current Account Stationary/Non-stationary
China	0.97 (13.81)*	0.88	1.32	0.99 (7.95)*	0.88	1.71*	0.01 (0.34)****	0.96 (6.40)*	0.67 (3.20)*	-0.03 (-0.42)****	Stationary**
Fiji	0.76 (3.91)*	0.37	0.76	1.82 (2.18)**	-0.12	2.08*	-0.01 (-0.37)****	0.17 (1.09)****	0.31 (2.76)*	0.15 (1.17)****	Non-stationary
Indonesia #	0.94 (8.38)*	0.74	0.53	8.18 (0.18)****	-9.45	2.57*	0.01 (0.53)****	0.43 (3.20)*	0.23 (2.07)**	0.01 (0.16)****	Stationary**
Korea, Republic of	0.50 (6.30)*	0.60	0.90	0.47 (2.82)*	0.70	1.52*	0.12 (3.61)*	-0.23 (-1.12)****	0.70 (4.63)*	-0.33 (-3.23)*	Non-stationary
Korea, Republic of #	0.46 (5.94)*	0.58	0.80	0.36 (2.18)**	0.72	1.50*	0.11 (3.17)*	-0.09 (-0.51)****	0.62 (4.14)*	-0.30 (-2.84)*	Non-stationary
Malaysia	0.82 (3.61)*	0.33	0.62	0.02 (0.10)****	0.79	1.30*	-0.02 (-0.53)****	0.11 (0.68)****	0.18 (1.65)***	0.12 (0.81)****	Non-stationary
Malaysia #	0.91 (4.74)*	0.46	0.76	-0.06 (-0.29)****	0.80	1.63*	0.00 (-0.04)****	0.02 (0.10)****	0.23 (1.90)**	0.07 (0.52)****	Non-stationary
Philippines	1.09 (7.08)*	0.66	1.07	1.19 (3.93)*	0.72	1.90*	-0.02 (-0.69)****	0.56 (2.79)*	0.55 (3.58)*	0.18 (1.39)****	Non-stationary

Table 3 Contd.

	OLS Estimates			OLS_C				Error Correction Model			
1	2	3	4	5	6	7	8	9	10	11	12
Country	b_{OLS} (t-stat)	R^2	DW	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)	Current Account Stationary/Non-stationary
Philippines #	0.96 (5.44)*	0.53	0.76	0.97 (1.80)**	0.71	1.76*	0.02 (0.52)****	0.71 (2.83)*	0.36 (2.23)**	-0.30 (-0.17)****	Non-stationary
Thailand	1.15 (13.03)*	0.87	1.10	1.22 (7.92)*	0.88	1.90*	0.003 (0.12)****	0.71 (2.78)*	0.57 (3.00)*	0.10 (1.11)****	Stationary***
REST OF EUROPE											
	OLS Estimates			OLS_C			Error Correction Model				
Country	b_{OLS} (t-stat)	R^2	DW	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)	Current Account Stationary/Non-stationary
Turkey	0.87 (10.25)*	0.80	1.34	0.87 (6.29)*	0.81	1.93*	0.03 (1.83)**	0.72 (4.35)*	0.67 (3.34)*	-0.09 (-1.05)****	Stationary***
NORTH AFRICA											
	OLS Estimates			OLS_C			Error Correction Model				
Country	b_{OLS} (t-stat)	R^2	DW	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)	Current Account Stationary/Non-stationary
Algeria	0.71 (4.14)*	0.40	0.96	0.20 (0.78)****	0.70	2.06*	0.02 (0.52)****	-0.01 (-0.05)****	0.20 (1.16)****	-0.06 (-0.43)****	Stationary***
Egypt	-0.44 (-1.91)**	0.12	0.31	-1.51 (-0.92)****	0.28	1.45*	0.07 (1.84)**	-0.29 (-1.55)***	0.19 (-1.75)***	-0.35 (-1.73)***	Non-stationary

Table 3 Contd.

EAST AND SOUTHERN AFRICA											
	OLS Estimates			OLSC			Error Correction Model				
1	2	3	4	5	6	7	8	9	10	11	12
Country	b_{OLS} (t-stat)	R^2	DW	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)	Current Account Stationary/Non-stationary
Kenya	0.45 (3.23)*	0.29	1.56	0.56 (2.12)**	0.30	1.94*	0.10 (2.22)**	0.37 (2.31)**	0.80 (4.11)*	-0.21 (1.00)****	Stationary**
Madagascar	-0.06 (0.18)****	0.00	1.13	-0.09 (-0.09)****	0.05	2.96@	0.05 (1.99)**	0.28 (1.19)****	0.42 (1.99)**	-0.24 (-0.71)****	Non-stationary
Malawi	0.70 (4.68)*	0.46	1.20	1.00 (2.48)**	0.48	1.87*	0.10 (3.00)*	0.27 (1.14)****	0.70 (3.84)*	-0.07 (-0.43)****	Non-stationary
Uganda (1980-1997)	0.07 (1.38)****	0.11	0.43	-0.07 (-0.42)****	0.82	1.67*	0.02 (1.27)****	-0.01 (-0.46)****	0.15 (1.08)****	-0.16 (-1.25)****	Non-stationary
Zambia	0.44 (5.61)*	0.55	1.47	0.70 (5.05)*	0.43	1.90*	0.08 (2.66)*	0.15 (1.32)****	0.56 (3.14)*	-0.26 (-2.33)**	Stationary*
Zimbabwe (1975-1997)	0.05 (0.34)****	0.01	1.07	-0.23 (-0.61)****	0.00	1.81*	0.12 (2.19)**	0.14 (0.87)****	0.54 (2.64)*	-0.58 (-2.06)**	Stationary***
WEST AFRICA											
	OLS Estimates			OLSC			Error Correction Model				
Country	b_{OLS} (t-stat)	R^2	DW	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)	Current Account Stationary/Non-stationary
Benin	0.01 (0.14)****	0.00	1.19	0.20 (0.52)****	0.02	2.11*	0.10 (3.32)*	0.02 (0.23)****	0.62 (3.32)*	-0.66 (-2.95)*	Non-stationary
Burkina Faso	-0.13 (-1.81)**	0.11	0.65	-0.32 (-1.46)***	0.50	0.85@	0.09 (2.91)*	-0.16 (-2.56)**	0.41 (2.79)*	-0.45 (-2.51)**	Stationary**
Central African Republic	0.36 (3.40)*	0.31	0.83	0.04 (0.11)****	0.35	2.33*	0.05 (2.27)**	0.34 (3.34)*	0.45 (2.66)*	-0.24 (-1.60)***	Non-stationary
Congo	0.23 (1.52)***	0.09	0.88	0.96 (2.19)**	0.31	1.94*	0.13 (2.19)**	0.02 (0.13)****	0.36 (1.89)**	-0.42 (-2.24)**	Stationary**
Cote d' Ivorie	0.54 (6.03)*	0.58	0.67	0.07 (0.43)****	0.86	1.38*	0.02 (1.66)***	0.13 (1.49)***	0.32 (3.10)*	-0.08 (-1.21)****	Non-stationary

Table 3 Contd.

	OLS Estimates			OLS_C			Error Correction Model				
1	2	3	4	5	6	7	8	9	10	11	12
Country	b_{OLS} (t-stat)	R^2	DW	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)	Current Account Stationary/Non-stationary
Gabon (1971-1997)	0.51 (4.37)*	0.43	1.45	0.70 (3.88)*	0.39	1.86*	0.01 (0.91)****	0.22 (1.52)***	0.60 (3.16)*	-0.22 (-1.62)***	Non-stationary
Ghana	-0.16 (-1.16)****	0.05	0.28	0.07 (-0.39)****	0.74	2.16*	0.05 (0.89)****	-0.08 (-0.89)****	0.06 (0.50)****	-0.16 (-0.98)****	Stationary**
Mauritania	-0.11 (-0.54)****	0.01	1.09	1.61 (1.65)***	0.28	2.60*	0.08 (1.43)***	0.63 (2.15)**	0.30 (1.55)***	-0.16 (-0.48)****	Non-stationary
Trinidad and Tobago	0.40 (3.39)*	0.31	0.66	0.22 (0.76)****	0.68	2.04*	0.03 (1.06)****	0.02 (0.17)****	0.27 (2.05)**	-0.13 (-1.16)****	Non-stationary

* Level of Significance - 1%
** Level of Significance - 5%
*** Level of Significance - 10%
**** Not Significant
@ Zone of Indecision

t-test $H_0: \alpha_{ECM}=0$ Ha: α_{ECM} 0
$H_0: \beta_{ECM}=0$ Ha: β_{ECM} 0
$H_0: \gamma_{ECM}>0$ Ha: $\gamma_{ECM}<0$
$H_0: \delta_{ECM}=0$ Ha: δ_{ECM} 0

Table 4 : Estimation results based on OLS and ECM Procedures with net public and publicly guaranteed debt added to savings for 1970-1997

			LATIN AMERICA AND CARIBBEAN				
		OLS_C			Error correction model		
1	2	3	4	5	6	7	8
Country	b_{OLSC}	R^2	DW	a_{ECM}	b_{ECM}	g_{ECM}	d_{ECM}
	(t-stat)			(t-stat)	(t-stat)	(t-stat)	(t-stat)
Argentina	0.69	0.94	2.15*	0.07	0.57	1.07	-0.32
	(17.35)*			(0.02)****	(5.49)*	(5.17)*	(-4.25)*
Chile	0.89	0.72	1.92*	0.03	0.61	0.69	0.02
	(5.68)*			(1.25)****	(7.23)*	(4.44)*	(0.21)****
Chile #	0.73	0.76	1.93*	0.02	0.59	0.50	0.03
	(4.23)*			(0.98)****	(5.92)*	(3.31)*	(0.27)****
Dominican Republic	0.26	0.18	1.87*	0.12	0.07	0.73	-0.49
	(1.02)****			(3.08)*	(0.81)****	(4.03)*	(-2.71)*
Ecuador	1.68	-1.27	2.90@	0.08	-0.31	0.34	-0.37
	(0.54)****			(2.17)**	(-2.89)*	(2.39)**	(-2.14)**
El Salvador	0.44	0.53	1.94*	0.05	0.20	0.40	-0.28
	(2.02)**			(2.32)**	(1.30)****	(2.38)**	(-2.07)**
Guatemala	-0.34	0.4	1.93*	0.05	0.16	0.48	-0.26
	(0.85)****			(2.18)**	(0.65)****	(2.57)**	(-1.68)***
Haiti	0.53	0.58	2.05*	0.06	0.06	0.54	-0.28
(1970-1996)	(7.82)*			(2.41)	(0.55)****	(2.52)**	(-2.23)**
Honduras	1.08	0.71	1.85*	0.04	0.75	0.64	-0.05
	(4.66)*			(1.59)***	(5.65)*	(3.03)*	(-0.38)****
Mexico	-0.14	0.39	1.34*	0.07	-0.09	0.35	-0.31
	(-0.61)****			(1.74)**	(-0.66)****	(1.75)***	(-1.72)**
Mexico #	0.44	0.22	1.72*	0.06	0.001	0.38	-0.26
(1970-1996)	(1.09)****			(1.63)***	(0.01)****	(2.35)**	(-1.58)***
Peru	0.69	0.59	1.75*	0.07	0.42	0.64	-0.23
	(3.11)*			(2.38)**	(2.69)*	(3.53)*	(-1.81)**
Venezuela	0.78	0.5	1.78*	-0.003	-0.03	0.53	-0.08
	(3.27)*			(-0.09)****	(-0.14)****	(3.18)*	(-0.59)****
			SOUTH ASIA				
		OLS_C			Error correction model		
Country	b_{OLSC}	R^2	DW	a_{ECM}	b_{ECM}	g_{ECM}	d_{ECM}
	(t-stat)			(t-stat)	(t-stat)	(t-stat)	(t-stat)
India #	0.4	0.62	2.03*	0.09	0.26	0.67	-0.42
	(3.78)*			(3.37)*	(1.89)**	(3.55)*	(-3.34)*
Pakistan	0.1	0.64	1.56*	0.03	-0.07	0.18	-0.17
	(0.25)***			(1.47)***	(-0.66)****	(1.47)****	(-1.37)***
			EAST ASIA AND PACIFIC				
		OLS_C			Error correction model		
Country	b_{OLSC}	R^2	DW	a_{ECM}	b_{ECM}	g_{ECM}	d_{ECM}
	(t-stat)			(t-stat)	(t-stat)	(t-stat)	(t-stat)
China	0.81	0.9	1.81*	0.04	0.92	0.67	-0.13
	(8.40)*			(1.55)***	(7.13)*	(3.26)*	(-1.87)**

Table 4 Contd.

	OLS_C			Error correction model			
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Country	b_{OLSC} **(t-stat)**	R^2	**DW**	a_{ECM} **(t-stat)**	b_{ECM} **(t-stat)**	g_{ECM} **(t-stat)**	d_{ECM} **(t-stat)**
Fiji	1.06 (4.91)*	0.61	2.04*	0.02 (1.04)****	0.30 (2.14)**	0.48 (3.16)*	0.00 (-0.01)****
Indonesia #	-0.97 (0.23)****	0.57	2.64*	-0.004 (-0.22)****	0.49 (3.91)*	0.13 (1.48)****	0.04 (0.52)****
Korea, Republic of	0.81 (4.39)*	0.7	1.7*	0.06 (2.14)**	0.09 (0.50)****	0.75 (5.15)*	-0.15 (-1.71)***
Korea, Republic of #	0.6 (3.29)*	0.72	1.64*	0.06 (2.22)*	0.12 (0.82)****	0.69 (5.00)*	-0.16 (-1.83)**
Malaysia	1.02 (2.54)*	0.78	0.84@	0.02 (0.43)****	0.30 (1.52)***	0.15 (1.09)****	-0.04 (-0.27)****
Malaysia #	1.19 (2.63)*	0.7	2.03*	0.02 (0.39)****	0.38 (1.78)**	0.19 (1.30)****	-0.02 (-0.20)****
Philippines	0.89 (4.02)*	0.82	1.8*	0.02 (0.73)****	0.74 (4.18)*	0.43 (2.43)**	-0.05 (-0.48)****
Philippines #	0.75 (1.73)**	0.8	1.64*	0.04 (1.75)**	0.89 (4.81)*	0.29 (2.06)***	-0.02 (-1.66)***
Thailand	1.3 (10.60)*	0.85	1.59*	-0.02 (-0.72)****	0.60 (2.06)**	0.69 (2.63)**	0.19 (1.33)***
REST OF EUROPE							
	OLS_C			Error correction model			
Country	b_{OLSC} **(t-stat)**	R^2	**DW**	a_{ECM} **(t-stat)**	b_{ECM} **(t-stat)**	g_{ECM} **(t-stat)**	d_{ECM} **(t-stat)**
Turkey	0.92 (5.33)*	0.76	1.92*	0.02 (1.15)****	0.59 (3.94)*	0.59 (3.10)*	-0.08 (-0.81)****
NORTH AFRICA							
	OLS_C			Error correction model			
Country	b_{OLSC} **(t-stat)**	R^2	**DW**	a_{ECM} **(t-stat)**	b_{ECM} **(t-stat)**	g_{ECM} **(t-stat)**	d_{ECM} **(t-stat)**
Algeria	0.71 (7.47)*	0.81	1.81*	0.06 (1.73)**	0.49 (3.84)*	0.64 (2.98)*	-0.16 (-1.78)**
Egypt	0.05 (0.18)****	0.74	1.79*	0.03 (1.17)****	0.14 (1.05)****	0.15 (1.37)****	-0.14 (-1.00)****
EAST AND SOUTHERN AFRICA							
	OLS_C			Error correction model			
Country	b_{OLSC} **(t-stat)**	R^2	**DW**	a_{ECM} **(t-stat)**	b_{ECM} **(t-stat)**	g_{ECM} **(t-stat)**	d_{ECM} **(t-stat)**
Kenya	0.43 (3.00)*	0.32	1.98*	0.13 (3.46)*	0.20 (1.74)**	0.98 (5.36)*	-0.45 (-2.72)*
Madagascar	-0.38 (-0.40)****	-0.32	2.71*	0.05 (2.33)**	0.14 (1.12)****	0.50 (2.73)**	-0.40 (-1.70)***
Malawi	1.01 (3.72)*	0.51	1.97*	0.08 (2.78)*	0.39 (2.22)**	0.84 (4.59)*	-0.15 (-1.11)****
Uganda (1980-1997)	-0.04 (-0.20)****	0.82	1.51*	0.02 (1.35)****	-0.01 (-0.37)****	0.16 (1.08)****	-0.17 (-1.26)****

Table 4 Contd.

	OLS_C			Error correction model			
1	2	3	4	5	6	7	8
Country	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)
Zambia	0.66 (5.90)*	0.57	1.67*	0.07 (2.75)*	0.25 (2.54)*	0.63 (3.65)*	-0.28 (-2.62)*
Zimbabwe (1975-1997)	0.09 (0.38)****	0.26	1.98*	0.09 (1.62)***	0.12 (0.85)****	0.46 (2.11)**	-0.41 (-1.50)***
WEST AFRICA							
	OLS_C			Error correction model			
Country	b_{OLSC} (t-stat)	R^2	DW	a_{ECM} (t-stat)	b_{ECM} (t-stat)	g_{ECM} (t-stat)	d_{ECM} (t-stat)
Benin	1.72 (0.65)****	-13.65	2.01*	0.09 (1.62)***	0.12 (0.85)****	0.46 (2.11)***	-0.41 (-1.50)***
Burkina Faso	0.44 (2.02)**	0.63	2.15*	0.09 (3.27)*	0.12 (1.58)***	0.62 (3.26)*	-0.54 (-2.86)*
Central African Republic	0.07 (0.27)****	0.38	2.35*	0.04 (2.17)**	0.28 (2.89)*	0.46 (2.79)**	-0.31 (-2.00)**
Congo	0.72 (3.06)*	0.32	1.76*	0.13 (2.06)**	0.04 (0.24)****	0.47 (1.84)***	-0.34 (-1.91)**
Cote d' Ivorie	0.59 (5.08)*	0.73	2.02*	0.03 (2.05)**	0.16 (2.28)**	0.43 (3.62)*	-0.17 (-2.42)**
Gabon (1971-1997)	0.6 (4.67)*	0.5	1.95*	0.06 (1.21)****	0.25 (2.17)**	0.72 (3.86)*	-0.30 (-2.42)**
Ghana	0.05 (0.31)****	0.75	2.13*	0.01 (0.89)****	-0.07 (-0.78)****	0.04 (0.34)****	-0.13 (-0.81)****
Mauritania	1.71 (2.48)**	0.47	0.53@	0.09 (1.67)***	0.62 (2.69)*	0.43 (2.58)**	-0.18 (-0.67)****
Trinidad and Tobago	0.48 (2.01)**	0.56	1.81*	0.03 (1.17)****	0.01 (0.10)****	0.29 (2.12)**	-0.14 (1.34)***

* Level of Significance - 1%
** Level of Significance - 5%
*** Level of Significance - 10%
**** Not Significant
@ Zone of Indecision

t-test $H_0:\alpha_{ECM}=0$ $Ha:\alpha_{ECM}$ 0
$H_0:\beta_{ECM}=0$ $H_a:\beta_{ECM}$ 0
$H_0:\gamma_{ECM}>0$ $H_a:\gamma_{ECM}>0$
$H_0:\delta_{ECM}=0$ $H_a:\delta_{ECM}$ 0

Table 5: Evidence of Capital Mobility

Country	b_{OLSC} Instrumental Variable and Serial Correlation Correction	b_{ECM}	Phillips-Peron Test of Stationarity on the Current Account	d_{ECM}
Benin	low	-	Non-stationary	Non-stationary
Burkina Faso	low	low	Stationary	Non-stationary
Central African Republic	-	low	Non-stationary	Non-stationary
Congo	high	-	Stationary	Non-stationary
Cote d' Ivorie	low	low	Non-stationary	Stationary
Dominican Republic	low	low*	Stationary	Non-stationary
Ecuador	low	low	Stationary	Non-stationary
Egypt	low	low	Non-stationary	Non-stationary
El Salvador	low	low*	Stationary	Non-stationary
Gabon	high	low	Non-stationary	Non-stationary
Haiti	low	-	Non-stationary	Non-stationary
India	low	low	Non-stationary	Non-stationary
Korea(wdi and ifs)	low	low*	Non-stationary	Non-stationary
Madagascar	-	low*	Non-stationary	Stationary
Malaysia(wdi and ifs)	low	-	Non-stationary	Stationary
Mexico(wdi)	-	-	Non-stationary	Non-stationary
Pakistan	-	low*	Stationary	Non-stationary
Trinidad and Tobago	-	-	Non-stationary	Stationary
Uganda	-	-	Non-stationary	Stationary
Zimbabwe	-	low*	Stationary	Non-stationary

Inconclusive Evidence

Category I

Country	b_{OLSC} Instrumental Variable and Serial Correlation Correction	b_{ECM}	Phillips-Peron Test of Stationarity on the Current Account	d_{ECM}
Algeria	low*	-	Stationary	Stationary
Ghana	-	low*	Stationary	Stationary
Guatemala	low	-	Stationary	Stationary
Kenya	low	low	Stationary	Stationary
Indonesia	-	low	Stationary	Stationary

Category II

Country	b_{OLSC} Instrumental Variable and Serial Correlation Correction	b_{ECM}	Phillips-Peron Test of Stationarity on the Current Account	d_{ECM}
Argentina	high	high	Stationary	Non-stationary
Chile(wdi)	high	high	Stationary	Non-stationary
Chile(ifs)	high	high	Stationary	Stationary
Fiji	high	low*	Non-stationary	Stationary
Honduras	high	high	Stationary	Stationary

Country	b_{OLSC} Instrumental Variable and Serial Correlation Correction	b_{ECM}	Phillips-Peron Test of Stationarity on the Current Account	d_{ECM}
Malawi	high	low*	Non-stationary	Stationary
Mauritiana	high	high	Non-stationary	Stationary
Peru	high	low	Stationary	Stationary
Phillipines(wdi)	high	low	Non-stationary	Stationary
Phillipines(ifs)	high	high	Non-stationary	Stationary
Thailand	high	high	Stationary	Stationary
Turkey	high	high	Stationary	Stationary
Venezuela	high	-	Stationary	Stationary
Zambia	high	low*	Stationary	Non-stationary

Conclusive Evidence for Capital Immobility

Country	b_{OLSC} Instrumental Variable and Serial Correlation Correction	b_{ECM}	Phillips-Peron Test of Stationarity on the Current Account	d_{ECM}
China	high	high	Stationary	Stationary

Low* indicates significant only at 25%
- indicates an insignificant coefficient

Table 6:- India: Stationarity Test for Savings/GDP, Investment/GDP and Co-Integration Test for 1970-1996

Source	Savings (Level of Significance)	Investment (Level of Significance)	Residual Tests(Level of Signficance)
International Financial Statistics	**I(1)** (1%)	**I(1)** (1%)	Co-integrated (1%)
World Development Indicators	**I(0)** (10%)	***I(1)** (1%)	Not co-integrated
Economic Survey, 1997-1998	**I(1)** (1%)	**I(1)** (1%)	Co-integrated (5%)

Saving-Investment Correlation and Current Account Stationarity

Source	b (t-stat)	R^2	DW	Stationarity/ Non-stationary
International Financial Statistics	0.36 (5.37)	0.54	1.13	Non-stationary
World Development Indicators	1.17 8.58	0.75	0.49	Non-stationary
Economic Survey, 1997-1998	1.06 (13.32)	0.87	0.67	Non-stationary

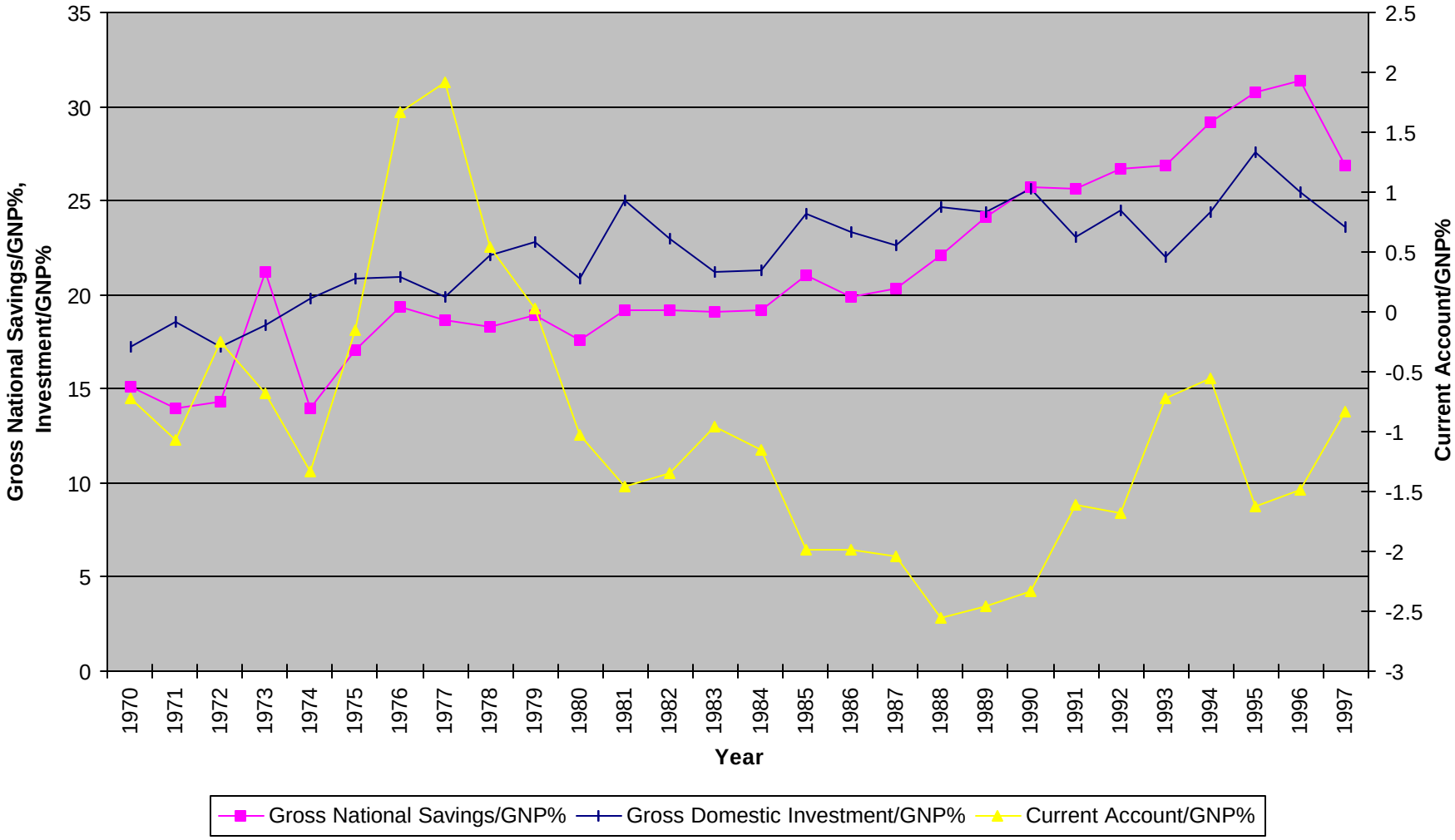
Error Correction Model

Source	a (t-stat)	b (t-stat)	g (t-stat)	d (t-stat)
International Financial Statistics	0.08 (3.06)	0.22 (1.59)	0.54 (3.20)	-0.35 (-2.96)
World Development Indicators	-0.002 (-0.08)	1.01 (7.32)	0.21 (1.44)	0.03 (0.30)
Economic Survey, 1997-1998	-0.003 (-0.19)	1.07 (7.80)	0.33 (2.08)	0.03 (0.45)

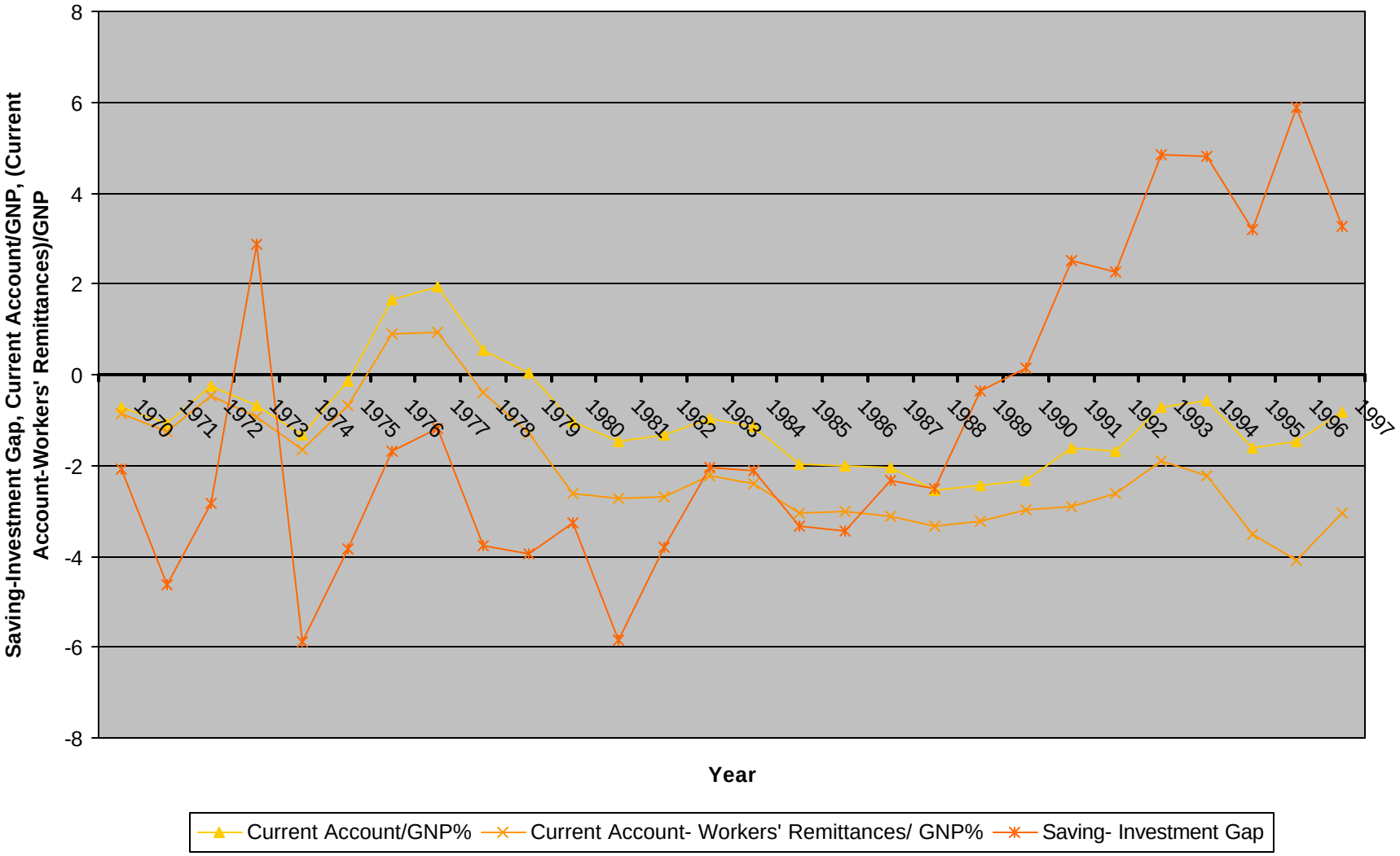
Table 7: Private Consumption, Government Consumption, GNP, Saving Data of India from International Financial Statistics Yearbook and World Development Indicators CD-ROM

	International Financial Statistics							
Year	*Government Consumption*	*Private Consumption*	*GNP*	*Savings*	*Government Consumption*	*Private Consumption*	*GNP*	*Savings*
1970	5,120.00	43,400.00	57,173.33	8,653.33	5,117	43,393	57,200	8,690
1971	5,953.02	46,849.97	61,358.78	8,555.79	5,989	47,153	61,828	8,686
1972	6,228.60	50,948.12	66,763.23	9,586.51	6,135	50,205	65,759	9,419
1973	6,664.94	56,096.62	79,669.34	16,907.78	6,618	59,861	79,204	12,725
1974	7,701.80	69,748.21	90,027.15	12,577.14	7,825	70,844	91,353	12,684
1975	8,715.38	69,030.56	93,732.09	15,986.15	8,530	66,823	90,751	15,398
1976	9,185.27	67,053.57	94,486.61	18,247.77	9,206	67,210	94,743	18,327
1977	10,024.03	79,162.38	109,657.86	20,471.45	10,229	80,793	111,916	20,894
1978	11,863.79	91,834.49	126,974.25	23,275.97	11,847	91,691	126,675	23,137
1979	13,746.00	100,541.47	140,918.04	26,630.57	13,825	101,169	141,708	26,714
1980	16,634.87	126,274.96	173,419.81	30,509.98	16,577	125,809	172,877	30,491
1981	17,738.77	131,389.31	184,547.87	35,419.79	17,197	122,825	178,947	38,925
1982	19,323.11	132,384.98	187,731.36	36,023.27	18,978	130,017	184,320	35,325
1983	20,932.77	144,539.06	204,624.22	39,152.39	20,501	142,504	200,388	37,383
1984	21,429.20	142,092.76	202,340.93	38,818.97	20,481	136,325	193,356	36,550
1985	23,583.15	142,978.41	210,857.79	44,296.23	23,835	145,902	213,072	43,335
1986	27,460.15	157,481.56	230,861.95	45,920.24	27,072	155,209	227,600	45,319
1987	31,507.48	171,694.18	255,037.80	51,836.14	31,490	174,301	254,896	49,105
1988	34,008.77	184,968.02	281,159.73	62,182.94	32,687	182,689	270,235	54,859
1989	33,403.18	177,640.82	278,004.44	66,960.44	32,535	182,258	270,768	55,975
1990	35,294.79	188,739.72	301,639.63	77,605.12	34,417	197,091	294,150	62,642
1991	30,542.61	167,922.79	266,783.92	68,318.52	28,327	167,690	247,431	51,414
1992	30,326.41	165,977.31	267,813.87	71,510.15	27,149	161,162	239,758	51,447
1993	29,492.01	161,801.07	261,509.20	70,216.12	29,025	173,662	254,511	51,824
1994	31,988.27	179,846.37	299,174.48	87,339.84	31,847	204,974	302,675	65,854
1995	35,760.32	200,169.61	340,913.44	104,983.51	33,510	219,943	330,395	76,942
1996	37,301.39	207,397.06	356,484.07	111,785.62	37,343	233,232	355,803	85,228
1997	47,878.17	264,478.29	426,874.67	114,518.22	38,159	266,927	379,064	73,978

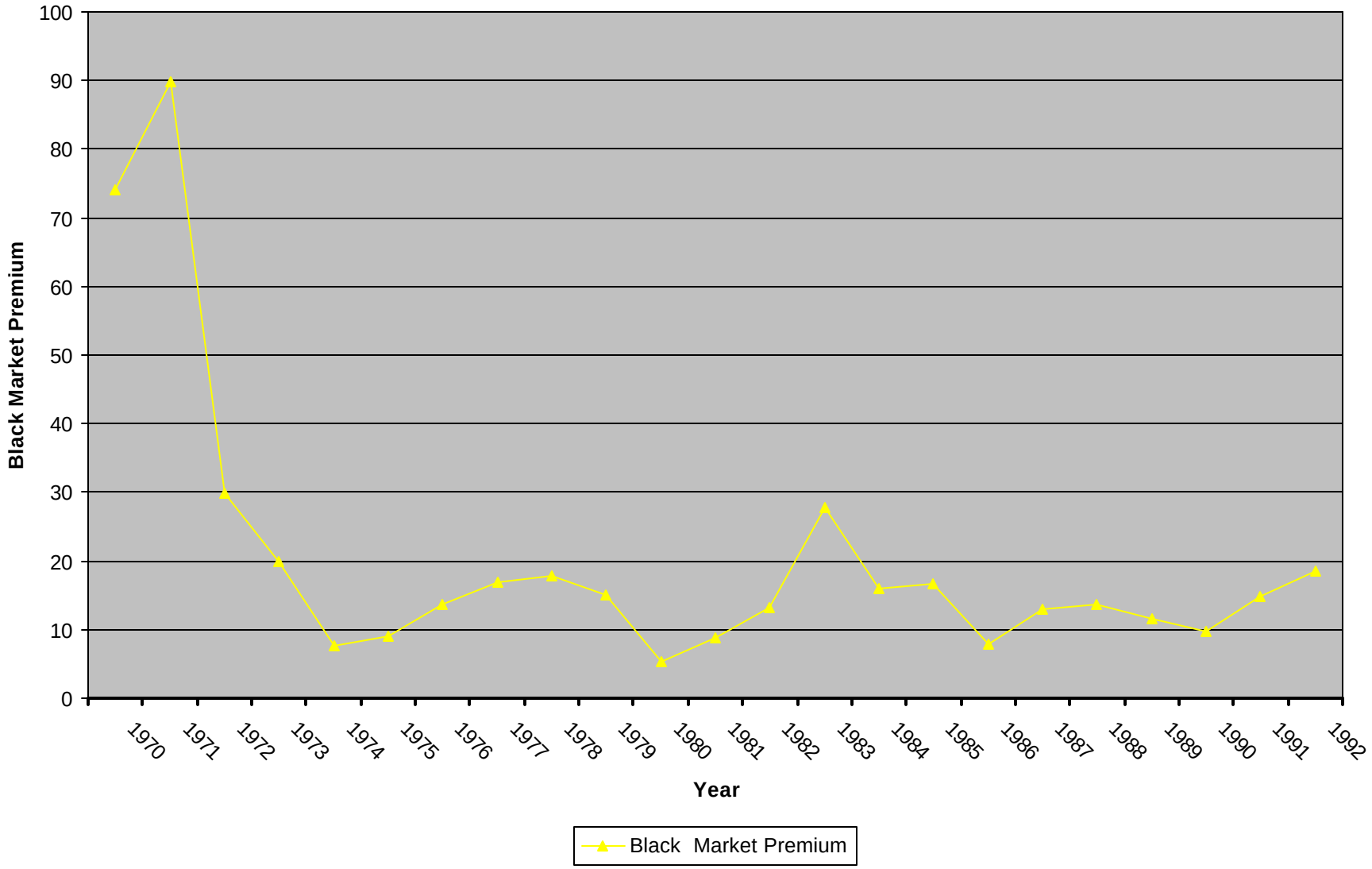
Graph 1:- India: Gross National Savings, Gross Domestic Investment and Current Account Ratios to GNP



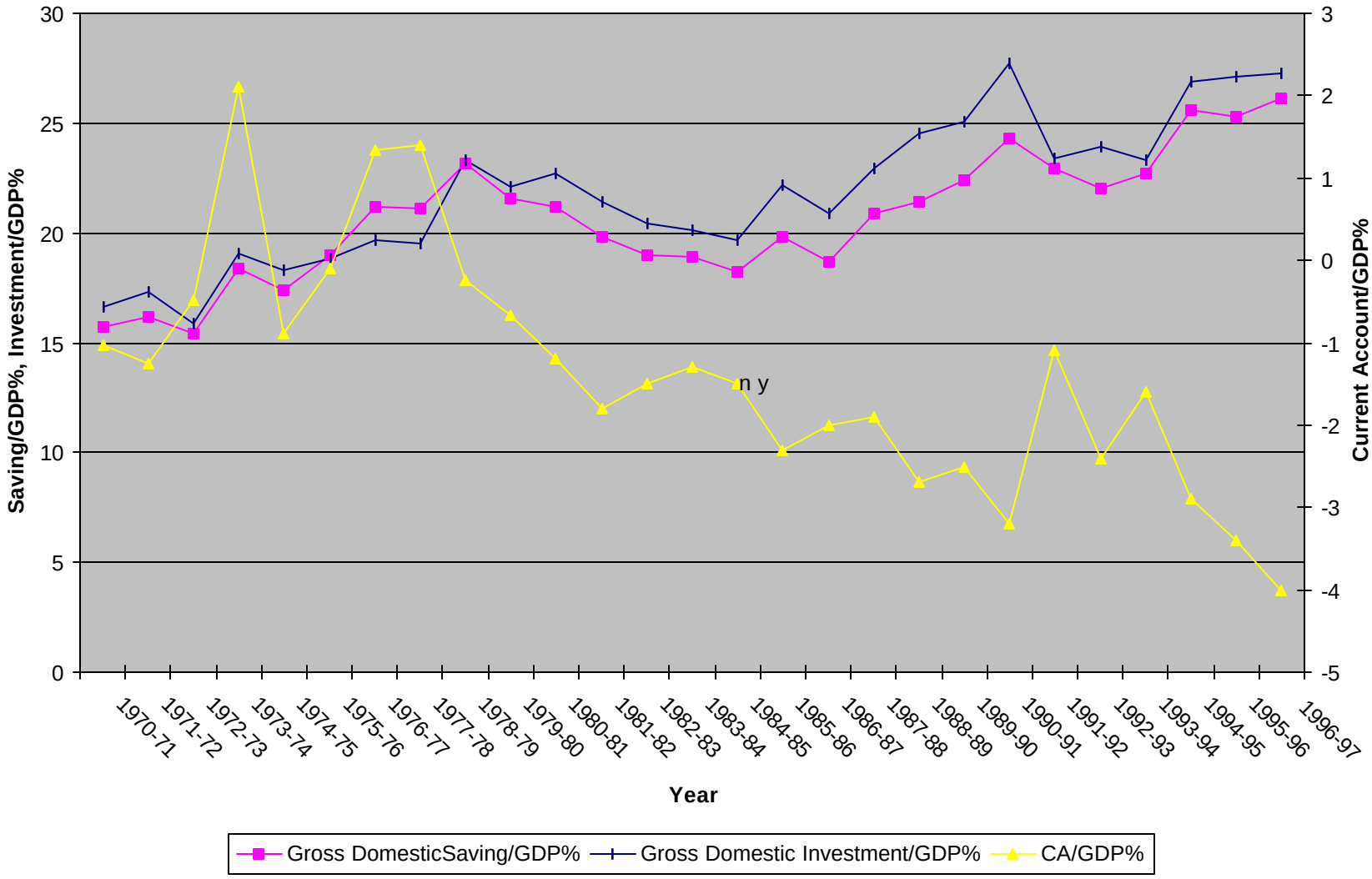
Graph 2:-Saving-Investment Gap, Current Account and Current Account Net of Workers' Remittances Ratio to GNP



Graph 3 :- India: Black Market Premium



Graph 4:- India: Gross Domestic Saving, Gross Domestic Investment and Current Account Ratios to GDP



PARTICIPANTS AT THE SEMINAR ON
SAVING-INVESTMENT CORRELATIONS AND CAPITAL MOBILITY IN DEVELOPING COUNTRIES WITH SPECIAL REFERENCE TO INDIA

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