Current Account Dynamics and Capital Mobility in Small Asian Economies

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This paper explores the current account dynamics in eight small economies of Asia to examine whether or not capital flows have been excessive in these countries. Standard assumptions of perfect capital mobility and small open economies are jointly instrumental in simplifying theoretical tractability of many open economy models. In empirical estimations, however, the identification of a small open economy is often oversimplified, which makes celebrated results, such as excessive or too low capital flows in OECD economies, questionable. This paper establishes that the actual extent of capital mobility in small open economies generally cannot be too high or too low. This, in turn, implies that the general idea of excessive capital flows in small open economies requires revision.

Introduction

Using the intertemporal approach to current account determination, this paper examines current account volatility in eight small Asian economies and thus attempts to relate the volatility to the extent of capital mobility in these small open economies. Earlier studies of similar kind like Ghosh and Ostry (1995), find that, based on the estimated volatility of current account, the possibility of high capital mobility cannot be rejected for a majority of developing countries. The current paper establishes that this conclusion is not strong and general; since small open economies are more likely to be affected by global shocks, the external balance position of such economies that reflects the allocation of riskless foreign assets actually infers agents' motivation to cushion future consumption against unanticipated future shocks. The allocation of foreign assets for small open economies thus depends crucially on the consumption smoothing motive of agents, and capital mobility in small open economies is actually determined by how agents tilt present consumption against future.

The current paper also argues that in most empirical applications of the intertemporal model, the identification of a small open economy is oversimplified. The first stage empirical studies that tested the degree of capital mobility, using the idea of savings-investment correlation, have concluded that even among industrialized countries capital mobility is

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sufficiently limited (see for instance, Feldstein and Horioka (1980)). Subsequent literature, as may be found in Fieleke (1982), Obstfeld (1986), Summers (1988) and Cardia (1991), shows that these tests are econometrically inconsistent, and conclusions on the degree of capital mobility drawn on the basis of such tests lack economic intuition. A relatively more recent approach based on intertemporal current account determination shows that actual volatility of current account with consumption smoothing behavior of agents is higher relative to benchmark current account volatility for most industrialized countries (see for instance, Obstfeld and Rogoff (1995), and Ghosh (1995)), implying that capital flows have been excessive. Such models depend crucially on a powerful and illuminatingly simplifying assumption; the economy represented by the model is small relative to the world economy. This simplification aids theoretical tractability, since it allows partial equilibrium analysis to be simple with an exogenous path of world interest rate. But the conclusions drawn on the basis of empirical evidence from relatively larger industrialized countries are inconsistent with the crucial assumption of small open economy.

The assumption of a small open economy is in no way empirically judicious for economies that are high-savers with ever-growing net foreign assets, since the assumption that such economies face a fixed world interest rate would then become strained In terms of share on world GDP, it is often sensible to state that most economies are small, but this would not necessarily imply that all of these economies are low-savers. Besides, unilateral actions of some leading industrialized economies can have a first order impact on the world interest rate. The assumption of a small open economy surely cannot be justified for economies like USA, for instance, since it has a relatively large share in world GDP and its actions may have potential impact on world interest rate. Similarly, it will also be misleading to assume that Singapore, which has a relatively low share in world GDP, faces a fixed world interest rate, since Singapore is a high-saver economy that has a sustained growing trend of net foreign asset accumulation until the late 1990s.

This paper attempts to explore the current account dynamics of eight truly small economies of Asia using an intertemporal approach, and examines the relative volatility of current account in order to assess the empirical justification of twin assumptions of perfect capital mobility and small open economy. Prior to this study, except for Ghosh and Ostry (1995), empirical studies established in literature that address the issue of capital mobility using similar approach perhaps have oversimplified the identification of a small open economy. For most small economies, the degree of openness is typically found to be large. This is because small economies are often import oriented, have extended demand for skilled labor and technology from relatively larger ones and realize the potential gains from trade with relatively larger ones. Moreover, small economies typically tend to have larger uncertainties attached to investment, among others, which attribute to frequent deviations from permanent level of output. Due to this phenomenon, economic agents belonging to small open economies are more likely to accumulate interest, yielding foreign assets as a way to smooth consumption over time. Hence, assuming perfect capital mobility for truly small economies of the world is innocuous. The question then remains identifying such economies which are not high-savers and hence do not possess an ever-growing trend of foreign asset accumulation. Empirically, this may not seem to be a difficult task. But as may be found in the huge volume of relevant literature, the intrinsic features of a small open economy are often

ignored, and similar studies are often conducted on industrialized and/or OECD economies, assuming, rather inappropriately, that these economies are small and take the world interest rate as exogenous.

The intertemporal model which is used in this paper to address the issue of capital mobility is simple in its features and standard in relevant literature. The underlying assumption which drives the theoretical reasoning of a dynamic current account is that economic agents choose contingent consumption plans in the face of shocks to output, and hence, prefer to smooth consumption over time by accumulating foreign assets. In a small open economy, it is reasonable to assume that these assets are available in a homogenous riskless form. The empirical model, derived from the theoretical model, therefore, necessitates characterization of the expectation formation behavior of economic agents, since the consumption-tilting component of the current account with optimal consumption profile[1] depends crucially on how agents form expectations about changes in national cash flow. Under the assumption that economic agents form expectations rationally, a simple Vector Auto Regression (VAR) can be applied to derive the augmented matrix that governs the expectation formation behavior of agents. The generated optimal current account, therefore, acts as the benchmark current account series with which the actual consumption-smoothing current account series can be compared to check whether or not actual volatility has exceeded the optimal volatility. If the actual current account is more volatile than what should have been observed with optimizing behavior of agents, the model's interpretation would be that capital mobility has been excessive, which in turns would justify the twin assumptions of perfect capital mobility and small open economy.

This paper finds that capital flows in small open economies of Asia have not been excessive (or too limited) in general, and the extent of country-specific capital mobility actually depends on the agents' motive to tilt present consumption against future. The consumption tilting behavior is found to be consistent with Khan and Selim (2004). The current paper finds that capital flows are excessive in three, too limited in another three and at par with optimal current account in two economies studied. The extent of capital flows corresponds directly to how agents smooth consumption over time. Hence, unlike the conventional idea, capital mobility in small open economies is not excessive in general.

If an economy is large but identified as small, the worst problem an empirical study will face is that a simple model with exogenous interest rate will not be a true representation of the case. No matter how sophisticated the econometric methodology is and how precise the estimates are, results on the degree of capital mobility will lack economic intuition. Moreover, another crucial assumption of such models that economic agents smooth consumption in the face of shocks to output and investment is more appropriate if the economy is truly small. Economic agents belonging to small economies use foreign borrowing to cushion their consumption in the face of unusually high investment needs. Similarly, in case where output is above its permanent level, agents choose to accumulate interest-yielding foreign assets. While such uncertainties are pervasive in countries like Bangladesh, for instance, to my

[1] This current account series which is derived from the optimizing behavior of economic agents will be referred to as the optimal consumption-smoothing current account, or simply the optimal current account, hereafter, without loss of generality.

knowledge no empirical studies have considered assessment of how volatile the current accounts are of these small open economies with consumption smoothing motive of agents. With frequent uncertainties in output and investment, current account should act as a shock absorber to smooth consumption of agents (Sachs, 1982). This behavioral assumption of agents is more appropriate for economies which are relatively more open but possess no control over world interest rate. In this sense, testing the intertemporal model with these assumptions for the case of OECD or industrialized countries will not truly reflect the relative volatility of current account which is commonly used in this literature to interpret the degree of capital mobility.

The purpose of this paper is to examine the degree of capital mobility in eight small open economies of Asia, in order to justify the joint assumptions of perfect capital mobility and exogenous world interest rate underlying the standard intertemporal current account model. If capital flows are found to be excessive for a small open economy in empirical estimations, the two assumptions are jointly valid, and the model becomes a justifiable representation that can be adopted to assess whether or not capital flows have been excessive in these economies. The theoretical approach of this paper is primarily suggested by Campbell's (1987) work on savings, and its extension to the current account is due to Sheffrin and Woo (1990), Otto (1992), Obstfeld and Rogoff (1995), Ghosh (1995) and Hoffmann (2001). This paper's point of departure, therefore, is the stream of literature that follows a comparable methodology, but it addresses similar issues for industrialized countries assuming ad-hoc manner that these economies are small. The paper is important in the sense that it allows one to recognize the potential strength of the intertemporal approach to address such issues empirically, when characterization of crucial assumptions are made appropriately, and not in an oversimplified manner.

The Model

The model small open economy is assumed to be populated by a single infinitely-lived representative household that derives utility from consumption of a single good. The economy is not a high-saver, in the sense that the net foreign asset holding of the representative household does not have an ever-growing trend. The economy is small relative to the world economy, and hence, takes the path of world interest rate as exogenous. Riskless bond is the only internationally traded asset. Future levels of output, private investment and government expenditure are all random variables, and the representative household can only choose contingency plans for future consumption. Faced with this uncertainty, the representative household maximizes the expected value of lifetime utility described by:

$$\sum_{t=0}^{\infty} \beta^t E_t[u(c_t)] \qquad \cdots(1)$$

Where, β is the subjective discount rate, and $\beta \in (0,1)$, and c_t is the consumption of a single good. The current period utility function is continuously differentiable and strictly concave. The budget constraint of the economy at any time is:

$$c_t \quad i_t \quad g_t \quad b_{t-1} \quad (1+r)b_t \quad q_t \qquad \cdots(2)$$

Where, b is the level of foreign assets held by the economy, r is the world interest rate, q is the level of domestic output, i is the level of private investment, and g is the level of government expenditure. National income at any time t, y_t, is equal to the sum of domestic output and net interest payments from foreign assets. The national income identity at any time t, therefore, is simply:

$$y_t = c_t + i_t + g_t + b_{t-1} - b_t \qquad \cdots(3)$$

Expression (3) states that the economy's current account balance, the sole external component of national income, at any time t is the change in the value of its net claims on the rest of the world, i.e., the change in its net foreign assets. This formation of the external balance component of national income is consistent with the consumption smoothing motive of the household. The representative household prefers to smooth consumption over time, which is induced by the concavity assumption of the utility function. In situations, where output is above its permanent level, for instance, the representative household prefers to accumulate interest-yielding foreign assets as a way of smoothing consumption over future periods. This behavior of the household, in turns, contributes to a higher current account surplus since the additional output is invested in the risk-free foreign asset. The model, therefore, incorporates dynamics in the current account determination by introducing consumption-smoothing motive of the representative household.

The social planner's problem, therefore, is to maximize (1) subject to the economy's dynamic budget constraint (2). With $\beta^t \lambda_t$ as the multiplier attached to the time t budget constraint, the necessary conditions for an optimum is the budget constraint itself and the followings:

$$c_t : \quad \beta^t \lambda_t = E_t u_c(t) \qquad \cdots(4.1)$$

$$b_{t+1} : \quad \frac{\beta^t \lambda_t}{\beta^{t+1} \lambda_{t+1}} = \beta^t (1+r) \qquad \cdots(4.2)$$

And for any time T, the Transversality condition that puts a restriction on the present discounted value of the foreign assets in the limit[2]:

$$\lim_{T \to \infty} (1+r)^{-T} b_{T+1} = 0 \qquad \cdots(4.3)$$

Combining of (4.1) and (4.2) yields the stochastic Euler equation:

$$E_t \, u_c(t) = \beta (1+r) E_t \, u_c(t+1) \qquad \cdots(4.4)$$

The choice of utility function, as long as made from a family of utility functions that satisfy desirable properties as mentioned, does not alter important theoretical results of this model. Consider a simple quadratic form that satisfies the assumptions of mapping, concavity and differentiability conditions:

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[2] Condition (4.3), more popularly known in literature as the No Ponzi-Games constraint, restricts the borrowers to leave the scene with unpaid debts or unused resources.

$$u(c_t) \quad c_t \quad \frac{/}{2} c_t^2 \qquad \cdots(5)$$

where, $N > 0$ is a constant with $N \; z \; c_t^{-1}$. Consider a fairly innocuous but reasonable simplification to the model. Assume that the representative household sets its rate of time preference, U, equal to the observed fixed world interest rate. This is tantamount to saying that the representative household follows a no-trend long-run path of consumption, implying $r = (l - E)/E$. While this simplification rules out the possibility of exogenous growth in consumption (which is not the focus of this paper), it makes the theoretical tractability simple. The marginal utility of consumption from (5) is linear in c_t, and substituting the marginal utility in (4.4) yields:

$$E_t \, c_{t+1} = c_t \qquad \cdots(6)$$

Iterating (2), and using (4.3) and (6), it is straightforward to show that the stochastic intertemporal budget constraint, where the optimality conditions are already incorporated, is as follows:

$$\sum_{t=0}^{f} \left(\frac{1}{1 \; r}\right)^{t} c_t \quad E_t \left\{ (1 \; r) b_t \quad \sum_{t=0}^{f} \left(\frac{1}{1 \; r}\right)^{t} (q_t \quad i_t \quad g_t) \right\} \qquad \cdots(7)$$

that in turns, with simplifications, yields the optimal path for consumption:

$$c_t^* \quad r b_t \quad r(1 \; r)^{1} E_t \left[\sum_{j=0}^{f} \left(\frac{1}{1 \; r}\right)^{j} (q_{t\,j} \quad i_{t\,j} \quad g_{t\,j}) \right] \qquad \cdots(8)$$

From (8), it is clear that consumption is proportional to permanent national cash flow, since optimal consumption is determined by the expected present discounted value of the national cash flow and interest earnings from foreign asset holdings. Hence, any optimal consumption decision made by the representative household may have a tilting dynamics, i.e., the representative household may decide either to tilt consumption towards present or towards future by consuming either more than or less than the current permanent cash flow. In case where restriction $r = (l - E)/E$ holds implying consumption follows a no trend long run path, there is no consumption tilting.

In order to capture the tilting dynamics of consumption, this paper follows Khan and Selim (2004) and defines a parameter $T \; [E(l + r)^2 - l]^{-1} [E(l + r)r]$ that represents the constant proportionality reflecting consumption tilting. This formulation of the consumption tilting parameter is simple but intuitive for both analytical results and empirical estimation. With the parameter restriction $r = (l - E)/E$ the hypothesized benchmark value of T is one. Incorporating the consumption-tilting parameter, the optimal path for consumption can be restated as:

$$c_t^* \quad (r/U) \left\{ b_t \quad (1 \; r)^{1} E_t \left[\sum_{j=0}^{f} \left(\frac{1}{1 \; r}\right)^{j} (q_{t\,j} \quad i_{t\,j} \quad g_{t\,j}) \right] \right\} \qquad \cdots(9)$$

Equation (9) reconfirms that consumption is proportional to permanent cash flow, and for $\theta_T < 1$ ($\theta_T > 1$), the representative household is consuming more than (less than) its current permanent cash flow, i.e., it is tilting consumption towards the present (the future).

Consider (3) with consumption tilting dynamics and optimal consumption. When the national income identity is θ_T incorporated, it is implicitly assumed that the representative household has consumption-tilting behavior. The external component of the national income identity, therefore, can be defined as the actual consumption-smoothing component of the current account. When (3) incorporates both θ_T and optimal consumption, the optimal consumption-smoothing current account can be defined by:

$$CA_t^* = y_t - i_t - g_t - \theta_T c_t^* \quad \cdots(10)$$

Substituting (9) for optimal consumption in (10) and simplifying yields:

$$CA_t^* = -\theta_T E_t \left[\sum_{j=1}^{f} \left(\frac{1}{1+r} \right)^j (q_{t+j} - i_{t+j} - g_{t+j}) \right] \quad \cdots(11)$$

Expression (11) states that the optimal current account is the expected present discounted value of changes in national cash flow, and computation of this series requires computation of the expected present discounted value of changes in national cash flow, where the expectation is conditional on the information set used by individual agents. Within the scope of this simple model, one way to capture this information set of consumers is to have them base forecasts on information on lagged current account and lagged changes in national cash flow, where the lag length depends crucially on the expectation formation behavior of the consumers. This motivates the empirical version of the model.

The Empirical Model and Data

In order to capture the transition matrix that governs consumers' expectation formation of changes in national cash flow, this paper closely follows the techniques developed by Campbell and Shiller (1987). Consider first a simple unrestricted stationary Vector Auto Regression (VAR) model in $\Delta(q_t - i_t - g_t)$ and CA_t, where CA_t is the actual consumption-smoothing component of the current account:

$$Z_t = \Phi Z_{t-1} + \varepsilon_t \quad \cdots(12)$$

where, the vector $Z_t = \begin{bmatrix} \Delta(q_t - i_t - g_t) \\ CA_t \end{bmatrix}$, Φ is the coefficient (transition) matrix of the VAR and ε_t is a vector of independently and identically distributed stochastic disturbances. Using the transition matrix, redefine the term $E_t \Delta(q_{t+k} - i_{t+k} - g_{t+k})$ in the infinite sum in (11) as:

$$E_t (q_{t+k} - i_{t+k} - g_{t+k}) = [1 \;\; 0] E_t Z_{t+k} \quad \cdots(13)$$

With $E_t Z_{t+k} = J^k Z_t$, the optimal current account, from (11) is simply:

$$CA_t^* = -[I \; 0] \; J(1+r)1-J^{-1} \; Z_t \qquad \cdots(14)$$

where, the assumption that the infinite sum (11) converges has already been imposed. This, in turn, is conditional on the stationarity property of the VAR defined (12). In empirical estimations (14) should be valid since the VAR defined by (12) is stationary. This is because time series of national aggregates such as d_t, i_t and g_t are typically found to be non-stationary of the first order (such that their first differences are stationary), and so should be stationary since it has been adjusted for the consumption-smoothing motive of agents.

The consumption smoothing component of the actual current account series, CA_t, cannot be generated unless an estimate of the consumption tilting parameter, T, is obtained. From the model, the optimal current account series, CA_t^*, will be an I(0) process. Under the null hypothesis that the actual consumption-smoothing module of the current account and optimal current account are equal, the consumption-smoothing component of the actual current account will also be I(0). Hence, an estimate of T may be obtained as the co-integrating parameter between c_t and $(y_t - i_t - g_t)$, and that can be obtained regressing $(y_t - i_t - g_t)$ on c_t using Ordinary Least Squares.

Once the optimal current account series is generated through estimation of the empirical model, one can conduct a number of interesting tests in order to justify the choice of such a model. One of the key implicit assumptions of this model is that if agents have more information about the evolution of national cash flow than is limited in its own past values, this supplementary information should be reflected in the current account. This is analogous to saying that in the empirical VAR, current account should cause subsequent changes in national cash flow. This hypothesis can be tested using Granger causality test in the estimated VAR. Secondly, with the maintained hypothesis that the generated optimal current account series and consumption smoothing component of the actual current account series are equal, their variances should also be equal. A simple test can be conducted to statistically verify this hypothesis. This test is important because it allows the simple partial equilibrium model to indicate the relative dynamics of capital flows. If the variance of the optimal current account exceeds the variance of the actual current account (i.e., the ratio $\text{var}(CA_t^*)/\text{var}(CA_t)$ exceeds one), actual current account has not varied amply to allow capital flows to smooth consumption in light of fluctuations in national cash flow. Finally, to justify the twin assumptions of perfect capital mobility and the intertemporal consumption-smoothing current account model, the sample correlation between the actual and optimal current account may be examined.

In comparable studies, Ghosh (1995) uses quarterly time series dataset of national aggregates of five major industrialized economies, and Jones and Obstfeld (1999) and Hoffmann (2001) use similar datasets of seven industrialized developed economies. The main motivation of this paper is to address the issues of capital mobility from the current account dynamics viewpoint for relatively smaller economies of Asia that are of similar size and possess similar structure of the economy. In this paper, time series of annual national aggregates of eight small economies of Asia, namely, Bangladesh (1973-2002), Indonesia (1960-2002), Malaysia (1955-2001), Nepal (1970-2002), Pakistan (1960-2002), the Philippines

(1948-2002), Sri Lanka (1950-2001) and Thailand (1950-2002), are used for empirical estimation. The reasons of this choice of samples are obvious enough: These countries belong to a subset of economies which are almost of similar sizes in terms of their share in world GDP, possess similar pattern of institutions and structure of economy, and are located in a neighborhood inside Asia. More importantly, the underlying assumptions of small open economy and perfect capital mobility are justifiable for this set of samples[3]. Understandably, relatively large Asian economies like India and China are not included in the group. All data for the purpose of estimation of the empirical model are collected from the International Monetary Fund's International Financial Statistics (IFS), March 2003 edition.

For estimation and testing of the validity of the model, most empirical works established in literature, as mentioned earlier, have focused on the current account dynamics of major industrialized developed economies. The main motivation of this paper is to test similar results for small open economies that are of similar size, norms and possess similar structure of the economy, arguing that the intertemporal model can be better characterized if the sample under testing represents a truly small open economy. In this regard, the main purpose of the empirical investigation is to show that economic agents belonging to small open economies are prone to tilt consumption, which empirical studies on developed countries were not able to establish[4]. Quarterly complete time series of national aggregates for most small economies are difficult (and in most cases impossible) to accumulate from secondary sources. Ghosh (1995) uses time series quarterly dataset of national aggregates of five major industrialized countries in his analysis of capital mobility. Jones and Obstfeld (1994), Taylor (1996) and Hoffmann (2001) use similar datasets of seven industrialized developed countries. In empirical investigation of the aggregate consumption tilting behavior, we use time series of annual national aggregates of four small economies of South Asia, namely, Bangladesh (1973-2002), Nepal (1970-2002), Pakistan (1960-2002) and Sri Lanka (1950-2001), and four small economies of the Asia Pacific, namely, Indonesia (1960-2002), Malaysia (1955-2001), The Philippines (1948-2002) and Thailand (1950-2002). None of these economies are high savers, meaning that none of these economies have prolonged episode of current account surplus or deficit[5]. Understandably, relatively large Asian economies like India, strong Asian

[3] That the chosen countries are small relative to the world economy is easily understandable, since all chosen countries are developing countries, and collectively account for a mere proportion of the world GDP. The unilateral actions of none of these countries have potential impact on world interest rate, and none of these countries have a sustained growing trend of foreign asset accumulation. Development economists may have the ground to argue why emerging market economies like Malaysia, Indonesia, Thailand and perhaps, the Philippines are included in the group. This choice is justifiable if one considers the relative share of these economies in world GDP. I agree that for case of Malaysia there are episodic patterns of sustained current account deficits which indicate that the accumulation of foreign assets may have periodic growing trend. But these episodic patterns are not that severe, if compared to the case of its neighbor Singapore. The assumption of perfect capital mobility is also justifiable since these countries were amongst the early followers of trade liberalization spree in Asia. The choice also allows the study to be conducted on four South Asian and four Asia-Pacific countries, which may be of interest.

[4] The study by Ghosh (1995), for instance, establishes that aggregate consumption tilting behavior is significant in only two out of five major industrialized countries. This is intuitively trivial since economic agents belonging to such economies are least affected by idiosyncratic global shocks to output or components of it, which makes them rather indifferent about tilting consumption towards future or present. A high saver country, therefore, would enjoy a potential first order impact on global interest rates through unilateral actions, which allows its agents to stay indifferent about tilting consumption. Hence there is limited need for smoothing consumption in these countries.

[5] An obvious reason to exclude Singapore as an Asia-Pacific small open economy, for instance, is that the current account of Singapore exhibits sustained deficits indicating a prolonged episode of asset accumulation.

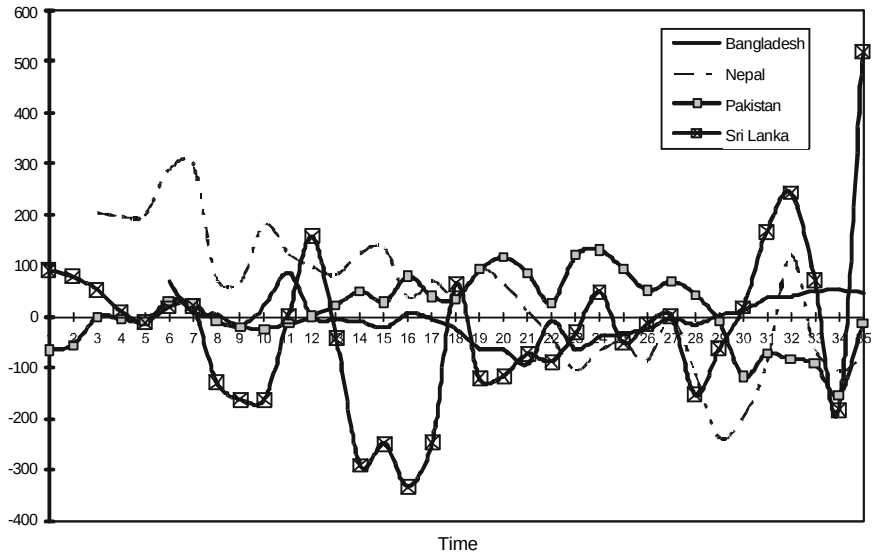
economies like Korea and Japan, and large and strong Asian economies like China are not included in the group.

All data, for the purpose of estimations and inference in the remainder of the paper are collected from the International Monetary Fund's International Financial Statistics (IFS), March 2003 edition.[6] All data are converted into real terms using the implicit GDP deflator with 1995 as the base year. Figures 1.1 and 1.2 present the actual path of current account of these economies over part of the sample period. Not all countries have complete dataset for IFS annual data period, i.e., 1948-2002. For each geographic location, the sample period in these figures are chosen such that the complete path of the current account of the country which has lowest frequency available is presented.

The important observation from these figures is that except for Malaysia and Thailand, none of these current account paths have a prolonged episode of deficits or surpluses, and thereby exhibits considerable amount of volatility around zero. This indicates that economic agents of these economies take the world interest rate as given, and hence, accommodate their savings and investment decision with rational expectations. Hence, visual observation would surely suggest the presence of aggregate consumption tilting behavior, which, however, is subject to testing.

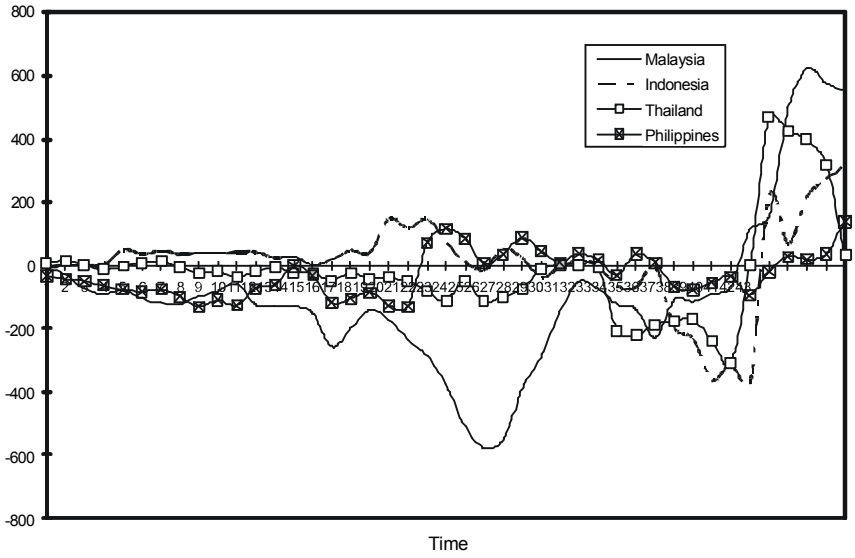
Using annual data for these countries (over a relatively short time period for Bangladesh and Nepal, in particular) may be questionable. Surely, empirical estimation with quarterly data of the same countries (possibly) for the same sample period would have been preferred.

Figure 1.1: Current Account Path of South Asian Small Economies (1968-2002)



[6] In processing data of these countries, we used IFS reported national aggregates in local currency, where private consumption c_t is household consumption expenditure (line 96f), government expenditure g_t is government consumption expenditure (line 9lf), investment i_t is the sum of gross fixed capital formation and changes in inventory (lines 93e+93i), GNP y_t is the nominal Gross National Income (line 99a) and GDP, q_t is the nominal GDP (line 99b).

Figure 1.2: Current Account Path of Asia-Pacific Small Economies (1959-2002)



But collecting quarterly time series of national aggregates of the chosen countries over the chosen sample period is a daunting task. These countries do not have reported quarterly time series before the 1990s in IFS, and using the reported quarterly data from 1990s again restricts the sample size to be (possibly) of the same size as used from the annual data. In addition to testing the model's robustness for small economy data, it will, however, be interesting to check if the model works with relatively smaller datasets. This is because tests of unit root, cointegration and estimation of VAR systematically excludes observations for lagged variables and differences, and there remains a caveat of losing precision and reliability of estimated parameters when sample size is relatively small. However, a smaller frequency dataset should be acceptable for the model as long as the model is a true representation of the process under consideration. In this regard, increasing the frequency of the dataset will not necessarily increase the precision of the estimates. In conducting the estimations, therefore, a dataset is not readily excluded just because it has a relatively low frequency.

Estimation, Tests and Results

A summary of results from Augmented Dickey-Fuller (ADF) test for unit roots in c_t and $(y_t - i_t - g_t)$ and their first differences (to test if both are I(1) processes) for each of the eight countries over available sample period, is presented in Table 1 (see Appendix). In order to test if c_t and $(y_t - i_t - g_t)$ are cointegrated, the residuals from the ordinary least squares regression of $(y_t - i_t - g_t)$ and c_t are tested for a unit root. If c_t and $(y_t - i_t - g_t)$ are both I(1) and cointegrated, the consumption-smoothing component of the actual current account, CA_t is stationary, which is tested and reported in Appendix Table 1. The other variable to be used in the VAR estimation is changes in national cash flow, $\Delta(q_t - i_t - g_t)$, which is also tested for the presence of a unit root and results are presented in Appendix Table 1.

Among the ADF test results reported in Appendix Table 1, results of the tests conducted on the differenced series are based on a specification with no trend and a constant; results

of the tests conducted on the residual CA_t series are based on a specification with no trend and no constant, and the remaining results of the tests are for a specification with constant and a time trend. In conducting the tests, all possible alternative specifications were attempted that gave quite similar results. The choice of lag length for the ADF tests is based on standard likelihood ratio test. For all samples, both c_t and $(y_t - i_t - g_t)$ are found to be I(1). For the samples of Malaysia and Thailand, these processes are found to be not significantly cointegrated, that results in a non-stationary CA_t series. Results suggest that CA_t series is not stationary for the sample of Philippines as well, but the processes c_t and $(y_t - i_t - g_t)$ are found to be significantly cointegrated. The $(q_t - i_t - g_t)$ series is found to be stationary in all samples except the one for Pakistan. Desirable stationary properties are robust for the two relatively small samples of Bangladesh and Nepal, which may suggest that empirical estimation of the model is not sensitive to volume of frequency.

The estimated values of the consumption-tilting parameter, T, are presented in Appendix Table 2. The magnitude of T can be used to interpret the movements in the consumption-smoothing component of the current account. All estimated T are statistically significant at 1% level. For all samples, the estimate is not significantly greater than one, implying that none of these economies are tilting consumption towards future, and hence are consuming more than or equal to their current permanent cash flow. Results suggest that most of the chosen samples show deficits in the current account, since six out of eight estimated T are considerably lower than one. Appendix Tables 4.1 and 4.2 present the summary of results of the VAR estimation for all samples. The VARs have been estimated starting with three lags and successively eliminating lags which were statistically insignificant using both F-test and likelihood ratio test on the exclusion restrictions. The final VARs have been between one and three lags.

To test for Granger causality of CA_t on $(q_t - i_t - g_t)$ and the hypothesis that capital flows have responded to consumption-smoothing behavior, a simple Granger causality test to the estimated VARs for all samples is conducted and the result summary is in Appendix Table 2. No Granger causality could be established for the sample of Malaysia implying that current account does not act causally for changes in national cash flow. They, empirically, may be due to the fact that current account deficits in Malaysia have been sustained for a relatively longer period in data (from 1960 to early 1990s), which may have made its levels a weaker predictor of changes in national cash flow for economic agents. In recent years, the emerging economy of Malaysia shows evidence of growing current account surplus which, however, was not the case during most of the sample period chosen. For all other samples, Granger causality is established at different significance levels. What this result suggests implicitly is the underlying assumption that economic agents form expectations on changes in national cash flow using the information available on current account dynamics is justified for seven out of the eight economies studied.

Computing the CA_t^* series requires a proxy for the world interest rate. The world interest rate, in this model, is the constant interest earned from per unit foreign assets held by the representative household in a particular country. I have considered various series of real interest rates of the USA and the UK for the time periods under consideration, and reached a conclusion that these generally vary within a range of 4% to 6%. The results are not sensitive to interest rates within this range, hence reported results are for a world interest rate of 6%.

In order to test whether capital flows have been too limited to allow consumption-smoothing behavior, a simple test, involving the null hypothesis that the ratio of variance of optimal current account to variance of actual consumption-smoothing component of the current account is one, is conducted. The summary is reported in Appendix Table 3. Results indicate that except for the samples of Nepal and Pakistan, the volatility of actual current account and optimal current account are not the same for the rest six economies. For samples of Bangladesh, Malaysia and the Philippines, there is strong evidence of excessive capital flows, since volatility of actual current account significantly exceeds volatility of optimal current account. On the contrary, for samples of Thailand, Sri Lanka and Indonesia, the variance of the optimal current account significantly exceeds variance of the actual current account, implying that the actual current account has not varied significantly enough to allow capital flows to smooth consumption. This finding is interesting, since it does not allow one to generalize the degree of capital mobility for the set of countries studied

The last column in Appendix Table 3 reports the sample correlations between CA_t and CA_t^*. For all samples except Bangladesh, the correlation of these two series is positive and convincingly high, which implies that the model works reassuringly well in explaining the major current account movements. This result is visually verified in the Figures 2.la to 2.8a presented in the Appendix, where the two series are plotted against time. Except for the case of Bangladesh, it is quite interesting how highly correlated the two series are for the remaining samples. For samples of Indonesia, Nepal and Philippines, the plots show almost a perfect fit. These plots, if compared to relevant studies on industrialized countries, are much more convincing as far as the applicability of the model in determining capital mobility is concerned. This, as may be evident from the discussion of this paper, is due to the fact that the twin assumption of small open economy and perfect capital mobility is better justified empirically for truly small open economies of Asia, as compared to industrialized developed countries which possess relatively larger share of the world GDP.

Conclusion

This paper has followed the intertemporal approach to the current account, which was primarily applied for industrialized countries in comparable studies established in literature, to establish that capital mobility in small open economies which take the world interest rate as exogenous smoothes consumption in the face of shocks to national cash flow. While the assumption of a small open economy is often empirically oversimplified, this paper identifies a subset of truly small open economies of Asia with relatively more open structure by demarcating the features of these economies (and hence confirming that these countries take the world interest rate as exogenous), and tests the empirical validity of the model for this subset of countries. Results indicate that the model works impressively well for seven out of eight economies studied. Whether or not capital flows have been excessive in these economies remains ambiguous and cannot be generalized for all countries studied, since results indicate excessive capital flows for three countries, limited capital flows for three countries and benchmark capital flows for the remaining two.

Out of curiosity, alternative VARs were estimated with current account and individual components of the changes in national cash flow, such as changes in domestic output,

investment and government expenditure. It was found that the model is insensitive to such minor changes in specification of the VAR. Thus, changes in exogenous components of the model, including world interest rate, changes the magnitude of the generated optimal current account series slightly, but in no way change its course and turning points. The empirical results presented in this paper can be conveniently compared to results established in literature from studies which were conducted on industrialized countries in similar settings. This analysis of annual data of national aggregates of Asian small economies does better than quarterly national aggregates of industrialized countries in similar settings, as may be found in Ghosh (1995), Jones and Obstfeld (1999), and Hoffmann (2001). Obstfeld and Rogoff (1996) present a similar study of five industrialized countries with annual data of national aggregates using the same data source. In their study, the data for Sweden, Belgium and Denmark fit the model almost perfectly. This provides evidence in support of using smaller frequency annual data for such estimations. The VAR estimates are encouraging for the formal validity of the model, since most estimated coefficients of the VARs are individually statistically significant. Current account dynamics is found to be causal for agents' expectations for changes in national cash flow in seven (out of eight) countries studied, which is very unlike the findings of studies conducted on industrialized countries. In a similar study on industrialized countries, for instance, Ghosh (1995) finds that current account acts as a strong predictor of changes in national cash flow for the case of USA only, out of five countries studied.

Among the motivating caveats of this particular study, an important one may be the fact that the paper abstracted from testing the model with reform effects, i.e., while conducting time series estimations, the fact that the volatility of capital movements in these countries possibly could have varied in accordance with reforms in economic systems within the sample period considered, has been ignored. However, this is reasonable since most of the sample periods considered for these countries is characterized by open trade regime with no major reforms of foreign asset holding regulation. There might have been some structural breaks in the time series which are ignored collectively. For instance, the volume and volatility of capital flows to and from Pakistan might have been affected with the liberation of Bangladesh (which was East Pakistan until 1971). In this study, the data for Pakistan has not been adjusted for this major change, where, due to the liberation of Bangladesh in 1971, the size of the Pakistan economy was virtually halved.[7] The 1990s Asian financial crisis is also not captured, which in principle, perhaps should persuade a structural break in the empirical models for Asia Pacific countries. The simple model only captures transitory productivity shocks, and thus abstracts from incorporating idiosyncratic shocks such as oil price shocks, international currency shocks etc.

Nevertheless, the correlations and plots strongly suggest empirical robustness and validity of the model and justify the choice of samples. The model is in no way sensitive to smaller frequency annual datasets. While the choice of samples is consistent with the assumption of small open economy, results do not suggest generalization of the perfect capital mobility assumption for models of similar kind. It is, however, acknowledged that volatility of current

[7] The IFS reported data for Pakistan during 1960-1971 is the data for former West Pakistan only, which now is known as Pakistan. This information defends the choice of dataset. However, in empirical estimation for Pakistan, I do not include any structural breaks and consider the full series as data for Pakistan.

account may well be due to different economic facts which are beyond the capacity of this simple model. The extent of capital flows in small economies (in general), for instance, may be caused by short-term capital flows that respond to speculation in the world foreign exchange market. The magnitude and precariousness of these private capital flows suggests that they are much larger than would be deemed necessary to smooth real idiosyncratic shocks to consumption, arising from transitory shocks to changes in national cash flow or any of its components.

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Appendix: Figures

Figure 2.1a: Bangladesh—Optimal and Actual Current Account

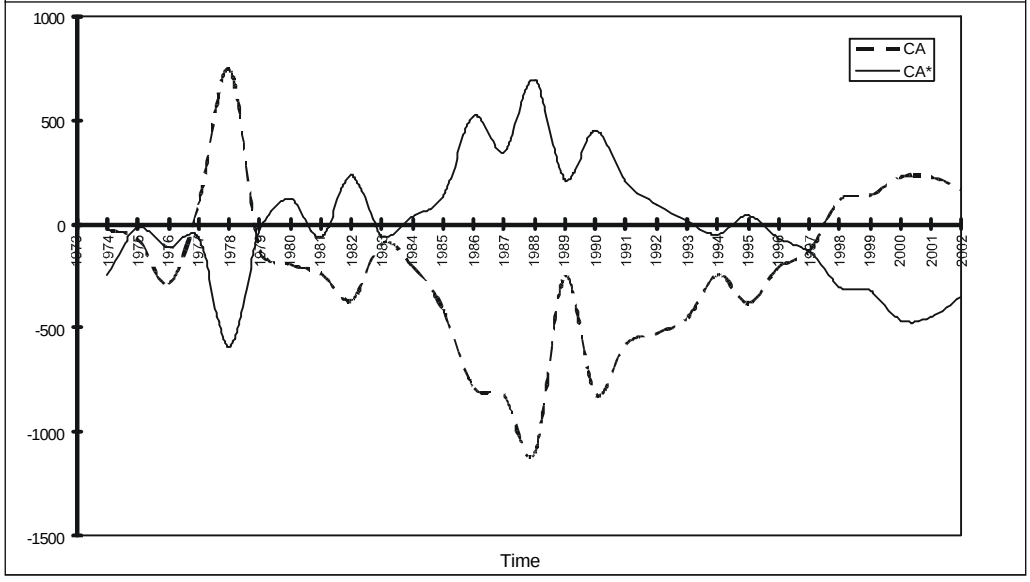


Figure 2.2a: Indonesia—Optimal and Actual Current Account

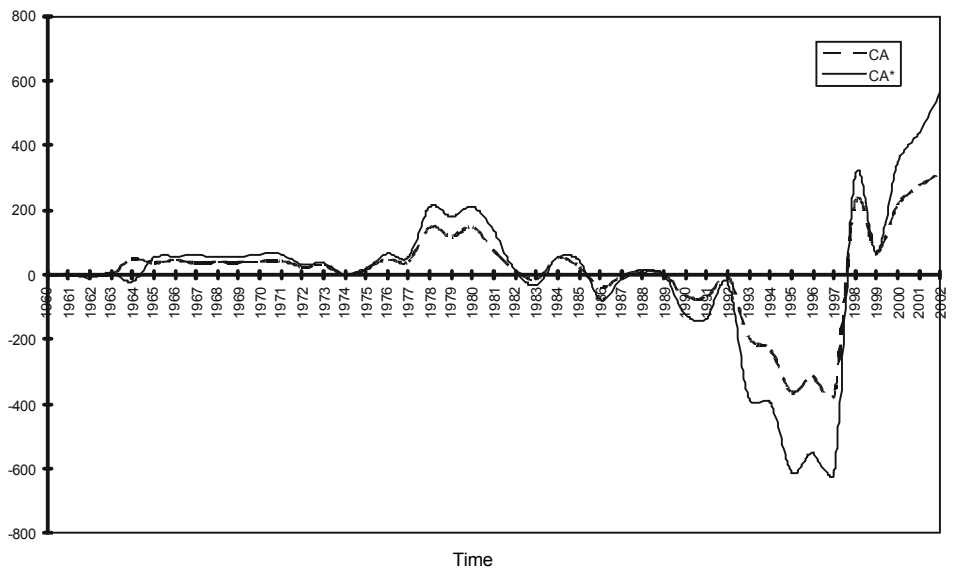


Figure 2.3a: Malaysia—Optimal and Actual Current Account

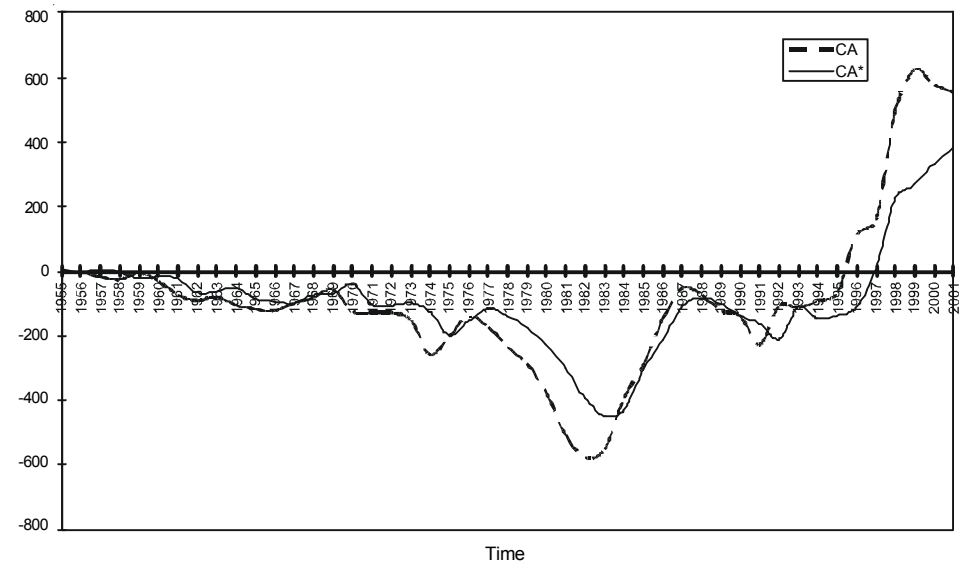


Figure 2.4a: Nepal—Optimal and Actual Current Account

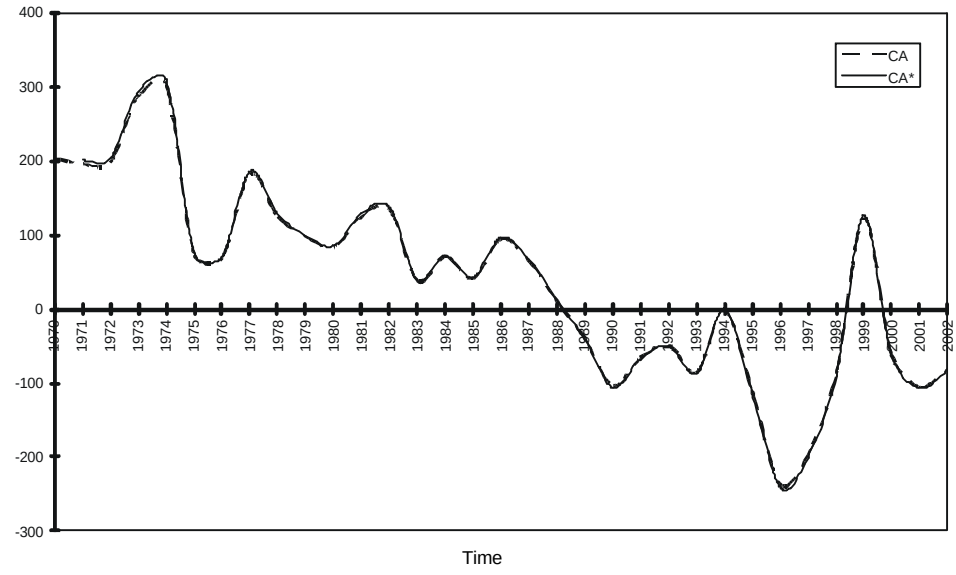


Figure 2.5a: Pakistan—Optimal and Actual Current Account

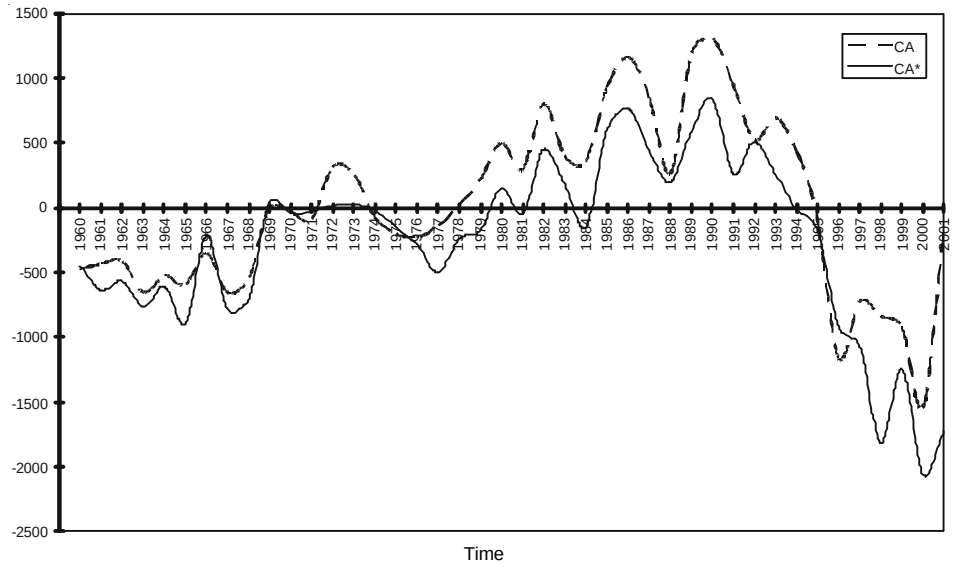


Figure 2.6a: The Philippines—Optimal and Actual Current Account

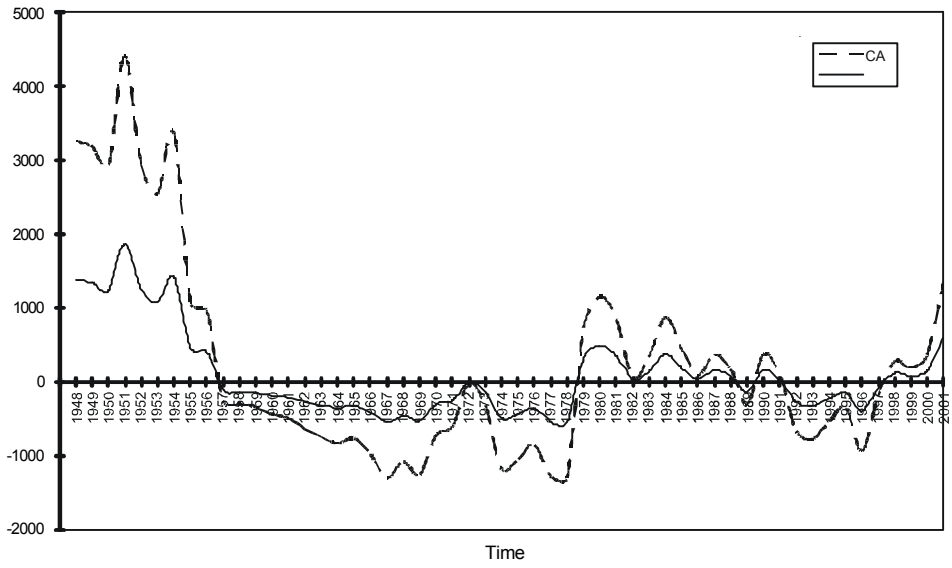


Figure 2.7a: Sri Lanka—Optimal and Actual Current Account

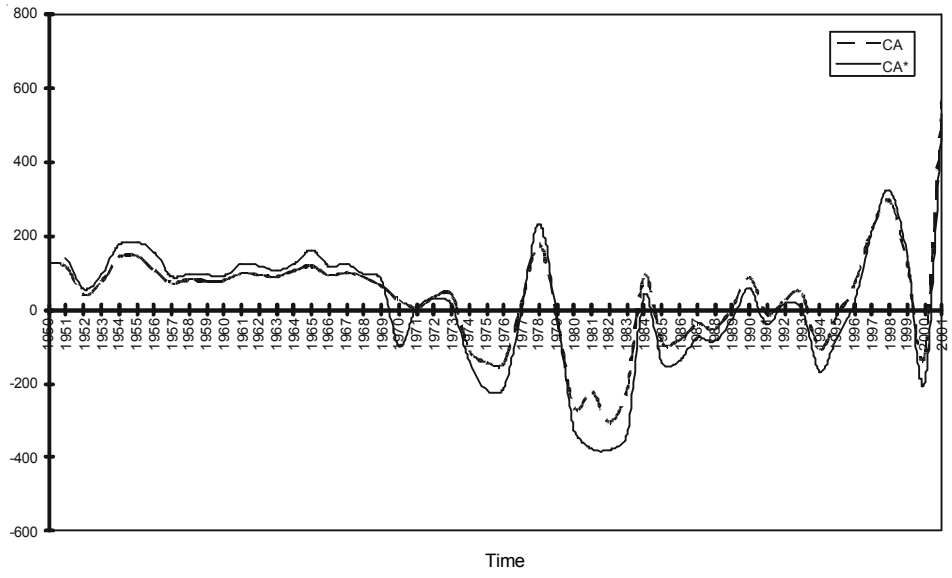
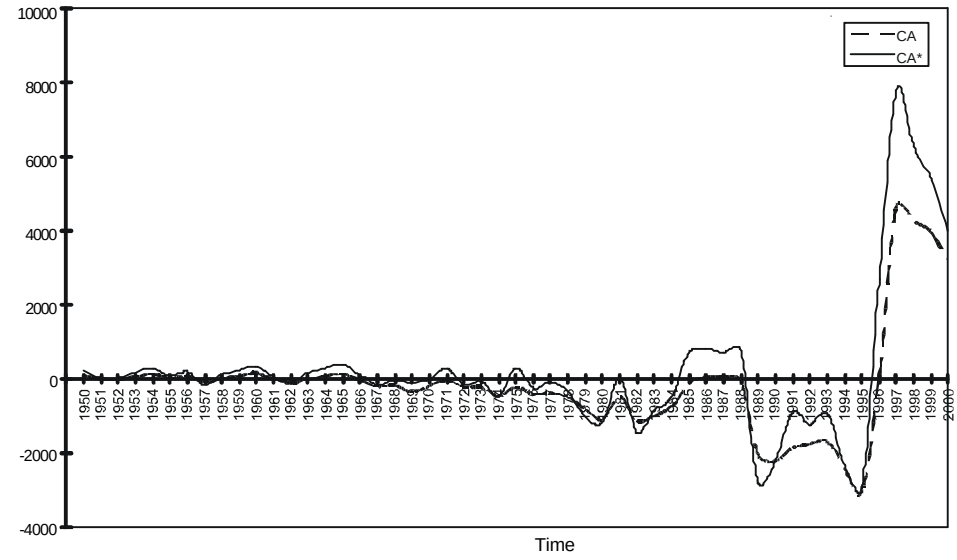


Figure 2.8a: Thailand—Optimal and Actual Current Account



Appendix Tables

Table 1: Test of Unit Root and Cointegration

	Sample						
Countries	**t adf c_t**	**t adf $(y_t - i_t - g_t)$**	**t adf Δc_t**	**t adf $\Delta(y_t - i_t - g_t)$**	**t adf CA_t**	**t adf u_t**	**t adf $\Delta(q_t - i_t - g_t)$**
Bangladesh (1973-2002)	–0.289	1.229	–5.085**	–3.172**	–2.425*	–2.997**	–3.348*
Indonesia (1960-2002)	–1.242	–0.462	–6.745**	–6.686**	–2.309*	–2.307*	–4.757**
Malaysia (1955-2001)	–1.027	0.777	–5.388**	–3.446**	–0.079	–0.075	–3.182*
Nepal (1970-2002)	–2.756	–2.390	–7.628**	–7.557**	–2.157*	–2.155*	–7.738**
Pakistan (1960-2002)	–0.159	–0.877	–5.794**	–3.774**	–2.310*	–2.309*	–2.873
Philippines (1948-2002)	–0.226	–0.987	–5.974**	–7.599**	–2.011	–2.025*	–7.931**
Sri Lanka (1950-2001)	–1.336	0.508	–5.747**	–4.602**	–3.207*	–3.269**	–4.352**
Thailand (1950-2002)	–1.132	0.820	–5.174**	–3.322**	–1.691	–1.711	–3.205*

Note: • * and ** indicate statistically significant at 5% level and 1% level, respectively, on the basis of ADF t critical values.

• t-adf is the Augmented Dickey Fuller t statistic on z_{t-1} from the general specification.

$$\Delta z_t = D_0 + D_1 z_{t-1} + \sum_{j=2}^{3} D_j \Delta z_{t-j} + G t + e_t$$

where z_t is c_t, $(y_t - i_t - g_t)$ and CA_t respectively, t is the time trend and $H_t \sim$ i.i.d.$(0, V_H)$ is the stochastic disturbance term.

Table 2: LR Statistic for Granger Causality Test from Unrestricted VAR Estimation and the Estimated Consumption-tilting Parameter

Sample	LR Statistic ( ) [p-value]	Estimate of T [p-value]
Bangladesh (1973-2002)	3.320 (j=1) [0.0684]	0.994 [0.000]
Indonesia (1960-2002)	11.693 (j=1) [0.0006]	0.961 [0.000]
Malaysia (1955-2001)	1.521 (j=1) [0.217]	0.882 [0.000]
Nepal (1970-2002)	28.295 (j=2) [0.000]	0.796 [0.000]
Pakistan (1960-2002)	2.836 (j=1) [0.0921]	0.874 [0.000]
Philippines (1948-2002)	8.606 (j=3) [0.035]	0.969 [0.000]
Sri Lanka (1950-2001)	8.782 (j=2) [0.012]	0.846 [0.000]
Thailand (1950-2002)	33.407 (j=2) [0.000]	0.980 [0.000]

Note: LR statistic is the test statistic for the likelihood ratio test of null hypothesis that the coefficients of lagged values of CA_t in the block of equations explaining $(q_t - i_t - g_t)$ is zero, and j is the number of restrictions imposed.

Table 3: Ratio of Variance of CA* to CA, and Correlation between CA and CA*

Sample	Ratio	P[F<=f] One Tail	Correlation (CA, CA*)
Bangladesh (1973-2002)	0.595	0.087	–0.938
Indonesia (1960-2002)	2.784	0.000	0.995
Malaysia (1955-2001)	0.431	0.002	0.939
Nepal (1970-2002)	1.042	0.453	0.999
Pakistan (1960-2002)	1.030	0.462	0.885
Philippines (1948-2002)	0.178	0.000	0.999
Sri Lanka (1950-2001)	1.498	0.070	0.976
Thailand (1950-2002)	1.805	0.010	0.963

Note:
- Ratio = Var(CA*)/Var(CA).
- P[F<=f] one tail is the p-value, with one degree of freedom, for the null that the ratio of the variances is equal to one.