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Have ASEAN Current Account Deficits Been Excessive ?

ROSS GUEST
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This paper evaluates the size of the current account deficits (CADs) of five ASEAN economies: Thailand, Singapore, Indonesia, Malaysia and the Philippines over the period 1976 to 1995. Two approaches are applied and compared. The first approach is to apply a calibrated representative agent model of optimal saving to each of these economies. The model generates optimal (CADs) for each year from 1976 to 1995 and these are compared with the actual CADs in order to determine whether the CADs have been above-optimal. This is one sense in which a CAD is interpreted in this paper as "excessive". As a supplementary approach, six structural indicators of current account sustainability are quantified for each country. A CAD which is unsustainable is also interpreted as excessive. An assessment based on the results from both approaches confirms that the reference country, Singapore, did not run excessive current account deficits over the sample period - indeed, quite the reverse. For three of the ASEAN countries - Thailand, Malaysia and Indonesia - the evidence is not conclusive. The representative agent model suggests that their deficits were not very excessive, particularly in the decade from 1976 to 1995, and their outcomes in terms of several of the sustainability indicators were not significantly different from that of Singapore. The evidence on the Philippines, on the other hand, points towards an excessive current account deficit over the whole sample period 1976 to 1995.

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I. INTRODUCTION

The roots of the 1997 financial crisis in Asia can be partly attributed to concerns about high current account deficits (CADs) in some of the ASEAN countries.[1] Similar concerns have caused currency realignments in other countries particularly in the 1980's. Some episodes have amounted to genuine external crises, for instance Chile and Mexico (1982), while others such as Korea (1980) and Australia (1985), have been less dramatic.[2] With the 1997 Asian crisis added to this list there is a need to apply generally accepted criteria in evaluating the size of CADs.

The aim of this paper is to evaluate the size of the current account balances of five ASEAN economies: Thailand, Singapore, Indonesia, Malaysia and the Philippines over the period 1976 to 1995.[3] The approach adopted is to firstly apply a calibrated representative agent model of optimal saving to each of these economies. The model generates optimal CADs for each year from 1976 to 1995 and these are compared with the actual CADs in order to determine whether the CADs have been above-optimal, which is interpreted here as "excessive". As an additional interpretation of excessiveness, the structural indicators of current account sustainability identified as important in the country episodes analysed by Frenkel and Razin (1996), see below, are quantified for each country. Taking into account the information from both sources - the sustainability indicators and the application of the representative agent model - an assessment is provided of the excessiveness of the CADs of each country over the sample period.

The paper is structured as follows. Section II provides a brief critical survey of the interpretations and operational indicators of current account sustainability in the literature. Section III gives an overview of the actual saving, investment and current account patterns of the five ASEAN economies for the period 1976 to 1995. In section IV the representative agent model is described, including the data and calibration required to apply this model empirically to the ASEAN economies. Sections V and VI present the results from application of the representative agent model and the sustainability indicators, respectively. Section VII concludes by providing an assessment of the ASEAN CADs on the basis of the results given in Sections V and VI.

II. CURRENT ACCOUNT SUSTAINABILITY: INTERPRETATIONS AND CRITERIA

Current account sustainability has received a variety of interpretations. See Frenkel and Razin (1996) and Pitchford (1995) for discussions of these interpretations. Under the least restrictive interpretation the CAD is sustainable if the country is solvent in the sense that its present value intertemporal budget constraint is satisfied. This implies that the country must be able to generate sufficient trade surpluses in the future to repay its debt. The typical approach to empirically testing for solvency is to estimate the consumption smoothing current account balance, which is equal to minus the present discounted value of expected changes in national cash flow (output minus investment minus government spending). Tests of the association between the actual and the consumption smoothing current account balances provide tests of insolvency and therefore unsustainability. Examples of this methodology are to be found in Cashin and McDermott (1996), Ahmed and Rogers (1996), Ghosh and Ostry (1995) and Milbourne and Otto (1992).

Salop and Spitaeller 1980 suggest an operational indicator of solvency is that national saving must be at least equal to wealth times the rate of growth of population, which implies non-decreasing levels of national wealth per capita. This in turn implies that foreign liabilities per capita are not rising faster than the capital stock per capita. A similar indicator often quoted is based on the condition for a non-increasing debt (or, strictly speaking, foreign liabilities) to GDP ratio. This condition requires that the country must not run persistent trade deficits where these are associated with the world rate of interest above the growth rate of the economy for a debtor country.[4] To do so would cause the debt to GDP ratio to increase (see Appendix for derivation of this result). This differs from the Salop and Spitaeller in that it ignores the capital stock and is expressed as a ratio to GDP rather than a per capita ratio. Expressing the stock of debt as a ratio of GDP is more restrictive than a per capita ratio. On the other hand, ignoring the capital stock may render the constant debt to GDP condition more or less restrictive than the Salop and Spitaeller condition depending on what is happening to the capital stock.

One criticism of the above criteria, however, is that the trade deficit is assumed to be exogenous with respect to national indebtedness. Wickens and Uctum (1996, p.428) point out that the trade balance is a "highly endogenous" variable being a function of, among other things,

wealth and therefore debt. It is quite possible that an optimal path towards a steady state may appear unsustainable, because of a trade deficit and interest rate exceeding the growth rate for many years along the path, only for the trade deficit to turn into a persistent surplus further along the path. In terms of the Salop and Spitaeller criterion, national saving may be negative initially and positive later on. This can occur through a feedback mechanism from wealth to consumption; hence, negative saving implies lower wealth which causes lower consumption and therefore higher saving. To allow for this feedback mechanism, Wickens and Uctum specify a complete linear model of the economy reduced to a two equation VAR. From this they establish the result that a sufficient condition for satisfying the intertemporal borrowing constraint is that there is a negative feedback or wealth effect from debt to the trade balance.

A more restrictive interpretation of sustainability is given by Frenkel and Razin (1996, p.512) who define an unsustainable path as one which would eventually require a "drastic" policy shift which would lead to either a large recession, which can be regarded as politically infeasible, or a "crisis" such as an exchange rate collapse or an inability to service external obligations. Such crises may occur along an optimal path, implying that some optimal paths may be infeasible, as shown by Pitchford (1995); or it may occur as a result of CADs which are misaligned, in the sense of being greater than their equilibrium values. The latter case of misaligned current account balances is the sense in which Williamson (1983) defines unsustainability.[5] This is the most restrictive interpretation of current account sustainability.

International banks adopt critical ratio levels, or trigger points, which are considered to be portents of a drastic policy shift or a crisis. The ratios include debt to GDP, debt servicing costs to exports, current account deficit to exports. The trigger points for these ratios vary somewhat.[6] They are among other factors typically incorporated in the country risk assessments by international banks and others such as Euromoney.[7] Many of these country risk factors have been shown by Frenkel and Razin (1996) to influence willingness to lend through their model of international portfolio diversification with moral hazard. Based on both willingness to lend and solvency considerations. Frenkel and Razin identify the operational indicators which affect current account sustainability and apply these factors in their analysis of particular country "episodes". The most readily quantifiable of those indicators consist of structural features of the

economy such as investment and saving ratios, the growth rate, the degree of openness, the composition of external liabilities. They nominate other indicators including the financial structure of the economy, the macroeconomic policy mix and political economy factors.

In this paper two operational approaches to evaluating the size of CADs are applied and compared. In one approach, a CAD is interpreted as "excessive" if it is above-optimal as determined by the representative agent model of optimal saving. An above-optimal CAD may or may not be unsustainable.[8] Similarly, an unsustainable CAD may or may not be above-optimal but it can be described as excessive. Hence, the second operational approach in this paper is the application of the sustainability indicators adopted by Frenkel and Razin (1996) in order to determine whether ASEAN CADs have been excessive. The use of these structural indicators of sustainability implies a restrictive interpretation of sustainability.

III. ASEAN SAVING, INVESTMENT AND CURRENT ACCOUNT PATTERNS

From national accounting identities, the current account balance (CAB) = national saving (S) minus national investment (I).[9]

TABLE 1.

		CAB/Y	S/Y	I/Y
mean for period				
1976:1985	Thailand	-0.075	0.245	0.299
	Indonesia	0.025	0.270	0.245
	Malaysia	-0.062	0.244	0.306
	Philippines	-0.023	0.224	0.246
	Singapore	**-0.065**	**0.370**	**0.435**
1986:1995	Thailand	-0.053	0.315	0.362
	Indonesia	-0.021	0.298	0.319
	Malaysia	-0.047	0.285	0.332
	Philippines	-0.021	0.183	0.204
	Singapore	**0.040**	**0.424**	**0.383**
1976:1995	Thailand	-0.063	0.283	0.334
	Indonesia	-0.017	0.276	0.293
	Malaysia	-0.065	0.262	0.327
	Philippines	-0.021	0.200	0.221
	Singapore	**-0.006**	**0.406**	**0.412**

Source: "DX" Database, compiled from World Bank World Tables

Table 1 shows the mean CAB, S and I, as ratios to GDP (Y) for each country. The period is divided into two decades, 1976 to 1985 and 1986 to 1995. The ratios for each year are plotted in Charts 1 to 5. In comparing the first four countries, to be named here the ASEAN Four, with the reference country, Singapore, two features stand out. Firstly, in the earlier decade the ASEAN Four countries ran CADs which were not in excess of Singapore's. However, in the latter decade Singapore's current account was in strong surplus while those of the ASEAN Four remained in approximately the same level of deficit as in the earlier decade. With respect to Singapore, this was due to an increase in saving and a decrease in investment. The second feature is that the levels of both saving and investment for both decades are much higher in Singapore than in any of the ASEAN Four countries. As suggested below the higher saving and investment rates is an obvious structural feature of Singapore which distinguished it from the ASEAN Four in the minds of foreign investors.

IV THE REPRESENTATIVE AGENT MODEL, DATA AND METHODOLOGY[10]

Take the objective of the economy to be a social welfare function defined as a concave function of the stream of aggregate consumption levels running up to h periods in the future and of the level of wealth at the end of the h periods. Writing the aggregate level of aggregate consumption in period j as C_j and terminal wealth as W_h, the social welfare function is

$$U(C_1, C_2, \ldots C_h, W_h) \tag{1}$$

The optimal intertemporal consumption pattern occurs when the social welfare function (1) is maximised subject to the production constraints and the international borrowing constraints of the economy. From the national accounting identity consumption in period j=1,..,h, is constrained by

$$C_j = Y_j - I_j + B_j - (m+r_1)(1+m)^{j-1} D_0 - \sum_{k=1}^{j-1} (m+r_k)(1+m)^{j-k-1} B_k \tag{2}$$

$$j = 1 \ldots h$$

where Y_j is output domestically produced in period j, I_j is investment expenditure in period j, B_j is the flow of borrowing plus investment from overseas in period j and r_j is the world rate of interest in period j. Each of the h interest rates, one for each period in the planning horizon, is assumed to be exogenous.

Output in period j is determined by a vintage production function of the general form:

$$Y_j = Y_1(1-\delta)^{j-1} + \sum_{k=1}^{j-1} A_k F_k(J_k(1-\delta)^{j-k-1}; l_{kj}) \qquad (3)$$

where F_k is the output produced from capital installed in period k; δ is the rate at which capital, once installed, depreciates; l_{kj} is the amount of labour available to work at time j on newly installed capital of vintage k, J_k; A_k is the efficiency parameter which captures technical progress; J_k is the effective capital stock installed in period k, after accounting for adjustment costs in the installation of new capital goods, and is given by

$$J_k = I_k\left(1-0.5\mu(I/K)_k\right) \qquad (4)$$

here K_k is the net capital stock and μ is an adjustment cost parameter.[1] The effective capital, J_k, has a one period gestation. Hence, effective capital installed in period k-1 produces output in period k.

Terminal wealth is the capital stock after *h* periods less the accumulated overseas foreign liabilities after *h* periods. Writing K_0 for the capital stock inherited in period 1 from the past, the capital stock after *h* periods of accumulation is

$$K_h = K_0(1-\delta)^h + \sum_{k=1}^{h-1} J_k(1-\delta)^{h-k} \qquad (5)$$

There is no investment in period h because, given a one year gestation period, any investment made in period h would not augment the capital stock and generate extra output until period h+1, which is after the end of the planning horizon.

The level of foreign liabilities after *h* periods is

$$D_h = D_0(1-m)^h + \sum_{k=1}^{n} B_k(1-m)^{h-k} \tag{6}$$

Note that overseas borrowing is possible in period h. Terminal wealth is measured at the end of period *h* and so can be influenced by borrowing in period h. Given (5) and (6), terminal wealth is defined as

$$\begin{aligned} W_h &= K_h - D_h \\ &= (1-\delta)^h K_0 + \sum_{k=1}^{h-1}(1-\delta)^{h-k} J_k - (1-m)^h D_0 - \sum_{k=1}^{h}(1-m)^{h-k} B_k \end{aligned} \tag{7}$$

The first order conditions for this problem are given in Guest and McDonald (forthcoming (b)). Given the overseas borrowing, output and wealth constraints. (2), (3) and (7) respectively, the optimal current account balance is determined as a residual. In this paper attention is restricted to the role of optimal consumption in determining the optimal current account balance. Optimal investment is assumed to be equal to the level of actual investment for each year from 1976 to 1995.[12] Beyond 1995 investment is assumed to grow at the long run growth rate of output.

Functional forms, data and calibration

The Cobb-Douglas form is chosen for the vintage production function (3):

$$Y_j = (1-\delta)^{(j-1)} Y_1 + \sum_{k=1}^{j-1} (1-\delta)^{(j-k-1)} A_k J_k^{\alpha} (L_{k-1} - (1-\delta)L_k)^{1-\alpha} \tag{8}$$

$$j = 1,\ldots,h$$

where L_k is the aggregate level of employment in period k and the term. $L_{k-1} - (1-\delta)L_k$. is the amount of labour available to work on effective capital newly installed. It is equal to the increase in the labour force in each time period. $L_{k-1} - L_k$. plus the amount of the previous period's employment released from working on old capital which has depreciated by δL_k.

For the utility function the additive, constant elasticity form is chosen:

$$U = \sum_{j=1}^{h} \left\{ \frac{N_j \left(\frac{C_j - \overline{C_j}}{N_j} \right)^{1-\beta} (1+\rho)^{1-j}}{1-\beta} \right\} + \frac{N_h \omega \left(\frac{W_h}{N_h} \right)^{1-\Psi} (1+\rho)^{1-h}}{1-\Psi} \qquad j = 1, \ldots, h \qquad (9)$$

$$\beta, \Psi, \omega > 0, \; C_j \geq \overline{C_j} \geq 0, \; W_h \geq 0$$

where N_j is the population in period j; ρ is the rate of time preference; and $\overline{C_j}$ is the minimum subsistence or habit level of consumption in year j and in year 1 is assumed to be 66% of actual consumption expenditure for j=1 (since actual expenditure in year 1 of a plan is given).[13] For years j=2,...h $\overline{C_j}$ is assumed to grow at the rate of growth of optimal output. Introducing a subsistence level of consumption has the effect of reducing the volatility in the series for optimal consumption. In (9) total utility is population times per capita utility.

From the first order conditions consumption levels in each period j=1,..,h-1 relative to the consumption level in period *h* are

$$C_j = \theta_j (C_h - \overline{C_h}) + \overline{C_j} \qquad j = 1, \ldots, h-1 \qquad (10)$$

where

$$\theta_j = \left(\frac{N_j}{N_h} \right) (1+\rho)^{\frac{h-j}{\beta}} \left\{ \prod_{k=j}^{h-1} (1+r_k) + \sum_{i=j-1}^{h-1} \left[(r_j - r_i)(1-m)^{h-i} \prod_{x=j-1}^{i-1} (1+r_x) \right] \right\}^{-\frac{1}{\beta}} \qquad (11)$$

The first order conditions also give terminal wealth as a function of terminal consumption as follows (and assuming that $\psi=\beta$)

$$\frac{W_h}{C_h - \overline{C}_h} = \omega^{\frac{1}{\beta}} \qquad (12)$$

The approach adopted is to mimic the infinite horizon solution in the sense that the longer the finite horizon the closer the solution gets to the infinite horizon solution. This implies conditions on the parameters ω and ρ. The value of ω is determined such that the target wealth to consumption ratio, $(W/C)_h$, is equal to the value that would obtain in a steady state (see Guest and McDonald (forthcoming (b)). The value of ρ is determined such that the growth rate of consumption is equal to the growth rate of output. This value of ρ is given by

$$\rho = \frac{(1+v)^{\beta}(1+r)}{(1+\gamma)^{\beta}} - 1 \qquad (13)$$

where v is the terminal rate of population growth, r is the interest rate and γ is the terminal rate of output growth.

The chosen length of the finite planning horizon is 100 years. Under a range of values for each parameter, a horizon of 100 years is long enough that the values of the optimal current account balance in year one are within a specified degree of tolerance of their optimal values for a horizon approaching infinity. The specified degree of tolerance is 0.005 of GDP.

Values of technological parameters are given in Table 1. The values chosen are generally in the mid-range of values adopted in the literature.[14] A sensitivity analysis showed that the results are most sensitive to the values chosen for α and the rate of technical progress. However, only values of these parameters at the very limits of their reasonable range were able to qualitatively alter the results. Values of the other parameters, within reasonable bounds, were immaterial to the results.

TABLE 2. PARAMETER VALUES

δ, the depreciation rate	0.051
α, the partial elasticity of output with respect to capital	0.350
m, the proportion of debt to be repaid in each year	0.150
β, the reciprocal of the elasticity of intertemporal substitution	2.000
ψ, the reciprocal of the elasticity of substitution between W_h and C_h	2.000
μ, the adjustment cost parameter	varies between countries such that adjustment costs equal 20%
ρ, the rate of time preference	0.04 (with small variation between plans and countries)
ω, the weight attached to terminal wealth in the utility function	varies between plans and countries from 5.0 to 20.0
h, the planning horizon	100 years
$\overline{C_j}$, subsistence consumption	0.66 of actual consumption
$(A_j/A_{j-1} - 1)$, the rate of technical progress	0.005

The values of exogenous variables are determined as follows. The world interest rate r_j for each country is assumed to be equal to the long term real bond rate for the U.S. The real rate is calculated by deflating the nominal rate using the GDP deflator and the US$ exchange rate for each country.[15] Values for employment, L_j, population, N_j, consumption, C_j, output, Y_j, investment, I_j, and the current account deficit, $B_j - mD_{j-1}$ for 1976 to 1995 are the actual values for those years.[16] The values of the capital stock, K_j, are imputed from gross fixed capital expenditure.[17] For the years from 1996 to the end of the planning horizon population and employment are assumed to grow at the projected growth rates of total population and the working age population respectively.[18]

Having specified explicit functional forms and values of the parameters and exogenous variables, optimal plans are calculated for each year from 1976 to 1995. This yields a set of 20 overlapping plans. The optimal values for year one of each plan commencing in 1976,...,1995 give the optimal values for that year.[19]

Factors determining the optimal current account pattern.

The optimal current account pattern is driven by factors influencing the optimal saving

and investment patterns. Factors influencing optimal investment can be ignored since in this paper optimal investment is assumed to be equal to actual investment. The patterns, as opposed to the mean levels, of optimal national saving and hence the optimal CAB are not influenced by the parameter values, since these are essentially constant for all plans.[20] Rather, the pattern of optimal saving is driven by the exogenously given levels of output, population and interest rates from 1976 to 1995. The influence of these three factors can be seen through equations (10) and (11) which determine the level of consumption in year j. Holding all other variables constant the effects of these three variables can be explained as follows. Saving varies positively with the level of output as a result of consumption smoothing; a temporary increase in output in a given year implies as increase in saving in that year since optimal consumption is not influenced by temporary changes in output.[21] A lower than average increase in population in a given year implies a lower than average increase in aggregate consumption in order to generate a given per capita consumption. Saving responds positively to the rate of interest through the shifting of consumption through time. To see this take a simple two period model. If the interest rate falls in year 1 of the two period plan it is optimal to increase consumption (shift consumption towards the present), reduce saving and increase overseas borrowing. This is because a lower interest rate lowers the opportunity cost to society of a unit of current consumption. An increase in the rate of interest, increases the opportunity cost of consumption, resulting in lower optimal consumption (shifting consumption towards the future), higher optimal saving and a lower optimal CAD. In the extension to the multi-period model, all fluctuations in future interest rates affect consumption though the effect is more complicated, as described by equation (11). Sensitivity analysis showed that the individual effects of output and interest rates are greater than the effect of population on optimal saving for all countries.

V. RESULTS OF SIMULATIONS OF THE REPRESENTATIVE AGENT MODEL

The optimal and actual saving and current account levels for each country are plotted in Charts 7 to 11. The averages for the two decades are summarised in Table 3. The ASEAN Four tended to under-save and run below-optimal current account balances, with the exception of Thailand and Indonesia in the latter decade in which cases the reverse was true. However, for three of the ASEAN Four countries - Thailand, Indonesia and Malaysia - the gaps between the decade averages of optimal and actual saving and current account balances were not large being in the order of 1% of GDP with Thailand being somewhat higher in the first decade. The Philippines had by far the largest degree of under-saving and below-optimal current account balances in both decades. The reference country, Singapore, considerably over-saved and incurred above-optimal current account balances over the two decades.

TABLE 3. Comparison of average optimal and actual saving and CAB

	1976:1985			1986:1995		
	saving*	CAB*	corr. coeff. CAB(opt.,act.)	saving*	CAB*	corr. coeff. CAB(opt.,act.)
Thailand	-2.30%	-4.31%	0.29	0.50%	0.30%	0.91
Indonesia	-1.50%	-1.46%	0.84	0.60%	0.61%	0.36
Malaysia	-0.60%	-0.71%	0.51	-1.00%	-0.17%	0.95
Philippines	-10.00%	-10.03%	0.65	-11.30%	-11.28%	0.86
Singapore	8.41%	16.52%	-0.09	9.10%	9.09%	0.68

* negative denotes below-optimal and positive denotes above-optimal, as a % of GDP

The last few years of the sample, the 1990's, show that two of the ASEAN Four - Thailand and Indonesia - consistently over-saved by several percent of GDP (Charts 7 and 8). The exact reverse was true for Malaysia and the Philippines (Charts 9 and 10). In the light of these results it is somewhat surprising that the financial crisis originated in Thailand, spreading then to Indonesia, since these countries had been over-saving according to the results.

As discussed above, the results were subject to a sensitivity analysis for a reasonable range of parameter values. The broad qualitative conclusion, consistent with the results of the sensitivity analysis. is that for Thailand, Indonesia and Malaysia there is no strong evidence that their CADs were excessive on average, especially in the last decade (although Thailand's was probably excessive in the earlier decade). On the other hand, the results suggest that the Philippines ran excessive CADs in both decades while the reverse was true for Singapore.

Table 3 also gives the correlation between the optimal and actual CABs in both decades. This can be interpreted as a measure of the degree to which the countries made optimal use of world capital markets. With the conspicuous exception of Indonesia, the correlation coefficients were significantly higher (at the 1% level) in the latter decade, 1986 to 1995, which is the period in which economic liberalisation accelerated in the ASEAN countries. This suggests a link between economic liberalisation and the optimal use of world capital markets and hence economic welfare. Such a link may operate through measures such as lower trade barriers and relaxed capital controls which allow a country to run a closer-to-optimal current account balance financed by closer-to-optimal use of foreign saving. Further investigation of a possible causal relationship between economic liberalisation and the optimal use of world capital markets in ASEAN countries is beyond the scope of this paper.

VI INDICATORS OF CURRENT ACCOUNT SUSTAINABILITY

Frenkel and Razin (1996) show that considerations of solvency and willingness to lend suggest a number of operational indicators of current account sustainability. These fall under three categories: structural indicators, macreconomic policy stance and political economy factors. In this paper attention is restricted to the following structural indicators from the Frenkel and Razin analysis: the rate of economic growth, the ratio of exports to GDP, the ratio of long-term to short-term debt and the ratios of investment and saving to GDP. The ratio of external debt to GDP is added. The averages for the two decades for each country are given in Table 4.

The higher the rate of economic growth the higher the CAD to GDP that can be maintained for a given constant level of foreign liabilities to GDP. This can be derived from the

condition for a constant foreign liabilities to GDP ratio (rearrange equation A2 in the Appendix). In this way higher growth enhances intertemporal solvency. Hence, countries with higher rates of economic growth can sustain higher CADs, ceteris paribus. On this indicator, the Philippines is the only country with a significantly inferior performance to Singapore. This is true for both decades.

TABLE 4. Structural Indicators of Sustainability

		Thailand	Indonesia	Malaysia	Philippine	Singapore
	mean for:					
Economic growth	1976:1985	0.066	0.069	0.069	0.024	0.074
	1986:1995	0.094	0.074	0.077	0.035	0.083
Openness (exports/GDP)	1976:1985	0.210	0.311	0.484	0.216	0.762
	1986:1995	0.364	0.234	0.766	0.318	1.354
Long-term debt / total debt	1976:1985	0.657	0.864	0.826	0.567	N/A *
	1986:1995	0.718	0.829	0.845	0.820	N/A
Saving/GDP	1976:1985	0.245	0.270	0.244	0.224	0.370
	1986:1995	0.315	0.298	0.285	0.183	0.424
Investment/GDP	1976:1985	0.299	0.245	0.306	0.246	0.435
	1986:1995	0.362	0.319	0.322	0.204	0.383
External debt/GDP **	1976:1985	0.282	0.329	0.389	0.588	0.122
	1986:1995	0.361	0.595	0.483	0.713	-0.066

* reliable estimates not available

** a negative denotes a net creditor position (see Singapore)

Source: "DX" Database complied from World Bank World Tables, IMF Balance of Payments Statistics, International Financial Statistics and, for Singapore's external debt, BIS International Banking and Financial Market Developments.

The higher the share of exports in GDP the more foreign exchange is likely to be generated to service a given level of debt to GDP. The exports to GDP ratio is one measure of the degree of openness of the economy which determines the ability to shift resources to the traded goods sector in response to a negative real external shock. The comparison with Singapore is a little distorted by the large amount of re-exports in Singapore's total exports. Neverthless, it can be observed that, with the exception of Indonesia, the ASEAN economies have increased

their exports share in the latter decade. Also, of the ASEAN Four, Malaysia's export share is significantly higher than the others in both decades.[22]

The maturity of a country's foreign debt affects its exposure to shocks. Long-term debt implies less exposure than short-term debt. This data was not able to be obtained for Singapore. However, the long-term to total debt ratios for the ASEAN Four are not significantly lower than that for other Asian countries for which data is available. Forexample, the ratios for China for the two decades 1976:1985 and 1986:1995 are 0.626 and 0.794, respectively. The possible exception is the Philippines in the earlier decade in which it had a significantly shorter debt maturity than all of the other ASEAN countries. The relative exposure of the Philippines on account of the ratio of short to long-term debt is exacerbated by its significantly higher ratio of total debt to GDP. This was the case for both decades. All of the ASEAN Four countries have increased their total debt to GDP ratios in the latter decade, with Indonesia having the greatest increase amounting to16.5 percentage points. This has no doubt been facilitated in all countries by the process of economic liberalisation in the latter decade. The debt to GDP ratio of Singapore is, as expected from its current account pattern, markedly below that for the other ASEAN countries and for the latter decade Singapore was on average a net creditor to the rest of the world.

The saving and investment ratios to GDP are indicators of the sustainability of a given CAD to GDP ratio. The higher the investment ratio the higher the future rate of economic growth, ceteris paribus, and hence above the higher the future CAD ratio that can be maintained for a given constant debt ratio. A higher saving ratio implies greater wealth accumulation and therefore enhanced intertemporal solvency. On these indicators all of the ASEAN Four perform well below Singapore as commented earlier. However, again with the exception of the Philippines, the ASEAN Four increased their saving and investment ratios in the latter decade. The Philippines had lower saving and investment ratios in the latter decade.

VII CONCLUSION

The evaluation of the current account balances in five ASEAN countries presented in this paper is based on two approaches: the first being the application of a representative agent model of optimal saving; the second being the application of current account sustainability criteria based on considerations of solvency and willingness to lend. Both approaches are used to draw inferences about the "excessiveness" of the CADs in the five countries over the period 1975 to 1995.

The results from both approaches confirm that the reference country, Singapore, did not run excessive CADs - indeed, quite the reverse, at least in relation to the ASEAN Four countries. For the Philippines the results suggest that their CADs were excessive. The representative agent model suggest that the Philippines undersaved and overborrowed, to a large degree, throughout the 20 years under study. For the sustainability indicators, the Philippines performed worse than the other ASEAN countries in terms of growth, debt, debt maturity (in the earlier decade) and saving and investment ratios (particularly in the latter decade).

For the other three ASEAN countries: Thailand, Malaysia and Indonesia, the evidence regarding the excessiveness of their CADs over the two decade period is less conclusive. For these countries results from the model of optimal saving reveal a small gap between averages of optimal and actual current account balances. Although in the 1990s the suggestion is that Thailand and Indonesia over-saved and under-borrowed from overseas while the reverse was true for Malaysia. In terms of three of the sustainability indicators - growth, debt maturity and export share - the performance of Thailand, Malaysia and Indonesia was not significantly different from that of Singapore. However, their saving and investment ratios were below, and total debt higher, than those of Singapore by a large margin. Hence, a strong conclusion regarding the excessiveness of their CADs is not warranted from the results in this paper.

With respect to the representative agent model of optimal saving, it could be argued that the results presented in this paper understate the excessiveness of the CADs. In applying this model it was assumed that the optimal investment for each year is the actual investment

undertaken for each year. To the extent that over-investment has occurred in the ASEAN countries, as suggested by many observers, the optimal CADs would be smaller than those calculated in our simulations. This consideration suggests that the undersaving and overborrowing by Malaysia, especially in the 1990's was greater than our calculations imply. Furthermore, it could reverse the conclusion that Thailand and Indonesia oversaved and underborrowed. Similarly, the investment to GDP ratio was given as a structural indicator of sustainability on the basis that higher investment implies higher economic growth. To the extent that over-investment or unproductive investment occurred, higher economic growth cannot be expected. This implies that one would be less confident that the CADs of Malaysia, Thailand and Indonesia were not excessive.

Several improvements to the analysis of optimal saving in this paper can be identified for future work. A more sophisticated version of the representative agent model would include an overlapping generations framework, an endogenous interest rate to allow for a risk premium as a function of the level of debt, a disaggregation to allow for projected changes in the demographic structure, an adjustment to allow for the degree of exessive or unproductive investment and disaggregating to allow for traded and non-traded sectors.

Appendix

One criterion for unsustainability given in Section II is the avoidance of persistent trade deficits accompanied by an interest rate greater than the growth rate. This result is derived as follows. A constant D/Y ratio is expressed as

$$\frac{\frac{d}{dt}\left(\frac{D}{Y}\right)}{\left(\frac{D}{Y}\right)} = 0 \qquad \text{(A1)}$$

Two definitions, (A2) and (A3), are given as follows:

$$\frac{\frac{d}{dt}\left(\frac{D}{Y}\right)}{\left(\frac{D}{Y}\right)} = \frac{Y\frac{dD}{dt} - D\frac{dY}{dt}}{Y^2}\left(\frac{Y}{D}\right) = \frac{dD}{dt}\left(\frac{1}{D}\right) - \gamma \qquad \text{(A2)}$$

where γ is the growth rate; and

$$\frac{dD}{dt} = T + rD \qquad \text{(A3)}$$

where T is the trade deficit and r is the interest rate. Substitute (A3) into (A2)

$$\frac{\frac{d}{dt}\left(\frac{D}{Y}\right)}{\left(\frac{D}{Y}\right)} = \frac{T}{D} + (r - \gamma) \qquad \text{(A4)}$$

From (A4) if $r > \gamma$ and if $T/D > 0$, then D/Y is rising. If this were to continue indefinitely D/Y would explode. For this reason persistent trade deficits accompanied by $r > \gamma$ are unsustainable.

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NOTES

1. For useful summaries of the economic and financial forces that led to the Asian crisis see, for example, Grenville (1997) and Bank for International Settlements (1997).

2. See Frenkel and Razin (1996) for an analysis of these country episodes.

3. The other two ASEAN economies - Brunei and Vietnam - are omitted because of data limitations. The inclusion of Singapore serves as a reference since it is the only ASEAN economy that has run consistent current account surpluses and the only one that has largely escaped the financial crisis.

4. Note that the assumption of an interest rate greater than the growth rate is a necessary condition for a path to a steady state. Otherwise the country could play a continuous Ponzi-game by running trade deficits indefinitely whilst maintaining a constant debt to output ratio. In a Ponzi-game the player (country) is borrowing indefinitely to repay interest on past borrowings. This implies that in a steady state a debtor country must be running a trade surplus.

5. Williamson uses the term "misaligned" but, for small countries, this can be interpreted as excessive since CADs that are too small are probably sustainable.

6. Moore (1990, p.28) reports that these trigger ratios typically include debt to exports of 160%, CAD of 20% of exports and debt servicing costs of 15% of exports. As an example of different levels, Markkula (1996) quotes the ratios used by Merita Bank as debt to exports of 200%, debt servicing costs of 25% of exports and debt to GDP of 100%.

7. In its December 1997 country risk assessment Euromoney establishes an overall score using nine weighted categories consisting of: economic performance (25% weighting), political risk (25%), debt indicators (10%), debt in default or rescheduled (10%), credit ratings (10%), access to bank finance (5%), access to short-term finance (5%, access to capital markets (5%) and discount on forfaiting (5%).

8. Persistent above-optimal CADs may be taken as a sign of an unsustainable path in that the optimal CAD is forward-looking, being determined by future output and consumption needs.

9. A positive balance is a surplus and a negative is a deficit.

10. For a more detailed exposition of the representative agent model see Guest and McDonald (forthcoming (b)).

11. The model of adjustment costs is adapted from McKibbin and Siegloff (1988), who broadly follow the method established by Lucas (1967) and Hayashi (1982).

12. This is done for simplicity. In previous applications of the model (Guest and McDonald (forthcoming (a) and (b)) the level and volatility of optimal investment has tended to be significantly at odds with the level and volatility of actual investment.

13. In the absence of estimates for the ASEAN economies, an estimate for Australia is adopted (Lluch (1977)). More recent estimates for the U.S are given by Constantinides (1990) and Ferson and Constantinides (1991), whose estimates of the habit rate of consumption are approximately 0.30 of recent actual consumption. If consumption behaviour in ASEAN countries is comparable with the U.S. then the assumed value of 0.66 may be on the conservative side.

14. For estimates of α see Guest and McDonald (forthcoming (a) and (b)), McHugh and Lane (1983), You (1976) and Wickens (1970). The rate of 0.5% p.a. for technical progress is the approximate average of estimates for the East Asian newly industrialised countries in Kim and Lau (1993). The values of other parameters, which are less critical in terms of the sensitivity of the optimal outcomes, are those adopted for the Australian economy in Guest and McDonald

(forthcoming (a) and (b)).

15. The expected future values of the exchange rate and the GDP deflator required to deflate the nominal rate are taken to be the actual values up to 1995. For the relevant years beyond 1995 purchasing power parity is assumed, with the US annual inflation rate assumed to be 3% and the inflation rate for each country adjusting at a log-linear rate to 3% in the year 2004.

16. Source: DX Database which is compiled from "World Tables" published by the World Bank and "Balance of Payments Statistics Yearbook" published by the IMF.

17. The capital stock is imputed as follows. The log-linear growth rate of the actual level of investment is calculated for the period 1970 to 1995. This log-linear rate is then used to project the investment series backwards from 1970 to 1960. Any investment prior to 1960 is assumed to have depreciated to zero by 1995. Hence, the capital stock for 1976 to 1995 is constructed from the investment series from 1960 to 1995 taking account of both depreciation and adjustment costs according to equations (4) and (5).

18. Source: Bos, E., Vu, M., Massiah, E. and Bulatao, R. (1994), "World Population Projections, 1994-95 edition, published for the World Bank, The Johns Hopkins University Press, Baltimore and London.

19. For instance, for 1977 there will be two sets of optimal values - one set will be the values for year two of the 1976 plan and the other set will be the values for year one of the 1977 plan. Generally the two sets of optimal values will differ. This is not time inconsistency because the 1977 plan takes account of new information not available at 1976, namely the actual values of output and the capital stock for 1977. These will in general differ from the values of output and the capital stock for year 2 of the 1976 plan since the latter are determined by the production function (3) subject to constant technical progress. But is it the actual values for 1977 that capture the most up-to-date exogenous information relevant to determining the optimal outcomes for 1977. Therefore, the year one values of the 1977 plan, not the year two values of the 1976 plan, give the relevant optimal values for 1977.

20. The non-constant parameters are the rate of time preference, ρ, which is extremely close to constant (see Table 2); and the weight attached to terminal wealth in the utility function, ω, which determines the steady state wealth to consumption ratio and has very little effect on the optimal outcomes in the first year of the plans.

21. This result is qualified by the assumption that optimal consumption includes a subsistence consumption component which is assumed to be 66% of actual consumption. If actual consumption responds to temporary changes in actual income then optimal consumption will also respond but less than proportionately to the change in income.

22. The share of re-exports in Malaysia's exports is probably larger than that for Thailand, Indonesia and the Philippines but not as large as that for Singapore.

allchts

Chart 1. Thailand

Actual saving, investment and current account balance (CAB), 1976 to 1995

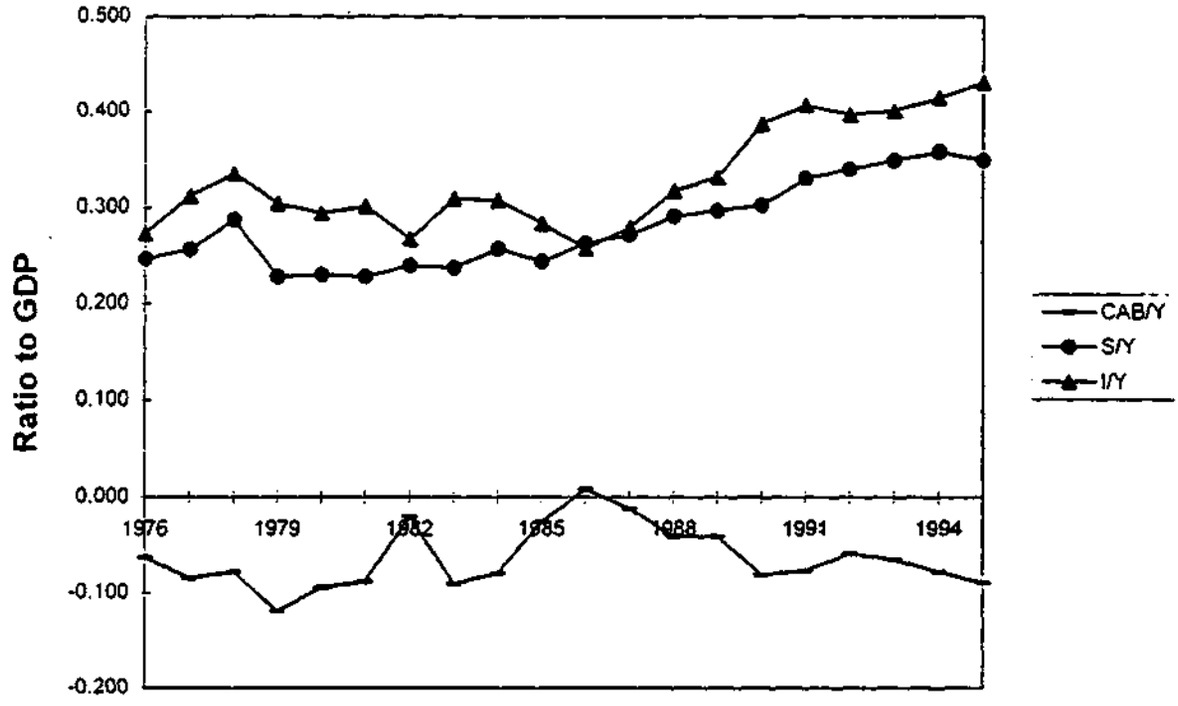


Chart 2. Indonesia.

Actual Saving, investment and current account balance (CAB), 1976 to 1995

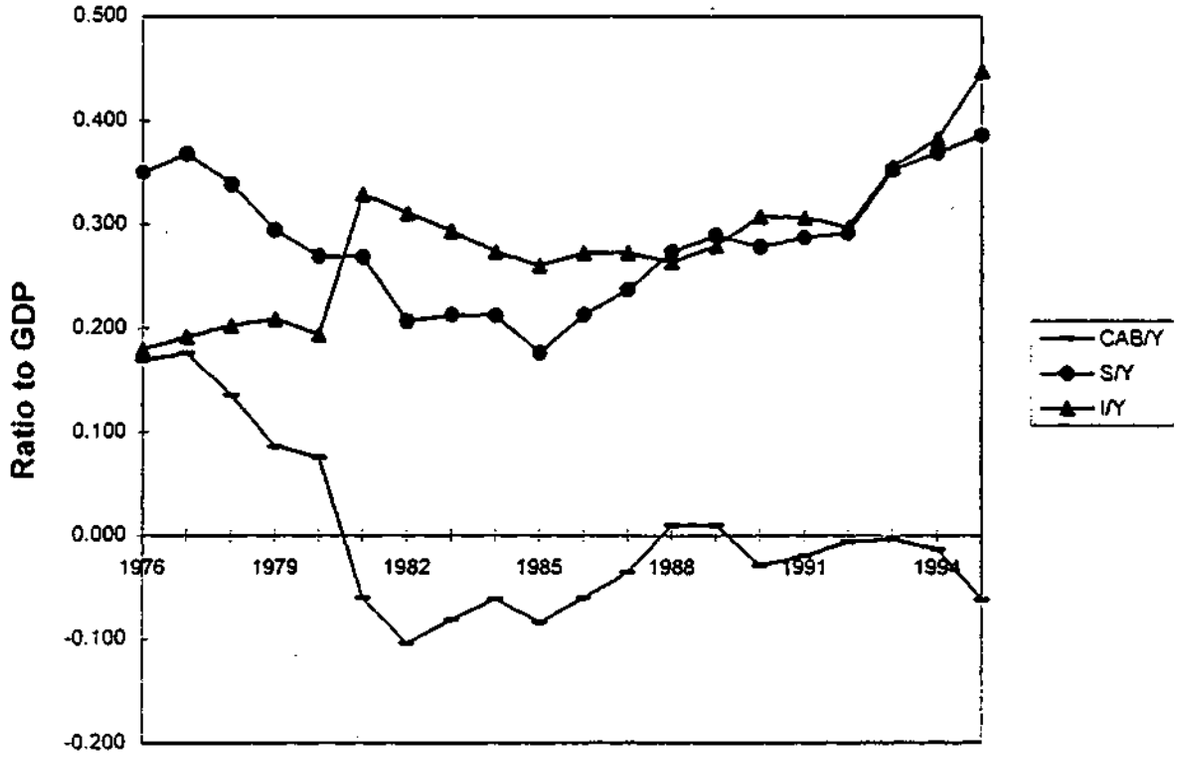


Chart 3. Malaysia.

Actual saving, investment and current account balance, 1976 to 1995

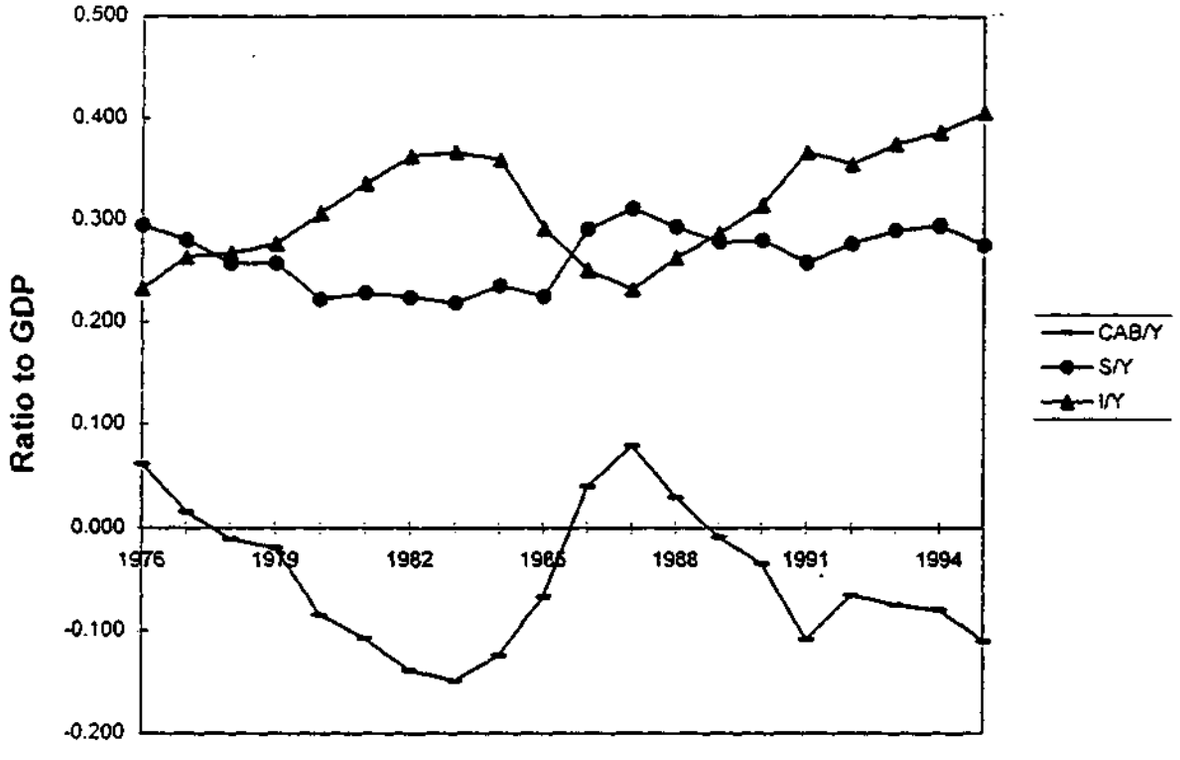


Chart 4. Philippines.

Actual saving, investment and current account balance, 1976 to 1995

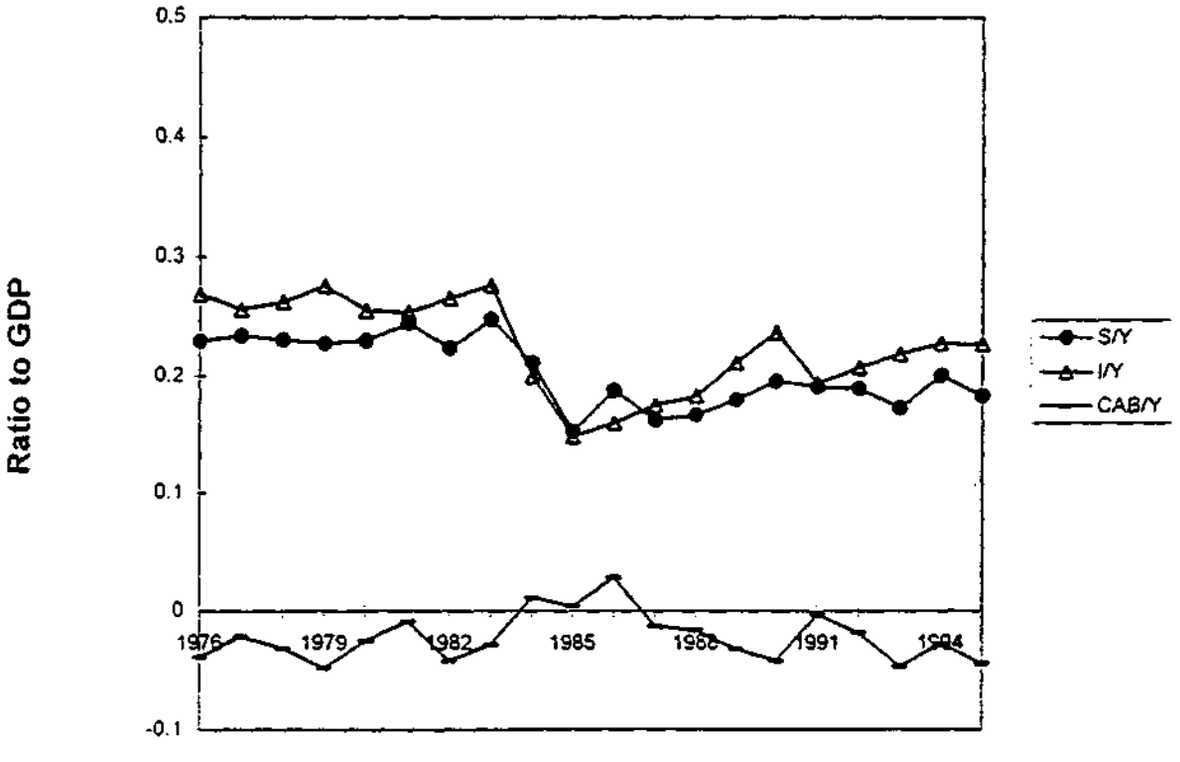


Chart 5. Singapore.

Actual saving, investment and current account balance, 1976 to 1995

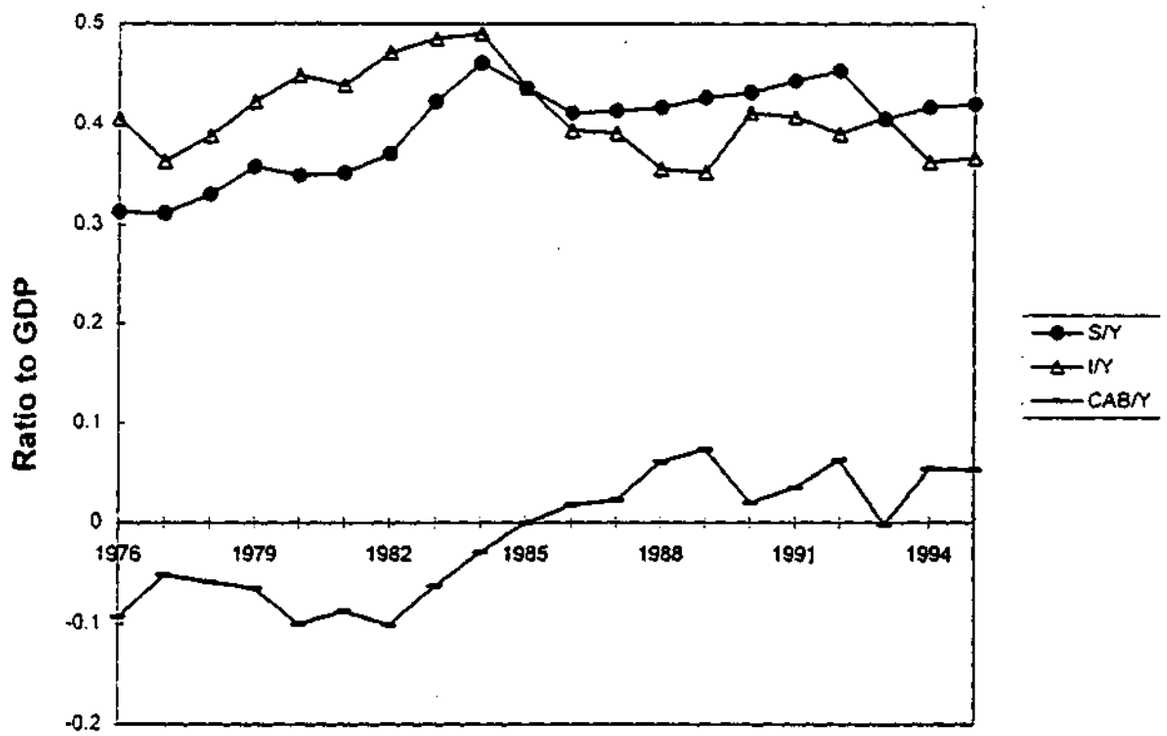


Chart 6. ASEAN current account balances, 1976 to 1995

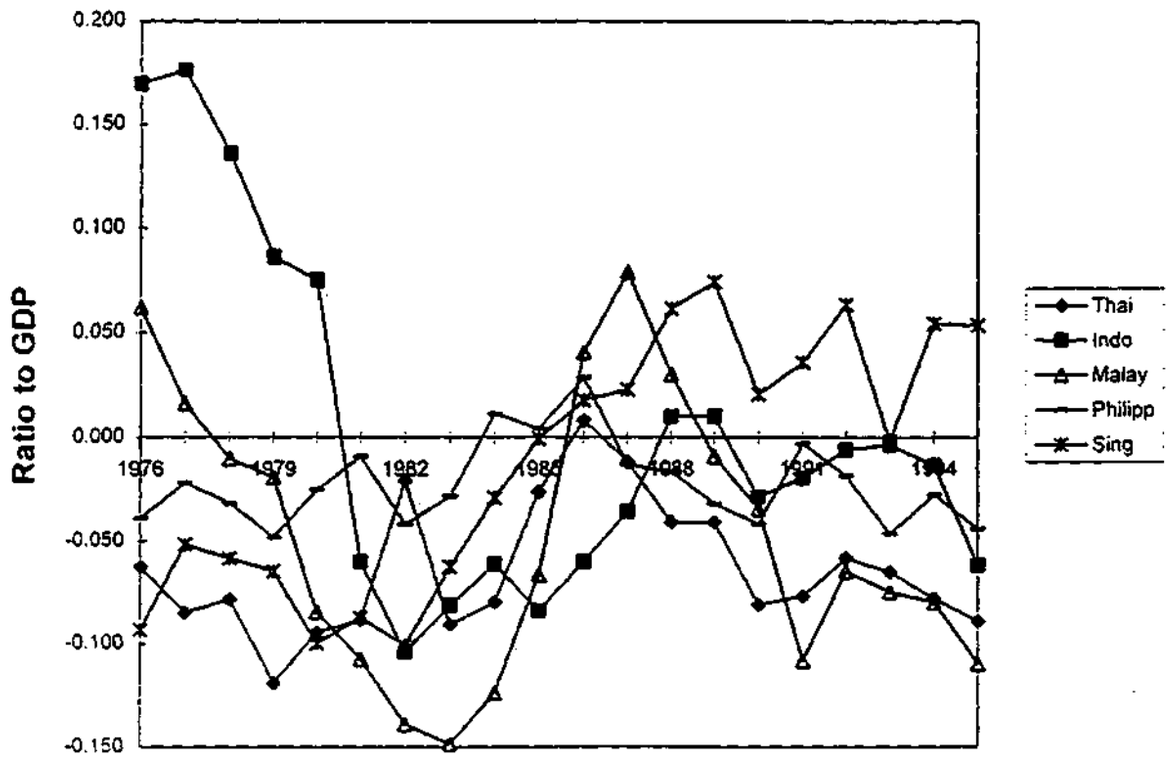


Chart 7. Thailand

Optimal and actual saving and CAB

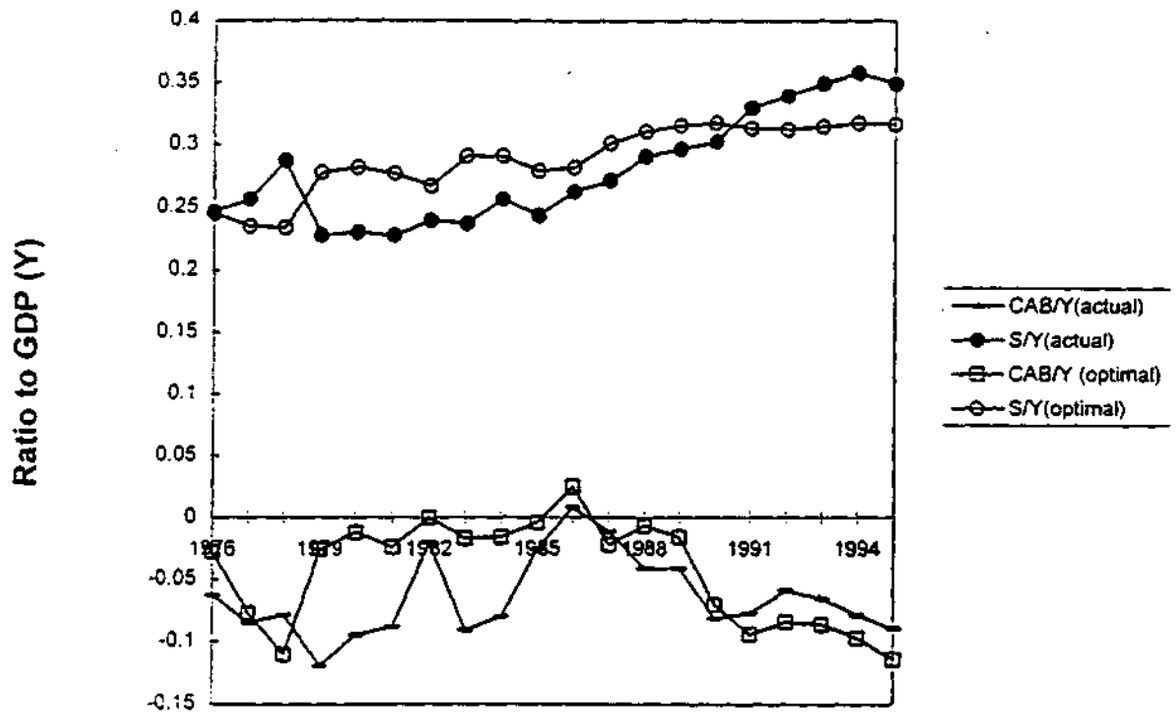


Chart 8. Indonesia

Optimal and actual saving and CAB.

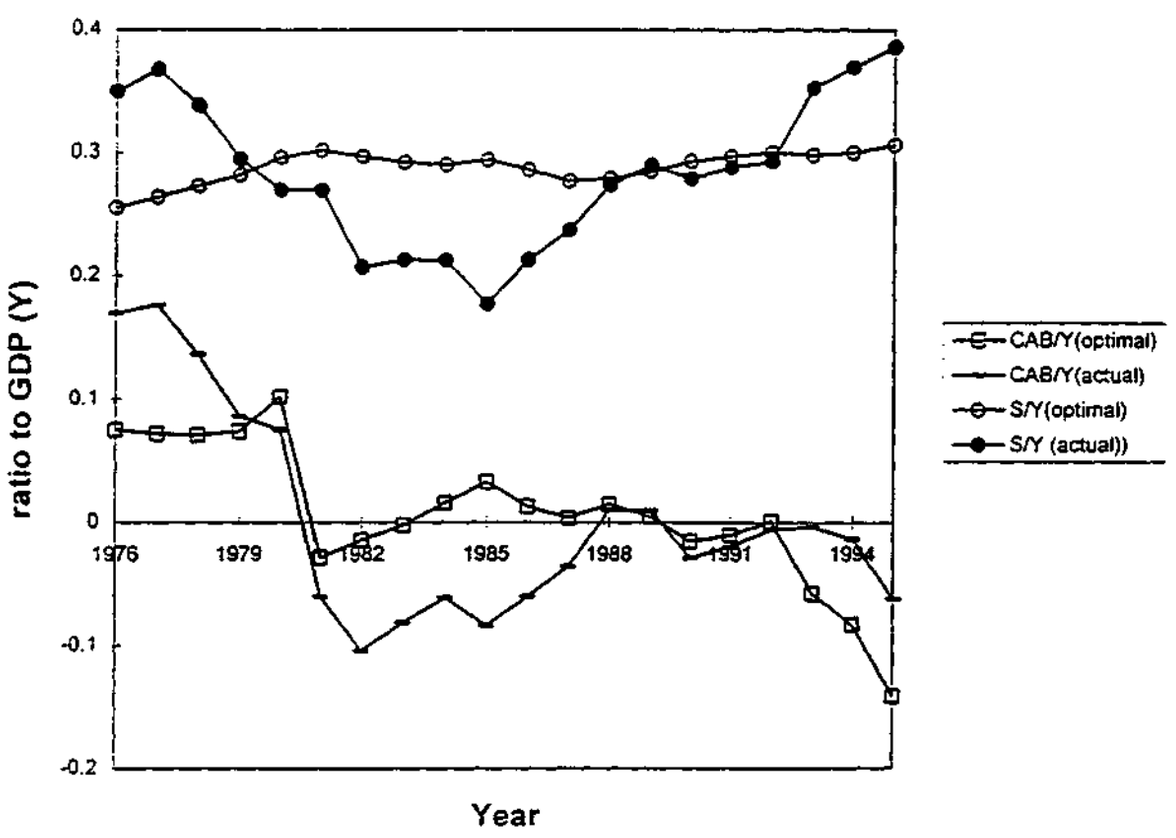


Chart 9. Malaysia

Optimal and actual saving and CAB

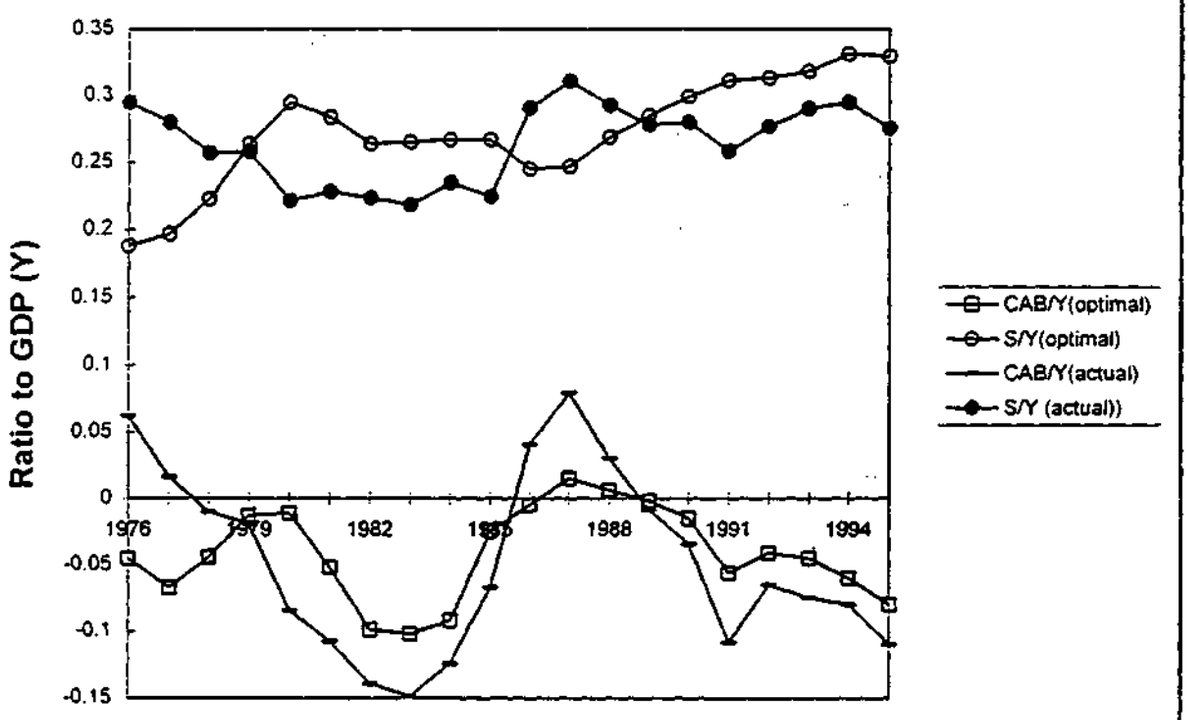
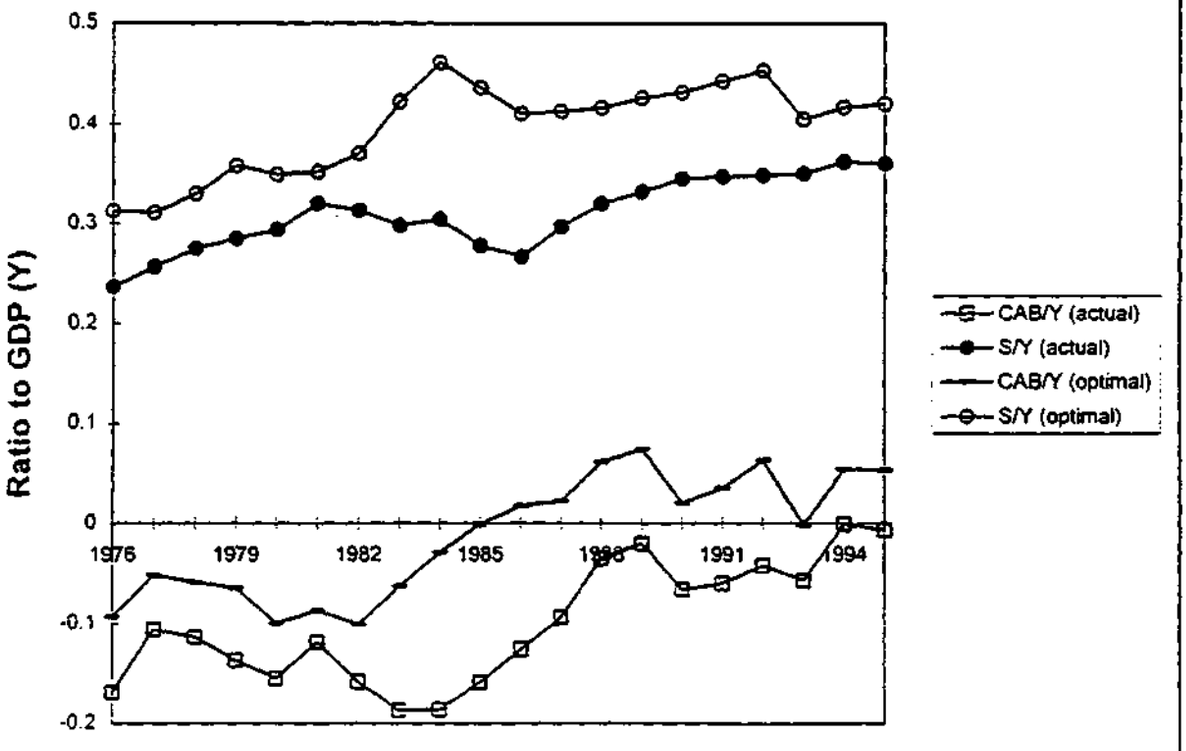


Chart 10. Optimal and actual saving and CAB Philippines



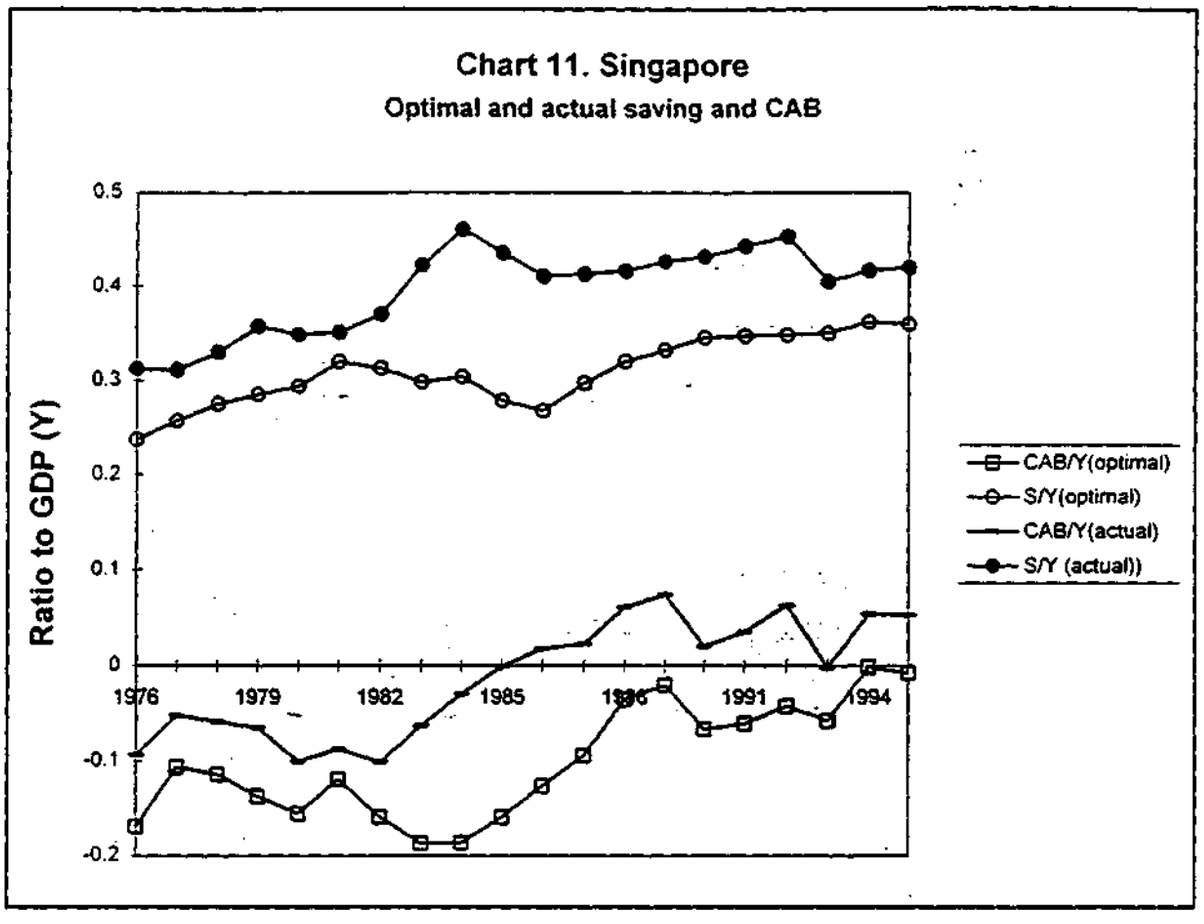


Chart 11. Singapore
Optimal and actual saving and CAB
Ratio to GDP (Y)
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
1976
1979
1982
1985
1988
1991
1994
CAB/Y(optimal)
S/Y(optimal)
CAB/Y(actual)
S/Y (actual))

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