IMF WORKING PAPER

This is a working paper and the author would welcome any comments on the present text. Citations should refer to an unpublished manuscript, mentioning the author and the date of issuance by the International Monetary Fund. The views expressed are those of the author and do not necessarily represent those of the Fund.

WP/88/49

INTERNATIONAL MONETARY FUND

Asian Department

Dynamics of Asian Savings: The Role of Growth and Age Structure

Prepared by Ashok K. Lahiri 1/

Authorized for Distribution by Ulrich Baumgartner and Susan Schadler

June 22, 1988

Abstract

This paper shows how growth and demography, two important determinants of the savings rate in the life-cycle approach, explain a large part of the diversity in savings behavior in Asia across eight countries as well as over time. Inflation and adverse movements in the terms of trade are found to be two additional factors with depressing effects on the propensity to save. The paper also finds evidence in favor of the error-correction formulation under which the savings rate varies procyclically in the short run but remains constant in the steady state.

JEL Classification Number:
111, 121, 211

MASTER FILES
ROOM C-130
001

1/ This paper was prepared while the author was visiting the Asian Department on leave from the Delhi School of Economics. He is grateful to Bijan Aghevli, Zafar Ahmed, Ulrich Baumgartner, Eduard Bos, Padma Gotur, Nadeem Ul Haque, Richard Hemming, Juha Kahkonen, Mohsin Khan, Kajal Lahiri, Ichiro Otani and Susan Schadler for helpful comments.

Contents

Summary

This paper examines savings behavior in eight Asian countries--India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Sri Lanka, and Thailand--during 1960-85. While the domestic savings rate in these countries has been high, on average, by international standards, it has varied considerably over time as well as across countries. Though these variations are, in part, explained by the role of government savings, the major explanation is found in the behavior of private savings and its determinants.

According to the findings of this paper, growth in per capita income and the changing age structure of a population are important determinants of the private savings rate in the Asian countries. In the life-cycle approach to private savings, these two factors can increase aggregate savings by making young savers more affluent and more numerous than elderly dissavers. The paper tests and rejects the use of the rational expectations version of the permanent income hypothesis to explain variations in private savings.

Inflation and movements in the terms of trade are, however, found to be determinants of private savings. Inflation, whether anticipated or not, has an adverse impact on savings, and countries with price stability tend to be high savers as well. There is consistent evidence in a majority of the sample countries that the savings rate declines with adverse movements in the terms of trade.

The adjustment of savings to an economic stimulus is far from instantaneous and differs in the short and the long run. In the model used in this paper, the savings ratio is constant in the long run, and any short-term divergence of this ratio from its long-run value is corrected over time. The paper also finds that, even under identical conditions, perhaps owing to differences in time preference, countries can be divided into three distinct categories according to their long-run private savings behavior, Malaysia and Singapore with a long-run private savings rate of 0.4 of private income; second, India with a rate of 0.3, and third, Indonesia, Korea, the Philippines, Sri Lanka, and Thailand with rate of 0.2.

I. Introduction

The capacity of Asian countries to mobilize savings since 1960 has been impressive. 1/ However, the general buoyancy of the savings rate in Asia masks a diversity of experiences. For example, starting with an insignificant savings rate in the early 1960s, Singapore achieved a rate as high as 47 percent of gross domestic product in 1984. By contrast, the Philippines recorded a modest rise in the savings rate during the latter part of the 1970s, but this was followed by a precipitous fall that culminated in an average rate in the 1980s lower than that in the 1960s. This paper examines savings behavior during 1960-85 in eight Asian countries--India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Sri Lanka, and Thailand--with a view to explaining their diverse experiences.

Given the beleaguered nature of the market for external debt and the close nexus between savings, capital accumulation, and growth, the need to understand the determinants of savings rates can hardly be overemphasized. The beneficial impact of savings on capital accumulation and thereby growth is part of popular wisdom. However, economists are also aware of an effect in the reverse direction, whereby prosperity influences savings via a "growth dividend" on the savings rate. The interdependence of growth and savings is at the root of theories of self-generating growth and development--the "virtuous circle" of development. What are the variables, apart from growth, that drive the savings rate upward in a developing country? The Asian data have sufficient variation to enable us to test various hypotheses and theories of savings.

Though there have been quite a few studies on savings in Asia--for example, Fry (1978, 1986), Giovannini (1983, 1985), Gupta (1987), Ravallion and Sen (1986) and Rossi (1988)--most of these have been carried out with pooled cross-sectional and time series data, and have used the questionable assumption of a uniform marginal response of the savings rate to various factors across countries. 2/ Further, they have paid very little attention to the dynamic adjustment pattern of savings to various stimuli and have analyzed total domestic savings without distinguishing between private and public savings. The latter is a valid procedure only under the strong assumption of Ricardian equivalence, which yields automatic and complete neutralization of any variation in government savings by opposite movements in private

---

1/ See World Bank, World Development Report, 1984 and 1985 (Table 5).
2/ Ravallion and Sen (1986) have shown the questionable nature of the assumption of uniform response of savings across countries.

savings. 1/ This study differs, therefore, from its precursors in several important respects. First, we distinguish between private and public savings and obtain our empirical findings from individual time series analysis of countries, carried out in an integrated framework incorporating the effects of growth, demography, inflation, terms of trade, and export orientation. 2/ Second, we pay explicit attention to the dynamic lag structure of the adjustment of savings and attempt to benefit from the advances in the literature made by Hall (1978), Davidson, Hendry, Srba and Yeo (1978), Flavin (1981), and Blinder and Deaton (1985).

The data limitations associated with developing countries are well known. In addition, the relative shortness of the time span for which the data are available and the annual frequency of the observations lead to extremely few degrees of freedom. Because of the lack of readily available data and the multi-country nature of the study, we have not been able to incorporate some variables, such as social security benefits, labor force participation, and the rate of interest, which may have played special roles in some of the countries. Furthermore, we have completely neglected intergenerational transfers and major changes in the extended family system. The results, accordingly, should be treated with caution.

The plan of the paper is as follows: Section II presents the issues and a review of the developments in savings rates and related characteristics of the eight countries. The basic framework of analysis is contained in Section III. Section IV reports the empirical findings. The conclusions and some policy issues are presented in Section V. An appendix contains a brief discussion of data issues and some empirical estimates for testing the appropriate specification.

II. A Review of Developments and Issues

Table 1 presents some summary statistics relevant to an analysis of savings. The buoyancy of the rate in India, Indonesia, Korea, Malaysia, and Singapore is evident from the table. The fall in the savings rate in the Philippines and the relatively modest rise in the rates in Sri Lanka and Thailand conceal considerable variation over time. In Thailand, for example, the savings rate registered a healthy rise in the

---

1/ Serious doubts have been raised about the validity of Ricardian equivalence. For a demonstration of its invalidity in developing countries, see Haque and Montiel (1987).

2/ Most existing studies use gross national product (GNP) as the explanatory variable in the analysis of savings behavior. We, however, estimate and use private disposable income in our empirical investigations, as it is the appropriate concept of income in the context of private savings.

Table 1: Savings Rates and Related Characteristics, 1960-85 1/

Variable	Time Period	India	Indonesia	Korea	Malaysia	Philippines	Singapore	Sri Lanka	Thailand
Savings Rate	I	14.92	3.53	3.85	17.08	15.54	15.81	13.93	15.65
(% GDP)	II	23.12	24.10	28.97	25.18	13.96	43.60	16.82	19.46
Government									
Savings 2/	III	0.89	12.53	3.60	3.42	3.05	9.01	-1.52	0.41
(% GDP)	IV	0.48	11.33	3.46	3.73	2.12	12.51	0.11	-0.63
Per capita									
Income 3/	I	180.34	239.88	476.39	951.31	423.91	1,415.03	140.95	297.33
(1980 $)	II	270.02	551.69	2,253.77	1,963.27	618.21	6,141.71	302.60 4/	815.30
Percentage of									
population	I	54.05	53.19	53.28	49.85	51.89	54.87	54.32	52.11
Between 15									
and 64	II	56.31	56.06	64.92	58.75	56.40	70.37	60.83	59.72
Consumer Price									
Index	I	25.73	6.72	6.07	52.75	14.76	50.39	32.52	31.53
(1980=100)	II	155.90	158.91	140.96	125.51	253.81	117.35	176.32	127.09
Terms of Trade	I	139.93	...	110.95 5/	103.37	207.86	...	285.60	132.60
(1980=100)	II	140.00	...	105.88	78.20	44.99	...	101.19	78.26
Exports as a									
percentage of	I	5.24	8.88	3.35	48.96	10.77	...	30.29	17.52
GNP	II	7.49 4/	23.93	37.51	59.31	21.29	...	26.12	27.07

... indicates that data are not available.

1/ I refers to 1960 for India, Korea, Philippines, Sri Lanka, and Thailand, to 1965 for Malaysia and Singapore, and 1967 for Indonesia.

II refers to 1985.

III refers to average for 1976-80 for all countries except Philippines for which it is 1978-80.

IV refers to 1981-84 for India and Singapore, 1981-83 for Indonesia, 1981-85 for Korea, Philippines, Sri Lanka, and Thailand, and 1981 for Malaysia.

2/ Has been derived as current revenues less current expenditure of central, state, and local governments.

3/ Has been derived as per capita GDP at 1980 prices divided by the average offical exchange rate per U.S. dollar during 1979-81.

4/ Refers to 1984.

5/ Refers to 1963.

early 1970s before declining to 19 percent in the early 1980s. Similarly, there was a moderate increase in the savings rate in the Philippines during the latter part of the 1970s, but the subsequent slump was so severe that the country ended up with an average rate in the 1980s lower than that in the 1960s.

There appears to be a distinct difference in the pattern of direct surplus generation by the central, state and local governments among the eight countries. They can be divided into three groups: (i) Indonesia and Singapore, where the governments generate 11-12 percent of gross domestic product (GDP) in savings; (ii) Korea, Malaysia, and the Philippines, where the governments account for 2-3.5 percent of GDP as savings; and (iii) India, Sri Lanka, and Thailand, the governments of which save an insignificant proportion of GDP.

Although differences in fiscal policies can explain part of the variation in national savings rates across countries, there remains a large diversity in private behavior that needs explanation. 1/ In this study, the government savings rate is taken as a policy variable and the focus is instead on the determinants of private savings.

Modigliani (1970), in his outstanding international cross-sectional study involving 36 countries, found growth and demographic factors to be of profound importance in explaining the intercountry differences in private savings rates during 1952-60. In more recent times, Graham (1987) found that these two factors explain "... about two thirds of the observed variation in the savings rates of OECD nations during the 1970s." 2/ Growth and the changing demographic structure, two salient features of the Asian development process, affect aggregate savings by making young savers both more affluent and more numerous than older dissavers. One of the major aims of this paper is to quantify the effect of growth and changing age structure on savings in Asian countries.

As can be verified from Table 1, the growth rates achieved in Asia have ranged from the modest to the spectacular. For example, during 1960-85 Korea and Singapore grew at an average annual rate of over 6 percent in per capita terms, but India managed an annual rate of only 1.7 percent. Similarly, the demographic experience has been quite diverse. Between 1960 and 1985, for instance, the proportion of

---

1/ The view that rich nations or people save more than poor ones does not have a very sound theoretical basis and is also not corroborated by Asian development experience. For instance, both Korea and Singapore in the 1960s had per capita incomes many times higher than those in India and Sri Lanka of that time or even today. However, the former saved a much smaller fraction of their incomes than the latter pair of countries.

2/ Graham (1987), p. 1509.

population of working age--that is, between 15 and 64--increased by as much as 11 and 16 percentage points in Korea and Singapore, respectively, while it remained practically stationary in India and Indonesia.

In the context of developing countries, Leff (1969, 1980) found a significant inverse relationship between dependency and savings rates. His findings have been challenged by Bilsborrow (1980), Ram (1982), and Rossi (1988), among others, on grounds of specification bias, sample selection bias, and lack of theoretical foundation. While Leff's work may be open to question on the first two scores, the theoretical basis of the dependence of the savings rate on the age structure of the population is easy to derive in a simple life-cycle framework without bequests: it is implicit in Modigliani (1970) and Tobin (1968), and explicit in Graham (1987). The model developed in Section III incorporates one possible stylized representation of this relationship. The empirical results of this paper, which we believe are free of specification bias and sample selection bias (since the exercise is carried out with individual country time-series data), clearly support Leff's conclusions, except perhaps in the case of Thailand.

There is considerable disagreement about the effect of inflation on savings in developing countries. Juster and Wachtel (1972) have found that inflation dampens consumer confidence and increases savings in a developed country. Deaton (1977) has presented a price-confusion effect--individual consumers buying one thing at a time cannot distinguish unanticipated inflation from relative price increases and, in response, tend to postpone purchases; unanticipated inflation therefore leads to involuntary savings. 1/ However, we find evidence that inflation tends to depress the savings rate in some Asian countries. Part of this adverse effect may be due to a flight from currency and increased purchases of consumer durables which biases consumption figures upwards. 2/ There are two further reasons why inflation may discourage savings in a developing economy. First, there is, according to McKinnon (1973) the "conduit" effect of money, and complementarity between money and physical capital because of lumpiness of investment and a preponderance of self-investment in a developing economy with highly imperfect capital markets. The return on money goes down with inflation and so do savings and investment. Second, the administered deposit rates of interest are frequently not adjusted appropriately in

---

1/ Branson and Klevorick (1969), however, found evidence of a negative effect of inflation on savings in the United States. Similarly, Howard (1978) found that though inflation led to increased savings in Canada, the United Kingdom, and the United States, expected inflation discouraged savings in Japan.

2/ Inflation leads to substitution of nominal assets by real assets including consumer durables. Since what we measure in developing countries is consumption expenditure and not consumption, measured consumption will rise and measured savings will be adversely affected.

response to inflation so that the real rate of interest falls. While there remains a debate on the interest-sensitivity of savings, there is reason to believe that lower real interest rates reduce savings.

With the exception of Indonesia in the early 1960s, there have been no instances of high and sustained inflation in our sample countries by international standards. However, there are perceptible differences in the inflationary profiles of the eight countries: Malaysia and Singapore had an average annual inflation rate of 3.5 percent between 1960 and 1985; in India, Sri Lanka, and Thailand, the average varied between 5.6 percent and 7.4 percent; while in Korea, the Philippines, and Indonesia, inflation averaged 12-14.5 percent per annum. 1/

Data on interest rates are extremely scanty. From whatever data are readily available, there seems to be some evidence of inertia in revising the largely administered deposit rates of interest appropriately in response to inflation. Taking the period 1978-85 for which comparable data are readily available for all the countries except India, we find that the average ex-post real rate of interest was negative in Indonesia and the Philippines, the two countries with high inflation by Asian standards. Though it remained positive on average (1.25 percent) in inflationary Korea, the rate did become significantly negative in 1980 and 1981. Malaysia and Singapore, on the other hand, with their excellent track records in inflation management, never allowed the real rate to become significantly negative and maintained an average real rate of roughly 3 percent. The average real rate was 3.8 percent and 1.6 percent during 1978-85 in Thailand and Sri Lanka, respectively. There are reasons to believe that during 1960-85 higher inflation in some Asian countries relative to others may have adversely affected their savings rates by reducing the real rates of interest.

A change in the terms of trade leads to three different effects on consumption--first, a direct effect through revaluation of exports and imports; second, a wealth effect through revaluation of wealth; and third, a pure substitution effect owing to relative price changes within and between periods. The possibility of a reduction in the savings rate in response to an adverse movement in the terms of trade has come to be known as the Laursen-Metzler-Harberger effect. Svensson and Razin (1983) and Persson and Svensson (1985) have shown the ambiguous nature of the effect of changes in the terms of trade on the savings rate. There are no readily available data on the terms of trade for Indonesia and Singapore for the period 1960-85. Among the other six countries, the terms of trade deteriorated considerably in Malaysia, the Philippines, Sri Lanka, and Thailand during 1960-85.

1/ For Indonesia, the period covered is 1967-85, that is, the post-hyperinflationary period.

According to Maizels (1968) and Lee (1971), export orientation may affect the savings rate in a developing economy. Apart from augmenting government revenue from export taxes and hence government savings, an increase in the ratio of exports to GNP may also increase private savings because exporters are supposed to have a relatively high propensity to save. There are substantial differences in the export orientation and performance among the eight countries in our sample. For example, the share of exports in GNP ranges from less than 7.5 percent for India to 59 percent in Malaysia. 1/ However, while the bulk of the countries had exports equivalent to about 25 percent of GNP in 1985, export performance has been quite diverse. For example, while the share of exports in GNP actually declined in Sri Lanka between 1960 and 1985, in Korea it increased by almost 35 percentage points. 2/

In sum, the Asian countries in our sample have undergone vast changes during 1960-85. Growth, demographic changes, various degrees of inflation, movements in the terms of trade, and the opening up of export markets are some of the dimensions of the process of their transformation. The speed of these changes has differed between subperiods as well as across countries. The experience of the countries in mobilization of savings has also varied over time as well as in comparison with one another. In the light of these other changes, the variety of savings experience merits a careful scrutiny. 3/

III. Basic Framework of Analysis

1. Dependence of savings rates on growth and demography: an illustration

Even if successive cohorts of the population have identical tastes and preferences, and the young save only to dissave when they are old, growth and demographic composition can affect the aggregate savings rate by making the young savers more affluent and more numerous than the older dissavers. It is fairly straightforward to construct models in

---

1/ Because of the lack of data, the significance of the ratio of exports to GNP for savings in Singapore could not be examined.

2/ In Sri Lanka the share of exports in GNP was subject to considerable fluctuations. It actually registered a healthy rise in the late 1970s before declining to a low value in the mid-1980s.

3/ Social security institutions, such as Employee Provident Fund in India, Malaysia, and Sri Lanka or the Central Provident Fund in Singapore, have played a crucial role in mobilizing contractual forced savings in Asian countries. There are reasons to believe that such compulsory savings were not neutralized by voluntary dissavings, see, for example, Datta and Shome (1981). However, we could not examine the importance of these schemes owing to the lack of readily available data.

the life-cycle-overlapping-generations framework to illustrate this dependence of the savings rate on growth and demography. We shall adapt Diamond (1965) to do so.

Consider a perfectly certain world with only one commodity and overlapping generations of agents who live for two periods--working during the first and in retirement during the second--with Cobb-Douglas production and utility functions, and no bequest motive. Population grows at the rate of n per period and labor-augmenting technology progresses at θ per period.

Let c denote consumption, a asset holding, w labor income, and r the rate of interest, and let superscripts y and o specialize variables to the young and the elderly. We assume that a young agent at time t maximizes the following utility function:

$$(1) \quad U(c_t^y, c^o_{t+1}) = \beta \log c_t^y + (1-\beta) \log c^o_{t+1}, \quad 0 < \beta < 1$$

subject to the two period constraints

$$(2) \quad \begin{aligned} c_t^y + a_t^y &= w_t \\ c^o_{t+1} &= (1 + r_{t+1})\, a_t^y \end{aligned}$$

Production is characterized by constant returns to scale:

$$(3) \quad Y_t = A\, K_t^{\alpha}\, [(1+\theta)^t N_t^y]^{(1-\alpha)}, \quad 0<\alpha<1,$$

where Y is output, K is capital, N_t^y the number of working people, A a given scale parameter, θ the rate of technical progress, and α is the marginal product of capital.

Notice that the elderly dissave and consume the entire stock of current capital at the end of the period. Next period's production is carried out by capital financed entirely by the savings of this period's young workers. Maximizing (1) subject to (2), it is easy to derive an individual young worker's asset holdings (a_t^y) as $(1-\beta)\, w_t$ and

$$(4) \quad K_{t+1} = N_t^y\, (1-\beta)\, w_t$$

implying

$$(5) \quad S_t = I_{t+1} = \Delta K_{t+1} = (1-\beta)\ \Delta[N_t^y\ w_t].$$

Assuming a competitive framework, labor's share in total income is $(1-\alpha)$ in every period and from (5), in terms of the savings rate, we get the following savings function:

$$(6) \quad \left(\frac{S}{Y}\right)_t = (1-\alpha)(1-\beta)\ \left(\frac{\Delta Y}{Y}\right)_t$$

which shows that the savings rate in this economy depends solely on productivity $(1-\alpha)$, time preference (β), and growth $\left(\frac{\Delta Y_t}{Y_t}\right)$.

In the steady state, growth in income $\left(\frac{\Delta Y_t}{Y_t}\right)$ will equal $1 - \frac{1}{(1+\theta)(1+n)}$ and the savings rate $(1-\alpha)(1-\beta)$ times the steady-state growth rate. The equilibrium savings rate, thus, depends on productivity, time preference, technical progress (θ), and population growth (n). Despite the constancy of the average propensity to save (APS) of the individual, productivity growth and technical progress increase the aggregate savings rate by making the young savers more affluent than the young savers of last period who constitute the older dissavers of today.[1] The age-dependency ratio, defined as the ratio of old to young, is $\frac{1}{(1+n)}$. An increase in population growth decreases the ratio, increases the number of savers relative to dissavers, and increases the APS in the economy.

2. Empirical specification

The relationship between growth and the savings rate, as given in (6), does not explicitly bring out the dependence of the savings rate on the age structure of the population. For this, we need to derive the dynamic behavior of the simple Diamond-economy starting from an arbitrary initial configuration.

Note that in the simple illustrative economy described above, any arbitrary initial level of capital automatically determines the level of output by the condition of full employment. Given the level of output, the preference relation determines the level of savings and, hence, the capital stock for the next period. Thus, the entire future path of output in this economy can be traced out for any given initial configuration. Let

$$(7) \quad z_t = \frac{Y_t}{(1+\theta)^t \, N_t^y} \quad ,$$

and

$$(8) \quad z^* = \left[A^{1/\alpha} \frac{(1-\alpha)(1-\beta)}{(1+\theta)(1-n)} \right]^{\frac{\alpha}{1-\alpha}}$$

denote the output per worker in efficiency units at time t and in the steady state, respectively. A bit of algebra applied to this simple model leads to:

$$(9) \quad \left(\frac{\Delta Y}{Y}\right)_t = 1 - \frac{1}{(1+\theta)\,(1+n)} \left[\frac{z_0}{z^*}\right]^{\alpha^{t-1}\,(1-\alpha)} \quad t = 1,2,3, \ldots.$$

as a complete description of the growth path of the economy from any arbitrary initial value of z_0 for output per worker in efficiency units.

Using (9) in (6), after some manipulation we get

$$(10) \quad \log\left[1 - \frac{1}{(1-\alpha)\,(1-\beta)} \left(\frac{S}{Y}\right)_t\right] = -(1-\alpha) \log\left[(1-\theta)(1+n)\right] + \alpha \log\left[1 - \frac{1}{(1-\alpha)(1-\beta)} \left(\frac{S}{Y}\right)_{t-1}\right].$$

Approximating log(1-x) by -x, we have

$$(11) \quad \left(\frac{S}{Y}\right)_t = (1-\alpha)^2(1-\beta) \log[(1+\theta)(1+n)] + \alpha \left(\frac{S}{Y}\right)_{t-1}$$

which upon substitution of $\left(\frac{S}{Y}\right)$ by $-\log\left(1 - \frac{S}{Y}\right) = -\log\left(\frac{C}{Y}\right)$ leads to

$$(12) \quad \log\left(\frac{C}{Y}\right)_t = -(1-\alpha)^2(1-\beta) \log[(1+\theta)\,(1+n)] + \alpha \log\left(\frac{C}{Y}\right)_{t-1}.$$

Since C and Y always come together in the form of a ratio, it is possible to transform them to per capita terms and rewrite (12) as

$$(13) \quad \Delta c_t = \beta_o + \beta_1 c_{t-1} + \beta_2 y_t + \beta_3 y_{t-1} + \beta_4 n$$

where c and y are the natural logarithms of per capita real consumption and income 1/ and

$$\beta_o = -(1-\alpha)^2(1-\beta)\log(1+\theta),\ \beta_1 = -(1-\alpha),\ \beta_2 = 1,\ \beta_3 = -\alpha,$$

and $\beta_4 = -(1-\alpha)^2(1-\beta)$.

Though there is a direct one-to-one relationship between the rate of growth of population and the age-dependency ratio in our simple illustrative economy, in reality the latter also depends on a host of other demographic factors such as age-specific mortality rates and life expectancies. 2/ Allowing for an adjustment period of two years, we replace the last term in equation (13), that is, $\beta_4 n$, by $\beta_4 PR + \beta_5 \Delta PR$ -- a linear combination of the percentage of population between the ages of 15 and 64 (PR) and the change in the percentage (ΔPR). Furthermore, to test for the effect of changes in the terms of trade, of inflation and of the degree of export orientation, we add to equation (13) variables for the change in the terms of trade (ΔT), the rate of inflation (π), and the ratio of exports to GNP (x). For estimation purposes a random disturbance term, ε, is also included to obtain:

$$\Delta c_t = \beta_o + \beta_1 c_{t-1} + \beta_2 y_t + \beta_3 y_{t-1} + \beta_4 PR_t + \beta_5 \Delta PR_t + \beta_6 \pi_t + \beta_7 \Delta T_t + \beta_8 x_t + \varepsilon_t \tag{14}$$

as an empirical specification of private consumption behavior. Note that it is very similar to the form proposed by Blinder and Deaton (1985).

There has been extensive discussion in the literature on the precise functional form and dynamic structure of consumption functions such as that specified in equation (14). Two general types of models stand out: the rational expectations-permanent income hypothesis by Hall (1978) and Flavin (1981), among others, and the error-correction model by Davidson et al. (1978). According to the rational expectations-permanent income framework of Hall (1978), foreseen changes in income should not affect private savings or consumption since these changes are already embodied in past savings decisions made in an intertemporal framework. In this formulation, growth should not affect savings so long as it is anticipated. Alternatively, however, it is

---

1/ Note the unfortunate change in the use of the symbols c and y. Though they have been used in the earlier subsection to denote consumption of a representative agent and his/her youth, in what follows they are used to denote the natural logarithms of per capita private consumption and income. This is mostly in deference to convention.

2/ See, for example, Clark and Spengler (1980).

often argued that, particularly in developing countries, because of liquidity constraints even anticipated growth may induce changes in savings behavior. For example, even if a consumer knows with certainty that his income is going to double next year, he may not be able to increase his current consumption adequately if he cannot obtain the credit to do so.

Let superscripts a and u distinguish between anticipated and unanticipated categories and let us rewrite (14) as

$$(15) \qquad \Delta c_t = \beta_o + \beta_1 c_{t-1} + \beta_2 y_t^a + \beta_2^* y_t^u + \beta_3 y_{t-1} + \beta_4 PR_t + \beta_5 \Delta PR_t + \beta_6 \pi_t^a + \beta_6^* \pi_t^u + \beta_7 \Delta T_t^a + \beta_7^* \Delta T_t^u + \beta_8 x_t + \varepsilon_t .$$

In the context of (15), it is easy to see that according to Hall's (1978) hypothesis $\beta_1=\beta_2=\beta_3=0$. Furthermore, in the rational expectations-permanent income framework, there is the assumption of an "immortal" household through the operation of a bequest motive. As Rossi (1988) has shown, in this framework variations in per capita real consumption may be related to variations in demographic composition through "cost of children" or overhead costs, but it is independent of the level of the age-composition variable, that is, $\beta_4=0$, $\beta_5 \gtrless 0$. Thus, a test of rational expectations-permanent income hypothesis in the context of our model is obtained by testing the hypothesis:

$$H_1: \ \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0.$$

Following Blinder and Deaton (1985), we shall call this the "surprise only" hypothesis.

Thus, there is a clear need to verify whether anticipated changes in income <u>did matter</u> in the determination of Asian savings rates in the light of Hall's hypothesis and liquidity constraints. Moreover, if they did then we need to find out whether they affected the savings rate in the same way as unanticipated income, that is, to test the hypothesis:

$$H_2 : \beta_2 = \beta_2^* \text{ when } H_1 \text{ stands rejected.}$$

An explanation of savings rates in terms of measured income is valid if and only if anticipated and unanticipated income affect savings in the same way.

Let us suppose that H_2 is not rejected and that the analysis of savings can be legitimately carried out in terms of measured income. Presumably the adjustment of savings to changes in income is far from instantaneous and there is a need to specify the dynamic adjustment pattern, that is, the lag structure. In many developed countries, the savings rate has been observed to vary procyclically in the short run but to remain constant over the long run. Is a similar pattern of adjustment of savings rates evident in Asian countries? Davidson et al. (1978) have proposed an "error-correction" model that has an attractive dynamic property: the consumption or savings ratio is constant in the long run and any short-term "error" or divergence of this ratio from its long-run value is corrected over time to ensure the constancy of the ratio in the steady state. A test of the error-correction model in the context of (15) takes the following form

$$H_3: \beta_1 + \beta_2 + \beta_3 = 0, \text{ when } H_2 \text{ is not rejected.}$$

Note that if the error-correction model is valid and we restrict the parameters such that $\beta_1 + \beta_2 + \beta_3 = 0$ then we can rewrite (15) as

$$(16)\quad \Delta c_t = \beta_o + \beta_2\, \Delta y_t + \beta_1(c_{t-1} - y_{t-1}) + \beta_4 PR_t + \beta_5 \Delta PR_t + \beta_6 \pi^a + \beta_6^* \pi_t^u + \beta_7 \Delta T_t^a + \beta_7^* \Delta T_t^u + \beta_8 x_t + \varepsilon_t.$$

Furthermore, ignoring the random error term in (16), in a noninflationary steady state with $\Delta c_t = \Delta y_t = g$, $PR_t = PR$, and $x_t = x$, we have

$$(17)\quad \frac{C}{Y} = \exp\left[\frac{1}{\beta_1}\{-\beta_o + (1-\beta_2)g - \beta_4 PR - \beta_8 x\}\right].$$

The long-run average propensity to save increases with growth and a rise in the proportion of people in the working ages (i.e., PR) as long as $\beta_1<0$, $0<\beta_2<1$, $\beta_4<0$.

Note that (15) involves anticipated and unanticipated variables that are unobservables. We follow Blinder and Deaton (1985) to generate these unobserved variables. Accordingly, let m and y^{us} denote money supply and U.S. gross national product (at constant 1980 prices) in logarithmic form, and t stand for a time trend factor. The unobserved anticipations z^a, for $z = y$, π and ΔT, are generated as one-period ahead forecasts from:

$$(18)\ z_t = \delta_o + \delta_1 y_{t-1} + \delta_2 y_{t-2} + \delta_3 c_{t-1} + \delta_4 c_{t-2} + \delta_5 PR_t + \delta_6 \Delta PR_t + \delta_7 m_{t-1} + \delta_8 m_{t-2} + \delta_9 y^{us}_{t-1} + \delta_{10} y^{us}_{t-2} + \delta_{11} t + \delta_{12} t^2 + v_t$$

and the unanticipated values, z^u, as its residuals (v). Note that our formulation, (15) and (18), is identical to that proposed by Blinder and Deaton (1985). Equation (18) may be interpreted as an unrestricted reduced form equation with y^{us} serving as a proxy for world demand.

As Blinder and Deaton (1985) have pointed out, the functional form (15) "nests" both the Hall-hypothesis as well as the error-correction model. Moreover, we can adopt a sequential testing procedure--proceeding from H_1 to H_2 to H_3 --for discriminating among the alternative models. In the following section we carry out these sequential tests for choosing the appropriate model for each country in our sample and then check for overparameterization and conduct a simplification search. We also check for the absence of serial correlation, parametric stability, and "reliability" of steady-state predictions. Through this process one equation that best explains private savings is chosen for each country.

IV. Empirical Findings

1. Concepts, data, and missing observations

We have deflated private consumption expenditure and disposable income at current prices by the implicit GDP deflator to arrive at private consumption and disposable income in real terms. These figures have been divided by population to obtain private consumption and disposable income in per capita real terms. Inflation is measured by the percentage rise in the consumer price index. 1/ The other variables are self-explanatory, and the appendix contains details about the sources of data, problems of measurement, and limitations.

1/ The use of the implicit GDP deflator for deriving real private consumption, on the one hand, and the use of the consumer price index (CPI) to obtain the rate of inflation, on the other, needs a word of explanation. We like to deflate nominal income and consumption, two variables that appear on two sides of the consumption function, by the same price index. The implicit GDP deflator being the natural choice for the income variable, we prefer to use the same index rather than the CPI for deflating consumer expenditure. In the case of the inflation variable, the preference runs in the opposite direction because of the more important role that durable goods play in the determination of the CPI relative to that in the GDP deflator.

For India, data on personal disposable income were readily available and have been used to explain private consumption. The concept of income used for other countries is private disposable per capita real income. Aggregate private disposable income at current prices has been deflated by the implicit GDP deflator and divided by population to obtain the figures in per capita real terms. Aggregate private disposable income at current prices has been derived from GNP at current prices by adding (a) private unrequited transfers from abroad and (b) public sector subsidies, and by subtracting (c) all government taxes. 1/ Because data on taxes and subsidies are not available for much of the 1960s, there are serious nonuniformities and discontinuities in our income series. Two easy options were not to use the concept of private disposable income or to use it with a much shorter sample period. However, the former would be incorrect while the latter would be a waste of useful information on all the other variables. We have assumed that, for the earlier period with missing observations, taxes, net of subsidies and as a proportion of total income, say, k, did not vary from year to year. Let z* be the logarithm of "true" private real disposable income while z is its incorrectly measured counterpart, ignoring the net taxes levied by the government. Note that:

$$(19) \quad z_t^* = z_t + \log(1-k_t)$$

which under the assumption of constancy of k_t can be approximated by

$$(20) \quad z_t^* = z_t - k.$$

We have utilized the data for the entire sample period by using z_t^* as the income variable for the later years and z_t as the income variable for the earlier years with missing observations. We have used a dummy

1/ Notice that the neglect of governmental property income, interest subsidies, retained earnings of the corporate sector, and depreciation may have introduced a bias in our income series.

variable, taking the value unity for the years with missing observations and zero otherwise, to remedy the problem of data discontinuity for all the countries except India. 1/

2. Tests of Alternative Models

Three versions of equation (15) were estimated by ordinary least squares (OLS): (a) an unrestricted version; (b) constraining $\beta_2 = \beta_2^*$ consistent with H_2; and (c) constraining $\beta_1 + \beta_2 + \beta_3 = 0$ (and $\beta_2^* = \beta_2$) consistent with H_3. Tables A1-A3 in the Appendix present the estimates.

Hypothesis H_1, that "only surprises matter", is convincingly rejected by a traditional F-test at the 5 percent level of significance. The test seems to be valid since we could not detect any signs of serial correlation in the error structure for any country except Korea. The correlogram of residuals for Korea revealed a high negative value (-0.58) at the second lag. However, the serial correlation problem appears to be related to the absence of income terms with lags greater than two. This seems to weaken the case for the validity of the rational expectations-permanent income hypothesis in Korea. The general result that even anticipated movements in income or other variables have an impact in Asian countries is intuitively appealing in view of the likely liquidity constraints in these developing countries.

Hypothesis H_2, that decomposition of current income between the anticipated and unanticipated parts is not important, that is, $\beta_2 = \beta_2^*$, is rejected at the 5 percent level of significance only in the case of Sri Lanka. 2/ However, the estimated unrestricted version of the equation for Sri Lanka suffers from some serious deficiencies, for example, the long-run income elasticity is abnormally large (about 3). 3/ In general, we find evidence to suggest that the decomposition of current income into anticipated and unanticipated categories is not of great importance in the countries under investigation, when lagged income and consumption are also included in the model as

---

1/ Notice that, owing to the presence of a dynamic lag structure in our model, consumption reacts to current as well as past incomes. Thus, strictly speaking, there should be a dummy to take account of the imprecision in the past income figures even in years when the contemporaneous income is measured correctly but the relevant past incomes are not. However, this would lead to the introduction of more than one dummy, nonlinear parametric restrictions and complicate the problem considerably.

2/ However, the hypothesis $\beta_2=\beta_2^*$ is not rejected for Sri Lanka at the 1 percent level of significance.

3/ As reported later, for Sri Lanka, the hypothesis $\beta_2 = \beta_2^*$ is not rejected at the 5 percent level of significance once the redundant variables are dropped from the equation.

explanatory variables. At first sight this may appear to be a refutation of not only the rational expectation version of the permanent income hypothesis (PIH) but also the PIH per se. However, this is not true and due cognizance must be taken of the presence of lagged income and consumption terms in the relationship when interpreting the result regarding H_2: $\beta_2 = \beta_2^*$. As Davidson et al. (1978) have shown, a distributed lag formulation of the consumption function of the form (15) even under H_3 (which assumes the validity of H_2: $\beta_2 = \beta_2^*$) is consistent with distributed lag variants of the PIH. 1/ A once and for all increase in income elicits very different responses in consumption behavior in our model even when $\beta_2 = \beta_2^*$, depending on whether the increase is permanent or temporary.

The overall goodness of fit of equation (15) under H_2: $\beta_2 = \beta_2^*$ is fairly impressive, especially because the dependent variable is the rate of growth of per capita private consumption in real terms and does not have a time trend. A straightforward way of testing the error-correction model (ECM) is to look at the value of long-run income elasticity of consumption obtained by estimating equation (15) under H_2: $\beta_2 = \beta_2^*$ and to judge whether it is significantly different from unity. The results of this exercise show that, in only three of the countries--Indonesia, the Philippines and Thailand--is the long-run elasticity significantly different from unity. Thus, at least for five countries there are reasons to believe that the ECM model is valid. Notice that the ECM model does not require "... that the data satisfy a unit elasticity restriction ... [and]... only requires that the model satisfy this restriction and the data are consonant with the model." 2/ When income increases, the average propensity to consume can decrease in the short run because of an initial disequilibrium effect, but a long-run income elasticity that is less than unity implies that the APS increases ad infinitum in a steady state with growth in income--a result that is contrary to our priors.

The anomalous result in the case of Indonesia, the Philippines, and Thailand could well be because of overfitting--there are variables in our equations that do not really matter in the context of each of these countries. We, therefore, investigate whether the unsatisfactory results for these three countries are due to the presence of such redundant variables.

1/ Our model departs from Davidson et al. (1978) because of the presence of variables other than only income and consumption. We have made some bold uniformity assumptions on the dynamic response of consumption to changes in inflation, the terms of trade, and export orientation because of the limited number of observations.

2/ Davidson et al. (1978), p. 681.

3. Factors that determine the private savings rate in each country

Though all the factors included in our model can, in theory, affect a country's savings rate, they need not have played equally important roles in every country for historical, political, or structural reasons. For example, the rate of inflation in Malaysia and Singapore has not been high or volatile enough for the sample data to reveal the impact of inflation on the private savings rate in these two countries. Similarly, exports as a share of GNP in India have hardly grown over the sample period, and it is therefore difficult to detect the impact of this ratio on savings in India.

We conducted a simplification search to narrow down the list of important factors that influenced private savings in each of our sample countries. 1/ The results are reported in Table 2. Note that the standard errors have not been corrected for "generated regressors." 2/

It is interesting to note that the hypothesis H_2: $\beta_2 = \beta_2^*$ for Sri Lanka is not rejected at the 5 percent level of significance once the redundant variables are omitted from the equation. Similarly, it may be recalled that the hypothesis that the long-run income elasticity of savings is unity, that is, H_3 holds, was rejected for Indonesia, the Philippines, and Thailand when all the factors were included in the model. Once the superfluous variables are dropped from the equation, H_3 is not rejected for Indonesia, but it remains rejected for the Philippines and Thailand. Nevertheless, in the specification of the final chosen equation the assumption of unitary long-run income elasticity is retained for the Philippines and Thailand.

Growth unambiguously leads to increased private savings in all the eight countries and the coefficient of the income-growth variable is less than unity. According to our calculations, a one percentage point increase in the rate of growth of per capita real income leads on average to a one percentage point rise in the private savings rate in the steady state. The change in the average propensity to save, however, differs substantially between the short and the long runs. The short-run behavior of the APS depends on the extent of the initial disequilibrium. The coefficient of the feedback variable (the lagged ratio of consumption to income) is highly significant indicating that an

---

1/ Appropriate F-tests were carried out before dropping one or more variables from the equation for any country.

2/ See Pagan (1984) for the complications arising from generated regressors. Exports as a proportion of GNP (x) are present as an explanatory variable in (15) but not in (18). This renders the calculation of the correct standard errors particularly complex.

Table 2. Consumption Functions

(Dependent variable is first difference of logarithm of private consumption expenditure) 1/

	India (1962-84)	Indonesia (1967-85)	Korea (1964-85)	Malaysia (1962-85)	Philippines (1962-85)	Singapore (1965-84)	Sri Lanka (1962-85)	Thailand (1962-85)
Coefficients of								
Constant	1.4643	-0.0085	0.6397	0.0372	-0.0432	0.4413	0.5757	-0.6268
	(3.41)	(0.16)	(6.27)	(0.25)	(2.10)	(2.75)	(2.17)	(2.60)
Private disposable income								
Rate of growth	0.9774	0.4182	0.6743	0.5877	0.1546	0.8009	0.5086	0.6647
	(13.81)	(1.74)	(7.11)	(4.45)	(1.26)	(7.81)	(2.77)	(4.72)
Change in the rate of growth	—	—	-0.1800	—	—	—	—	—
			(2.44)					
Lagged consumption income ratio	-1.0931	-0.7414	-0.4440	-0.6543	-0.2515	-0.1851	-0.3075	-0.5795
	(4.50)	(2.82)	(5.44)	(4.87)	(3.88)	(2.40)	(2.81)	(3.05)
Population (%) between ages 15 and 64								
Level	-0.0287	—	-0.0109	-0.0079	—	-0.0084	-0.0101	0.0108
	(3.48)		(6.73)	(2.25)		(3.27)	(2.14)	(2.39)
Change	-0.1884	-0.3695	-0.2021	-0.0764	—	0.0322	—	-0.0412
	(3.81)	(2.34)	(6.31)	(3.32)		(1.71)		(2.01)
Dummy	—	-0.0726	-0.1691	-0.0568	-0.0200	-0.0479	-0.1075	-0.0421
		(2.22)	(6.33)	(3.42)	(1.91)	(1.70)	(3.09)	(2.29)
Inflation								
Anticipated	—	0.0004	0.0026	—	-0.0007	—	—	—
		(1.10)	(7.06)		(1.51)			
Unanticipated	0.0009	0.0010	—	—	—	—	—	—
	(1.03)	(1.67)						
Changes in terms of trade								
Anticipated	-0.0014	...	—	-0.0019	—	...	-0.0008	-0.0015
	(3.23)			(2.82)			(1.31)	(2.87)
Unanticipated	—	...	—	-0.0022	-0.0002	...	-0.0017	—
				(2.44)	(1.36)		(2.30)	
Exports as a ratio of GNP	—	-0.0038	—	0.0036	—	...	—	-0.0045
		(1.77)		(2.68)				(1.35)
Summary Statistics								
R-squared	0.9315	0.6097	0.9423	0.7985	0.5716	0.8490	0.7216	0.6853
Standard error	0.0142	0.0281	0.0101	0.0178	0.0180	0.0196	0.0275	0.0169
Sum of squared residuals	0.0032	0.0087	0.0014	0.0048	0.0058	0.0054	0.0129	0.0046
Degrees of freedom	16	11	14	15	18	14	17	16
Steady-state average propensity to consume at no growth	0.6928	0.8067	0.8559	0.5991	0.8422	0.5633	0.7757	0.8318
No. of observations x (Sum of squared first four auto-correlations)	2.0910	1.3420	14.4670	4.5520	1.5250	5.3780	1.4830	6.9080
LM test for first order auto-correlation	0.1360	0.0980	0.9250	2.3800	0.3100	0.2350	1.0050	0.9850
Chow-Test 2/ for parametric stability	1.6100	0.3200	1.4600	0.1500	0.2500	1.0700	0.9400	0.1800

1/ Figures within parentheses under country names are periods of analysis and those under coefficients are t-values.
2/ Period considered is 1980-85 except for India, Korea, and Singapore, for which it is 1980-84, 1981-85, and 1980-84, respectively.

acceleration in the rate of growth results in a substantially greater increase in the APS in the short-run than in the long-run. 1/ In only one country, Korea, do changes in the rate of growth play an important role in determining private savings. However, Houthakker and Taylor (1970) and Davidson et al. (1978) found similar results for other countries.

On average, a one-point increase in the percentage of population between the ages of 15 and 64 leads to a 1.6 percentage point rise in the APS in the long run in India, Korea, Malaysia, Singapore, and Sri Lanka. We could not detect any lasting effect of age composition on savings behavior in Indonesia and the Philippines. 2/ However, in Indonesia, where the age structure of the population has shown very little long-term movement, we find evidence that changes in the age-composition of the population (ΔPR) affects private savings in the short run. These short-run movements are also found to be of importance in India, Korea, Malaysia, Singapore, and Thailand, indicating the existence of lags in the adjustment of savings to age composition. Thailand is the only country in which the private savings rate appears to decline in the long run with lower age-dependency; however, we are unable to find any satisfactory reasons for the large perverse coefficient of the age-composition variable in that country. 3/

While the age composition of the population exerts a significant influence on the private savings rate in all the countries except the Philippines, 4/ an important question arises regarding the significance of the demographic variables. Primary information on age composition is

---

1/ For the Philippines, the short-run increase in APS appears to be too large relative to other countries. This, along with the rejection of H_3 and the insignificance of demographic variables, shows the poor performance of the model for the Philippines.

2/ The insignificance of the age-dependency variable in the Philippines' consumption function could be partly due to the high spurious correlation (-0.92) between the age-composition variable and the dummy for data discontinuity.

3/ Much like the Philippines, the performance of the model is relatively poor in Thailand owing to the perversity of the coefficient of the demographic variable and rejection of H_3.

4/ Ram (1982) and Rossi (1988) found that dependency rates are not important for savings rate in developing countries. Our results are sharply different. Their studies differ from the present one in three respects: the country coverage; their use of a static framework without any dynamic lag structure; and the functional form. Ram's and Rossi's results are obtained from a very large cross section of time-series data. Although the results reported in this present study relate to individual time-series analysis, we found an unambiguously positive impact of low dependency rates on private savings, even in a pooled analysis of the eight countries.

available only at intervals of ten years or so, when a census is conducted. For the intermediate years, the data are prepared by demographers through interpolation. The correlation between age composition and time trend can, therefore, be expected to be high in any of the countries in our sample. There is then the question of whether the coefficient of the age composition variable is identified or whether it simply captures the effect of a time trend or some other time-trending variable? We investigated the time-series property of the age-composition variable and found that it has a fairly complicated variation structure in every country--a simple time trend yields a high correlation coefficient but fails to explain the movements in the demographic pattern. Thus, there is no prima facie reason for undue skepticism. 1/

On average, inflation has an adverse impact on private savings in the countries under study. However, the effect seems to vary considerably from country to county. Inflation, both anticipated and unanticipated, results in lower private savings in Indonesia. Unanticipated inflation reduces private savings in India while anticipated inflation does not have an impact. In Korea and the Philippines, on the other hand, only anticipated inflation matters. In Korea, it has an adverse impact on private savings while, in the Philippines, the effect seems to be the reverse. Inflation, whether anticipated or not, does not affect private consumption-savings behavior in the two low-inflation economies of Malaysia and Singapore as well as in Sri Lanka and Thailand.

In general, adverse movements in the terms of trade tend to depress private savings in the sample countries. Any anticipated deterioration in the terms of trade affects private savings adversely in India, Malaysia, Sri Lanka, and Thailand. Similar movements, when they are unanticipated, also affect private behavior in Malaysia, the Philippines, and Sri Lanka. As noted earlier, the effect of movements in the terms of trade on private consumption could not be estimated for Indonesia and Singapore, although as a major oil-exporter, Indonesia may have witnessed some sharp changes in its terms of trade during the reference period. For Korea, where there has been a very modest and gradual deterioration in the terms of trade, we could not find any evidence of the Laursen-Metzler-Harberger effect.

The Maizels-Lee hypothesis, that increased export-orientation augments savings, is for the most part rejected by the evidence. Even for Korea, exports as a proportion of GDP does not seem to have played a direct role in the determination of private consumption or savings. As can be verified from the sign of the relevant coefficient in Table 2, while private savings seems to have risen in line with increasing share

---

1/ Admittedly, we have not investigated whether the composition of dependents in terms of children and elderly people has any impact on savings over and above that of the total proportion of dependents in the population. This question merits further attention.

of exports in GDP in Indonesia and Thailand, for Malaysia it seems to have declined. This may point to the possibility that exporters do not have a higher propensity to save relative to others in every country, or that the Maizels-Lee hypothesis is sensitive to the pattern of ownership of export industries.

To verify the reliability of the results, the final equations for each country are tested for (i) their error structure, (ii) parametric stability, and (iii) implied steady-state values. None of the equations reported in Table 2 seem to suffer from any first-order serial correlation. The Lagrange-multiplier (LM) test-statistic for first-order serial correlation, which is distributed as χ_1^2, is not significant at the 5 percent level of significance. We could not detect any prima facie evidence of higher-order serial correlation in any country except Korea. In Korea, the statistic obtained by multiplying the sum of squares of the first four autocorrelations by the number of observations is a significantly high 14.47. The statistic is high for all the specifications tried out in this study. 1/ We could not discover the source of the misspecification.

The final equations are parametrically stable. The Chow-test carried out with out-of-sample forecasts for the subperiod of the early 1980s does not reveal any nonconstancies.

The steady-state average propensity to consume (APC) is computed under the assumption that there is no growth in per capita income, no inflation or movements in the terms of trade. Exports are assumed to constitute 40 percent of GNP, as is the present case for Korea. Furthermore, 65 percent of the population is assumed to be between the ages of 15 and 64 in the steady state. The countries fall into three groups: Indonesia, Korea, the Philippines, Sri Lanka, and Thailand with a steady-state APS of roughly 0.2; Malaysia and Singapore with a steady-state APS of 0.4 approximately; and India with a steady-state APS of 0.3. 2/

V. Conclusion

Savings behavior in Asian countries is diverse in two ways: first, there have been large changes in savings rates over time in many of the countries; and second, the rates have varied markedly across the countries.

1/ For the usefulness of this statistic, see Godfrey (1978).

2/ The high average propensity to save in India in the long run may seem surprising. It must be recalled, however, that India has had a relatively low growth rate and little change in the age composition of the population, yet its savings rate has been high.

Both diversities are partly explained by government behavior. Except for the Philippines and Thailand, national savings rates rose in all the countries in our sample between the early 1970s and early 1980s; a development that is intimately connected to government behavior. In Indonesia, Malaysia, and Singapore, government savings as a proportion of GDP rose by 3.5-4 percentage points between the early 1970s and early 1980s. During the same period, the Korean Government generated an additional 1.5 percent of GDP, while in Sri Lanka it was only 0.6 percent. In India and Thailand, on the other hand, the additional contribution was negative: -1 percent and -2 percent, respectively. Similarly, as is evident from Table 1, the differences in national savings rates across countries are related to the differences in direct surplus generation by governments.

The major explanation for the two diversities, however, is found in the behavior of private savings and its determinants. Growth in per capita income and lower dependency rates stimulate private savings. The countries that rank high in terms of these two criteria--for example, Korea and Singapore--have higher rates of private savings as well. Similarly, the variations in growth rates and demographic changes over time explain a large part of the changes in the savings rate in any particular country in our sample. For example, the deceleration in the rate of income growth in the Philippines accounted for a large part of the fall in the nation's savings rate. The dependency ratio in Korea fell at a much faster rate during the 1970s than a decade earlier, and this partly explains the country's higher savings rate in the 1970s compared with the 1960s. According to our findings, on average a one percentage point increase in the rate of growth of per capita income leads to an equivalent increase in the private savings rate in the long run. A one percentage point fall in the dependency ratio results, on average, in a 1.6 percentage point rise in the long-run private savings rate in India, Korea, Malaysia, Singapore, and Sri Lanka.

Inflation and movements in the terms of trade are found to be two additional determinants of private savings. Inflation, both anticipated and unanticipated, is found to have an adverse effect on savings in some of the countries. It is interesting to note that the effect is quite different from that found in a developed economy. Apart from the measurement errors owing to "the flight from currency" during an inflationary situation and McKinnon's hypothesis of complementarity between demand for money and savings resulting from the lumpiness of investment and preponderance of self-finance, the difference could be due to the repressed nature of financial markets in a developing economy. The effect of anticipated inflation is weak when the nominal rate of interest adjusts to maintain the equilibrium real rate of interest. However, in developing economies because of financial repression through administered rates of interest, anticipated inflation may depress savings by reducing the real rate of interest. In view of this, though cross-sectional results (for a much shorter period for which the data on interest rates are readily available) fail to reveal any interest

sensitivity of savings in line with Giovannini (1983, 1985) and Ravallion and Sen (1986), we interpret the inflation sensitivity of savings as weak partial evidence of interest sensitivity of savings.

Countries with price stability, such as Singapore, have tended to be high savers as well. Inflation, which reached crisis proportions by Asian standards in the early 1970s, declined markedly in the early 1980s in all the countries except the Philippines and Sri Lanka. The deceleration in inflation has contributed to the increase in the Asian savings rates.

In conformity with Fry (1986), who found evidence of the savings rate declining in the face of adverse movements in the terms of trade, we find consistent evidence in favor of the Laursen-Metzler-Harberger effect in a majority of the sample countries. Terms of trade movements during 1980-85 were much more favorable than a decade earlier for most countries except Malaysia, the Philippines, and Thailand. As a result, the savings rate rose in the other countries, but actually declined in the latter countries.

The evidence from the eight Asian countries is somewhat negative on the Maizels-Lee hypothesis: while export orientation did not affect private savings in at least five countries, there is some support for the hypothesis in Indonesia and Thailand. Finally, in the Malaysian case, the direction of the effect is perverse: an increased export orientation actually serves to reduce the private savings rate.

Some of the short-run variations in the savings rate in a particular country can be attributed to the adjustment lags present in savings behavior. The adjustment of savings to an economic stimulus is far from instantaneous and differs between the short and the long run. Though there is clear evidence of a procyclical behavior of the savings rate over the short run, it is consistent with its secular constancy in the long run in the "error-correction" framework of Davidson et al. (1978).

In the context of cross-country differences in savings behavior, one of the interesting findings is that, even under identical conditions, in the long run the countries can be divided into three distinct categories: first--Malaysia and Singapore--with a long-run private savings rate of 0.4 of private income, second--India--with a rate of 0.3, and third--Indonesia, Korea, the Philippines, Sri Lanka, and Thailand--with a rate of 0.2. While this categorization could be due to misspecification, for example, omitted variable bias, it could well be due to differences in tastes, which is another way of saying that some save more because they like to save more. Could it be argued, on similar lines, that some countries are saving more in recent times because their desire to save has increased? The parametric stability of the estimated equations rules out such a possibility.

Movements in the savings rate are of great interest to economists and policymakers because of the close connection between savings and the current account of the balance of payments and that between savings, capital accumulation, and growth. Though many crucial policy instruments, such as provident funds, tax incentives, and innovative savings schemes, could not be incorporated into the analysis because of data problems, there are three important policy conclusions that can be drawn from the findings of this paper. First, governmental initiative in generating savings on its own account can lead to a substantial increase in the national savings rate in many developing countries. There are three countries in our sample--Indonesia, Malaysia, and Singapore--which demonstrate this adequately. Second, just as savings leads to capital accumulation and hence growth, we find that growth leads to savings by making the young savers more affluent than the older dissavers. Technical progress and a more efficient allocation of resources can foster growth even without any augmentation in the supply of physical factors. Such increases in the growth rate bring forth an increase in savings and can set off the process of self-generating growth. Thus, the importance of appropriate policies for increasing the efficiency of resource allocation and providing incentives for technical innovation can hardly be overemphasized. Third, population planning has been widely advocated for economic development, and it has been pursued in many Asian countries. The consequent reduction in dependency rates has resulted in a bonus in the form of increases in the private savings rate. A fall in the birthrate can increase the savings rate in a developing country by increasing the rate of growth of per capita income for an unchanged rate of growth of aggregate national income as well as by a reduction in the dependency rate in the short and the medium runs.

Can the Asians sustain their high savings rates? The tentative answer varies from country to country. Singapore and Korea have sustained remarkably high growth rates and low age-dependency ratios for quite some time. The age structure of the population in these two countries leans more heavily toward those aged between 15 and 64 than in a demographically stable country like Sweden. Any deceleration in growth and rise in dependency rates will adversely affect savings in these two countries. For the rest of the countries in our sample, the levels of per capita income and proportions of population in the working ages are way below those in Korea and Singapore. In the process of catching up with their more prosperous neighbors, they should be increasing their savings rate over time, provided there are no adverse movements in the terms of trade and inflationary buildup.

Data Sources

The concept of savings employed in this study is that of gross national savings (GNS). 1/ We have estimated GNS by adding the current account balance to gross domestic investment (GDI). The current account data are taken from the balance of payments account while GDI figures are from national accounts. Notice that our savings figures include net current transfers, exclude statistical discrepancies, and use two different data accounts--namely, national accounts and balance of payments. Net current transfers have been included to make the savings figures representative of available resources for investment purposes. Statistical discrepancies have been excluded on the presumption that consumption figures are perhaps less reliable than other national accounts categories and may be underestimated. Exclusion of the statistical discrepancies produces underestimates of savings, which is not as damaging as overestimates in a discussion of high savings rates in Asia. Data from balance of payments accounts are not always consistent with data from national accounts; this was also the case with two countries in our study--India and Indonesia. 2/ We have followed the uniform practice of taking the figures of foreign savings for all the eight countries as the current account balance (with sign reversed). The average official exchange rate for every year has been used to convert foreign currency figures into local currency.

The population figures are mid-year estimates. The price index used to deflate figures at current prices to obtain their constant price counterparts is the implicit GDP deflator. For some data-deficient countries, for example, Indonesia, we used the consumer price index to extrapolate the available data on the implicit GDP deflator.

The source of all the data used in our study is International Financial Statistics (IFS) published by the International Monetary Fund, with three major exceptions. Data on age composition are from the World Bank; the data on personal disposable income for India are from the National Accounts Statistics, January 1987, of the Central Statistical Organization, Government of India; while the data on consolidated government revenue and expenditure are from the Government Finance Statistics Yearbook of the Fund. "The Government" refers to the consolidated government sector consisting of central, state, and local governments.

1/ The difference between GNS and gross domestic savings (GDS) is net factor income from abroad and net current transfers. Since our main interest is in understanding the amount of resources available for investment, we concentrate on GNS rather than GDS.

2/ For a detailed discussion of savings data in Asian countries, see Sigit (1985).

The inflation variable is the rate of rise in the consumer price index. The terms of trade is the unit value index of exports as a percentage of the unit value index of imports. Exports as a percentage of GNP have been calculated by taking the relevant figures from the national accounts data in IFS. Money supply figures used in our analysis refer to narrow money. The data utilized for GNP for the United States are at constant prices.

Table A1. Empirical Estimates of the Unrestricted Consumption Function: Equation (15)

(Dependent variable is first difference of logarithm of private real consumption expenditure) 1/

	India (1962-84)	Indonesia (1967-85)	Korea (1964-85)	Malaysia (1962-85)	Philippines (1962-85)	Singapore (1965-84)	Sri Lanka (1962-85)	Thailand (1962-85)
Coefficients of								
Constant	1.2981	2.7620	0.2354	1.0707	1.5520	1.8728	-1.4596	0.3853
	(1.96)	(1.78)	(0.26)	(2.06)	(1.80)	(2.13)	(1.04)	(0.99)
Lagged consumption	-1.1242	-1.0826	-0.5369	-0.8831	-0.6307	-0.6041	-0.2450	-1.0537
	(3.44)	(3.72)	(3.20)	(4.92)	(2.84)	(2.41)	(1.21)	(4.15)
Private disposable income								
Anticipated	1.0076	0.3739	0.4491	0.3879	0.1490	0.6686	0.8524	0.6801
	(8.26)	(1.71)	(5.09)	(1.84)	(0.37)	(5.14)	(3.49)	(3.32)
Unanticipated	0.8019	0.7417	0.6375	0.6423	0.0934	0.6385	-0.0475	0.8290
	(5.58)	(1.06)	(3.13)	(3.06)	(0.27)	(2.22)	(0.15)	(3.54)
Lagged	-0.0431	0.0106	0.1532	0.2779	0.2361	-0.3528	-0.1187	0.1850
	(0.14)	(0.04)	(0.99)	(1.08)	(0.50)	(1.78)	(0.54)	(1.08)
Population (%) between ages 15 and 64								
Level	-0.0151	0.1043	-0.0191	0.0042	0.0069	0.0056	-0.0472	0.0219
	(0.97)	(2.28)	(3.68)	(0.49)	(0.62)	(0.73)	(1.79)	(4.56)
Change	-0.1637	-0.3746	-0.2359	-0.0893	-0.0018	0.0691	0.0736	-0.0173
	(2.51)	(2.06)	(4.95)	(3.18)	(0.05)	(2.69)	(1.18)	(0.80)
Dummy	—	-0.0573	-0.1761	-0.0817	-0.0673	-0.0252	-0.0031	-0.0850
		(1.80)	(4.38)	(3.22)	(2.09)	(0.85)	(0.04)	(3.02)
Inflation								
Anticipated	-0.0005	-0.0002	0.0026	-0.0010	-0.0003	0.0016	0.0017	-0.0016
	(0.54)	(0.50)	(4.87)	(0.59)	(0.42)	(1.69)	(0.96)	(1.27)
Unanticipated	0.0007	0.0007	0.0012	-0.0023	-0.0004	0.0029	0.0004	0.0007
	(0.66)	(1.03)	(1.03)	(0.94)	(0.45)	(1.29)	(0.15)	(0.61)
Changes in terms of trade								
Anticipated	-0.0014	...	0.0004	-0.0013	-0.0001	...	-0.0009	-0.0015
	(2.19)		(0.58)	(1.84)	(0.18)		(1.25)	(3.59)
Unanticipated	0.0008	...	0.0004	-0.0024	-0.0003	...	-0.0032	-0.0002
	(1.51)		(0.38)	(2.25)	(1.37)		(2.87)	(0.33)
Exports as a ratio of GNP	-0.0079	-0.0010	0.0006	0.0025	-0.0001	...	0.0053	-0.0048
	(1.01)	(0.42)	(0.45)	(1.53)	(0.04)		(0.91)	(1.48)
Summary statistics								
R-squared	0.9523	0.7778	0.9416	0.8658	0.7275	0.9038	0.8215	0.8742
Standard error	0.0143	0.0248	0.0126	0.0170	0.0183	0.0185	0.0274	0.0129
Sum of squared residuals	0.0022	0.0049	0.0014	0.0032	0.0037	0.0034	0.0083	0.0018
Degrees of freedom	11	8	9	11	11	10	11	11
Long-run income elasticity	0.9346	0.3552	1.1219	0.7538	0.6107	0.5227	2.9949	0.8210
No. of observations x (Sum of first four autocorrelations squared)	0.7120	3.0810	15.2820	3.9360	2.0390	8.4110	2.4440	4.2090

1/ Figures within parentheses under country names are periods of analysis and those under coefficients are t-values.

Table A2. Empirical Estimates of the Consumption Function: Equation (15), under H_2: $_2 = {}^*_2$

(Dependent variable is first difference of logarithm of private real consumption expenditure) 1/

	India (1962-84)	Indonesia (1967-85)	Korea (1964-85)	Malaysia (1962-85)	Philippines (1962-85)	Singapore (1965-84)	Sri Lanka (1962-85)	Thailand (1962-85)
Coefficients of								
Constant	1.4693	2.8583	0.0857	0.8621	1.5768	1.8925	0.6553	0.2621
	(2.29)	(1.94)	(0.10)	(1.92)	(1.98)	(2.32)	(0.51)	(0.82)
Lagged consumption	-1.0275	-1.1073	-0.5134	-0.8361	-0.6335	-0.6097	-0.3461	-1.0561
	(3.27)	(4.03)	(3.16)	(4.98)	(3.00)	(2.63)	(1.49)	(4.27)
Private disposable income								
Contemporaneous	0.9196	0.3995	0.4816	0.5151	0.1167	0.6636	0.5203	0.7393
	(10.58)	(1.95)	(6.18)	(3.63)	(0.44)	(5.83)	(2.19)	(4.23)
Lagged	-0.0038	-0.0025	0.1091	0.1392	0.2711	-0.3461	-0.1928	0.1403
	(0.01)	(0.01)	(0.76)	(0.73)	(0.79)	(1.96)	(0.74)	(0.93)
Population(%) between ages 15 and 64								
Level	-0.0134	0.1051	-0.0190	0.0031	0.0064	0.0058	-0.0089	0.0224
	(0.86)	(2.40)	(3.72)	(0.37)	(0.65)	(0.82)	(0.36)	(4.88)
Change	-0.1478	-0.3716	-0.2354	-0.0834	-0.0005	0.0695	0.0026	-0.0189
	(2.33)	(2.14)	(5.02)	(3.11)	(0.01)	(2.87)	(0.04)	(0.91)
Dummy	—	-0.0535	-0.1759	-0.0729	-0.0672	-0.0250	-0.1156	-0.0831
		(1.80)	(4.44)	(3.21)	(2.18)	(0.88)	(1.65)	(3.06)
Inflation								
Anticipated	-0.0001	-0.0002	0.0027	-0.0009	-0.0003	0.0016	-0.0002	-0.0015
	(0.16)	(0.52)	(5.13)	(0.53)	(0.52)	(1.79)	(0.09)	(1.23)
Unanticipated	0.0012	0.0009	0.0011	-0.0024	-0.0003	0.0029	0.0013	0.0006
	(1.18)	(1.65)	(1.04)	(0.97)	(0.45)	(1.35)	(0.48)	(0.55)
Changes in terms of trade								
Anticipated	-0.0011	...	0.0003	-0.0016	-0.0001	...	-0.0007	-0.0015
	(1.95)		(0.52)	(2.45)	(0.35)		(0.80)	(3.78)
Unanticipated	0.0008	...	0.0007	-0.0021	-0.0003	...	-0.0016	-0.0001
	(1.61)		(0.81)	(2.12)	(1.50)		(1.52)	(0.29)
Exports as a ratio of GNP	-0.0050	-0.0008	0.0003	0.0025	-0.0001	...	0.0001	-0.0057
	(0.68)	(0.39)	(0.22)	(1.54)	(0.04)		(0.02)	(2.06)
Summary statistics								
R-squared	0.9478	0.7705	0.9372	0.8574	0.7272	0.9038	0.7283	0.8901
Standard error	0.0143	0.0238	0.0124	0.0168	0.0176	0.0176	0.0324	0.0126
Sum of squared residuals	0.0025	0.0051	0.0015	0.0034	0.0037	0.0034	0.0126	0.0019
Degrees of freedom	12	9	10	12	12	11	12	12
Long-run income elasticity	0.8913	0.3585	1.1504	0.7826	0.6122	0.5208	0.9461	0.8329
No. of observations x (Sum of first four autocorrelations squared)	1.6860	2.2080	14.4810	3.4310	2.1460	8.6780	1.6370	4.3350

1/ Figures within parentheses under country names are periods of analysis and those under coefficients are t-values.

Table A3. Empirical Estimates of the "ECM"-Type of Consumption Function: Equation (15) under H_3: $_1 + _2 + _3 = 0$

(Dependent variable is first difference of logarithm of private real consumption expenditure) 1/

	India (1962-84)	Indonesia (1967-85)	Korea (1964-85)	Malaysia (1962-85)	Philippines (1962-85)	Singapore (1965-84)	Sri Lanka (1962-85)	Thailand (1962-85)
Coefficients of								
Constant	1.2649	-0.1836	0.8723	0.1014	0.0392	0.3435	0.5789	00.6777
	(2.03)	(0.18)	(4.33)	(0.62)	(0.06)	(1.97)	(1.74)	(2.12)
Rate of growth of Private Disposable Income	0.9655	0.4144	0.4595	0.6100	0.2497	0.7878	0.5245	0.7064
	(12.39)	(1.64)	(6.21)	(4.27)	(0.81)	(7.55)	(2.40)	(2.75)
Lagged consumption Income Ratio	-1.0163	-0.7296	-0.6435	-0.7665	-0.2122	-0.1813	-0.3423	-0.6225
	(3.20)	(2.57)	(7.44)	(4.33)	(1.37)	(2.35)	(1.58)	(1.90)
Population (%) between ages 15 and 64								
Level	-0.0247	0.0034	-0.0157	-0.0101	-0.0016	-0.0071	-0.0104	0.0118
	(2.03)	(0.17)	(4.28)	(2.49)	(0.14)	(2.56)	(1.77)	(2.13)
Change	-0.1657	-0.3927	-0.2322	-0.0939	-0.0017	0.0373	0.0030	-0.0429
	(2.67)	(1.83)	(4.99)	(3.31)	(0.04)	(1.91)	(0.05)	(1.46)
Dummy	—	-0.0740	-0.1884	-0.0776	-0.0250	-0.0278	-0.1123	-0.0460
		(2.10)	(5.07)	(3.17)	(0.81)	(0.88)	(2.51)	(1.22)
Inflation								
Anticipated	0.0001	0.0003	0.0025	-0.0016	-0.0005	0.0009	-0.0001	-0.0002
	(0.08)	(0.87)	(5.10)	(0.90)	(0.80)	(0.96)	(0.08)	(0.09)
Unanticipated	0.0011	0.0010	0.0012	-0.0027	-0.0001	0.0028	0.0013	0.0009
	(1.11)	(1.59)	(1.09)	(1.00)	(0.08)	(1.15)	(0.51)	(0.60)
Changes in terms of trade								
Anticipated	-0.0012	...	0.0004	-0.0017	0.0001	...	-0.0007	-0.0015
	(2.18)		(0.64)	(2.44)	(0.40)		(1.05)	(2.53)
Unanticipated	0.0007	...	0.0009	-0.0027	-0.0001	...	-0.0016	0.0000
	(1.43)		(1.11)	(2.65)	(0.61)		((1.71)	(0.06)
Exports as a ratio of GNP	-0.0024	-0.0038	0.0009	0.0041	0.0007	...	0.0005	-0.0052
	(0.34)	(1.68)	(0.75)	(2.79)	(0.24)		(0.18)	(1.27)
Summary Statistics								
R-squared	0.9421	0.6108	0.9315	0.8189	0.5812	0.8710	0.7283	0.6950
Standard Error	0.0145	0.0294	0.0124	0.0182	0.0209	0.0195	0.0311	0.0185
Sum of squared residuals	0.0027	0.0086	0.0017	0.0043	0.0057	0.0046	0.0126	0.0045
Degrees of freedom	13	10	11	13	13	12	13	13
Steady-state APC at no growth	0.8913	1.0494	0.7971	0.4851	0.7475	0.5303	0.7484	1.1504
No. of observations x (Sum of squared first four auto-correlations)	0.7150	1.3040	19.3820	3.2340	1.7000	8.3710	1.5880	4.9800

1/ Figures within parentheses under country names are periods of analysis and those under coefficients are t-values.

References

Bilsborrow, Richard E., "Dependency Rates and Aggregate Savings Rates Revisited: Corrections, Further Analysis, and Recommendations for the Future," Research in Population Economics, ed. by Julian L. Simon and Julie DaVanzo, Vol. 2 (Greenwich, Connecticut; Jai Press Inc., 1980).

Blinder, Alan S. and Angus Deaton, "The Time Series Consumption Function Revisited," Brookings Papers on Economic Activity: 2 (1985), pp. 465-511.

Branson, William H. and Alvin Klevorick, "Money Illusion and the Aggregate Consumption Function," American Economic Review, Vol. 59 (December 1969), pp. 832-50.

Clark, Robert L. and Joseph J. Spengler, "Dependency Ratios: Their Use in Economic Analysis,": Research in Population Economics, ed. by Julian L. Simon and Julie DaVanzo, Vol. 2 (Greenwich, Connecticut; Jai Press Inc., 1980).

Datta, Gautam and Parthasarathi Shome, "Social Security and Household Savings: Asian Experience," The Developing Economies, Vol. 19 (June 1981), pp. 143-60.

Davidson, James E.H., David F. Hendry, Frank Srba, and Stephen Yeo "Econometric Modelling of the Aggregate Time Series Relationship Between Consumers' Expenditure and Income in the U.K.," Economic Journal, Vol. 88 (December 1978), pp. 661-92.

Deaton, Angus, "Involuntary Saving Through Unanticipated Inflation," American Economic Review, Vol. 67 (December 1977), pp. 899-910.

Diamond, Peter A., "National Debt in a Neoclassical Growth Model," American Economic Review, Vol. 55 (December 1965), pp. 1126-50.

Flavin, Marjorie A., "The Adjustment of Consumption to Changing Expectations about Future Income," Journal of Political Economy, Vol. 89 (October 1981), pp. 974-1009.

Fry, Maxwell J., "Money and Capital or Financial Deepening in Economic Development", Journal of Money, Credit and Banking, Vol. 10 (November 1978) pp. 464-75.

_____, "Terms of Trade Dynamics in Asia, An Analysis of National Saving and Domestic Investment Responses to Terms of Trade Changes in 14 Asian LDCs," Journal of International Money and Finance, Vol. 5 (March 1986), pp. 57-73.

Giovannini, Alberto, "The Interest Elasticity of Savings in Developing Countries: The Existing Evidence," World Development, Vol. 11, No. 7 (1983), pp. 601-607.

_____, "Saving and the Real Interest Rate in LDCs," Journal of Development Economics, Vol. 18 (August 1985), pp. 197-217.

Godfrey, L.G., "Testing Against General Autoregressive and Moving Average Error Models when the Regressors Include Lagged Dependent Variables," Econometrica, Vol. 46, No. 6 (November 1978), pp. 1293-1301.

Graham, John W., "International Differences in Savings Rates and the Life Cycle Hypothesis," European Economic Review, Vol. 31 (December 1987), pp. 1509-1529.

Gupta, Kanhaya L., "Aggregate Savings, Financial Intermediation, and Interest Rate," The Review of Economics and Statistics, Vol. 69 (May 1987), pp. 303-11.

Hall, Robert E., "Stochastic Implications of the Life-Cycle-Permanent Income Hypothesis: Theory and Evidence," Journal of Political Economy, Vol. 86 (December 1978), pp. 971-87.

Haque, Nadeem Ul and Peter Montiel, "Ricardian Equivalence, Liquidity Constraints and the Yaari-Blanchard Effect: Tests for Developing Countries," (unpublished, International Monetary Fund, 1987).

Houthakker, Hendrik S. and Lance D. Taylor, Consumer Demand in the United States, 1929-70. (Cambridge, Massachusetts: Harvard University Press, 1970).

Howard, David H., Personal Saving Behavior and the Rate of Inflation," Review of Economics and Statistics, Vol. 60 (November 1978), pp. 547-54.

Juster, F. Thomas, and Paul Wachtel, "A Note on Inflation and the Saving Rate," Brookings Papers on Economic Activity: 3 (1972), pp. 765-79.

Lee, Joong-Koon, "Exports and the Propensity to Save in LDCs," Economic Journal, Vol. 81 (June 1971), pp. 341-51.

Leff, Nathaniel H., "Dependency Rates and Savings Rates," American Economic Review, Vol. 59 (September 1969), pp. 886-96.

_____, "Dependency Rates and Savings Rates: A New Look," in Research in Population Economics, ed. by Julian L. Simon and Julie DaVanzo, Vol. 2 (Greenwich, Connecticut; Jai Press Inc., 1980)

Maizels, Alfred, Exports and Economic Growth of Developing Countries. (New York: Cambridge University Press, 1968).

McKinnon, Ronald I., Money and Capital in Economic Development (Washington, D.C.: The Brookings Institution, 1973).

Modigliani, Franco, "The Life-Cycle Hypothesis of Saving and Intercountry Differences in the Saving Ratio," in Induction, Growth and Trade: Essays in Honor of Sir Roy Harrod ed. by W.A. Eltis, M.Fg. Scott and J.N. Wolfe, (Oxford: Clarendon Press, 1970).

Pagan, Adrian, "Econometric Issues in the Analysis of Regressions with Generated Regressors," International Economic Review, Vol. 25 (February 1984), pp. 221-48.

Persson, Torsten and Lars E.O. Svensson, "Current Account Dynamics and the Terms of Trade: Harberger-Laursen-Metzler Two Generations Later," Journal of Political Economy, Vol. 93 (February 1985), pp. 43-65.

Ram, Rati, "Dependency Rates and Aggregate Savings: A New International Cross-Section Study," American Economic Review, Vol. 72 (June 1982), pp. 537-43.

Ravallion, Martin and Abhijit Sen, "On Some Estimates of Asian Savings Function," Economic Letters, Vol. 20, No. 2 (1986), pp. 121-24.

Rossi, Nicola, "Government Spending, the Real Interest Rate, and the Behavior of Liquidity Constrained Consumers in Developing Countries," Staff Papers, International Monetary Fund, Vol. 35 (March 1988), pp. 104-40.

_____, "Dependency Rates and Private Savings Behavior in Developing Countries," (Unpublished, International Monetary Fund, 1988).

Sigit, Hananto, "Estimates of Comparable Savings in Selected DMCs," Statistical Report Series, No. 4, Economics Office, Asian Development Bank, (Manila: 1985).

Svensson, Lars E.O. and Assaf Razin, "The Terms of Trade and the Current Account: The Harberger-Laursen-Metzler Effect," Journal of Political Economy, Vol. 91 (February 1983), pp. 97-125.

Tobin, James "Notes on Optimal Monetary Growth," Journal of Political Economy, Vol. 76 (July/August 1968), pp. 833-59.

World Bank, The World Development Report (New York: Oxford University Press, 1984, 1985).