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GROWTH, STRUCTURAL TRANSFORMATION, AND CONSUMPTION BEHAVIOR: EVIDENCE FROM ASIA

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I. INTRODUCTION

In a world beleaguered with financial constraints developing countries will have to mobilize higher savings for fostering growth. An understanding of the determinants of savings is crucial for understanding the development process in the Third World. Asian countries merit special attention in this context insofar as in the last two decades gross national savings as a percentage of GNP has been much more buoyant in the economies of East and Southeast Asia compared to the rest of the world in general. For example, between the early sixties and the early eighties, in most of the economies in this region,[1] the ratio went up by at least 5 percentage points, as compared to a decline of 2.3 percentage points in the Western industrial market economies and a near constancy in the countries of Africa and Latin America.[2] In many of these Asian countries, foreign and government savings have behaved rather erratically and it has been private savings which has been the source of sustained increase in total savings. It is, therefore, important to explain the behavior of private consumption in these countries to understand their growth experience in savings.

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1 Except Bangladesh, Myanmar, Sri Lanka, and Japan.

2 See World Bank, *World Development Report* (New York: Oxford University Press), 1984 and 1985 editions, Table 5.

We have concentrated on the following nine Asian developing countries, the choice of which was to some extent guided by the availability of data for the 1960–80 period: India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Sri Lanka, Taiwan, and Thailand.[3]

In a very fundamental sense one of the primary factors driving savings is growth. In the life-cycle theory of savings all savings are eventually dissaved and net positive savings increase only because the young generations who save are becoming more affluent and more numerous than the old who are dissavers. The Asian countries have been growing and the average propensity to consume (APC) has been falling over time. This can be verified from Table I: in the region the seventies witnessed a higher rate of growth than the sixties and the APC in the seventies was considerably smaller than the corresponding value in the sixties.

Is growth alone sufficient to explain the consumption behavior in the Asian countries? Many of these countries have undergone and are still undergoing a structural transformation in terms of a shift away from the relative importance of the agricultural sector. The lower APCs in the 1970s, compared to the 1960s, was accompanied by a corresponding lower value of the proportion of income arising in agriculture (see Table I). There is a remarkable statistical regularity in the direct relationship between the proportion of income originating in agriculture and the overall APC in these countries (see Figure 1). There are enormous differences in the physical and financial infrastructural facilities, demographic factors, basic nature of economic activity and market features in rural and urban areas. Consequently, the consumption propensities may differ between the agricultural and nonagricultural sectors and structural shifts may affect the overall consumption behavior. Is it growth and structural transformation or growth alone that can explain the consumption behavior in these Asian countries?

Starting with Houthakker [8] there have been quite a few international comparative analyses of consumption or saving behavior, e.g., Friend and Taubman [4], Swamy [17], Williamson [19], Mikesell and Zinser [13], and Fry [5]. One of the aims of this article is to extend the tradition of that research for Asian developing countries. Various theories, e.g., life-cycle and permanent income, have been proposed and tested for studying the relationship between consumer's expenditure and income in a number of countries. One of the problems with the findings of most of these studies is that the contending models are not embedded in a common framework making it difficult to carry out nested tests of alternatives. Davidson, Hendry, Srba, and Yeo [2] have proposed an error-correction model (DHSY henceforth) which nests many of the "theories" or their analogues within it. In this article we use the DHSY model for analyzing consumption behavior in the Asian countries and judging the appropriateness of alternative theories.

[3] Korea refers to the Republic of Korea. The Asian countries not included in the analysis are the oil exporters of the Middle East, Afghanistan, Bangladesh, Myanmar, People's Republic of China, Fiji, Hong Kong, Democratic People's Republic of Korea, Nepal, Papua New Guinea, Singapore, Solomon Islands, and Western Samoa. The nine countries under analysis can be described as "agricultural developing economies"—they had at least a quarter of their total income contributed by the agriculture sector in 1960.

TABLE I

THE AVERAGE PROPENSITY TO CONSUME, RATE OF GROWTH, AND PROPORTION OF INCOME ORIGINATING IN AGRICULTURE

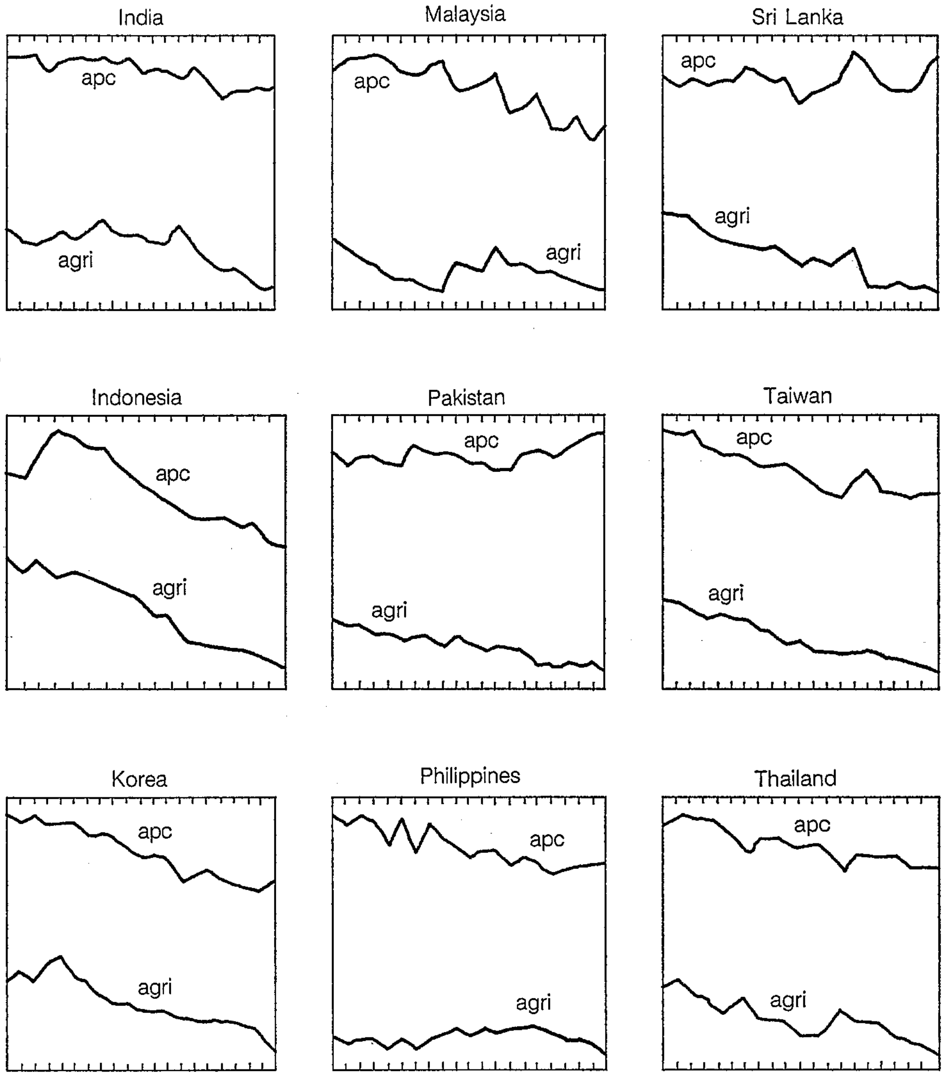
	Period		
	1960–80	1960–69	1970–80
India	0.82 (3.32) [45.26]	0.85 (2.30) [48.08]	0.79 (3.73) [42.69]
Indonesia[a]	0.82 (10.44) [43.95]	0.91 (2.01) [55.82]	0.75 (3.11) [34.40]
Korea	0.82 (11.42) [32.43]	0.89 (10.25) [39.64]	0.75 (8.99) [25.88]
Malaysia	0.73 (7.58) [33.07]	0.77 (4.72) [33.43]	0.69 (8.99) [32.73]
Pakistan	0.85 (4.05) [37.63]	0.86 (4.76) [39.90]	0.85 (5.55) [35.57]
Philippines	0.79 (8.08) [29.78]	0.83 (5.89) [29.15]	0.75 (6.21) [30.35]
Sri Lanka	0.79 (6.72) [36.55]	0.80 (3.69) [41.42]	0.78 (9.05) [32.11]
Taiwan	0.67 (9.29) [18.77]	0.73 (9.56) [24.62]	0.61 (8.10) [13.46]
Thailand	0.77 (7.26) [36.20]	0.80 (7.99) [39.90]	0.74 (6.88) [32.83]

Note: The numbers reported in the body of the table are as follows: the average propensity to consume, the trend rate of growth (within parentheses), and the proportion of income originating in agriculture (within brackets).

[a] For Indonesia the periods are 1963–80, 1963–69, and 1970–80.

As already mentioned above, consumption behavior may vary across sectors and is not directly estimable in a time-series framework due to the lack of consumption data on a sectoral basis. In the literature on consumption or savings, Kaldor [10], Houthakker [9], Kelley and Williamson [11], Shinohara [16], Holbrook and Stafford [7], Ong, Adams, and Singh [14], and Bhalla [1], among others, have analyzed and tested the effects of differences in sources of income. However, this class of literature has had a double life of sorts: it has divided income

Fig. 1. Average Propensities to Consume and Proportion of Income Originating in Agriculture in Some Developing Countries



Notes: 1. apc: average propensity to consume.
agri: proportion of income originating in agriculture.
2. The time period for all countries except Indonesia is 1960–80. For Indonesia, it is 1963–80.

into profits and wages for aggregate time-series data and into agricultural and nonagricultural income for cross-sectional budget data on households. The importance of the sectoral composition has not been investigated satisfactorily in the analysis of consumption over time.[4]

We have tried to extend the DHSY model to obtain its disaggregate analogue which is estimable in the absence of sectoral data on consumption. This model has been tested and examined to find out whether sectoral differences in consumption propensities along with the structural transformation of the Asian countries can add to the explanation of the dynamic behavior of aggregate consumption propensities in these countries during the decades of the sixties and seventies.

The empirical estimation has been done for each of the nine economies separately as well as for the pooled data. Sub-sample estimates have been obtained with the pooled data for the decades of the sixties and seventies separately to detect signs of "structural" instability. One of the major findings of the study is that along with growth sectoral composition of income can contribute significantly to our understanding of the behavior of average propensity to consume in agricultural developing economies in general and Asian countries in particular.

The plan of the paper is as follows, Section II presents the DHSY model and its disaggregative version, the empirical estimates are contained in Section III with summary and conclusions following in Section IV. Appendix contains data sources.

II. MODEL

Consumption behavior, a priori, has to satisfy a range of theoretical and empirical requirements, e.g., (i) the fundamental psychological law of Keynes and consumption going up with income, but less than proportionately, and (ii) contracyclical behavior of the APC in the short run coupled with a constancy in the long run.[5] Davidson, Hendry, Srba, and Yeo [2] proposed an error-correction model which conforms with these requirements. In aggregative annual terms it is given by

$$\Delta \log C = \alpha_0 + \alpha_1 \Delta \log Y + \alpha_2 \Delta^2 \log Y + \alpha_3 (\log C - \log Y)_{-1}, \qquad (1)$$

where Y and C denote income and consumption respectively. Note that the model does not incorporate the influence of the rate of interest and government policies on consumption. Though this evidently is a simplification but it has the advantage of bringing to sharp focus the dynamic adjustment of consumption to income.

For $\alpha_0 = 0$, we can give a simple interpretation to this model. To paraphrase Davidson et al. [2]: a relationship like (1), with $\alpha_0 = 0$, can be derived from a simple "feedback" theory in which consumers plan to spend each year the same

[4] In a somewhat similar context Driscoll and Lahiri [3] have found the sectoral income composition factor important in explaining the behavior of demand for or income-velocity of money in agricultural developing countries.

[5] This second requirement essentially implies that, ceteris paribus, if income were to grow at a uniform rate consumption-to-income ratio should stabilize at a constant level rather than growing or declining continuously.

as they spent in the previous year modified by a proportion of the annual change in income ($\alpha_1 \Delta\log Y$), and by whether that change is itself increasing or decreasing ($\alpha_2 \Delta^2\log Y$); these together determine a "short-run" consumption decision which is altered by $\alpha_3 \log(C/Y)_{-1}$, the feedback from the previous C/Y ratio ensuring coherence with the long-run "target" outcome $C = kY$.

It is easy to verify how DHSY reconcile the short-run and long-run behavior of APC. Firstly, note that in the short-run, according to (1), the marginal propensity to consume (MPC) is expressed as

$$\frac{dC}{dY} = (\alpha_1 + \alpha_2)\frac{C}{Y} \tag{2}$$

and MPC < APC as long as $\alpha_1 + \alpha_2 < 1$. However, in the long run with a steady-state growth of g, we have

$$\Delta\log Y = \Delta\log C = g, \quad \Delta^2 \log Y = 0 \tag{3}$$

and

$$\frac{C}{Y} = \exp\left\{\frac{1}{\alpha_3}[-\alpha_0 + (1-\alpha_1)g]\right\} \tag{4}$$

as the long-run average propensity to consume. Note that $\alpha_1 < 1$ and $\alpha_3 < 0$ imply an inverse relationship between growth and APC.

Also note that the assumption $\alpha_1 = 1$, $\alpha_2 = 0$, and $\alpha_3 = -1$ converts (1) to $C = \beta Y$ where $\beta = e^{\alpha_0}$, a close analogue of the absolute income hypothesis with long-run constancy of the APC built into it. Moreover, it is possible to rewrite (1) in a solved distributed lag form as

$$\log C = \beta_0 + \beta_1 \log Y + (\beta_2 + \gamma\beta_1) \log Y_{-1} + \sum_{j=2}^{\infty} \gamma^{j-2}(\beta_3 + \gamma\beta_2 + \gamma^2\beta_1) \log Y_{-j}, \tag{5}$$

where $\beta_0 = -\alpha_0/\alpha_3$, $\beta_1 = \alpha_1 + \alpha_2$, $\beta_2 = -(\alpha_1 + 2\alpha_2 + \alpha_3)$, $\beta_3 = \alpha_2$, and $\gamma = 1 + \alpha_3$. This is the familiar distributed lag representation of the permanent income hypothesis. Hall [6] has claimed that if the endogeneity of income and the stochastic implications of the permanent income–life cycle theory are taken into account then consumption should follow a random walk with perhaps a trend. It is not hard to verify that the assumption $\alpha_1 = \alpha_2 = \alpha_3 = 0$ in (1) yields

$$\log C = \alpha_0 + \log C_{-1} \tag{6}$$

which is Hall's corollary 5 with a Taylor series expansion of $\log C$ rather than C itself.[6]

The DHSY specification implies a lower APC with a higher secular trend rate

[6] In Hall's notation $\alpha_0 = \left(\frac{1+\delta}{1+r}\right)^{u'(c_{-1})/c_{-1}\cdot u''(c_{-1})} - 1$. The error term, which has been omitted, is $\varepsilon/[c_{-1}\cdot u''(c_{-1})]$. Note that, strictly speaking, in Hall's formulation there is an extra term—the unanticipated change in contemporaneous income—that should figure in equation (6).

of growth. Furthermore, the dynamic adjustment pattern implies a gradual fall in APC over time, asymptotically approaching a lower long-run value, when growth rate of income jumps up by a few percentage points. The growth rate in many of the Asian countries accelerated during the last two decades and this according to DHSY would be accompanied by APC falling over time trying to seek its lower long-term value.

What about the statistical regularity of the relationship between the proportion of income arising out of the agricultural sector and the APC? Raj [15], Vakil [18], and Krishamurty and Saibaba [12] have found some "evidence" that the sectoral composition of income is important in the determination of consumption and savings in India. Consumption propensities may differ across sectors and if they do then the structural transformation of the economies during their development process may bring about changes in the APC's over time.

Holbrook and Stafford [7] and Bhalla [1] have argued that the propensity to consume out of income from agricultural sources is likely to be lower than that out of nonagricultural sources. This is because of the volatility of agricultural income leading to a weaker relationship between measured and permanent income in agriculture compared to nonagriculture. But this has been argued in the context of a given household deriving income from two alternative sources. In a developing economy there is a large number of households deriving their income entirely from only one of the two sources. How would the consumption propensity of a household relying on agriculture alone for its income compare with another dependent only on nonagriculture?

There are at least six sets of factors that have an immediate bearing on the answer. Firstly, the agents deriving their incomes from the two alternative sources are likely to reside in two different types of geographic locations: rural and urban. Values, traditions, infrastructural facilities, and, hence, tastes and consumption opportunities are likely to differ between the two. Expenditure on account of social hospitality, religious and family festivals are likely to be higher for the agricultural agents than their nonagricultural counterparts. On the other hand, the easier access to the variegated consumption basket available in urban areas, ceteris paribus, tends to make the nonagriculturalists' propensity to consume, different from that of the agriculturist.

Secondly, a large part of the produce of agriculturists, specially small and middle farmers, is for self-consumption. The ability to consume a product without the intermediation of the market and, hence, without incurring any transaction costs is likely to exert an upward pressure on the propensity to consume of the agriculturists relative to others.

Thirdly, saving (and consumption) propensity is related to the rate of return available from foregoing present consumption. Given the imperfection of the capital market and generally a lower rate of return on agricultural investments relative to the rest of the economy, the propensity to consume in agriculture is likely to dominate its nonagricultural analogue.

Fourthly, as already mentioned above, the relationship between permanent and measured income is weaker in agriculture due to the volatility of income, arising from its dependency on weather. Ceteris paribus, this is likely to result in a lower propensity to consume in agriculture relative to the rest of the economy.

Fifthly, life expectancy in the urban and rural areas differ due to differences in sanitation and health facilities. Insofar as consumption depends on expectation of life, the consumption propensities are likely to differ in the agricultural and nonagricultural sectors.[7]

Lastly, consumption decisions depend on household size and dependency ratios. Since these tend to differ across sectors the consumption behavior may also diverge.

The net result of these countervailing forces is difficult to gauge, a priori. A hypothesis propounded and tested in the present study is that the propensity to consume is higher in agriculture relative to nonagriculture. It is easy to verify that if this hypothesis holds, even under the absolute income theory we have an increasing savings ratio with increasing income as the ratio of total income arising in agriculture decreases. We note that though MPC $<$ APC is sufficient to guarantee rising savings with increasing income under the absolute income hypothesis, neglect of the intersectoral propensity differentials is likely to result in an underestimation of the extent of rise in the savings ratio accompanying development.

The evidence for India, with regard to the importance of the sectoral composition of income, alluded above, has been obtained in the context of a sectorally disaggregated absolute income hypothesis. But this hypothesis, as is well known, is a bit naive and does not satisfy some of the minimal theoretical and empirical requirements of a properly specified consumption income relationship. Hence we try to test our hypothesis in the context of DHSY error-correction model.

What could be the disaggregative analogue of the DHSY specification in the absence of sectoral data on consumption? Let us postulate that for the agricultural and the nonagricultural sectors, consumption follows:

$$\Delta \log C_a = \phi_0^a + \phi_1^a \Delta \log Y_a + \phi_2^a \Delta^2 \log Y_a + \phi_3^a (\log C_a - \log Y_a)_{-1} \tag{7}$$

and

$$\Delta \log C_n = \phi_0^n + \phi_1^n \Delta \log Y_n + \phi_2^n \Delta^2 \log Y_n + \phi_3^n (\log C_n - \log Y_n)_{-1}, \tag{8}$$

where subscript "a" and "n" specialize variables to the two sectors.[8] Note that $\phi_i^a \neq \phi_i^a$ for $i = 0, 1, 2, 3$ implies sectoral differences in consumption. Since measurements do not exist on C_a and C_n we need to aggregate and this we attempt by using the approximations:

$$\Delta \log x \cong \frac{\Delta x}{x_{-1}} \tag{9}$$

and

[7] Apart from the reasons mentioned above we can add the differences in income distribution in the two sectors as an argument for the consumption propensities to differ across sectors.

[8] Note that C_i, aggregate consumption of the ith sector, includes goods produced by the other sectors as well.

$$\log\left(\frac{C}{Y}\right)=\log\left(1-\frac{S}{Y}\right)\cong-\frac{S}{Y}. \tag{10}$$

By virtue of (9) and (10), we can approximate (7) and (8) by

$$S_i=-\phi_0{}^iY_i-(\phi_1{}^i+\phi_2{}^i-1)\frac{\Delta Y_i}{Y_{i_{-1}}}Y_i+\phi_2{}^i\frac{\Delta Y_{i_{-1}}}{Y_{i_{-2}}}Y_i$$
$$+(1+\phi_3{}^i)\left(\frac{S_i}{Y_i}\right)_{-1}Y_i, \qquad i=a,\,n. \tag{11}$$

Summing over sectors we get

$$S=-\phi_0{}^aY-(\phi_0{}^n-\phi_0{}^a)Y_n-(\phi_1{}^a+\phi_2{}^a-1)\left(\frac{\Delta Y_a}{Y_{a_{-1}}}Y_a+\frac{\Delta Y_n}{Y_{n_{-1}}}Y_n\right)$$
$$-(\phi_1{}^n+\phi_2{}^n-\phi_1{}^a-\phi_2{}^a)\frac{\Delta Y_n}{Y_{n_{-1}}}Y_n+\phi_2{}^a\left(\frac{\Delta Y_{a_{-1}}}{Y_{a_{-2}}}Y_a+\frac{\Delta Y_{n_{-1}}}{Y_{n_{-2}}}Y_n\right)$$
$$+(\phi_2{}^n-\phi_2{}^a)\frac{\Delta Y_{n_{-1}}}{Y_{n_{-2}}}Y_n+(1+\phi_3{}^a)\left[\left(\frac{S_a}{Y_a}\right)_{-1}Y_a+\left(\frac{S_n}{Y_n}\right)_{-1}Y_n\right]$$
$$+(\phi_3{}^n+\phi_3{}^a)\left(\frac{S_n}{Y_n}\right)_{-1}Y_n. \tag{12}$$

Now we have

$$\frac{\Delta Y_a}{Y_{a_{-1}}}Y_a+\frac{\Delta Y_n}{Y_{n_{-1}}}Y_n=\frac{\Delta Y}{Y_{-1}}Y-\left(\frac{\Delta Y_n}{Y_{n_{-1}}}-\frac{\Delta Y_a}{Y_{a_{-1}}}\right)\left[\Delta Y\left(\frac{Y_n}{Y}\right)_{-1}-\Delta Y_n\right] \tag{13}$$

and

$$\left(\frac{S_a}{Y_a}\right)_{-1}Y_a+\left(\frac{S_n}{Y_n}\right)_{-1}Y_n$$
$$=\left(\frac{S}{Y}\right)_{-1}Y+\left[\left(\frac{S}{Y}\right)_{-1}-\left(\frac{S_n}{Y_n}\right)_{-1}\right]\left[\frac{\Delta Y_a}{Y_{a_{-1}}}-\frac{\Delta Y_n}{Y_{n_{-1}}}Y_{n_{-1}}\right] \tag{14}$$

Dividing both sides of (12) by Y and using (9), (10), (13), and (14), we get

$$\Delta\log\left(\frac{C}{Y}\right)=\phi_0{}^a+(\phi_1{}^a-1)\left[\Delta\log Y-\Delta\log\left(\frac{Y_n}{Y_a}\right)\cdot\Delta\log\left(\frac{Y_a}{Y}\right)\right]$$
$$+\phi_2{}^a\left\{\Delta\left[\Delta\log Y-\Delta\log\left(\frac{Y_n}{Y_a}\right)\cdot\Delta\log\left(\frac{Y_a}{Y}\right)\right]\right.$$
$$\left.+\Delta\log\left(\frac{Y_n}{Y_a}\right)_{-1}\cdot\Delta\log\left(\frac{Y_a}{Y}\right)\right\}+\phi_3{}^a\log\left(\frac{C}{Y}\right)_{-1}$$
$$+(1+\phi_3{}^a)\log\left(\frac{C}{Y}\right)_{-1}\cdot\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}$$
$$-(\phi_0{}^n-\phi_0{}^a)\log\left(\frac{Y_a}{Y}\right)-(\phi_1{}^n+\phi_2{}^n-\phi_1{}^a-\phi_2{}^a)\,\Delta\log Y_n$$
$$\cdot\log\left(\frac{Y_a}{Y}\right)+(\phi_2{}^n-\phi_2{}^a)\Delta\log Y_{n_{-1}}\cdot\log\left(\frac{Y_a}{Y}\right)$$

$$-(1+\phi_3{}^a)\log\left[\left(\frac{C_n}{Y_n}\right)_{-1}\cdot\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}\right]$$
$$-(\phi_3{}^n-\phi_3{}^a)\log\left(\frac{C_n}{Y_n}\right)_{-1}\cdot\log\left(\frac{Y_a}{Y}\right). \qquad (15)$$

Since (C_n/Y_n) is not measurable, we approximate it by its steady-state value,

$$\exp\left\{\frac{1}{\phi_3{}^n}[-\phi_0{}^n+(1-\phi_1{}^n)\,g]\right\},$$

where g is the rate of growth, in the last two terms of (15), and get

$$\Delta\log\left(\frac{C}{Y}\right)-\log\left(\frac{C}{Y}\right)_{-1}\cdot\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}$$
$$=\phi_0{}^a+(\phi_1{}^a-1)\left[\Delta\log Y-\Delta\log\left(\frac{Y_n}{Y_a}\right)\cdot\Delta\log\left(\frac{Y_a}{Y}\right)\right]$$
$$+\phi_2{}^a\left\{\Delta\left[\Delta\log Y-\Delta\log\left(\frac{Y_n}{Y_a}\right)\cdot\Delta\log\left(\frac{Y_a}{Y}\right)\right]+\Delta\log\left(\frac{Y_n}{Y_a}\right)_{-1}\right.$$
$$\left.\cdot\,\Delta\log\left(\frac{Y_a}{Y}\right)\right\}+\phi_3{}^a\left[1+\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}\right]\log\left(\frac{C}{Y}\right)_{-1}$$
$$+\left\{-\frac{1}{\phi_3{}^n}(\phi_3{}^n-\phi_3{}^a)[-\phi_0{}^n+(1-\phi_1{}^n)g]-(\phi_0{}^n-\phi_0{}^a)\right\}\log\left(\frac{Y^a}{Y}\right)$$
$$-(\phi_1{}^n+\phi_2{}^n-\phi_1{}^a-\phi_2{}^a)\,\Delta\log Y_n\cdot\log\left(\frac{Y_a}{Y}\right)+(\phi_2{}^n-\phi_2{}^a)\,\Delta\log Y_{n_{-1}}$$
$$\cdot\log\left(\frac{Y_a}{Y}\right)-(1+\phi_3{}^a)\frac{1}{\phi_3{}^n}[-\phi_0{}^n+(1-\phi_1{}^n)\,g]\,\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}. \qquad (16)$$

How does APC behave in the long run when sectors differ in their consumption propensities? Let the steady-state value of Y_a/Y, i.e., the proportion of income originating in agriculture, be p. With a rate of growth of g per annum, it is easy to verify from (16) that in steady-state

$$\frac{C}{Y}=\exp\left[\frac{1}{\phi_3{}^a}\left(\phi_0{}^a+(1-\phi_1{}^a)\,g+\{\frac{1}{\phi_3{}^n}(\phi_3{}^n-\phi_3{}^a)[-\phi_0{}^n+(1-\phi_1{}^0)\,g]\right.\right.$$
$$\left.\left.+(\phi_0{}^n-\phi_0{}^a)\}\cdot\log p+(\phi_1{}^n+\phi_2{}^n-\phi_1{}^a-\phi_2{}^a)\cdot g\cdot\log p\right)\right]. \qquad (17)$$

It is interesting to note that though (16) does not collapse to (1) when $\phi_i^a=\phi_i^n=\delta_i$ for $i=0,1,2,3$, it yields the same steady-state behavior of the APC given by (4). Furthermore, it includes all the explanatory variables of (1) plus some more in the determination of $\Delta\log C$. We call (16) the disaggregated version of DHSY specification.

III. EMPIRICAL FINDINGS

A. *Data*

The data utilized for the analysis have been collected from various publications of international organizations. The exact source for each variable is presented in Appendix. The definition and measurement of variables is as follows: Consumption C is private consumption expenditure at current market prices deflated by the consumer price index. For Sri Lanka the consumption figures include food stamps and subsidies given by the government. Aggregate income Y is measured as the gross domestic product (GDP) at current market prices less indirect taxes plus net factor income from abroad deflated by the consumer price index. For Taiwan, however, due to non-availability of data on net factor incomes from abroad, aggregate income has been defined as GDP only. Agricultural income Y_a is defined as the value added in agriculture at factor cost at current prices plus a fraction of net factor income from abroad proportional to GDP at factor cost at current prices originating in agriculture, deflated by the consumer price index. Nonagricultural income is measured as the difference between total and agricultural income. The sample period is 1960–80 for all countries except Indonesia for which it is 1963–80 and Korea for which it is 1960–79. For Korea 1980 was exceptional with sociopolitical unrest and bad agriculture and the parameters were found to be sensitive to the inclusion or exclusion of 1980 in the sample period. We have treated 1980 as an outlier for Korea.

We should note a couple of aspects of how the variables have been measured. Firstly, data on personal disposable income is not readily available and the income variable used in the analysis is an approximation. The approximation, however, may not be unsatisfactory since direct taxation in most of the countries under our analysis is not substantial. Secondly, we have apportioned net factor incomes from abroad between the agricultural and nonagricultural sectors in proportion to the GDP at factor cost at current prices originating in the sectors.

For three countries we have used dummy variables to offset the non-availability of data on particular series for subperiods within the sample. For Indonesia and Pakistan data on net factor incomes from abroad was not available for 1963–65 and 1960–70, respectively. Dummy variables taking the value zero for these initial periods and unity subsequently have been employed for these two countries. Figures on public expenditure on account of food subsidy and food stamps in Sri Lanka were not readily available to us for the years 1960–70. A dummy variable taking the value zero for 1960–70 and unity subsequently was used as a partial remedy to this problem.

B. *Individual Country Estimates*

The estimates of the aggregate DHSY model are given in Table II-A. The estimates of the coefficients of $\Delta \log Y$ and $\Delta\Delta \log Y$ imply that in the short run MPC is roughly equal to APC for Pakistan, whereas for the rest of the countries

TABLE II-A

AGGREGATIVE DHSY ERROR-CORRECTION MODEL
Dependent Variable: $\Delta \log C$

Specification: $\Delta \log C = \alpha_0 + \alpha_1 \Delta \log Y + \alpha_2 \Delta^2 \log Y + \alpha_3 (\log C - \log Y)_{-1}$

(Period: 1962–80)

Country	Intercept	Coefficients				APC in Steady-state with 5 Per Cent Growth Rate	$\bar{R}^2$	Standard Error of Regression	Durbin-Watson Statistic (*h*-statistic)	Sum of Squared Residuals
		$\Delta \log Y$	$\Delta^2 \log Y$	$\log (C/Y)_{-1}$	Dummy Variable					
India	−0.038	0.923	−0.106	−0.183	—	0.80	0.80	0.02	2.92	0.007
	(1.39)	(5.75)	(1.00)	(1.27)					(−2.02)	
Indonesia[a]	−0.031	0.848	−0.251	−0.083	0.107	0.63	0.95	0.03	2.89	0.012
	(1.62)	(4.41)	(3.51)	(1.02)	(1.09)				(−1.78)	
Korea[b]	0.010	0.806	−0.326	0.017	—	0.97	0.65	0.02	1.73	0.005
	(0.59)	(5.33)	(3.00)	(0.29)					(0.57)	
Malaysia	−0.024	0.726	−0.161	−0.114	—	0.72	0.67	0.03	2.03	0.011
	(0.80)	(4.11)	(1.38)	(1.05)					(−0.07)	
Pakistan[c]	−0.152	1.097	−0.002	−0.877	0.018	0.84	0.87	0.02	1.90	0.006
	(3.29)	(6.61)	(0.02)	(3.27)	(1.66)				(0.22)	
Philippines	−0.012	0.022	0.087	−0.258	—	0.79	0.02	0.03	2.97	0.016
	(0.29)	(0.06)	(0.41)	(1.81)					(−2.15)	
Sri Lanka[d]	−0.113	0.860	−0.030	−0.695	−0.048	0.84	0.68	0.03	1.80	0.016
	(2.17)	(2.65)	(0.14)	(3.37)	(2.06)				(0.45)	
Taiwan[e]	0.009	0.492	−0.009	−0.058	—	0.75	0.62	0.02	2.66	0.007
	(0.34)	(4.31)	(0.12)	(0.99)					(−1.45)	

TABLE II-A (Continued)

Country	Intercept	Coefficients				APC in Steady-state with 5 Per Cent Growth Rate	$\bar{R}^2$	Standard Error of Regression	Durbin-Watson Statistic (h-statistic)	Sum of Squared Residuals
		$\Delta \log Y$	$\Delta^2 \log Y$	$\log (C/Y)_{-1}$	Dummy Variable					
Thailand	0.039	0.455	−0.114	0.025	—	0.62	0.53	0.01	1.75	0.002
	(1.96)	(4.36)	(1.57)	(0.37)					(0.55)	

Note: Figures within parentheses below the coefficients are t-values. The h-statistic is presented within parentheses below the Durbin-Watson to take account of the presence of the lagged dependent variable (though in a transformed way) on the right-hand side.

[a] Sample period is 1965–80. A dummy variable taking the value zero for 1965 and unity subsequently has been used to partially remedy the nonavailability of data on net factor incomes from abroad for 1965.

[b] Sample period is 1962–79. 1980 is treated as an outlier.

[c] A dummy variable which equals zero for 1962–70 and is unity otherwise has been used to partially remedy the nonavailability of data on net factor incomes from abroad for 1962–70.

[d] Consumption figures have been adjusted for food subsidy and food stamps for the period 1971–80. A dummy variable which equals zero for 1971–80 and is unity otherwise has been used to partially remedy the nonavailability of data on food stamps and subsidy for 1961–70.

[e] Due to nonavailability of data on net factor income from abroad, income is defined by GDP.

TABLE II-B

AGGREGATIVE DHSY ERROR-CORRECTION MODEL
Dependent Variable: $\Delta \log C$

Specification: $\Delta \log C = \alpha_0 + \alpha_1 \Delta \log Y + \alpha_3 (\log C - \log Y)_{-1}$

(Period: 1961–80)

Country	Intercept	Coefficients				APC in Steady-state with 5 Per Cent Growth Rate	$\bar{R}^2$	Standard Error of Regression	Durbin-Watson Statistic (h-statistic)	Sum of Squared Residuals
		$\Delta \log Y$	$\Delta^2 \log Y$	$\log (C/Y)_{-1}$	Dummy Variable					
India	−0.039	0.802	—	−0.209	—	0.79	0.80	0.022	2.68	0.008
	(1.51)	(8.40)		(1.63)					(−1.53)	
Indonesia[a]	−0.007	0.628	—	−0.083	0.264	0.73	0.96	0.045	2.60	0.026
	(0.30)	(3.67)		(0.82)	(2.55)				(−1.24)	
Korea[b]	0.035	0.445	—	−0.068	—	1.11	0.48	0.024	1.88	0.009
	(2.05)	(4.03)		(1.22)					(0.26)	
Malaysia	−0.031	0.483	—	−0.199	—	0.75	0.62	0.028	1.60	0.013
	(1.05)	(5.07)		(2.19)					(0.90)	
Pakistan[c]	−0.162	1.098	—	−0.938	0.017	0.84	0.87	0.020	1.79	0.006
	(3.83)	(10.01)		(3.72)	(1.63)				(0.48)	
Philippines	−0.006	0.205	—	−0.196	—	0.79	0.03	0.033	3.18	0.018
	(0.16)	(1.13)		(1.50)					(2.68)	
Sri Lanka[d]	−0.114	0.857	—	−0.703	−0.051	0.84	0.74	0.033	1.80	0.017
	(2.66)	(5.03)		(3.59)	(2.92)				(0.46)	
Taiwan[e]	0.003	0.493	—	−0.070	—	0.73	0.67	0.020	2.66	0.007
	(0.15)	(6.35)		(1.45)					(−1.48)	

TABLE II-B (Continued)

Country	Intercept	Coefficients				APC in Steady-state with 5 Per Cent Growth Rate	$\bar{R}^2$	Standard Error of Regression	Durbin-Watson Statistic (h-statistic)	Sum of Squared Residuals
		$\Delta \log Y$	$\Delta^2 \log Y$	$\log (C/Y)_{-1}$	Dummy Variable					
Thailand	0.015	0.457	—	−0.064	—	0.82	0.66	0.012	1.81	0.002
	(0.85)	(6.28)		(1.09)					(0.43)	

Note: Figures within parentheses below the coefficients are t-values. The h-statistic is presented within parentheses below the Durbin-Watson to take account of the presence of the lagged dependent variable (though in a transformed way) on the right-hand side.

[a] Sample period is 1964–80. A dummy variable taking the value zero for 1964 and 1965 and unity subsequently has been used to partially remedy the nonavailability of data on net factor incomes from abroad for 1965.

[b] Sample period is 1961–79. 1980 is treated as an outlier.

[c] A dummy variable which equals zero for 1961–70 and is unity otherwise has been used to partially remedy the nonavailability of data on net factor incomes from abroad for 1961–70.

[d] Consumption figures have been adjusted for food subsidy and food stamps for the period 1971–80. A dummy variable which equals zero for 1971–80 and is unity otherwise has been used to partially remedy the nonavailability of data on food stamps and subsidy for 1961–70.

[e] Due to nonavailability of data in net factor income from abroad income is defined by GDP.

MPC < APC and APC behaves contracyclically in the short run. For the Philippines, the estimates are insignificant and there does not appear to be any contemporaneous relation between consumption and income—income affects consumption only after the lapse of a year. In terms of long-run behavior the countries can be divided into two distinct groups: all countries except Pakistan, the Philippines, and Sri Lanka, on the one hand, for which there is no significant feedback from past C/Y ratio and hence a secularly declining APC over time, and the three countries mentioned above, on the other, with a feedback and thus a constant APC in the long run. The hypothesis $\alpha_1 = 1$, $\alpha_2 = 0$, and $\alpha_3 = -1$, and hence the absolute income hypothesis with long-run constancy of APC built into it, is rejected by the F-test. Similarly, $\alpha_i = 0$ for $i = 1, 2, 3$ and thus Hall's formulation of the permanent income hypothesis does not get support from the Asian countries, except perhaps for the Philippines.

Evidently the value of APC in the DHSY formulation depends on the rate of growth of income. The countries in our sample grew at different rates and were characterised by different values of APC. Would they come together if they were to grow at the same rate? We have used (4) to calculate the steady-state values of the APC when income is growing at 5 per cent per annum and these are reported in column 7 of Table II-A. We find that had the growth rate been uniform at 5 per cent for India, Pakistan, the Philippines, and Sri Lanka, each of them would have had roughly the same APC of 0.8. In comparison to these four countries Indonesia and Thailand would have had a significantly lower APC while Malaysia and Taiwan a marginally lower one. Korea, on the other hand, would have had an unrealistically large APC almost as great as unity.

The absence of a significant "feedback" for as many as six countries is disappointing for the desirability of the specification since it is this feedback alone which endows it the built-in property of ensuring a constant APC in the long run. Even among the three countries with a meaningful error-correction in the behavior of the APC, the Philippines fail to show any sensitivity of consumption to current income—it seems to follow the permanent income hypothesis à la Hall.

The coefficient of $\Delta^2 \log Y$ is insignificant for all countries except Indonesia and Korea. The original DHSY model was formulated with quarterly data and Davidson et al. had introduced $\Delta_1 \Delta_4 \log Y$ in addition to $\Delta_4 \log Y$ to capture the seasonally adjusted trend effect from the raw data. The importance of $\Delta^2 \log Y$ in a model with annual data is hardly as compelling as in a model with quarterly data. The model estimates with $\alpha_2 = 0$, i.e., without $\Delta^2 \log Y$, are reported in Table II-B.[9]

The steady-state APC's with 5 per cent annual growth according to Table II-B lie within a narrow range of 0.73 to 0.84 except for Korea with an unrealistic value of 1.11. Only three countries—Malaysia, Pakistan, and Sri Lanka reveal a significant "feedback" from current APC to the future and hence a coherence with the long-run constancy of the APC. The results for the Philippines continue

[9] The dropping of $\Delta^2 \log Y$ also allows us to enlarge the sample period by one more year from 1962–80 to 1961–80.

to be disconcerning both in terms of explanatory power or goodness of fit and also in terms of the stochastic properties of the error term. The performance of the aggregative DHSY specification appears to be rather unsatisfactory for the Asian countries under study.

Does the disaggregative specification offer a more satisfactory explanation? To test the effects of structural transformation along with growth on consumption behavior we estimated (16). For reasons already mentioned above, we estimated (16) under the assumption: $\phi_2^a = \phi_2^n = 0$. Thus, we estimated

$$\begin{aligned}
&\Delta\log\frac{C}{Y}-\log\left(\frac{C}{Y}\right)_{-1}\cdot\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y} \\
&\quad=\phi_0^a+(\phi_1^a-1)\left[\Delta\log Y-\Delta\log\left(\frac{Y_n}{Y_a}\right)\cdot\Delta\log\left(\frac{Y_a}{Y}\right)\right] \\
&\quad+\phi_3^a\left[1+\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}\right]\cdot\log\left(\frac{C}{Y}\right)_{-1} \\
&\quad+\left\{-\frac{1}{\phi_3^n}(\phi_3^n-\phi_3^a)[-\phi_0^n+(1-\phi_1^n)g]-(\phi_0^n-\phi_0^a)\right\}\log\left(\frac{Y_a}{Y}\right) \\
&\quad-(\phi_1^n-\phi_1^a)\cdot\Delta\log Y_n\cdot\log\left(\frac{Y_a}{Y}\right) \\
&\quad-(1+\phi_3^a)\cdot\frac{1}{\phi_3^a}[-\phi_0^n+(1-\phi_1^n)g]\cdot\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}. \quad (18)
\end{aligned}$$

The individual country results showed that the coefficient of $\Delta\log Y_n\cdot\log(Y_a/Y)$ is insignificant and we estimated (18) under the hypothesis $\phi_1^n = \phi_1^a$. The results are reported in Table III.

The results reported in Table III are distinctly superior to those of the aggregative model because of the following reasons. Firstly, though the estimates of ϕ_1 and $\phi_1^a = \phi_1^n$ in Tables II-B and III, respectively, are roughly the same, there is a significant "feedback" from past consumption propensity to the present in every country according to the disaggregated model whereas in the aggregated model there is none in six out of nine. Secondly, the autocorrelation properties of the error term in the aggregative model are inferior to those of the disaggregative model.[10] Thirdly, the steady-state APC values computed for 5 per cent growth rate in the aggregative model is independent of the structural composition of the economy and diverge significantly. In the disaggregated model we can control for the sectoral composition factor and when we assume that uniformly across all the nine countries only 30 per cent of income originates in agriculture, the steady-state APC values turn out to be much less heterogeneous than what Table II-B would have led us to believe.

All the parameters of the model are not identified (e.g., ϕ_3^n and ϕ_0^n). However, it is possible to find out the impact of a change in the sectoral composition of income on the APC by numerically simulating the model. How sensitive is APC

[10] It is important to note that $\bar{R}^2$'s of Tables II-B and III are not directly comparable, as the dependent variables of the two models are different.

TABLE III

DISAGGREGATIVE DHSY ERROR-CORRECTION MODEL

Dependent variable[a]: $\Delta \log\left(\frac{C}{Y}\right) - \log\left(\frac{C}{Y}\right)_{-1} \Delta \log\left(\frac{Y_a}{Y_n}\right) \frac{Y_{n-1}}{Y}$

(Period: 1961–80)

Country	$\phi_0{}^a$ Intercept	Coefficient of $\phi_1{}^a - 1$	$\phi_3{}^a$	ξ_4	ξ_5	Dummy Variables	Steady State APC with 5% Growth and 30% Income Originating in Agriculture	$\bar{R}^2$	Standard Error of Regression	Durbin-Watson Statistic (*h*-statistic)	Sum of Squared Residuals
India	0.019	−0.223	−0.498	0.139	0.163	—	0.72	0.46	0.020	2.21	0.006
	(0.41)	(1.90)	(2.19)	(1.37)	(0.94)					(−0.48)	
Indonesia[b]	0.233	−0.440	−0.984	0.474	−0.544	0.183	0.69	0.68	0.030	1.80	0.010
	(3.25)	(3.14)	(3.38)	(3.41)	(2.62)	(1.66)				(0.43)	
Korea[c]	0.147	−0.567	−0.301	0.134	0.081	—	0.87	0.64	0.022	1.76	0.007
	(2.84)	(4.57)	(1.75)	(1.76)	(0.74)					(0.54)	
Malaysia	0.071	−0.503	−0.185	0.085	0.250	—	0.74	0.60	0.029	1.60	0.013
	(0.73)	(5.19)	(1.82)	(0.93)	(2.16)					(0.99)	
Pakistan[d]	−0.279	0.082	−1.026	−0.098	−0.037	0.029	0.86	0.41	0.020	2.00	0.006
	(1.95)	(0.74)	(3.73)	(0.84)	(0.30)	(1.60)				(0.00)	
Philippines	−0.327	−0.495	−0.295	−0.234	0.684	—	0.79	0.85	0.024	2.67	0.009
	(2.18)	(3.04)	(2.68)	(2.16)	(5.59)					(−2.02)	
Sri Lanka[e]	0.067	−0.033	−0.661	0.159	−0.074	−0.085	0.82	0.55	0.031	1.65	0.014
	(0.59)	(0.19)	(2.77)	(2.05)	(0.50)	(3.47)				(0.91)	

TABLE III (Continued)

Country	$\phi_0{}^a$ Intercept	Coefficient of $\phi_1{}^a-1$	$\phi_3{}^a$	ξ_4	ξ_5	Dummy Variables	Steady State APC with 5% Growth and 30% Income Originating in Agriculture	$\bar{R}^2$	Standard Error of Regression	Durbin-Watson Statistic (h-statistic)	Sum of Squared Residuals
Taiwan[f]	0.048	−0.467	−0.294	0.078	0.250	—	0.79	0.87	0.018	2.68	0.005
	(2.10)	(6.45)	(1.99)	(1.92)	(1.94)					(−1.53)	
Thailand	0.043	−0.343	−0.169	0.070	−0.014	—	0.71	0.73	0.009	1.87	0.001
	(2.38)	(6.12)	(2.43)	(2.63)	(0.28)					(0.29)	

Note: Figures within parentheses below the coefficients are t-values. The h-statistic is presented within parentheses below the Durbin-Watson to take account of the presence of the lagged dependent variable (though in a transformed way) on the right-hand side.

[a] Specification:
$$\Delta\log\left(\frac{C}{Y}\right)-\log\left(\frac{C}{Y}\right)_{-1}\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n-1}}{Y}=\phi_0{}^a+(\phi_1{}^a-1)\left[\Delta\log Y-\Delta\log\left(\frac{Y_n}{Y_a}\right)\cdot\Delta\log\left(\frac{Y_a}{Y}\right)\right]$$
$$+\phi_3{}^a\left[1+\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n-1}}{Y}\right]\log\left(\frac{C}{Y}\right)_{-1}+\xi_4\cdot\log\left(\frac{Y_a}{Y}\right)+\xi_5\,\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n-1}}{Y}.$$

[b] Sample period is 1964–80. A dummy variable taking the value zero and unity subsequently has been used to partially remedy the nonavailability of data on net factor incomes from abroad prior to 1965.

[c] Sample period is 1961–79. 1980 is treated as an outlier.

[d] A dummy variable which equals zero for 1961–70 and is unity)therwise has been used to partially remedy the nonavailability of data on net factor incomes from abroad for 1961–70.

[e] Consumption figures have been adjusted for food subsidy and ood stamps for the period 1971–80. A dummy variable which equals zero for 1971–80 and is unity otherwise has been used to partially remedy the nonavailability of data on food stamps and subsidy for 1961–70.

[f] Due to nonavailability of data on net factor income from abroad income is defined by GDP.

TABLE IV

TESTING FOR APPROPRIATE DHSY SPECIFICATION: THE UNRESTRICTED MODEL
Dependent Variable: $\Delta\log C$

Specification: $$\Delta\log C=\phi_0+\phi_1\,\Delta\log Y+\phi_2\,\Delta\log\left(\frac{Y_n}{Y_a}\right)\cdot\Delta\log\left(\frac{Y_a}{Y}\right)+\phi_3\log\left(\frac{C}{Y}\right)_{-1}+\phi_4\,\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n-1}}{Y}\cdot\log\left(\frac{C}{Y}\right)_{-1}+\phi_5\log\left(\frac{Y_a}{Y}\right)+\phi_6\,\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n-1}}{Y}$$

(Period: 1961–80)

Country	Intercept	ϕ_1	ϕ_2	ϕ_3	ϕ_4	ϕ_5	ϕ_6	Dummy Variable	$\bar{R}^2$	Standard Error of Regression	Durbin-Watson Statistic (h-statistic)	Sum of Squared Residuals
India	0.044	0.764	2.123	−0.572	−0.511	0.178	−0.126	—	0.84	0.019	2.22	0.005
	(0.89)	(0.64)	(1.78)	(2.54)	(0.17)	(1.74)	(0.21)				(−0.50)	
Indonesia[a]	0.247	0.547	0.907	−0.980	0.809	0.491	−0.536	0.195	0.98	0.033	1.75	0.010
	(2.62)	(3.24)	(0.71)	(2.87)	(0.49)	(2.84)	(0.91)	(1.31)			(0.56)	
Korea[b]	0.139	0.475	0.448	−0.336	−0.421	0.136	−0.045	—	0.48	0.024	1.71	0.007
	(1.95)	(3.26)	(0.63)	(1.74)	(0.26)	(1.47)	(0.20)				(0.66)	
Malaysia	0.100	0.507	0.876	−0.165	1.201	0.103	0.412	—	0.54	0.031	1.58	0.012
	(0.65)	(4.71)	(0.80)	(0.95)	(0.26)	(0.89)	(0.30)				(1.29)	
Pakistan[c]	−0.245	1.061	−1.104	−1.065	1.671	−0.057	0.222	0.024	0.85	0.022	1.95	0.006
	(1.54)	(7.83)	(0.64)	(3.50)	(0.23)	(0.41)	(0.20)	(1.23)			(0.16)	
Philippines	−0.345	0.500	0.815	−0.293	0.714	−0.252	0.694	—	0.42	0.025	2.68	0.008
	(1.85)	(2.84)	(0.48)	(2.33)	(0.29)	(1.74)	(1.23)				(−2.75)	
Sri Lanka[d]	−0.017	0.782	−1.225	−0.712	2.082	0.088	0.704	−0.065	0.75	0.032	1.97	0.012
	(0.12)	(3.42)	(0.74)	(2.78)	(0.35)	(0.89)	(0.49)	(2.17)			(0.09)	

TABLE IV (Continued)

Country	Intercept	ϕ_1	ϕ_2	ϕ_3	ϕ_4	ϕ_5	ϕ_6	Dummy Variable	$\bar{R}^2$	Standard Error of Regression	Durbin-Watson Statistic (h-statistic)	Sum of Squared Residuals
Taiwan[e]	0.067	0.510	0.065	−0.300	1.336	0.089	0.546	—	0.71	0.019	2.69	0.005
	(1.64)	(0.20)	(0.08)	(1.93)	(1.16)	(1.91)	(1.15)				(−1.57)	
Thailand	0.036	0.603	−0.089	−0.108	1.051	0.045	0.937	—	0.81	0.009	2.05	0.001
	(1.72)	(8.02)	(0.28)	(1.16)	(0.82)	(1.43)	(0.29)				(−0.11)	

Note: Figures within parentheses below the coefficients are t-values. The h-statistic is presented within parentheses below the Durbin-Watson to take account of the presence of the lagged dependent variable (though in a transformed way) on the right-hand side.

[a] Sample period is 1964–80. A dummy variable taking the value zero and unity subsequently has been used to partially remedy the nonavailability of data on net factor incomes from abroad prior to 1965.

[b] Sample period is 1961–70. 1980 is treated as an outlier.

[c] A dummy variable which equals zero for 1961–70 and is unity otherwise has ben used to partially remedy the nonavailability of data on net factor incomes from abroad for 1961–70.

[d] Consumption figures have been adjusted for food subsidy and food stamps for the period 1971–80. A dummy variable which equals zero for 1971–80 and is unity otherwise has been used to partially remedy the nonavailability of data on food stamps and subsidy for 1961–70.

[e] Due to nonavailability of data on net factor income from abroad, income is defined by GDP.

to sectoral income composition in agricultural developing countries? Since our model has a dynamic structure we simulated it dynamically for the decade of the seventies under the alternative assumptions of (i) sectoral composition at its historical level and (ii) agricultural sector's share in total income lower by 5 percentage points. A comparison of the two simulation results reveal that APC would have been lower by 0.01 on the average for India, Korea, and Sri Lanka and by as much as 0.06 for Indonesia.

Is growth and dynamic adjustment pattern adequate to explain the behavior of consumption propensities in Asian countries or is it necessary to take structural transformation into account? This question can be answered by comparing the two alternative specifications (1) and (18).[11] We note that though (1) and (18) are not nested within each other they are "nested" in

$$\begin{aligned}\Delta\log C = {} & \psi_0 + \psi_1\,\Delta\log Y + \psi_2\,\Delta\log\left(\frac{Y_n}{Y_a}\right)\cdot\Delta\log\left(\frac{Y_a}{Y}\right) \\ & + \psi_3\cdot\log\left(\frac{C}{Y}\right)_{-1} + \psi_4\,\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}\cdot\log\left(\frac{C}{Y}\right)_{-1} \\ & + \psi_5\log\left(\frac{Y_a}{Y}\right) + \psi_6\,\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}. \qquad (19)\end{aligned}$$

Note that (1) with $\alpha_2 = 0$ follows as a special case of (19) when $\psi_2 = \psi_4 = \psi_5 = \psi_6 = 0$. And (18) with $\phi_1{}^n = \phi_1{}^a$ follows as a special case of (19) when $\psi_1 + \psi_2 = 1$ and $\psi_3 = \psi_4$. We tested these two hypotheses in the context of (19). The estimated results for (19) are presented in Table IV. The F-statistics reported in Table V are calculated by comparing the residual sums of squares of the unrestricted model and the models obtained by the alternative sets of parametric restrictions, i.e., (1) and (18) with $\alpha_2 = 0$ and $\phi_1{}^n = \phi_1{}^a$. We find that the disaggregative model is not rejected for any of the nine countries, whereas the aggregative model is rejected for three countries, namely Indonesia, the Philippines, and Thailand. Thus, there is some evidence that the disaggregative model—incorporating the effects of growth as well as structural transformation on consumption—is superior to the aggregative model.

C. *Pooled Estimates*

Given the small number of observations on any single economy, we have pooled the data and examined the rôle of growth and structural transformation in the context of the nine Asian countries as a whole during the decade of the sixties and the seventies. We have 176 data points in our pooled set—17 (1964–80) from Indonesia, 19 (1961–79) from Korea, and 20 (1961–80) from each of the seven other countries. We used eight country dummies for accommodating the inter-country differences and three dummies, *DATIA*, *DATPA*, and *DATSRI* for Indonesia, Pakistan, and Sri Lanka respectively to take into account the data problems already discussed above. The results indicated that in the pooled context

[11] We compare (1) with $\alpha_2=0$ and (18) with $\phi_1{}^n=\phi_1{}^a$.

TABLE V

F-Test for Appropriate Specification

Country	Residual Sum of Squares			Unrestricted Model		*F*-Test Statistic		Degrees of Freedom of Denominator[a]
	Unrestricted	Aggregative	Disaggregative	Number of Observations	Number of Explanatory Variables in Unrestricted Model	Aggregative	Disaggregative	
India	0.0048020	0.0081440	0.0058790	20	6	2.262	1.458	13
Indonesia	0.0096170	0.0265070	0.0099490	17	7	3.952	0.155	9
Korea	0.0067520	0.0090040	0.0070260	19	6	1.001	0.243	12
Malaysia	0.0125140	0.0135820	0.0126400	20	6	0.277	0.065	13
Pakistan	0.0056940	0.0064840	0.0059100	20	7	0.416	0.228	12
Philippines	0.0083650	0.0181550	0.0083990	20	6	3.804	0.026	13
Sri Lanka	0.0123230	0.0171740	0.0139490	20	7	1.181	0.792	12
Taiwan	0.0047560	0.0071780	0.0049710	20	6	1.655	0.294	13
Thailand	0.0010530	0.0024940	0.0012110	20	6	4.448	0.975	13

[a] The degrees of freedom for the numerator are 4 and 2 for the aggregative and disaggregative models respectively.

the inter-country differences among India, Indonesia, Malaysia, Taiwan, and Thailand are not very significant and hence we dropped the dummies for these economies.[12] We designate the country dummies for Korea, Pakistan, the Philippines, and Sri Lanka as *DUMKO, DUMPA, DUMPH,* and *DUMSRI,* respectively.

The results from estimation are reported below. For the aggregative version, i.e., (1), we obtained

$$\begin{aligned}\Delta\log C = & -\underset{(1.46)}{0.012} + \underset{(13.59)}{0.586}\,\Delta\log Y - \underset{(4.34)}{0.111}\left(\frac{C}{Y}\right)_{-1} + \underset{(8.70)}{0.282}\,DATIA \\ & -\underset{(0.39)}{0.005}\,DATPA - \underset{(3.11)}{0.043}\,DATSRI + \underset{(2.73)}{0.023}\,DUMKO \\ & +\underset{(1.44)}{0.015}\,DUMPA + \underset{(0.40)}{0.003}\,DUMPH + \underset{(3.58)}{0.037}\,DUMSRI, \qquad (20)\end{aligned}$$

Number of observation $=176$,
$\bar{R}^2=0.86$, $S.E.E.=0.030$, $R.S.S.=0.154$.

The steady-state value of APC at 5 per cent growth is found to be 0.74.

We estimated the disaggregative *DHSY* specification (18) without the assumption of $\phi_1^a = \phi_1^n$. The result is reported below:

$$\begin{aligned}&\Delta\log\left(\frac{C}{Y}\right) - \log\left(\frac{C}{Y}\right)_{-1} \Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y} \\ &= -\underset{(0.11)}{0.001} - \underset{(0.36)}{0.042}\left[\Delta\log Y - \Delta\log\left(\frac{Y_n}{Y_a}\right)\cdot\Delta\log\left(\frac{Y_a}{Y}\right)\right] \\ &\quad -\underset{(5.90)}{0.260}\left[1+\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}\right]\cdot\log\left(\frac{C}{Y}\right)_{-1} + \underset{(3.31)}{0.048}\log\left(\frac{Y_a}{Y}\right) \\ &\quad +\underset{(2.99)}{0.297}\cdot\Delta\log Y_n\cdot\log\left(\frac{Y_a}{Y}\right) - \underset{(0.08)}{0.006}\cdot\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y} \\ &\quad +\underset{(3.36)}{0.152}\,DATIA - \underset{(0.52)}{0.007}\,DATPA - \underset{(4.54)}{0.063}\,DATSRI \\ &\quad +\underset{(4.20)}{0.035}\,DUMKO + \underset{(2.53)}{0.026}\,DUMPA + \underset{(1.90)}{0.015}\,DUMPH \\ &\quad +\underset{(5.10)}{0.053}\,DUMSRI, \qquad (21)\end{aligned}$$

Number of observations $=176$,
$\bar{R}^2=0.55$, $S.E.E.=0.023$, $R.S.S.=0.136$.

With the pooled data the hypothesis $\phi_1^a = \phi_1^n$ stands rejected and the nonagricultural sector seems to have a short-run income elasticity of consumption a third less than the agricultural sector's. This is in contrast to the results obtained in

[12] The F-test was carried out with the pooled data for each of the three versions: aggregative *DHSY,* i.e., (1), disaggregated *DHSY,* i.e., (18), and the unrestricted version (19), for the insignificance of the dummies for India, Indonesia, Malaysia, Taiwan, and Thailand. The hypothesis was not rejected by the pooled data.

the context of individual countries, which could well be due to the small number of observations.

The unrestricted model for comparing (20) and (21) is (19) augmented by $\Delta\log Y_n \cdot \log(Y_a/Y)$. The estimated equation was found to be:

$$\begin{aligned}\Delta\log C = & \underset{(0.29)}{-0.004} + \underset{(5.96)}{0.851}\ \Delta\log Y - \underset{(0.60)}{0.109}\ \Delta\log\left(\frac{Y_n}{Y_a}\right)\cdot\Delta\log\left(\frac{Y_a}{Y}\right) \\ & \underset{(6.08)}{-0.266}\log\left(\frac{C}{Y}\right)_{-1} + \underset{(0.38)}{0.144}\ \Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{n_{-1}}}{Y}\cdot\log\left(\frac{C}{Y}\right)_{-1} \\ & +0.046\log\left(\frac{Y_a}{Y}\right) + \underset{(1.77)}{0.209}\ \Delta\log Y_n\cdot\log\left(\frac{Y_a}{Y}\right) \\ & \underset{(0.48)}{-0.062}\Delta\log\left(\frac{Y_a}{Y_n}\right)\cdot\frac{Y_{a_{-1}}}{Y} + \underset{(3.58)}{0.187}\ DATIA - \underset{(0.51)}{0.006}\ DATPA \\ & \underset{(4.18)}{-0.058}\ DATSRI + \underset{(4.10)}{0.034}\ DUMKO + \underset{(2.52)}{0.026}\ DUMPA \\ & \underset{(1.66)}{+0.013}\ DUMPH + \underset{(4.66)}{0.049}\ DUMSRI, \end{aligned} \qquad (22)$$

Number of observations $=176$,
$\bar{R}^2=0.88$, $S.E.E.=0.029$, $R.S.S.=0.132$.

The F-test was carried out to test for the appropriateness of the aggregative and disaggregative specifications and the values of the test statistics were found to be 5.4 and 2.4, respectively. Thus, we reject the hypothesis of sectoral uniformity and conclude that structural transformation *along* with growth are useful for explaining the saving experience in Asia.

Is there any evidence that (i) consumption behavior is changing over time in general and (ii) sectoral differences in behavior are getting narrowed down over time? To obtain an answer to the first question we carried out a Chow-test of "structural" stability on the disaggregative DHSY specification for the pooled data for the two sub-periods 1961–69 and 1970–80.[13] The sub-sample estimates corresponding to (21) above are reported in Table VI.

The F-statistic for the Chow-test is found to be 1.9 which is insignificant at 1 per cent level of significance but significant at 5 per cent level of significance. There seems to be a slow change in consumption behavior over time but it is perhaps not very pronounced.

Similarly, there does not appear to be any evidence that the sectoral differences in consumption behavior had got narrowed down in the seventies compared to the sixties. For the pooled data for the seventies the aggregative specification was rejected by the F-test whereas the disaggregative specification was not. Ultimately, it is to be expected that, the development process would "integrate" the sectors in an economy by providing better infrastructural—physical as well as financial—

[13] As already mentioned above the data for Indonesia and Korea for the two sub-samples are 1963–69 and 1970–79, respectively.

TABLE

TESTING FOR STABILITY: SUB-SAMPLE

Sub-sample	ϕ_0^a	ϕ_1^a-1	ϕ_3^a	Coefficient of log (Y_a/Y)	$(\phi_1^a-\phi_1^n)$	Coefficient of $\Delta\log(Y_a/Y_n)\ \frac{Y_{n-1}}{Y}$	*DATIA*	*DATPA*
1961–69[a]	0.026	−0.048	−0.502	0.125	0.245	−0.122	0.110	—
	(1.24)	(0.18)	(4.78)	(3.51)	(0.93)	(0.67)	(1.38)	
1970–80[b]	−0.030	0.003	−0.345	0.053	0.310	−0.027	—	−0.025
	(2.20)	(0.02)	(6.02)	(3.27)	(2.89)	(0.35)		(0.91)
1961–80	−0.001	−0.042	−0.260	0.048	0.297	−0.006	0.152	−0.007
	(0.11)	(0.36)	(5.90)	(3.31)	(2.99)	(0.08)	(3.36)	(0.52)

Note: Figures within parentheses are t-values.
[a] For Indonesia the data used for pooling was for the period 1964–69. The dummies
[b] For Korea the data used for pooling was for the period 1970–79. The dummy *DATIA*

facilities in the rural areas, homogenized tastes and values by education, commercialization of all economic activities and unifying the capital market. However this does not seem to have been achieved by the decade of the seventies in Asia.

IV. SUMMARY AND CONCLUSIONS

Growth along with structural transformation offer a plausible explanation of the behavior of the average propensity to consume in Asia. Consumption propensities in the agricultural developing economies of Asia have been falling partly in response to the accelerating growth in these countries and partly in response to the structural shifts they have been experiencing due to industrialization. Table VII presents the average propensity to consume that would obtain in Asia for various combinations of steady-state rates of growth and sectoral composition of income. The bands 26 per cent to 35 per cent for percentage of income arising in agriculture and 1 per cent to 10 per cent for rate of growth were chosen to reflect the current historical reality in the countries of Asia. From the table it is clear that the propensity to consume is as sensitive to structural transformation as it is to growth.

There does not appear to be any evidence in favor of the absolute income hypothesis or the permanent income hypothesis à la Hall. The disaggregative Davidson-Hendry-Srba-Yeo specification performs reasonably well in explaining the consumption behavior in Asia.

The sensitivity of the average propensity to consume to sectoral composition of income arises from the enormous differences in the physical and financial infrastructural facilities, demographic factors, basic nature of economic activity, and market features in rural and urban areas. Over time these differences are expected to become less and less sharp. However, till the decade of the seventies there does not appear to be any evidence that they have become small enough to justify a neglect of the structural composition of the economy in seeking an explanation of the consumption behavior in agricultural developing economies of Asia.

VI

ESTIMATES WITH POOLED DATA

Coefficient of Dummy Variable					$\bar{R}^2$	Standard Error of Regression	Sum of Squared Residuals	Number of Observations
DASRI	*DUMKO*	*DUMPA*	*DUMPH*	*DUMSRI*				
—	0.051	0.027	0.048	−0.024	0.45	0.030	0.062	78
	(3.32)	(2.12)	(3.05)	(1.98)				
−0.110	0.039	0.045	0.013	0.048	0.69	0.025	0.053	98
(4.15)	(4.11)	(4.05)	(1.48)	(6.39)				
−0.063	0.035	0.026	0.015	0.053	0.55	0.029	0.136	176
(4.54)	(4.20)	(2.53)	(1.90)	(5.10)				

DATPA and *DATSRI* are irrelevant since they take the value zero throughout the sample. is irrelevant since it takes the value unity throughout the sample.

TABLE VII

GROWTH, STRUCTURAL TRANSFORMATION, AND APC FOR ASIA

Percentage of Income Originating in Agriculture	Annual Rate of Growth of Income									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
26%	0.76	0.75	0.74	0.73	0.71	0.70	0.69	0.68	0.67	0.66
27%	0.77	0.75	0.74	0.73	0.72	0.71	0.70	0.68	0.67	0.66
28%	0.77	0.76	0.75	0.74	0.73	0.71	0.70	0.69	0.68	0.67
29%	0.78	0.77	0.76	0.74	0.73	0.72	0.71	0.70	0.69	0.68
30%	0.79	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.69	0.68
31%	0.79	0.78	0.77	0.76	0.74	0.73	0.72	0.71	0.70	0.69
32%	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70
33%	0.80	0.79	0.78	0.77	0.75	0.74	0.73	0.72	0.71	0.70
34%	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71
35%	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72

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APPENDIX

SOURCES OF DATA

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Series	*Source*
Consumer price index	(3)
For Taiwan	(1)
Food stamps and subsidies in Sri Lanka	(2)
GDP at current market prices	(5)
Net factor income from abroad	(3)
Net indirect taxes in current prices	(5)
Private consumption expenditure in current market prices	(5)
Value added in agriculture at factor cost in current prices	(5)