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11 Saving Behavior in Ten Developing Countries

Susan M. Collins

11.1 Introduction

The 1987 *World Development Report* (World Bank 1987) noted that gross domestic savings, as a share of income, ranged from 31% to 33% in Korea, Malaysia, and Indonesia, while Singapore saved 42% of GDP.[1] In contrast, the highest saving rate for a Latin American developing country was 26% for Mexico. Argentina, Brazil, Colombia, and Venezuela saved 16%, 22%, 17%, and 24% respectively. For comparison, saving rates were 16% in the United States and 32% in Japan. Why do the developing countries in Asia save so much? Were Korea, Malaysia, and Indonesia outliers? Have they always had high saving rates? Did the savings come primarily from the government, corporate, or household sector?

This paper examines saving behavior in nine Asian developing countries plus Turkey since the early 1960s. The paper has two primary objectives. The first is to present a variety of facts about saving and other key variables. The times-series data used were collected for each country. Unfortunately, data problems are notorious both in measuring savings and in many developing countries. It is especially difficult to make cross-country comparisons. While the empirical findings should be interpreted with caution, they do indicate trends and differences in saving across countries and within countries over time. The findings that seem most likely to be robust to improved savings indicators concern shifts in saving behavior within particular countries over time. In fact, many of these countries have experienced striking shifts.

Section 11.2 of the paper provides a first look at the data. It highlights the

roles of economic growth rates, the standard of living, and the age distribution of the population as determinants of saving. In particular, it points to a central role for dependency ratios—the percentage of the population aged 14 or younger. In fact, the high savers tended to have high growth rates and to have experienced a dramatic decline in fertility rates, reducing their dependency ratios.

The second objective of the paper is to empirically examine the determinants of saving across these 10 countries and over time. The empirical work builds on the extensive literature on saving behavior in developing countries. A number of authors have examined the impact of demographic factors on saving in developing countries. See Hammer (1985) for a survey. Early cross-section studies (see Leff 1980 for a review and update) concluded that dependency ratios were an important determinant of differences in saving behavior. Later work (e.g., Ram 1982) took issue with these results. Empirically, saving seemed to be negatively correlated with dependency rates among developed countries, but positively correlated among developing countries.

In a series of recent papers, Mason (e.g., 1988; and Mason et al. 1986) argued that these equations are misspecified because the effect of dependency rates (and other variables) on savings depends on the economic growth rate. Declining dependency ratios should tend to lower savings in slow-growing economies but to raise savings in rapidly growing economies. His empirical estimates did show saving rates negatively related to dependency rates for four Asian countries. But these results were based on annual observations. As discussed further in sections 11.2 and 11.5 of this paper, year-to-year fluctuations in saving rates seem to be closely tied to agricultural inventories and to exhibit considerable measurement error. Therefore, it is preferable to consider time averages.

The third section of this paper sets out a version of the life-cycle model of saving behavior to illustrate the effects of growth, dependency rates, and other variables on aggregate savings. The model follows Mason (1987, 1988) in emphasizing that socioeconomic factors and the economic growth rate might influence saving interactively.

The saving equation is used in section 11.4 to econometrically examine saving in the 10 countries. Five-year time averages are used. The empirical estimates suggest that growth rates, demographic factors, and the standard of living account for a substantial portion of saving behavior across countries and over time. They also point to the importance of the interaction effects between growth and other socioeconomic characteristics, and imply that there are structural differences between low-income and middle-income countries in the determinants of savings.

Section 11.5 of the paper turns to one country, Korea, to examine some of the issues raised in more detail. In particular, the aggregate date suggests that most of the changes in aggregate savings are attributable to the household sector. However, it is difficult to interpret disaggregated national savings data.

This section presents some additional data from surveys of urban and rural households' income and expenditure in Korea.

The final section provides a summary and concluding remarks. I hope that the findings presented in this paper will be provocative and will raise a variety of interesting areas for future research.

11.2   Saving Behavior in 10 Countries

This section takes a first look at the experiences of the 10 countries. The focus is on five sets of variables for each country. The key variable is savings as a share of income. How to best measure savings raises a number of important but difficult problems even in developed economies.[2] Instead of piecing together the details for one or two countries, the objective of this paper was to draw inferences for a group of countries over time. Thus, the regressions in section 11.4 and much of the discussion in this section focus on gross national savings as a share of GNP. This variable can be interpreted as a share of total national resources available to finance investment. The data sources for each country are listed in the appendix. There are clearly shortcomings with this indicator; however, none of the alternatives available for these countries, given the data limitations, was clearly superior. A number of issues deserve mention.

First, net savings may be more appropriate than gross savings when the concern is growth rates and development, since net savings indicates domestic resources available for additions to the capital stock. However, net savings data were available for only four of the 10 countries—Korea, the Philippines, Taiwan, and Thailand. Even in these four, the capital consumption allowance seems unreliable. The definitions change frequently. Even in Korea, a country with relatively good data, different sources report different aggregate depreciation series. See Mason (1987) for further discussion of gross versus net savings measure for developing countries.

A second issue is whether to focus on aggregate savings or to disaggregate by sector. Although life-cycle theories of saving apply most directly to households, there remains an active controversy over the extent to which household saving should be treated as independent from corporate and government saving. The same issue is relevant for developing countries, with the added twist that the line between households and firms is more difficult to draw. When disaggregated data exist, the "household sector" is simply the residual once government and corporate savings are subtracted from total national savings. Accurate information on the size of the "informal" business sector is not available. Even though the precise interpretation is unclear, it is interesting to look at the trends in different components of savings where data do exist. Strong trends within countries over time are likely to be robust and do warrant some interpretation. However, differences in the composition of savings across countries may primarily reflect differences in definitions and errors in mea-

surement. Additional data on household and firm behavior is potentially quite informative. Section 11.5 of this paper takes some steps in that direction, discussing data from surveys of Korean households.

Finally, these data do not adequately treat asset valuations (in particular, land or housing) or consumption of durables. It is difficult to tell how these omissions might bias the existing series. An interesting area for future work is to incorporate these corrections for those countries where adequate data are available.

In addition to savings, the discussion below considers four sets of variables: real economic growth rates, the age distribution of the population, per capita income, and inequality. The discussion of age distribution focuses on the share of the population below the age of fifteen ($D15$). In fact, the results change little if the "dependency ratio" is defined more broadly to include the share of the population over the age of 65 ($D15 + D65$). In this sample, most of the differences across countries and over time come from the relative importance of children. The per capita income measures come from Heston and Summers's (1988) pioneering work to obtain internationally comparable series on real income and prices. These data are measured in 1980 international prices.

Finally, an indicator of income distribution is used for seven of the countries. This indicator, from the *1987 World Development Report* gives the share of income going to the poorest 20% of the population relative to the share going to the richest 10% as a measure of income inequality. Measures of income distribution are well known to be unreliable. Nonetheless, many of the discussions about rates of saving focus on the distribution of income, and no ideal measures are available.

The remainder of this section discusses behavior of savings and other key variables for the 10 countries. I begin by comparing the "long-run" experiences across countries, and then I move to a discussion of time trends in individual countries.

11.2.1 Cross-Country Experiences

Table 11.1 shows key variables for each country. Saving rates are averaged across 1960–84 (1960–81 in a few cases). The countries are ordered from Singapore, the country with the highest average saving rate, at the top, to Indonesia, with the lowest rate, at the bottom. The table includes four additional indicators: real economic growth rates, per capita income, the dependency ratio (share of the population age 14 or younger), and the measure of inequality.

The table shows a wide variation in performance across countries. For example, savings rates range from 12% to 24%, while growth rates range from 4% to 10%. Taiwan and Korea have relatively equitable distributions of income, while in Turkey and Malaysia the poorest 20% of the population receive less than 9% of the income that goes to the richest 10%. However, it is

Table 11.1   **Key Indicators: 1960–84**

	Gross Savings (% GNP)[a]	Real Growth[a]	Dependency Ratio (<15)		Real Per Capita Income[b]	Income Distribution
			1960[b]	1980[b]		
Singapore	24.3	8.5	43.2	29.3	3,481	. . .
Taiwan	23.0	8.8	38.9	33.4	1,778	. . .
Malaysia	22.5	7.0	51.2	55.6	1,959	8.8
Korea	22.0	9.3	42.9	34.4	1,429	20.7
Philippines	21.3	4.2	44.6	44.1	1,167	13.5
Thailand	21.2	6.9	44.7	41.9	1,158	16.9
Hong Kong	19.1	10.2	40.9	28.1	3,643	17.3
Turkey	16.6	5.2	42.0	39.0	1,874	8.6
Burma	12.0	3.9	38.2	41.2	397	. . .
Indonesia	11.9	5.9	40.7	40.1	505	19.4

Note: See data appendix and text for sources and description.
[a]Period averages.
[b]End of period.

Table 11.2   **Rapid versus Slow Growth Countries**

	Real Growth	Gross Savings (% GNP)	Real Per Capita Income	Dependency	
				1960	1980
Rapid	9.2	22.1	2583	41.5	31.3
Slow	4.8	15.4	986	41.4	41.1

Source: See data appendix and text.
Note: The rapid growth countries are Hong Kong, Korea, Taiwan, and Singapore. The slow growers are Malaysia, Thailand, Burma, and the Philippines.

important to make two points at the outset. First, by world standards, these countries have grown rapidly. The group that we will identify as the slow growers had average annual growth rates of 4%-6%.

Second, most enjoy equitable income distributions. This is especially true in Korea and Taiwan which, like Japan, underwent fundamental land reforms in the 1940s and 1950s. The income share of the poorest 20% of the population is 9.5% in Taiwan, and averages 5.1% in the other seven countries. In comparison, the poorest 20% receive just 3.1% of income in a sample of eight Latin American countries.[3] In only one country, El Salvador, do they receive at least the minimum share (3.5%) that they receive in the Asian countries.

Tables 11.2–11.4 further explore the relationships between these variables and savings rates. Table 11.2 compares performance of the four countries with growth rates above 8% and the four countries with growth rates below 6%. Not surprisingly, the high-growth countries are substantially richer than the slow growers. Also, the rapid growers save 40% more income than the slow growers.

Table 11.3   Savings and Per Capita Income

	Real Per Capita Income[a]	Gross National Savings (% GNP)
Poorest	451	12.0
Middle	1,561	20.9
(excluding Turkey)	1,498	21.7
Richest	3,562	21.7

Source: See data appendix and text for sources and description of savings data.
[a]These data are average real per capita incomes during 1980–84 (Summers and Heston 1988). The poorest countries (Burma and Indonesia) have per capita incomes < $1,000. The middle-income countries have per capita incomes between $1,000 and $2,000 and the richest (Singapore and Hong Kong) have incomes above $3,000.

Table 11.4   Income Distribution and Savings

	Income Inequality	Gross Savings (% GNP)	Real Growth	Real Per Capita Income
Equal	18.4	18.6	8.1	1,684
Equal, excluding Indonesia	18.1	20.7	8.8	2,077
Unequal	10.3	20.1	5.5	1,667

Source: See text and data appendix for sources and description.
Note: Income inequality is the share of income received by the poorest 20% relative to the share received by the richest 10%. The countries with relatively equitable income distributions are Korea, Indonesia, Hong Kong, and Thailand (labeled "Equal" above). The inequitable ones are Malaysia, Turkey, and the Philippines (labeled "Unequal").

At the beginning of the period, all of the countries had very similar age distributions. However, by the end of the period, there had been no change in the dependency ratios in the slow growers but a 25% reduction in the dependency rates of the rapid growers. In fact, each of the rapid growers experienced a significant decline (i.e., a drop in fertility rates), and these were the only countries in the sample which did. Using the broader measure of dependency that includes the share of the population over age 65, the rapid growers experienced a decline in the dependency ratio from 44.7 in 1960 to 36.1 in 1980. The comparable figures for the slow growers are 47.6 in 1960 and 49.0 in 1980.

Table 11.3 groups countries by per capita income levels. The two poorest countries had very low saving rates. However, there is no clear relationship between per capita incomes and saving rates among the middle- and upper-income groups. When Turkey is excluded from the middle-income group, the mean saving rate is 21.7%, exactly the same as for the richest countries. While it is not possible to generalize from such small samples, these data do not suggest that saving rates rise with income across countries. In the next sections we will ask whether there is a relationship between saving and the standard of living within a country over time.

Table 11.4 compares the countries with relatively equal income distributions with the less equitable ones. In the first group, the poorest 20% of individuals receive 18% of the income received by the richest 10%. The comparable number for the second group of countries is just 10%. The table shows that, on average using this measure of distribution, there is no relationship between income equality and the standard of living. Hong Kong, the richest country in the sample, and Indonesia, one of the poorest, have very similar indicators of inequality. However, the countries with less equal distributions did grow more slowly than the more equitable countries.

There is also little support for the view that saving is related to income distribution. If Indonesia, the only country with distribution data available with a per capita income below $1,000, is excluded, saving rates are almost identical across the two groups.

11.2.2   Trend Saving Behavior

Averaging saving rates over a 20-year period masks important changes in saving behavior over time. We turn next to a discussion of saving trends in individual countries. The discussion divides the 10 countries into four groups. The first group is composed of the countries that experienced trend increases in saving. The second group is made up of the low-income countries. The third includes countries in which saving declined over the sample period. Finally, one country, Turkey, does not fit neatly in any of these groups.

Where available, we also decompose savings into type: government, corporate, and household. As discussed above, there are some problems with these decompositions. In particular, the household sector is typically the residual, once government and corporate savings are subtracted from total national savings. Therefore, it includes savings of unincorporated businesses, which is likely to be important for many developing countries. Furthermore, savings exhibits strong positive correlation with real output growth rates in most of the countries. While it is not possible to explain this correlation in each country, additional data for South Korea shows that there, much of the correlation comes from rural households, where savings are closely linked to farm inventories.

Countries with Increasing Savings

In 1986, savings rates as a percentage of GDP in Singapore (fig. 11.1), Taiwan, and Korea were 46%, 37%, and 33% respectively. However, none of these countries began with a high savings rate. Each experienced a dramatic increase.[4] The real question is not why these countries save a lot now, but why they experienced significant increases in savings since the 1960s when so many other countries did not.

It is interesting to note that Hong Kong, the richest country in the sample, underwent a rapid rise in saving rates from 2% of GNP in 1960 to 34% in 1976 (see fig. 11.2). However, saving rates have declined since then to approximately 25% of income.[5]
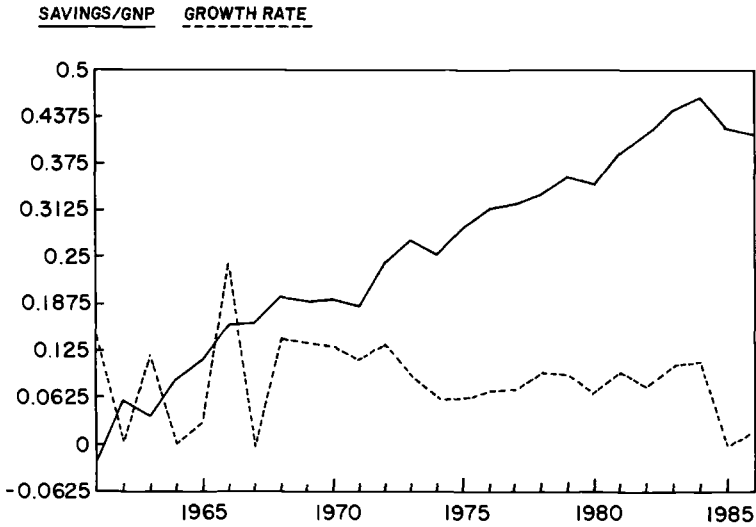
SAVINGS/GNP   GROWTH RATE

Fig. 11.1   Savings/GNP and growth: Singapore
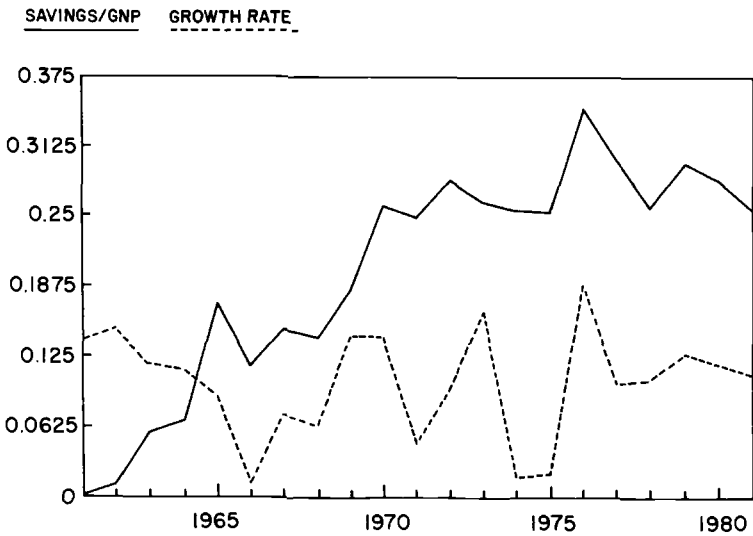
SAVINGS/GNP   GROWTH RATE

Fig. 11.2   Savings/GNP and growth: Hong Kong

Malaysia began with a higher standard of living than Korea, and with a relatively high saving rate. Malaysian saving has trended upward slightly during the period 1960–80 (fig. 11.3). It is interesting to note that Malaysia's average growth rate was 7% during this period as compared to over 9% in Korea. Like Korea, Malaysian saving is positively correlated with real growth
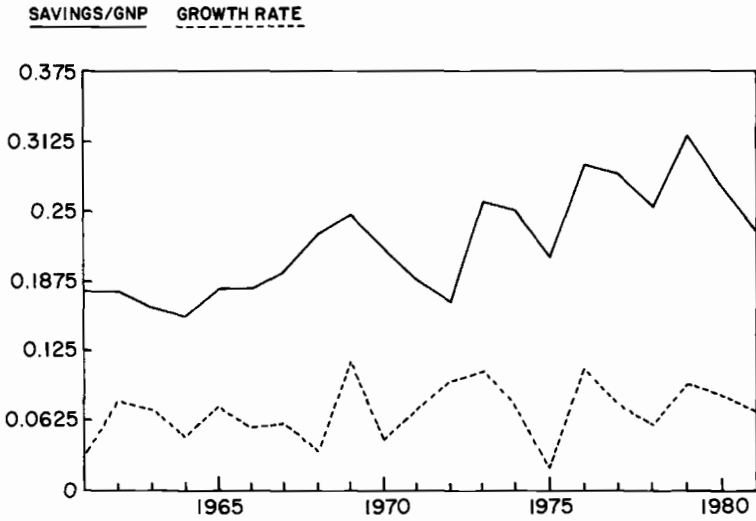
SAVINGS/GNP   GROWTH RATE

Fig. 11.3   Savings/GNP and growth: Malaysia

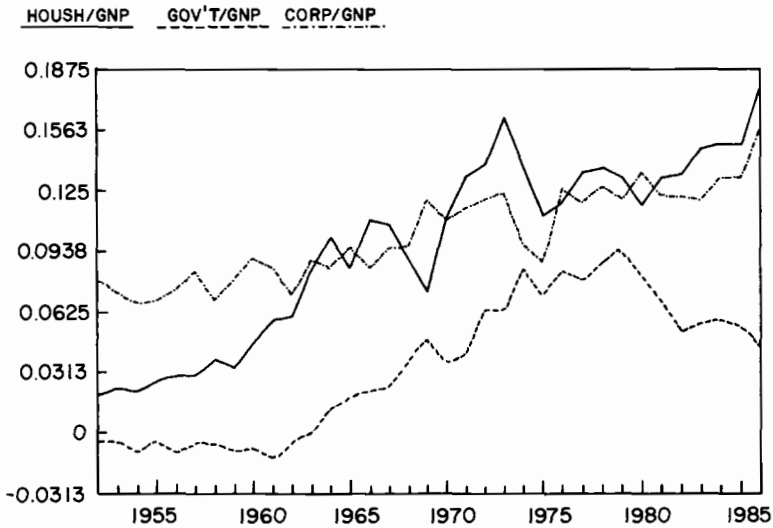HOUSH/GNP   GOV'T/GNP   CORP/GNP

Fig. 11.4   Components of savings: Taiwan

rates. This may also be attributable to measurement problems from the treatment of agricultural inventories.

Savings decompositions are available for two of these high savers: Taiwan and Korea. Figures 11.4 and 11.5 show their savings as a percentage of GNP by the government, corporate sector, and households through 1986.
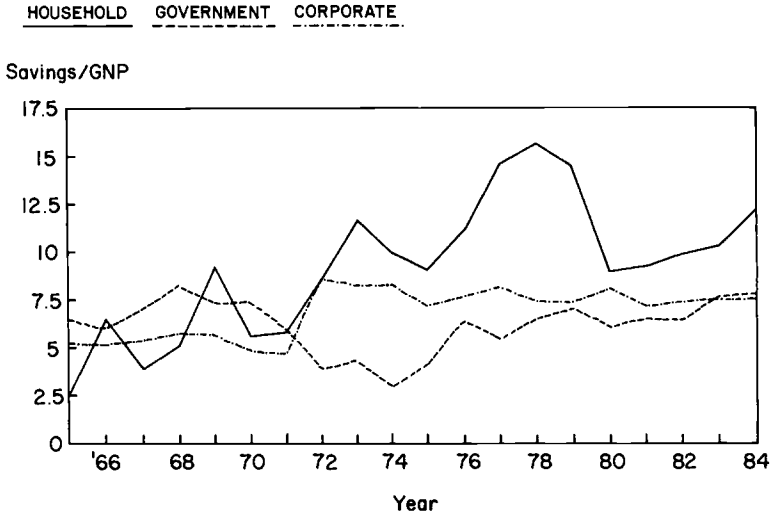
HOUSEHOLD   GOVERNMENT   CORPORATE

Fig. 11.5   Components of savings: Korea

Turning first to Taiwan, all three components of savings increased as a share of income through the 1970s. During the 1980s, government savings dropped off, while both corporate and household savings continued to rise. The largest increase over the period was in the household sector, where savings rose from 1.9% of GNP in 1952 to 17.8% in 1986. Corporate savings rose from about 7% in the 1950s to a high of 15.7% in 1986.

In Korea, both the trend rise in savings and the large swings in savings came from the household sector. The rise is similar to that in Taiwan: household savings rose from 2.4% in 1965 to 18% in 1986. However, corporate savings remained relatively constant (7%-8% of GNP) since the early 1970s.

As discussed above, it is difficult to interpret the evidence on the sectoral composition of savings. In particular, it is not clear whether the differences in corporate savings in these two rapidly growing countries is real or arises from the difficulties in distinguishing between households and firms, difficulties perhaps exacerbated by tax laws. However, these data do not suggest that high saving rates in rapidly growing economies are concentrated in the corporate sector. The role of profits and corporate savings in industrialization is an especially interesting area for additional analysis. See Murphy, Shleifer, and Vishny (1988) for an interesting theoretical discussion.

The Low Income Countries

Both Burma and Indonesia had extremely variable, and often negative, real growth rates during the early part of the sample. As shown in figures 11.6 and 11.7, they also had low and variable saving rates. However, in recent years, performance in both countries more closely resembled performance of the
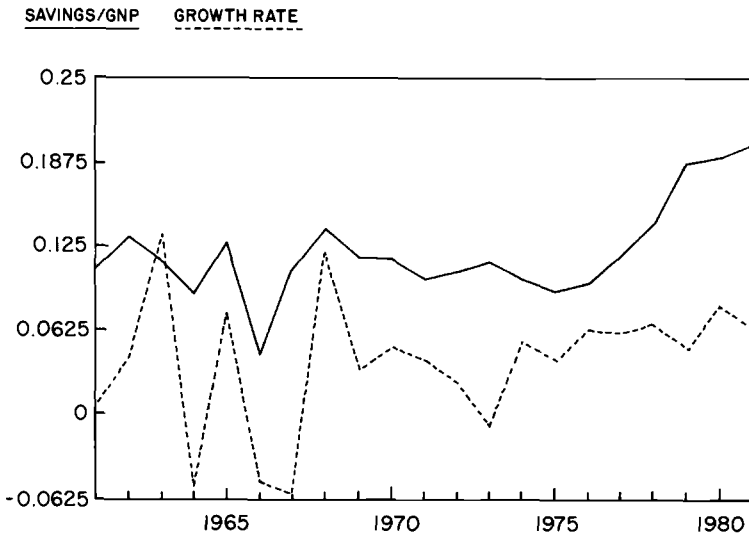
SAVINGS/GNP   GROWTH RATE

Fig. 11.6   Savings/GNP and growth: Burma

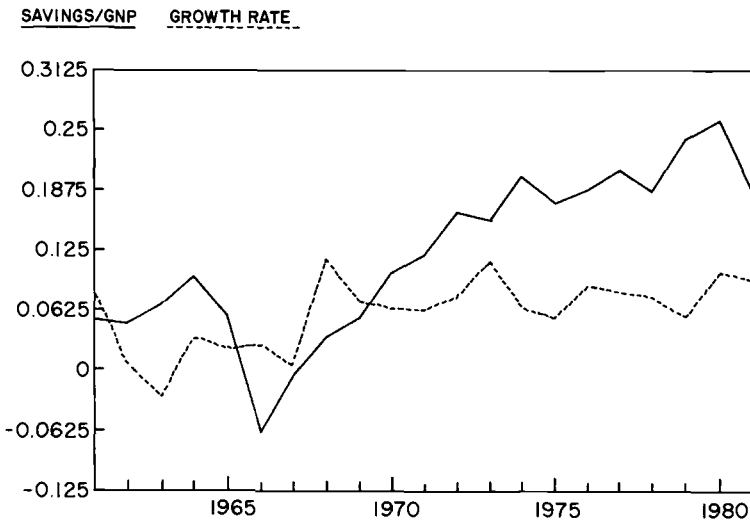SAVINGS/GNP   GROWTH RATE

Fig. 11.7   Savings/GNP and growth: Indonesia

high savers. As real growth rates stabilized, both countries enjoyed a rapid rise in saving rates.

Declining Savers

Two countries experienced declines in savings rates. In Thailand (Fig. 11.8), savings rates were subject to large swings and a trend decline. Again, most of the movements came from the household sector.
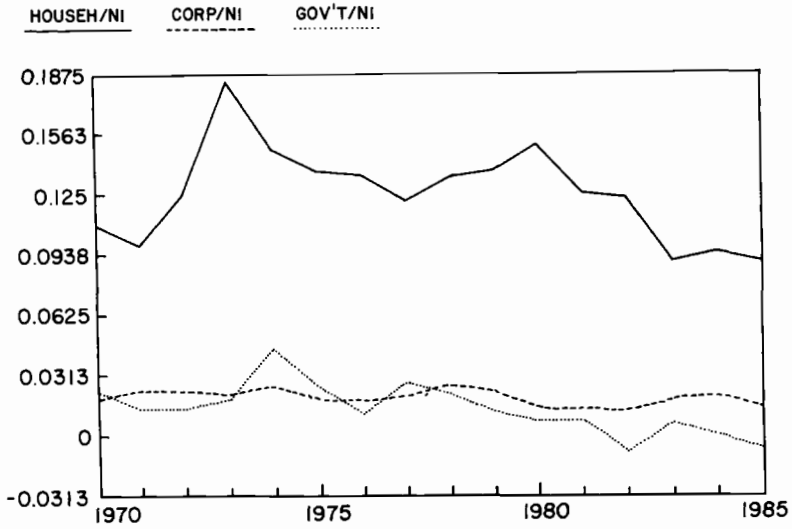
HOUSEH/NI   CORP/NI   GOV'T/NI

Fig. 11.8   Components of savings: Thailand

HOUSEH/NI   CORP/NI   GOV'T/NI

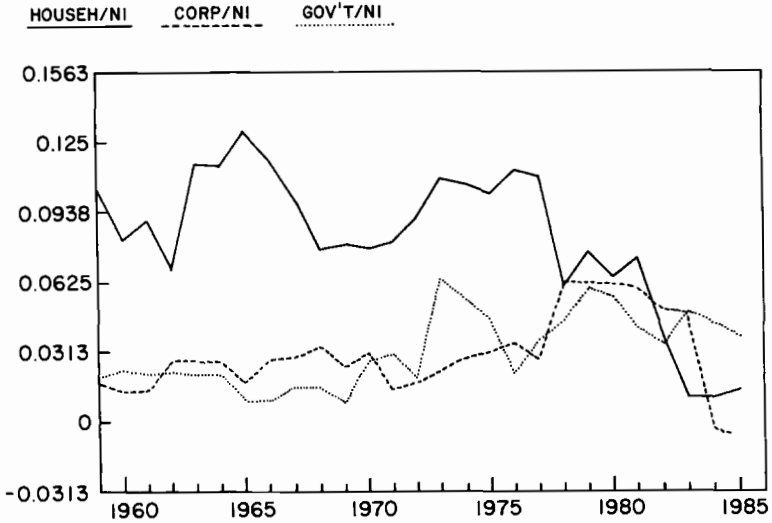Fig. 11.9   Components of savings: Philippines

In the Philippines, saving rates were approximately constant until the mid-1970s and then declined (Fig. 11.9). The decline was concentrated in the private sector, with household savings falling from 11% of GNP in 1976 to 7% during 1979–81 and just 1% during 1984–86. Corporate savings also declined, becoming negative by 1985. The fall in savings coincided with a se-
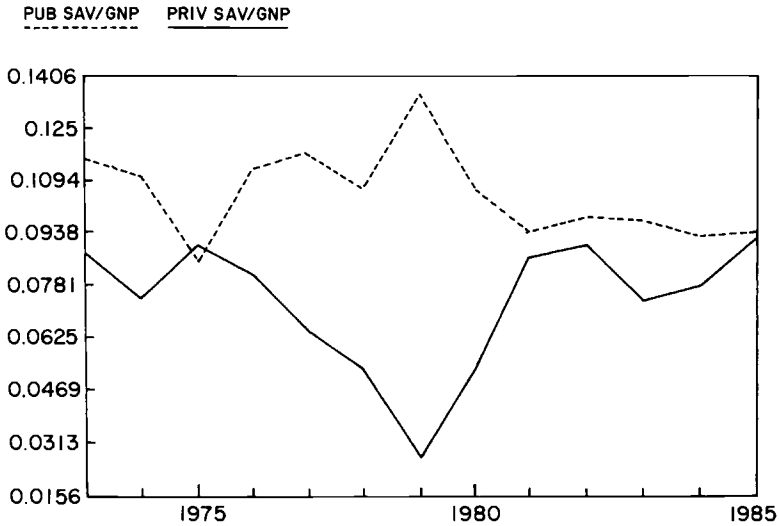
PUB SAV/GNP   PRIV SAV/GNP

Fig. 11.10   Public and private savings: Turkey

vere deterioration in economic performance. Real growth rates averaged 6.4% during 1972–80, plunging to 1.5% during 1981–82 and − 5.3% during 1983–84. See Dohner and Intal (1989) for a recent analysis of the Philippine economic crisis.

Other

Finally, Turkey did not fit any of the above categories. Turkey's saving rate rose during the 1960s and has since stabilized. As shown in figure 11.10, a decomposition of Turkish savings is interesting and unusual. Public-sector savings were strongly negatively correlated with private savings.

11.3   A Model of Saving Behavior

This section uses a simple life-cycle model of household savings to derive the equations to be estimated in section 11.4. The approach, which follows Fry and Mason (1982) and Mason (1988), emphasizes three aspects of saving behavior.

First, it clearly distinguishes between level and growth effects. In a stationary economy (with no real growth and a constant age distribution) changes in the timing of household savings will have no effect on the aggregate savings rate as long as households consume their entire lifetime earnings over their life cycle. However, there is substantial empirical evidence against this strict life-cycle assumption. In fact, households frequently leave positive wealth, whether because of uncertainty or the desire to leave bequests. Thus, the framework developed below allows for the possibility that lifetime consump-

tion is a fraction of lifetime resources, and that the fraction may depend on economic and social environment. Changes in this fraction will be called level effects on saving.

Second, the framework shows that the effect of real growth on saving depends on the mean age at which households earn income relative to the mean age at which they consume. In two economies with identical (nonnegative) growth rates, one would expect lower saving rates in the one where the mean age of consumption was lower relative to the mean age of earnings.

Third, most factors that influence saving behavior will have both level effects and "growth-tilt" effects—effects on the mean age of earnings relative to consumption that enter the savings equation interactively with the real growth rate. These effects need not have the same sign. Furthermore, econometric estimates of the determinants of savings are misspecified if the interactive effects are omitted.

For example, an increase in the dependency rate is likely to reduce the mean age of consumption, with little effect on the mean age of earnings in the economy. This implies lower saving rates working through the growth-tilt effect, provided that there is a positive real growth rate. However, the level effect of an increase in the share of the population under age 15 is less clear. It may either raise the lifetime consumption of households, reducing savings, or raise the share of lifetime earnings the household wishes to leave to future generations. The remainder of this section develops a life-cycle model of aggregate savings.

Households are characterized by their age and by the year in which they were formed. Define $w(a,t)$ as the earnings of a household at age a which was formed at time t. We will refer to this as a household of generation t. Let $w(a)$ be the age-earnings profile of the initial household, and assume that the economy grows at a constant rate g over time. Therefore,

$$(1) \qquad\qquad w(a,t) = w(a)e^{gt}.$$

The present value of earnings for a household of generation t is

$$(2) \qquad\qquad V(t) = \int_a w(a,t)\, e^{-ra} da.$$

Therefore, in year τ, the lifetime earnings of an age a household (a household of generation $\tau - a$) is

$$(3) \qquad\qquad V(\tau - a) = V(\tau)e^{-ga}.$$

It is also useful to define $\gamma(a,t)$ as the share of lifetime income households of generation t earn at age a.

$$(4) \qquad\qquad \gamma(a,t) = w(a,t)/V(t).$$

In addition, if $n(a,t)$ is the number of age a households in year t, then GNP is:

(5)
$$X(t) = e^{gt} \int_a n(a,t)\, w(a)\, e^{-ga}\, da.$$

Turning next to consumption, define $\alpha(a,t)$ as the share of lifetime income households of generation t consume at age a. As discussed above, we do not impose the strict life-cycle assumption, but allow for the possibility that the value of income exceeds the value of consumption over the life cycle. The consumption of an age a household as a share of GNP in year t is $\alpha(a,t-a)V(t-a)/X(t)$. Therefore, aggregate consumption as a share of GNP in year t is

(6)
$$C(t) = \int_a \alpha(a,t-a)\frac{V(t-a)}{X(t)}n(a,t)\, da.$$

Substituting from (3), (4) and (5), (6) can be rewritten as

(7)
$$C(t) = \frac{\int_a n(a,t)\, \alpha(a,t-a)\, e^{-ga}da}{\int_a n(a,t)\gamma(a,t)\, e^{-ga}da}.$$

Taking a linear approximation of (7) around $g = 0$, the following expression for aggregate savings as a share of aggregate income $s(t)$ is obtained

(8)
$$-\ln C(t) = \ln\left(\frac{1}{1 - s(t)}\right)\ln(L) + g(\mu_c - \mu_y),$$

where

$$L \equiv \frac{_a\!\int n(a,t)\, \gamma(a,t)\, da}{_a\!\int n(a,t)\, \alpha(a,t-a)\, da}$$

$$\mu_y \equiv {}_a\!\int a\, n(a,t)\, \gamma(a,t)\, da$$

and

$$\mu_c \equiv {}_a\!\int a\, n(a,t)\, \alpha(a,t-a)\, da.$$

The left-hand side of (8) is approximately equal to the ratio of savings to GNP for moderate saving rates. There are two terms on the right-hand side. Here L is the level effect. A reduction in consumption relative to income, either because of a decline in the share of income consumed over the life cycle or because of a shift in the age distribution away from high-consumption households, will raise aggregate savings. The second term is the growth-tilt effect, which shows that real growth rates enter interactively with the difference between the economywide mean ages of consumption and earnings.

Finally, we assume that L and $(\mu_c - \mu_y)$ are simple functions of social and economic characteristics, W.

$$(9) \qquad\qquad L = \exp(W\beta),$$

$$(10) \qquad\qquad \mu_c - \mu_y = W\delta$$

As discussed further below, the small sample precluded the inclusion of a large number of characteristics in the regressions. The included variables (W) are a constant, the percentage of the population below the age of 15, ($D14$) and per capita income (PCI). The results are not substantially different if the broader measure of dependency is used. The variable PCI is taken as a percentage of the per capita income for Hong Kong during 1980–84. Combining (8) with (9) and (10) gives a simple log-linear specification that is used in the estimations.

$$(11) \qquad \ln\!\left(\frac{1}{(1-s)}\right) = \beta_0 + \beta_1 \cdot D14 + \beta_2 \cdot PCI + \delta_0 \cdot g$$
$$+ \delta_1 \cdot g \cdot D14 + \delta_2 \cdot g \cdot PCI$$

11.4 Estimation Results

Equation (11) was estimated using data from the nine Asian economies plus Turkey from 1960 through 1984. Because disaggregated data is only available for some countries, the aggregate savings rate is used as the dependent variable. However, for most of these countries, annual savings rates are highly correlated with annual growth rates. As discussed above, additional information for Korea suggests that much of the correlation arises from fluctuations in inventories of rural households. To minimize these types of relationships, data on savings rates, per capita income, and growth were averaged over 1960–64, 1965–69, 1970–74, 1975–80, and 1980–84. In some cases, averages were taken over fewer years (e.g., 1980–82) because of missing values. The reported standard errors use the White heteroskedasticity correction, since the variance of the errors can be expected to vary with group size.

Table 11.5 reports the results from two sets of regressions. The first set includes all 10 countries. The second set excludes the two low income countries, Burma and Indonesia. There was not enough data to run separate regressions for these countries. Each set consists of two regressions—one with and one without the growth interaction terms.

A comparison of columns 1 and 3 with columns 2 and 4 in table 11.5 shows the importance of the growth interaction effects. Even though exclusion of these effects causes only a modest reduction in the overall fit, it does severely bias the parameter estimates. For example, if they are excluded, the dependency ratio does not seem to significantly influence saving rates. However, once the interaction effects are included, the dependency rates do enter significantly for the middle-income countries.

Table 11.5   **Regression Results**

$$\ln\left(\frac{1}{(1-s)}\right) = \beta_0 + \beta_1 \cdot D14 + \beta_2 \cdot PCI + \delta_0 \cdot g + \delta_1 \cdot g \cdot D14 + \delta_2 \cdot g \cdot PCI$$

	All Countries		Middle-Income Countries	
	1	2	3	4
Constant	.10	−.31	.15	−.71
	(2.52)	(1.31)	(2.62)	(−1.92)
D14	−.01	.74	−.06	1.40
	(−.17)	(1.29)	(−.74)	(2.09)
PCI	.23	.60	.21	.95
	(3.42)	(3.86)	(2.53)	(2.27)
g	1.01	7.25	.78	12.40
	(3.02)	(1.82)	(2.05)	(2.39)
g·D14		−11.83		−20.69
		(−1.27)		(−2.04)
g·PCI		−4.79		−8.69
		(−2.79)		(−1.98)
Adjusted R^2	.51	.56	.38	.44
Number of	43	43	35	35
Observations				

Source: Data sources are given in the text and the data appendix.
Note: Estimation Method: ordinary least squares, with heteroskedasticity consistent standard errors. *t*-statistics are in parentheses. Variable Definitions: s = aggregate savings/GNP; $D14$ = share of the population aged 14 or younger; PCI = real per capita income, as a share of 1980–84 income in Hong Kong; g = real economic growth rate.

For the middle-income countries, the dependency rate has a positive level effect and a negative growth-tilt effect on savings. In other words, given the standard of living and the real growth rate, increases in the population share of children tend to lower the fraction of lifetime income that a household consumes over its life cycle. This is consistent with an increased population share of children raising household bequests or increasing household precautionary savings.

The positive level effect on savings is offset by the reduction in the mean age of consumption in the economy relative to the mean age at which income is earned. The magnitude of this offset is tied to the economic growth rate. In countries where the growth rate exceeds 6.8%, the negative growth-tilt effect dominates, and the net effect of a rise in the dependency rate will be to reduce savings. From table 11.1, all of the middle-income countries except Turkey and the Philippines had average growth rates above 6.8%. It is interesting to note that Fry and Mason (1982) find both level and growth-tilt effects to be negative. The relationship between age distribution and saving seems quite sensitive to the countries and time period considered.

When the two low-income countries are included in the sample, the effects retain their signs, but the magnitudes decrease and the parameter estimates become insignificant. Interestingly, the overall fit in these equations is better

than for the middle-income countries alone, because per capita income becomes a more important determinant of saving behavior. The results suggest that household consumption over the life cycle is less sensitive to the age distribution in poor countries, possibly because a larger percentage of households simply consume all of their income, regardless of the household size. Similarly, changes in the age distribution seem to have less effect on the mean age of consumption relative to income in the poor countries.

The estimates in table 11.5 also imply that the standard of living (PCI) has a positive level effect on savings but a negative growth-tilt effect. The net effect (for the middle-income countries) is positive for growth rates below 10.9%. Hong Kong, the fastest grower in the sample, averaged 10.2% over 1960–84. Thus, in this sample, countries save more as they get richer even though younger households dissave more relative to older households, because households consume a smaller share of lifetime incomes over their life cycles.

While the parameter differences are not statistically significant, including the low-income households seems to reduce the effect of per capita income on savings even though its explanatory power rises. One interpretation is that an increase in per capita income lowers the share of lifetime income consumed over the life cycle by more in the middle-income than in the poor countries.

The regressions discussed above point to the importance of growth rates, per capita incomes, and the dependency ratio as determinants of saving in developing countries. The simple equations explain only a modest portion of the differences in saving across countries and over time. The next section considers additional information about saving in Korea, to examine the rapid rise in the amount of savings between 1960 and 1986 in more detail.

11.5   Korean Saving Behavior

The previous sections used data from national income accounts to examine saving behavior in 10 countries. Disaggregation, where available, showed that most of the interesting developments in saving were concentrated in the household sector. However, the household sector is typically measured as a residual, once government and corporate savings have been subtracted out. This section discusses household savings in Korea, using data from household surveys. There are separate surveys for urban and rural households—surveys that have been conducted annually from 1965. However, there have been some changes in the sampling procedure. The surveys prior to 1975 are not strictly comparable to the more recent surveys.

Table 11.6 shows savings behavior (disposable income less consumption expenditure) for urban and rural households since 1965. As shown, urban household savings have risen dramatically to over 20% since 1978. Urban savings have been somewhat cyclical, declining during the 1974–75 and 1980–82 recessions.

Rural households seem to save substantially more than urban households.

Table 11.6   **Urban and Rural Household Savings in Korea**
                         (household survey data)

	Urban	Rural	Rural Inventory Adjusted	Urban + Rural	Urban + Adjusted Rural
1965	−2.2	4.4	1.3	2.8	1.2
1966	3.2	10.5	1.1	8.6	4.4
1967	4.3	9.8	1.1	8.1	4.8
1968	2.6	16.1	.4	11.3	5.2
1969	3.4	17.8	4.3	12.5	7.6
1970	5.6	15.2	4.1	9.8	5.8
1971	9.2	29.0	7.9	16.0	7.7
1972	12.2	24.5	4.9	15.7	8.0
1973	12.6	26.2	7.8	16.6	9.4
1974	11.2	33.2	7.9	19.0	8.6
1975	9.6	26.6	7.5	14.9	7.6
1976	15.2	32.6	11.1	20.2	12.3
1977	18.9	28.9	10.4	20.4	13.7
1978	21.4	26.5	13.1	21.1	16.7
1979	22.9	21.0	7.8	21.0	17.3
1980	22.5	15.7	3.6	19.6	16.5
1981	21.2	22.7	3.3		
1982	20.5	22.5	3.7		
1983	22.9	18.3	3.1		
1984	24.2	21.8	2.4		
1985	25.3	17.6	2.8		

Source: Economic Planning Board (Korea), Annual Report on the Family Income and Expenditure Survey, 1965–86
Note: It was not possible to calculate the weighted averages of urban and rural savings ratios after 1980 because data for number of households was unavailable.

However, rural savings include increases in inventories (especially cereals). Excluding this component of savings, rural households savings has averaged just 6.5% as compared to 18.6% for urban households. During the 1960s and 1970s, rural household savings also rose significantly, from 1% to 10% of disposable income. However rural savings fell to just 3%-4% since 1979. One reason for the drop was the extremely poor performance of the agricultural sector during 1978–82, including a 20% decline in real output in 1980.

The final column of table 11.6 shows combined urban plus inventory-adjusted rural savings. The series shows a strong upward trend and is only slightly procyclical. The remainder of the discussion focuses on urban household savings.

Figure 11.11 shows saving by age of the head of the household since 1975. The plot shows that savings have increased at each age level over the past decade. This development is consistent with a strong level effect on savings—total household consumption has declined as a share of income over the life cycle. Possible explanations include the rising life expectancy or a growing bequest motive.
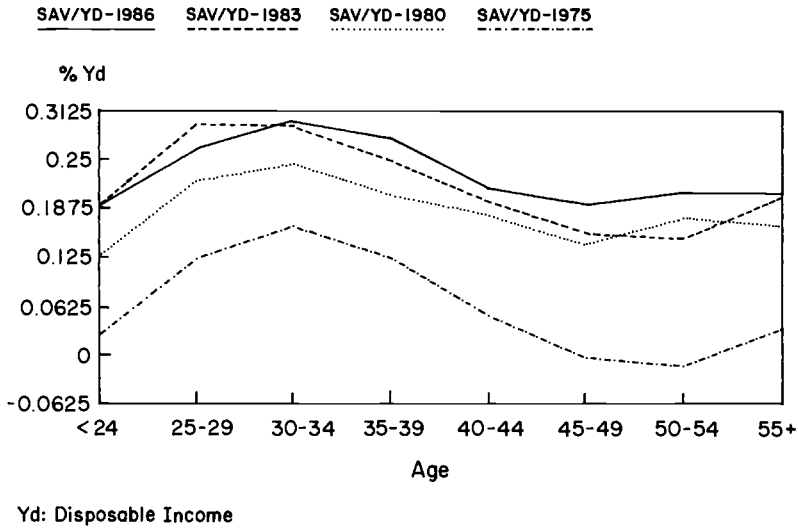
SAV/YD-1986   SAV/YD-1983   SAV/YD-1980   SAV/YD-1975

% Yd

Yd: Disposable Income

Fig. 11.11   Household savings by age of head of household: Korea

The regressions in the previous section suggest that we should also observe a rise in the share of total savings accounted for by younger households if the mean age of consumption has in fact risen relative to the mean age of earnings. Instead, the plot points out a puzzle—the savings profile shows evidence of flattening out over time. In 1975, saving was quite concentrated among households with heads from 25 to 40 years of age. Households with heads aged 50–54 were dissaving slightly. By 1986, however, even older households saved nearly 18% of their incomes. In this respect, Korea is becoming more like Japan, where the saving rate seems to be independent of age.

The regressions in the previous section suggest that a rising standard of living may account for the rising savings. Real incomes have risen dramatically in Korea, and households with older heads tend to earn higher incomes. In 1986, household heads aged 50–54 earned the highest average incomes. To explore this channel further, figure 11.12 shows savings rates at a variety of real income levels (in constant 1980 won) from 1975–86. The figure was constructed by deflating the average nominal incomes of households grouped by nominal income ranges (eg. 100,000 to 149,000 won, etc.). The plot shows that low-income households have continued to save approximately the same fraction of their incomes. Thus, not all households saved more in 1986 than comparable households in 1975. Of course, the percentage of households in the low-income groups has declined over time as Korea's standard of living increased and saving rates rise steeply with household real incomes. The plot suggests that households with higher real incomes saved a greater percentage of income over time. Unfortunately, this picture may be misleading, because the 1975 data averages together all nominal incomes over 110,000 won. In
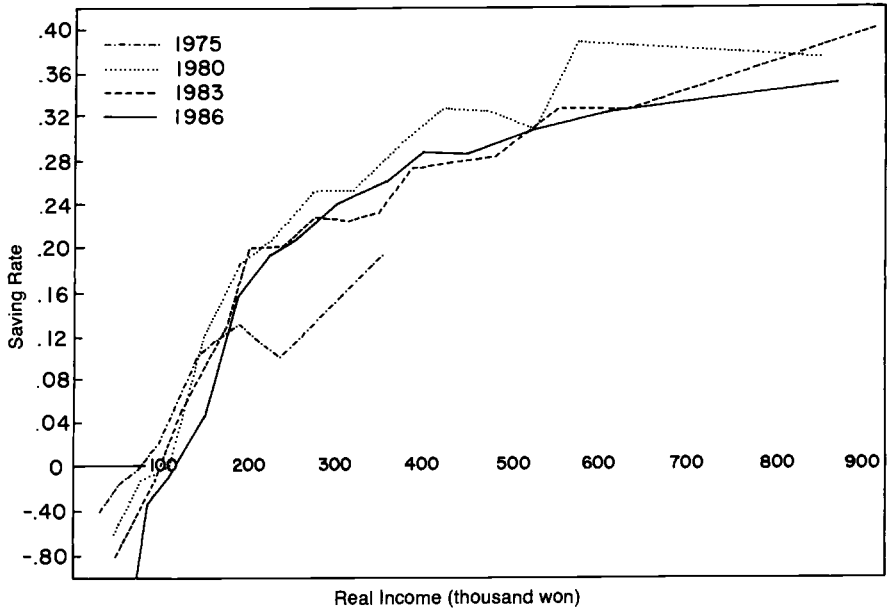
Fig. 11.12   Household savings by income group: Korea

contrast, the 1980 survey divides incomes between 70,000 and 649,999 won into 14 groups and averages incomes over 650,000 won.

11.6   Concluding Remarks

Many Asian countries do have high saving rates. However, much more interesting than the current level is the widespread and dramatic rise in saving that has occurred since the early 1960s. The real question then is why savings rose in some of these countries, but not in others. This question is explored using a panel of data on savings and other key variables for 10 countries since 1960.

The paper shows that the countries with the highest saving rates in the 1980s were also the ones with the fastest real growth rates during 1960–84 and the ones that underwent a dramatic shift in their age distributions—from over 40% under the age of 15 to barely 30%. Interestingly, even the Asian countries with moderate saving rates that did not experience large demographic shifts exhibit strong correlations between real growth and savings. For example, the two low-income countries in the sample experienced low and variable growth rates during the years when real growth rates were low and erratic. As growth rates stabilized at moderate positive levels, aggregate savings rates in both countries began to rise.

The paper also looks at saving behavior disaggregated into households, corporations, and government where data are available. These data suggest that

most of the movement is concentrated in the household sector. In particular, the government does not seem to account for the increases in saving—at least not directly. Though provocative, these data suffer from serious measurement errors, especially in separating households from firms. Further analysis here requires additional data, preferably microlevel panels of firms and households.

Regressions analysis is used to separate out the determinants of savings over time and across countries. There are three key findings. First, the population share of children, the standard of living, and the real growth rate all enter significantly. Together, they explain a moderate portion of the variation in saving behavior. One area for future work will be to expand the sample so that additional socioeconomic factors can be entered as explanatory variables. Unfortunately, the sample cannot be extended much further in time. While additional countries can be added, the results may well be sensitive to the included countries.

Second, the results suggest structural differences in saving behavior between the low-income and the middle-income countries. In particular, household saving seems to be less sensitive to the age distribution and to changes in per capita income in the poorer countries. These findings are consistent with previous cross-country studies, which found structural differences between industrial and developing countries.

Third, the explanatory variables influence saving through two separate channels. On the one hand, living standards and the age distribution seem to have important structural effects on household behavior. On the other hand, changes in these variables tilt the mean age of consumption relative to the mean age of earnings in the economy. This second channel works interactively with the real growth rate. In contrast to some previous studies, the two channels are shown to work in opposite directions in this sample. Thus, omission of the interaction effects strongly biases the estimation results, suggesting, for example, that saving is not affected by the youth dependency ratio. However, the net effect for the middle-income countries is that a rise in dependency rates reduces saving—more so the higher the real growth rate. Similarly, the net effect of a rise in real per capita income is to raise aggregate savings—less so the higher the real growth rate.

Appendix
Savings Data Sources

BURMA: National income and gross savings data for 1960–81 were obtained from the *World Tables* (Baltimore: Johns Hopkins University Press for the World Bank), various issues. HONG KONG: National income and gross savings data for 1960–81 were obtained from the *World Tables*, various issues. INDONESIA: National income and gross savings data for 1960–85 were ob-

tained from the *World Tables,* various issues. KOREA: National income and gross savings data for 1960–84 were obtained from Economic Planning Board (EPB), *Economic Statistics,* various issues. Urban and rural household savings data were obtained from EPB, *Annual Report on the Family Income and Expenditure Survey,* and Ministry of Agriculture & Fisheries, *Farm Household Economy Survey,* various issues. MALAYSIA: National income and gross savings data for 1960–85 were obtained from the International Monetary Fund, *International Financial Statistics (IFS)* and the *World Tables,* various issues. PHILIPPINES: National income data for 1959–86 were obtained from the *IFS,* gross and net savings data were obtained from the Philippine *Statistical Yearbook* (Manila: National Economic and Development Authority), various issues. SINGAPORE: National income data for 1960–85 were obtained from *IFS* and *World Tables,* gross savings data were obtained from *Yearbook of Statistics for Singapore* and *Economic and Social Statistics for Singapore,* various issues. TAIWAN: National income and savings data for 1960–86 were obtained from *Taiwan Statistical Data Book,* various issues. THAILAND: National income and savings data were obtained from *IFS* and *World Tables,* various issues. TURKEY: National income and savings data for 1960–85 were obtained from *IFS, World Tables,* and the Central Bank of Turkey.

Notes

1. The *World Development Report* (World Bank 1987) defines gross domestic savings as GDP less total consumption.

2. See Hammer (1985) for additional discussion of savings measures in cross-country studies. Hayashi (1986) provides a useful discussion of particular issues in measuring Japanese savings.

3. The countries are Argentina, Brazil, Costa Rica, El Salvador, Mexico, Panama, Peru, and Venezuela. These data come from *World Development Report* (World Bank 1987).

4. It is interesting to note that Williamson's (1978) study of Korean savings is entitled "Why Do Koreans Save 'So Little'?"

5. Japanese savings rates also peaked in the 1970s. It would be interesting to explore whether this saving pattern could be explained by temporarily high savings (especially corporate) during the rapid development phase, or the "big push" as suggested by Murphy, Shleifer and Vishny (1988).

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Comment   Anne O. Krueger

A number of papers presented at the NBER conference on saving—including Sue Collins's interesting and important contribution—raise fundamental and

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difficult questions about the determinants of economic growth. Historically, development economists have examined those determinants for developing countries, while others have raised the same questions in the context of the OECD countries. There is a great deal to learn by examining the entire range of country experiences, especially when it is recognized that some countries—including several in Sue Collins's group—have achieved more growth in per capita income in the past two decades than most now-industrialized countries did in the entire nineteenth century. This is especially so at a conference that focuses on savings and its determinants; some of the countries examined by Collins have experienced increases in their saving rates from less than 5 percent of GNP 30 years ago to 35 percent and more now.

Overall, I have little to quarrel with in Collins's paper. Moreover, the issues it raises are issues that have come up in several other papers in this volume, and I therefore wish to address some of these broader issues. The basic question that arises—with respect to Christopher Carroll and Lawrence Summers's paper, with regard to Robert Barro's, and to several others—is What are the determinants of growth? And how is growth related to savings? Growth as it has been experienced by the rapidly growing newly industrializing countries (NICs) of East Asia, and as it was experienced in the nineteenth century by the now-developed countries, transforms society. Almost by definition, all major economic variables move together. Poverty and low per capita incomes are such pervasive constraints on political, social, and economic behavior for poor countries that it is unthinkable that it could be otherwise. A major problem, therefore, is how to disentangle the simultaneous causation of growth from those exogenous stimuli that permit some countries to achieve rapid growth in per capita incomes while others grow, at best, slowly or even experience declining real per capita incomes and living standards. If, as Larry Summers suggested, saving is the activity that reflects the trade-off between the present and the future, it is clearly a central concern of those attempting to understand economic development and the growth process.

My unease is that it is not clear what savings we are focusing on and why we regard it as an interesting economic variable. To illustrate the basis of my concern, a useful starting point is to form the identity that the rate of growth of output is equal to the weighted average rate of factor accumulation plus the rate of growth of efficiency in factor use.

The increase in output, dY, is equal to the real rate of return on capital, r, times the increase in capital stock, dK, plus the return to everything else, w, times the change in everything else, dO. That is,

$$dY = rdK + wdO.$$

If we adhere to a conventional notion of savings and capital formation and ignore foreign capital inflows (which would not significantly alter the argument I want to make), then the rate of growth can be written as

$$dY/Y = rs + a \, dO/O,$$

where s is savings expressed as a fraction of output, and a is the share of all factors other than capital in output.

The point I wish to make is this: suppose, as Larry Summers's paper suggests and is often asserted by others, that the real return to capital does not vary much from 5 percent. Then, even with a high saving rate, say .3, the rate of growth of output that can be achieved will be only .3 $\times$ .05 = .015 or 1.5 percent. Considering the range of saving rates from .05 to .35 of income, with a real return to capital of .05, differences in saving behavior could explain at most 1 percentage point of differences in growth rates. Since we observe rates of growth of output of 10 and 12 percent in East Asia, and of 1 and 2 percent in sub-Saharan Africa, it seems clear that either we are misdefining savings and/or investment or the real return, or else savings and investment are relatively unimportant as determinants of growth.

Something is clearly wrong. What is it? I think there are several things. First, savings finances human capital as well as physical capital formation, especially at early stages of growth. Estimates from the human capital literature suggest real rates of return of 25 percent on primary education in developing countries, and certainly there is evidence that human capital formation is a vital component of the growth process. If savings were redefined to include expenditures (and forgone income) on human capital formation, the saving rates used in our growth equations would look quite different.

Second, measured savings fails to pick up a number of forms in which individuals save, especially in countries where the returns to saving in legal channels are low—a point to which I return in a moment. Measured savings in most developing countries fails to record capital flight (which is estimated cumulatively to have exceeded public external borrowing in a number of developing countries in the late 1970s), accumulation of gold (the stock of which in India is estimated to have been more than twice national income in the 1960s) and other precious metals and minerals, and savings destined for investment in the underground economy.

Third, the real rate of return to investors is a function of several variables, and there is a lot of suggestive evidence that it has fluctuated widely between countries and over time as a function of incentives afforded by economic policies. In Korea, for example, it is estimated that the real rate of return to investment in manufacturing exceeded 30 percent during the late 1960s and early 1970s; there is ample evidence that it remains very high. In the Korea of the 1950s, the evidence suggests that the real rate of return varied a great deal depending on the nature of the activity, but probably did not average more than 5 percent.

A final point, which is more relevant to estimating saving responses than it is to overall growth rates, is that, in many developing countries, financial markets are little developed and governments control the banking system and the allocation of credit. In these circumstances, real returns available to small savers through the financial system are negative and sometimes strongly so.

In Korea, for example, real returns to depositors in savings accounts were negative until 1964.

As these remarks imply, I am skeptical about using measured rates of saving as they are recorded in the national income accounts; I am even more skeptical about using 5 percent as a real rate of return on capital. While high growth rates clearly are a factor contributory to high saving rates in the rapidly growing countries, the real return to saving is also a factor, and it is questionable whether measurements of that return to date have adequately reflected returns to savings. Possibly even more important, factors (and especially governments' economic policies) governing the economic efficiency with which new resources are allocated, including the financial markets and the real returns they offer to savers, are clearly important in influencing the saving rate and its impact on the rate of economic growth.

Turning specifically to Sue Collins's paper in light of these considerations, I would only raise several issues. First, and most important, she does not investigate the role of the real rate of return to savers in affecting saving behavior. Second, she uses period averages as the saving rate for the countries involved. A major question there is why the evidence embodied in the very large changes in rates over time is not used. Third, I have some questions about the "sample" of countries used. Except for Turkey, it is entirely East and Southeast Asian—that part of the world (except Indonesia) has been subject to a relatively similar set of economic policies and incentives (as contrasted with sub-Saharan Africa and Latin America, for example): one wonders if the procedure is not akin to estimating determinants of height based on a sample of professional basketball players. Fourth, and less important, I have some misgivings about use of the dependency ratio as Collins uses it: in most rapidly growing developing countries, there is rapid migration from rural to urban areas and, with it, a drop in the number of children per family. As such, the dependency ratio is to a large extent a variable measuring lagged and cumulative migration, itself a function of the rate of economic growth.

Overall, the Collins paper, along with the other presented in this volume, provides a valuable contribution to the all-too-sparse literature on determinants of saving behavior in developing countries. It is to be hoped that her effort spurs further work, incorporating better estimates of real returns to savers, and alternative estimates of savings that more closely correspond to the concept relevant for economic growth.

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