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Saving in Developing Countries: An Overview

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This article reviews the current state of knowledge on the determinants of saving rates, presenting the main findings and contributions of the recently completed World Bank research project, "Saving Across the World." The article discusses the basic design of the research project and its core database, the World Saving Database. It then summarizes the main project results and places them in the context of the literature on saving, identifying the key policy and nonpolicy determinants of private saving rates. Special attention is paid to the relationship between growth and saving and the impact of specific policies on saving rates. The article concludes by introducing the studies included in this special issue.

Saving rates around the world vary widely: on average East Asia saves more than 30 percent of gross national disposable income (GNDI), while Sub-Saharan Africa saves less than 15 percent. Regional differences have been rising: over the past three decades saving rates have doubled in East Asia and stagnated in Sub-Saharan Africa and in Latin America and the Caribbean (figure 1).

Should these disparities make saving a policy concern? In theory there is little reason why countries facing different income streams, preferences, or demographics, and subject to different types of shocks, should choose similar saving rates. In practice, however, the intertemporal choices that underlie saving are subject to a host of externalities, market failures, and policy-induced distortions that are likely to drive saving away from socially desirable levels. Some market imperfections—such as the unavailability of risk-sharing instruments, overly stringent mandatory saving schemes, or outright Soviet-style rationing—can lead to socially excessive saving. Others—such as too little government saving or the negative effect on retirement saving of an anticipated public bailout of the poor in old age—can result in too little national saving.

Across countries higher saving rates tend to go hand in hand with higher income growth—a fact that has been taken as proof of the existence of both virtuous cycles of saving and prosperity and poverty traps of insufficient saving and stagnation. If virtuous cycles can be jumpstarted by a hike in aggregate saving,

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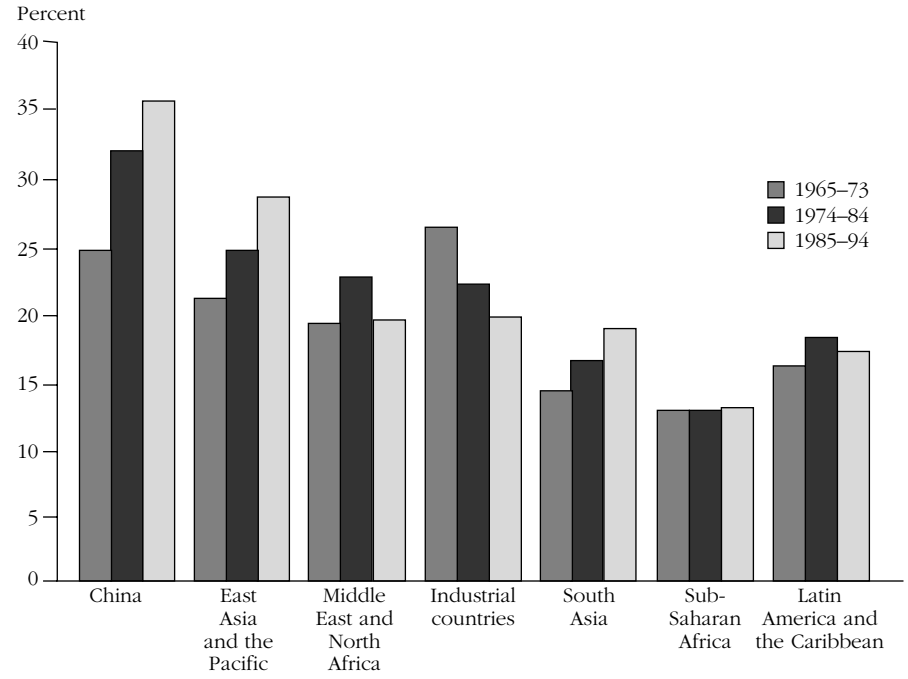
Figure 1. *Median Gross National Saving Rates by Region, 1965–94*



Note: Gross national saving rates, including net current transfers, are given as a percentage of gross national disposable income.
Source: World Saving Database.

then the social value of saving would exceed its private value in many developing countries, particularly poorer countries.

The social value of saving could also exceed its private value because of imperfections in world financial markets: a national saving rate broadly in line with the economy's investment rate reduces vulnerability to sudden shifts in international capital flows driven by uncontrollable forces, such as herd behavior or self-fulfilling investor expectations. As the recent turmoil in international financial markets illustrates, low saving and high current account deficits can exacerbate the likelihood, and the adverse effects, of capital flow reversals. However, the East Asian experience of 1997–98 demonstrates that high saving alone cannot fully insure against the consequences of weak financial systems or unsustainable exchange rate policies.

Although a large literature has shed light on some aspects of consumption and saving behavior, many empirical puzzles and policy-relevant questions remain. The recently completed World Bank research project, "Saving Across the World," addressed many of them. This article reviews empirical facts on saving behavior in the world, summarizes the main output and results of the World Bank's project, and introduces the articles included in this special issue.

I. The World Bank's Saving Research Project

The World Bank's research project "Saving Across the World" was motivated largely by behavioral puzzles and policy questions that are at the core of saving experiences and policy discussions in developing, transition, and industrial economies. The project was organized around three broad questions:

- Why do saving rates differ so widely across countries and time periods?
- What is behind the relationship between saving and growth, and which way does the causal link run?
- Which policies have the greatest impact on national saving, and which are unlikely to work?

The project addressed these questions by commissioning a set of articles from leading scholars. Most of the studies are empirical, tackling saving issues from the frontiers of consumption theory and econometric methods.[1]

The studies fall into three broad categories. A first group examines cross-country evidence, focusing on the behavioral and policy determinants of saving. Loayza, Schmidt-Hebbel, and Servén (2000) examine the most important determinants of saving proposed in the literature, and Attanasio, Picci, and Scorcu (2000) focus on the dynamic relationship between national saving, investment, and growth. Deaton and Paxson (2000) also examine the connection between income growth and saving, but do so from a microeconomic perspective, making use of household saving data from Indonesia, Taiwan (China), and Thailand. Finally, Deaton and Laroque (1998) reexamine the theoretical relationship between saving and growth, assessing whether the presence of a limited amount of residential land can catalyze a virtuous circle of saving, growth, and rising real estate prices.

The second set of articles assesses specific saving-oriented policies, using methodologies that range from estimation of parsimonious theoretical models (López, Schmidt-Hebbel, and Servén 2000) to reduced-form empirical estimation (Bandiera and others 2000 and Samwick 2000). They assess the impact of saving on domestic financial liberalization (Bandiera and others 2000), pension reform (Samwick 2000), tax incentives (Besley and Meghir 1998), and public saving (López, Schmidt-Hebbel, and Servén 2000).

The remaining articles focus on specific geographic regions, countries, and country groups selected because many features of their saving experiences are relevant to policy. The articles included in this issue are drawn from this third set.[2]

1. All are available at the project's website, *http://www.worldbank.org/research/projects/savings/policies.htm*.

2. Other country studies in this third group, but not included in this issue, are Burnside (1998) and Burnside, Schmidt-Hebbel, and Servén (1999) on Mexico and López-Mejía and Ortega (1998) on Colombia.

Empirical studies of consumption and saving in both industrial and developing countries are often hampered by inadequate aggregate data.[3] Thus in order to address the empirical questions posed in the project, considerable effort was devoted to constructing a large cross-country and time-series database on saving, consumption, income (at various levels of aggregation), and their major determinants, satisfying basic requirements of data quality and consistency. The resulting World Saving Database, which represents one of the project's major outputs, is described in detail in Loayza and others (1998b). The database and its underlying documentation are publicly available at the project website.

This new database features several improvements over existing, publicly available data sets. First, its broad coverage makes it the largest and most systematic collection of annual time series on country saving rates and saving-related variables, spanning a maximum of 35 years (1960 to 1994) and 112 developing and 22 industrial countries. To illustrate its size, there are, for example, 3,464 country-year observations for the gross national saving rate.[4]

Second, the database corrects inconsistencies in country time series that are pervasive in existing databases. Apart from checking for accounting consistency in the data, statistical testing for the presence of outliers was also conducted. Third, the World Saving Database unifies definitions regarding the coverage of the public sector, by including separate public saving measures for the consolidated central government and the general government or nonfinancial public sector. Fourth, the database contains series on private and public saving both with and without adjustments for capital gains and losses from inflation and real exchange rate devaluation. Fifth, for a limited number of economies the database disaggregates private saving and investment between households and firms. And sixth, the new database includes cross-country and time-series information on determinants of saving, including national and private income measures, proxies for financial depth, interest rates, inflation and other uncertainty-related variables, and demographic variables like urbanization and age dependency.[5]

II. Main Findings on the Behavior of Private Saving

Before addressing the main determinants of private saving, we first trace the major trends in national saving rates across regions.[6] The world's median gross

3. The criticisms stem partly from conceptual and empirical shortcomings of existing aggregate data and partly from inadequate use of the data in applied research. See Schmidt-Hebbel and Servén (1999b) for a full discussion.

4. Construction of the database involved making consistent use of existing data sources, including the World Bank's *World Development Indicators*, the International Monetary Fund's *International Financial Statistics* and *Government Financial Statistics*, the United Nation's *National Income and Product Accounts*, and data sets from the Organisation for Economic Co-operation and Development (OECD), the Asian Development Bank, and the Inter-American Development Bank. This information was supplemented and made consistent with data gathered from about 1,500 "Recent Economic Development" reports of the International Monetary Fund and about 500 World Bank reports and country government reports.

5. The importance of using appropriate measures of saving can be illustrated by the results of various incremental adjustments applied to Indian saving data (Loayza and Shankar, this issue).

6. A more detailed discussion of these trends and other saving patterns and correlations is presented in Loayza and others (1998a).

national saving rate has declined over the past three decades. It fell from 21 percent in 1965–73 to 20 percent in 1974–84 and further to 19 percent in 1985–94. The median gross national saving rate in industrial countries increased gradually from 25 percent in the early 1960s to a historical peak of almost 28 percent in 1972–73, just before the first oil shock. Since then, it has declined persistently, reaching 19 percent in 1993–94 (figure 1).

The median gross national saving rate in developing countries rose from 17 percent in 1965–73 to 19 percent in 1974–84, falling subsequently to 18 percent in 1985–94. However, this aggregate figure conceals wide divergences in saving patterns within the developing world. Saving rates have risen rapidly in China and most other countries in East Asia. China's already high saving rate (averaging 29 percent in 1970–77) rose further during the period of economic reform that began in 1978, reaching 41 percent in 1993–94. The median national saving rate in the East Asia and the Pacific region rose spectacularly from 20 percent in 1966–68 to 33 percent in 1992–94.

South Asia's median saving rate also rose substantially over the past three decades. By contrast, saving rates in other developing countries and regions stagnated or declined. In Latin America and the Caribbean the median national saving rate rose after the first oil shock (1973–80) and then fell after the debt crisis. A similar pattern of rise and fall is observed in the Middle East and North Africa, largely mirroring the path of world oil prices. Sub-Saharan Africa's median saving rate declined from an already low 13 percent in 1965–73 to just over 12 percent in 1974–84, returning to 13 percent in 1985–94. Notwithstanding this recovery, Africa's saving rate continues to be the lowest across all regions.

We now turn to the analysis of the main determinants of private saving rates, comparing their expected signs according to consumption theory and their actual signs derived in seven empirical studies of private saving rates in cross-country time-series (panel) samples (table 1).[7] The empirical studies cover both industrial and developing countries (Masson, Bayoumi, and Samiei 1995; Edwards 1996; Bailliu and Reisen 1998; and Loayza, Schmidt-Hebbel and Servén 2000), industrial countries alone (Pesaran, Haque, and Sharma 2000), and developing countries alone (Corbo and Schmidt-Hebbel 1991 and Dayal-Ghulati and Thimann 1997).

The common feature of these articles is that they are based on reduced-form saving equations, not derived from first principles. They differ in that they use different samples, model specifications, and estimation techniques. Still, many of the estimated coefficients are consistently significant across different studies or are consistent with signs predicted by theory. Variables whose signs are consistent across studies and are statistically significant include the terms of trade, foreign borrowing constraints, fiscal policy variables, and pension system variables. Regarding the signs of other determinants, on which consumption theories

7. A detailed discussion of the expected signs of saving determinants in table 1 and how they relate to specific consumption theories is provided in Loayza, Schmidt-Hebbel, and Servén (2000). Further reviews of consumption hypotheses and their relation to empirical findings can be found in Schmidt-Hebbel and Servén (1997, 1999a).

Table 1. *Determinants of the Ratio of Private Saving to Income in Panel Studies*

Variable category	*Specific variable*	*Sign predicted by theory*	*Empirical findings*
Income	Income level		
	Actual	0 or +	+ (1, 2, 3, 4, 7) 0(5, 6)
	Temporary/permanent	+ / 0 or +	0 / 0 (7)
	Terms of trade		
	Actual	0 or +	+ (2, 4, 6, 7)
	Temporary/permanent	+ / 0 or +	+ / + (7)
	Growth rate: actual	Ambiguous	+ (2, 3, 7) 0 (4, 5, 6)
Rates of return	Real interest rate	Ambiguous	–(7) 0 (1, 3, 5, 6) + (2)
Uncertainty	Variance of innovations to saving determinants	+	
	Inflation or other measures of macroeconomic instability	+	
	Measures of political instability	+	–(4) 0 (1, 2, 3, 6), + (7)
Domestic borrowing constraints	Private credit flows	–	+ (3) – (7)
	Broad money flows	–	
	Income	–	
Foreign borrowing constraints	Foreign lending	–	
	Current account deficit	–	– (1, 2, 3, 7)
Financial depth	Private or domestic credit stocks	Ambiguous	– (5)
	Money stocks	Ambiguous	+ (1, 3, 4) 0 (7)
Fiscal policy	Public saving	–	– (1, 3, 7)
	Public surplus	–	– (2, 5, 6) 0 (4)
	Public consumption	Ambiguous	– (2, 6)
Pension system	Pay-as-you-go pension transfers	0 or –	– (3, 4, 5)
	Mandatory fully funded pension contributions	0 or +	+ (4)
	Fully funded pension assets	Ambiguous	0 / + (5)
Demographics	Old- and/or young-age dependency	–	– (2, 3, 4, 7) 0 (5, 6)
	Urbanization	Ambiguous	– (3, 7)
Distribution of income and wealth	Income concentration	Ambiguous	0 (3)
	Wealth concentration	Ambiguous	
	Capital income share	+	

Note: The qualitative results listed in the last column summarize significant signs of saving regressors in the following studies:

1. Corbo and Schmidt-Hebbel (1991: table 4)
2. Masson, Bayoumi, and Samiei (1995: table 2, "restricted model" column)
3. Edwards (1996: table 2, col. 5)
4. Dayal-Gulati and Thimann (1997: table 4, col. 2)
5. Bailliu and Reisen (1998; table 1, cols. 3 and 4)
6. Pesaran, Haque,and Sharma (2000: table 6, cols. 4 and 5)
7. Loayza, Schmidt-Hebbel, and Servén (2000; table 4, col. 3 and table 7, various columns).

Significant coefficient signs are identified by a plus or a minus. Results identified by a zero mean either an insignificant coefficient in the corresponding column of the original study or, when the variable is omitted from the particular specification reported in the column, a significant or insignificant variable in a different column of the same table. A zero in the third column means that theory predicts no effect.

either differ or give ambiguous predictions, such as income growth and the real interest rate, the empirical studies give conflicting results. They also differ in the significance levels of some variables for which theories agree on expected signs: income, inflation, and age-dependency ratios.

Keeping these results in mind, we turn to a brief discussion of the literature's findings on saving behavior, relying mainly on the most recent and comprehensive of the seven studies in the table, Loayza, Schmidt-Hebbel, and Servén (2000), and the other articles of the World Bank's saving research project. The review starts by identifying nonpolicy saving determinants and subsequently discusses the influence of specific policy variables on private saving.

What Drives Private Saving Rates?

We begin the review by identifying nonpolicy determinants of saving. These include persistence, income, growth, demographics, and uncertainty.

PERSISTENCE. Private saving rates show inertia; that is, they are highly serially correlated even after controlling for other relevant factors. The effects of a change in any determinant of saving thus are fully realized only after a number of years, with long-run responses estimated to be about twice as large as short-run (within a year) effects (Loayza, Schmidt-Hebbel, and Servén 2000).[8]

INCOME. Several multivariate cross-country studies of saving find that the level of real per capita income positively affects saving rates (see, for example, Collins 1991; Schmidt-Hebbel, Webb, and Corsetti 1992; Carroll and Weil 1994; Edwards 1995; and Schmidt-Hebbel and Servén 2000). Six of the seven panel studies reported in table 1 show similar effects for private saving rates.

The influence of income typically is greater in developing than in industrial countries, tapering off at medium or high income levels. In developing countries a doubling of income per capita is estimated, other things being equal, to raise the long-run private saving rate by 10 percentage points of disposable income (Loayza, Schmidt-Hebbel, and Servén 2000). Of course, other things are never equal in practice: development also changes demographics and rates of urbanization, which may reduce saving. Thus the long-term effect of income on saving may be more modest than this figure indicates. Nevertheless, the overall implication is that policies that spur development are an indirect but effective way to raise private saving.[9]

8. A related but different form of persistence is that which affects consumption levels. One way to explain consumption inertia observed in the data—that is, the finding that future consumption levels are partly predictable—is by introducing consumption habits. They imply that consumer utility in any given period depends on both consumption in that period and a stock of consumption habits. One form is external habits (Abel 1990 and Campbell and Cochrane 1994), in which utility depends positively on the difference between an individual's consumption and (possibly lagged) average per capita consumption levels. An alternative specification is internal habits (Ferson and Constantinides 1991) in which utility depends on the difference between an individual's current and lagged consumption levels.

9. These results are also consistent with the view that the ability to save rises sharply only after income exceeds subsistence consumption levels, as implied by the Stone-Geary specification of consumer prefer-

Income inequality is another potentially important determinant of saving. It played a prominent role in post-Keynesian models of saving and growth (Lewis 1954, Kaldor 1957, and Pasinetti 1962), which focus on the *functional* distribution of income (that is, the distribution of income among classes of consumers, such as workers and capitalists). However, most of the recent theoretical work and the bulk of related empirical studies focus on the *personal* distribution of income (that is, the distribution based solely on income criteria). Given the links between income inequality and saving, income concentration is expected to have a positive effect on household saving, but a negative effect on corporate and public saving, resulting in an ambiguous effect on aggregate saving (for a discussion see Schmidt-Hebbel and Servén 2000). Edwards (1995) and Schmidt-Hebbel and Servén (2000) find that personal income concentration has no significant effect on the private and national saving rates, respectively.

Both the permanent-income hypothesis (Friedman 1957) and the life-cycle hypothesis (Modigliani and Brumberg 1954) distinguish between the consumption (and saving) effects of changes in permanent and temporary income, whether measured by fluctuations in private disposable income or movements in the terms of trade, in studies using aggregate data. In its simple and extreme form—permanent-income shocks should be entirely consumed, whereas temporary-income shocks should be entirely saved—the permanent-income hypothesis is typically rejected by the evidence. However, the evidence also shows that the positive impact on saving of a temporary increase in real per capita income is greater than that of a permanent rise in income (Loayza, Schmidt-Hebbel, and Servén 2000).

GROWTH. The simple permanent-income theory predicts that higher growth (that is, higher future income) reduces current saving. But in the life-cycle model growth has an ambiguous effect on saving, depending on which cohorts benefit the most from income growth, how steep their earning profiles are, and the extent to which borrowing constraints apply (Deaton 1992). Reverse causation from saving to growth also is possible, taking place through capital accumulation.

A strong positive association between saving ratios and real per capita growth has been documented amply in cross-country empirical studies (see, for example, Modigliani 1970, Maddison 1992, Bosworth 1993, and Carroll and Weil 1994). Half of the panel studies included in table 1 confirm the positive relationship. However, its structural interpretation is controversial, as it has been viewed both as proof that growth drives saving (for example, Modigliani 1970 and Carroll and Weil 1994) and that saving drives growth through the saving-investment link (for

ences, which characterizes utility as a positive function of the difference between current consumption and an exogenously given subsistence level below which no saving takes place. Variants of this model specify the intertemporal elasticity of consumption as an increasing function of wealth (Atkeson and Ogaki 1991) or of the distance between permanent income and subsistence consumption (Ogaki, Ostry, and Reinhart 1996). These studies provide household and aggregate evidence in support of this view for both industrial and developing countries.

example, Levine and Renelt 1992 and Mankiw, Romer, and Weil 1992). Recognizing the importance of controlling for the joint endogeneity of income growth and saving, Loayza, Schmidt-Hebbel, and Servén (2000) use a panel instrumental-variable approach to estimate the effect of income growth on saving. They find that a 1 percentage-point rise in the growth rate increases the private saving rate by a similar amount, although this effect may be partly transitory.

Three other studies in the World Bank's saving project revisit the correlation between saving and growth. Attanasio, Picci, and Scorcu (2000) examine the dynamic relationship between economic growth, the investment rate, and the saving rate using annual time series for a large cross section of countries. Employing a variety of samples and econometric techniques, they consistently find that growth Granger-causes saving, although the effect appears to be quantitatively weak. They also find that increases in saving rates do not always precede increases in growth. Moreover, there seems to be a negative relationship between lagged saving rates and current income growth (a "saving-for-a-rainy-day" effect) when additional controls (such as dependency rates) are included in the regression specification. Deaton and Paxon (2000) reassess the association between saving and growth using household data and find that the observed correlation between both variables can be explained largely as the effect of income growth on saving if individual household members determine their consumption plans on the basis of their respective lifetime income profiles.

Finally, Rodrik (this issue) examines both long-lasting and short-lived episodes of saving takeoffs, showing that sustained increases in saving typically are followed by accelerations in growth that persist for several years, but eventually disappear. In contrast, sustained accelerations in growth are associated with permanent saving hikes. We return to this issue below.

DEMOGRAPHICS. The cornerstone of the life-cycle hypothesis is age-related consumer heterogeneity and the prediction that saving follows a hump-shaped pattern (that is, high at middle age and low at young and old ages). Research has shown that this hypothesis is not problem-free when it comes to interpreting actual saving behavior. Life-cycle saving is not sufficient to account for the high level of aggregate wealth in industrial economies (Kotlikoff and Summers 1981). Changes in growth do not cause the cohort-specific differences in saving levels (Bosworth, Burtless, and Sabelhaus 1991) or in intertemporal consumption patterns (Carroll and Summers 1989 and Deaton 1991). Elderly people save or at least do not dissave as much as predicted by the life-cycle hypothesis (Deaton and Paxson 1994 and Poterba 1995), and consumers appear to value bequests (Menchik 1983).

Yet microeconomic and macroeconomic evidence, both at the international and single-country level, confirms that a rise in the young-age and old-age dependency ratios tends to lower private saving rates—a result in line with the predictions of the life-cycle theory. Panel evidence indicates that a rise in the young-age dependency ratio by, say, 3.5 percentage points leads to a decline in the private

saving rate of about 1 percentage point; the negative impact on saving of an increase in the old-age dependency ratio is more than twice as large (Loayza, Schmidt-Hebbel, and Servén 2000). An implication of these results is that developing countries with young populations that want to accelerate their demographic transition—like China—and speed up the decline in young-age dependency may experience a transitory increase in their saving ratios. This increase will continue until the country reaches the next stage of demographic maturity, at which old-age dependency rises swiftly and saving rates level off.

Another demographic force that typically affects private saving rates is the degree of urbanization. Its effect on saving has been found to be negative empirically, a result that has been explained along the lines of the precautionary saving motive.

UNCERTAINTY. Theory predicts that greater uncertainty should raise saving since risk-averse consumers set resources aside as a precaution against possible adverse changes in income and other factors (Skinner 1988 and Zeldes 1989). Uncertainty helps to explain why consumption follows income so closely (contradicting the simple permanent-income hypothesis) in the case of young consumers who expect positive but uncertain future income growth: their risk aversion is at war with their impatience (Carroll 1991). It also explains why the retired save a positive amount or dissave little, as they face much uncertainty regarding the length of their life and health costs. Direct empirical tests of the precautionary saving motive have been hampered by the difficulty of obtaining estimable closed-form solutions to models with this motive. However, some empirical estimates suggest that precautionary saving may account for a substantial fraction of household wealth (Carroll and Samwick 1995a).

In the empirical literature on saving and growth the most popular proxy for (macroeconomic) uncertainty is inflation. However, only one of the six panel studies that include inflation among the explanatory variables finds a positive and significant effect on the private saving rate (Loayza, Schmidt-Hebbel, and Servén 2000). Another variable related to uncertainty is the rate of urbanization, which is expected to have a negative impact on saving. Rural incomes are more uncertain than urban incomes and, in the absence of financial markets through which risks can be diversified, rural residents would save a greater fraction of their income. Edwards (1996) and Loayza, Schmidt-Hebbel, and Servén (2000) provide supporting evidence for this view.

Which Policies Affect Private Saving and Why?

In addition to the factors mentioned above, economic policies may also affect saving directly and indirectly. These include fiscal policies, pension reform, financial liberalization, and external borrowing and foreign aid.

FISCAL POLICY. Extending the permanent-income hypothesis, the Ricardian equivalence hypothesis combines consumers' and the government's intertemporal

budget constraints and derives permanent income as net of the discounted value of government spending (Barro 1974). Its implication is that, as long as a number of restrictive conditions hold, a permanent rise in government saving will be fully offset by a corresponding reduction in private saving, leaving national saving unchanged.

Most international empirical evidence rejects full Ricardian equivalence, finding that the offset is only partial. Six of the seven studies included in table 1 show that public saving or deficits have a negative effect on private saving. However, the estimated contemporaneous offset coefficients are significantly smaller than 1, ranging from 0.23 to 0.65. In the one study that distinguishes between short- and long-term effects, the contemporaneous offset coefficient is only 0.29 but rises to 0.69 in the long term (Loayza, Schmidt-Hebbel, and Servén 2000). López, Schmidt-Hebbel, and Servén (2000) provide evidence that borrowing constraints, rather than finite horizons, lie behind the rejection of full Ricardian equivalence. This conclusion is based on the empirical estimation of a model derived from first principles that aggregates consumption plans of heterogeneous agents.

Hence public sector saving seems to be one of the most direct and effective tools available to policymakers targeting national saving. However, its estimated effectiveness varies considerably—not only between the short and long term but also across countries. Offset coefficients vary from less than 30 percent in India (Loayza and Shankar, this issue) to almost 80 percent in Mexico (Burnside 1998). Regarding the composition of public saving, the international evidence shows that cutting expenditures is a more effective way to increase national saving than raising taxes (Corbo and Schmidt-Hebbel 1991; Edwards 1996; and López, Schmidt-Hebbel, and Servén 2000).

The evidence on the effectiveness of tax incentives granted to private savers—typically on specific financial instruments—in raising national saving is mixed and, overall, not promising. The elasticity of private saving to net rates of return is ambiguous on theoretical grounds, because of offsetting substitution, income, and human-capital effects. The empirical evidence on interest-rate elasticities of saving reflects the theoretical ambiguity: empirical estimates typically are small and not significantly different from zero. Four of the seven studies reported in table 1 show that the effect of interest rates on private saving is not significantly different from zero; one study (Masson, Bayoumi, and Samiei 1995) reports a positive effect, and one study (Loayza, Schmidt-Hebbel, and Servén 2000) reports a negative effect. More direct evidence from industrial countries on the effectiveness of tax incentives for voluntary retirement saving instruments is equally mixed. If the tax incentives have a positive effect on saving, the effect is generally found to be small, particularly when the negative effects of tax incentives on public saving are taken into account (Besley and Meghir 1998).

PENSION REFORM. Some countries, especially countries in Latin America and Europe, are replacing pay-as-you-go pension systems with fully funded schemes, a reform often advocated for its favorable impact on saving. However, analytical

considerations suggest that the impact of pension reform on saving is not a given, but rather hinges on the way the transition deficit is financed and on the reform's efficiency gains. Pension reform should have little short-run impact on private saving if it is financed by issuing public debt, since this entails converting an implicit government liability into an explicit one. If, however, the transition is financed by reducing the nonpension public deficit (by lowering net benefits to current retirees, imposing higher taxes on current generations, or lowering government expenditures), saving levels of current generations will decline, while those of future generations will rise, although their saving rates will not necessarily change.

In the long term pension reform can have additional effects on saving through mandatory saving requirements. A well-known example is Singapore's Central Provident Fund, requiring minimum retirement contributions of 25 percent of salary. These requirements may raise the saving of low-income borrowing-constrained earners well above what they would have saved otherwise, although the welfare implications of such a change are obviously open to question. Pension reform also can have positive, indirect effects on saving if it raises per capita income and growth by reducing labor market distortions and spurring capital market development.

Empirical evidence shows that countries that increase the funding of their mandatory retirement programs tend to achieve higher private saving rates. Three of the panel-data studies reported in table 1 show that pay-as-you-go transfers negatively affect private saving rates or that fully funded contributions or assets positively affect private saving rates. Time-series evidence for Chile, the first country that reformed its pension system, suggests that 3.8 percentage points of the 12.2 percentage-point increase in the national saving rate since 1986 can be attributed to pension reform (Schmidt-Hebbel 1999). Samwick (2000) provides further time-series evidence for five reforming countries, revealing that national saving increased only in Chile. However, Samwick also reports that pay-as-you-go systems had significant negative effects on saving—the magnitude of which increased with the system's coverage rate—in cross-country regressions of 94 countries.

FINANCIAL LIBERALIZATION. Financial liberalization includes interest rate liberalization, elimination of credit ceilings, easing of entry for foreign financial institutions, development of capital markets, and enhanced prudential regulation and supervision. Until recently, the view that financial liberalization should encourage aggregate saving was widely held. Analytically, we can separate the effect of financial liberalization on private saving rates into a direct, short-run impact, which is generally negative, and an indirect, long-run impact, which is generally positive. The direct impact is felt through price and quantity channels. The price channel refers to the effect on saving of higher interest rates, which typically result from financial liberalization. Although popularly advocated in the financial press, higher interest rates are seldom found to be effective in raising private

saving, suggesting that the negative income effect of higher interest rates tends to neutralize the positive intertemporal substitution effect.

The quantity channel works through the expansion of the supply of credit to previously credit-constrained private agents, allowing households and small firms to use collateral more widely, and reducing down payments on loans for housing and consumer durables. Theory predicts that the expansion of credit should reduce private saving as individuals are able to finance higher consumption at their current income level. This prediction is well supported by the empirical evidence: a 1 percentage-point increase in the ratio of private credit flows to income reduces the long-term private saving rate by 0.74 percentage point (Loayza, Schmidt-Hebbel, and Servén 2000). Deeper analysis of eight episodes of financial liberalization fails to find a systematic direct effect on saving rates: it is clearly negative in some cases (the Republic of Korea and Mexico), positive in others (Ghana and Turkey), and negligible in the rest, likely reflecting different emphases on price and quantity channels (Bandiera and others 2000). It should be noted, however, that these studies do not use a measure of saving that includes the future-consumption portion of durable-good purchases. Taking advantage of the extensive national account information in India, Loayza and Shankar (this issue) find that financial development has induced private agents to change the composition of their assets to favor durable goods but has not affected the total volume of saving once saving is measured correctly (that is, to include durable purchases). This conclusion should invite a reinterpretation of the negative direct link between financial development and private saving.

Moreover, the indirect positive effects of financial liberalization on saving should not be underplayed. Liberalizing domestic financial markets—particularly if done by strengthening the domestic banking sector—improves the efficiency of financial intermediation and hence investment, contributing to higher growth. Thus it is mostly through faster income growth that financial liberalization will increase private saving rates in the long run.

EXTERNAL BORROWING AND FOREIGN AID. The relationship between national saving and foreign resource inflows in general, and foreign aid in particular, has attracted considerable attention. Many empirical studies, starting with Chenery and Strout (1966), attempt to establish whether foreign saving crowds national saving in or out, but no consensus has emerged. One problem of this literature is the simultaneity between the two variables, which can be ruled out only if domestic savers face binding borrowing constraints in world financial markets. Addressing this issue, Loayza, Schmidt-Hebbel, and Servén (2000) estimate that an increase of 2 percent of GNDI in the exogenous component of foreign lending reduces private (and national) saving by approximately 1 percent of GNDI in the long run.[10]

10. Although the authors attempt to control for the endogeneity of foreign saving, this result should be taken with considerable caution in view of the wide disparity in external financial regimes faced by different countries in different periods.

The relationship between saving and foreign aid has also been examined in several empirical studies, starting with Griffin (1970). Most conclude that aid crowds out national saving, a finding that is confirmed by recent evidence for Sub-Saharan Africa (Elbadawi and Mwega, this issue). This result also must be taken with caution, however, as aid flows mostly to the poorest countries or to economies in distress, one symptom of which is low saving—so the negative relationship between saving and aid could partly reflect reverse causation. Closer scrutiny of countries experiencing a transition from low to high saving rates reveals instead that in a number of cases hikes in foreign aid were positively associated with takeoffs in private and national saving (Rodrik, this issue). The conclusion is that aid need not invariably crowd out national saving.[11]

III. Articles in the Symposium Issue

This issue includes a substantial part of the output of the World Bank research project on saving. The issue comprises two complementary sets of articles. The first group includes studies that focus on geographic regions or groups of countries sharing a common saving experience: Ibrahim Elbadawi and Francis Mwega on Africa's saving collapse, Cevdet Denizer and Holger Wolf on postsocialist saving adjustment in transition economies, Peter Montiel on temporary consumption booms, and Dani Rodrik on saving transitions. The second group comprises case studies of saving in three developing countries: Janine Aron and John Muellbauer on South Africa, Aart Kraay on China, and Norman Loayza and Rashmi Shankar on India. Taken together, the articles in this issue provide a comprehensive assessment of private, national, and, in a few cases, household saving in major developing countries and regions of the world.

Regional Studies

The poor saving performance of Sub-Saharan Africa over the past three decades is a matter of concern given the increasing scarcity of foreign aid. Private saving ratios declined from an already low level of 11 percent in the 1970s to 8 percent in the 1980s, recovering only partially (to less than 9 percent) in the 1990s. Ibrahim Elbadawi and Francis Mwega examine the pattern of causality between saving and related aggregates, study the determinants of private saving, and identify specific policies that could help to reverse the region's poor saving performance. They find weak evidence that growth precedes saving, but not the reverse. Foreign aid—of major importance in the region—is found to negatively Granger-cause saving. Panel estimation shows that the region's low private saving is not a result of unknown features specific to Sub-Saharan Africa; rather, it reflects differences in saving fundamentals relative to other regions. In explaining the difference in saving performance between Sub-Saharan Africa and the high-

11. This result might reflect the impact of ongoing reforms that invited aid and induced higher investment and growth, so that aid and saving rose together ex post. On this issue see Burnside and Dollar (2000).

performing Asian economies, the authors identify low per capita income, the high young-age dependency ratio, and large amounts of foreign aid as the main causal factors. Complementary evidence from country experiences suggests that controls on external trade and capital flows in Zimbabwe and a relatively developed domestic financial system in both Kenya and Zimbabwe contribute to the relatively high private saving rates in these two countries. In turn, prudent public management of a boom in a nonrenewable resource (diamonds) explains Botswana's very high public saving rate, which is reflected—through the imperfect offset between private and public saving—in a high national saving rate.

A striking feature of the economic transition in Central and Eastern Europe has been the dramatic decline in measured ratios of gross domestic saving to gross domestic product (GDP), from about 30 percent in 1989, before the transition, to around 10 percent in 1992–94, with a partial recovery afterward. Cevdet Denizer and Holger Wolf analyze three possible explanations for the saving collapse in a sample of 10 Eastern European countries, 3 Baltic countries, and 12 successor countries of the former Soviet Union: elimination of involuntary excess saving during socialism, changes in the responsiveness of saving to its key determinants, and changes in the determinants of saving themselves. They assess the extent of involuntary saving by comparing saving rates of market economies with hypothetical saving rates in pretransition economies that are predicted from the same fundamentals underlying saving rates in market economies. On balance, the predicted saving rates fell short of actual saving rates—particularly for the countries of the former Soviet Union and the Baltics and less so for Central European countries—supporting the notion of excessive saving before the transition. Substantial similarities are found between the saving behavior of market and transition economies. The exception is the negative link between growth and saving in transition economies, suggesting that consumption smoothing in the face of a deep recession dominates the other links between growth and saving. Finally, the authors find that economic liberalization reduces saving, a further indication of smoothing in the presence of an output path that follows a J-curve.

Transitory surges in consumption have played a major role in boom-bust aggregate cycles in many developing countries. Peter Montiel analyzes consumption booms across countries, weighing potential macroeconomic and financial explanations. Defining a consumption boom as a large and sustained deviation of the ratio of real private consumption to real GDP from its normal or trend value, Montiel identifies 39 booms that have occurred since the 1960s. Prospective causes include income redistribution through populist policies, changes in intertemporal relative prices (temporarily lower real interest rates and nominal interest rates and appreciated real exchange rates), wealth effects (perceived wealth arising from terms-of-trade windfalls and expectations of higher future growth from successful reforms), and credit booms (rapid expansion of credit to the private sector with implicit or explicit government backing of financial liabilities, resulting from inappropriate domestic financial liberalization and large capital inflows). Empirical results from probit regressions, based on a panel sample of

52 countries with and without boom episodes, show that booms are more likely to occur because of appreciated real exchange rates and favorable terms of trade. Other factors are not statistically significant in causing consumption booms. However, further country-by-country analysis shows that some of the other potential causes—including anticipated higher growth and the expansion of private credit—also have contributed to several episodes. Indeed, in 16 of the 39 booms more than one cause was associated with the temporary consumption surge.

Over the past three decades only a handful of countries (the "takeoff" economies) have achieved persistent increases in their growth and saving rates. Dani Rodrik examines the factors that promote such takeoffs and the time precedence between saving and growth, using a formal approach to identify saving transitions. For a sample of 20 countries that have experienced saving transitions (defined as a sustained increase of 5 percentage points or more in the ratio of national saving to national income) since the 1960s, growth rates tend to return to levels before the saving transition, even though saving rates remain high. This contrasts with the findings for a sample of 18 countries that experienced growth transitions (defined as a sustained increase in the growth rate of 2.5 percentage points or more): growth booms are associated with permanent increases in saving rates. This evidence, complemented by Granger-causality tests, indicates that growth tends to lead saving, not the reverse. Rodrik suggests that behind these results are positive productivity shocks that raise the return on investment, leading to higher aggregate investment and growth. Saving rates follow higher investment and growth because of factors such as consumption habits. Further inquiry into takeoffs of individual countries leads Rodrik to identify favorable policy changes behind the growth spurts. Investment and export incentives and supportive public investment were behind the growth (and subsequent saving) takeoffs in Korea, Singapore, and Taiwan (China), while financial development and implementation of mandatory fully funded pension systems contributed to the takeoffs in Chile and Singapore.

Country Studies

South Africa's gross national saving rate declined by half between the 1980s and the 1990s. In net terms it fell from 8 to 1 percent. Janine Aron and John Muellbauer examine the causes, and possible remedies, of this precipitous fall. They show that the trend decline in national saving reflects mainly a deterioration in the government's saving performance. Private saving remained roughly stable until recently, with declining household saving offset by rising corporate saving. Aron and Muellbauer focus on the causes of the disparate evolution of these two components of private saving. For this purpose they construct a comprehensive database on private sector wealth. Their analysis also includes a number of innovations, such as the explicit inclusion of asset effects and income expectations and the modeling of corporate profits. The empirical findings show that financial liberalization has been a major factor behind the decline in per-

sonal saving and the rise in corporate saving, whereas the increase in real interest rates has had a positive impact on both components of saving. Aron and Muellbauer highlight the policy implications of their results in terms of corporate taxation and prudential regulation of financial intermediaries.

China, the world's largest and fastest-growing economy, also has national saving rates that are among the highest in the world. Although China's saving rates are similar to those in the East Asian miracle economies, they have been achieved at much lower income levels. Furthermore, China's transition to a market economy has not been associated with declining saving, unlike in most other former socialist countries. Aart Kraay's study represents a first attempt to sort out these puzzles. Kraay highlights the considerable statistical difficulties that cloud the measurement of saving in China, both at the national and household level. For example, depending on the data source, household saving could represent one-fourth or one-half of gross national saving. These unresolved measurement issues make it difficult to interpret the recent trends in China's saving aggregates. With this strong caveat, Kraay explores the main determinants of household saving. He finds that expectations of future income growth, as well as income levels higher than subsistence consumption (proxied by the share of food consumption), play a significant role in the observed evolution of saving, although they account for only a small portion of the observed variation in household saving. In contrast, he finds that demographic factors or income uncertainty have no effect on saving—although the fact that saving rates of rural households are much higher than those of urban households may partly reflect the greater uncertainty of rural incomes.

In recent years India's national and private saving performance has surpassed that of countries with comparable per capita incomes—although to a more modest extent than in China. Norman Loayza and Rashmi Shankar analyze the factors behind India's high private saving rates. A distinguishing feature of their article is its use of private and public saving measures that are adjusted for inflationary capital gains and losses, durable expenditures, and human capital accumulation, bringing them close to their theoretically correct counterparts. As Loayza and Shankar show, such adjustments—which are made possible by India's highly detailed data—result in large changes in public and private saving relative to the naive measures based on national accounts data. Using these improved measures of saving, the article identifies the determinants of private saving, after showing that perfect offset between household and corporate saving makes it unnecessary to examine them separately. The empirical results show that private saving ratios react positively to the real interest rate and are negatively affected by age-dependency ratios. Saving also is positively related to the share of agricultural income in total income. As with cross-country results concerning the degree of urbanization, this likely reflects precautionary saving motives. Loayza and Shankar also show that the naive measure of private saving is adversely affected by financial liberalization, whereas the (theoretically superior) measure of saving inclusive of purchases of durable goods is not.

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