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Savings transition in Asia: Unity in diversity

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Savings transition in Asia: Unity in diversity*

Prema-chandra Athukorala and Wanissa Suanin

Abstract

This paper examines the national savings behaviour in the process of economic growth through a comparative analysis of countries in developing Asia from a historical perspective. Developing Asia provides an ideal laboratory for the study with considerable differences in the savings behaviour among countries and over time within individual countries, notwithstanding the ‘model saver’ image based on the average savings rate. The empirical analysis distinguishes between private and government savings rates, with specific emphasis on the former. The results of the empirical analysis are consistent with the view of ‘virtuous circle’ between growth and savings, with growth initiating the savings transition. No evidence to suggest that a prior phase of promoting savings through specific policy initiatives is needed to initiate the process of growth and structural transformation. The private savings rate is associated positively with per capita gross domestic product, export orientation, and foreign resource inflows and negatively with the young dependency ratio of the population and domestic credit availability.

Key words: developing Asia, savings, investment, life cycle model, export-led growth

JEL classification: D15, E21, O47, O53

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1 Introduction

The literature on national savings in the process of economic development and structural change has evolved around two separate but interrelated issues: what is the relationship between the savings rate and growth, and why do savings rates differ across countries and over time in a given country?

The debate on the first issue has been virtually settled, even though there has been some controversy about why a given savings rate is associated with different growth rates and in what way the causality runs. In the formative stage of development thinking during the early post-war years, the Harrod-Domar model, which held sway as the workhorse of development policy, linked growth directly and almost exclusively to the savings rate (Meier 1984). Given the perceived structural constraints on domestic savings mobilization in developing countries, foreign savings (foreign capital inflows) was considered a key prerequisite for economic take-off. The supremacy of savings (and hence investment) in the growth process was, however, questioned by the neoclassical growth model (*a la* Solow 1956) that received increased attention in the policy debate from the late 1960s. It postulated that an increase in savings rates generates higher growth only in the transition between steady states, and long-term growth depends solely on technological progress. From about the late 1980s, the new endogenous growth models have, however, provided theoretical support for the view that higher savings (and hence investment) results in a permanent increase in growth rates. New multi-country empirical growth studies spawned by these theoretical advances have supported the notion that the rate of investment is the single-most important determinant of intercountry differences in growth rates (Levine and Renelt 1992; Sala-i-Martin 1997; Prichett 2006).

In contrast to the emerging consensus on the investment-growth nexus, the issue of why some countries save more than others remains an unresolved issue. What is the process by which a community that was previously saving a low percentage of national income dramatically increases its savings? Do countries need to start with specific savings proportion policies to initiate the growth process or by harnessing foreign capital inflows? Alternatively, would initiation of the growth process through economy-wide market-oriented reforms generate a ‘virtuous cycle’ of growth-induced savings, resulting in a further increase in savings to

generate even higher savings and growth? How do demographic dynamics influence the savings trajectory in the process of growth and structural change?

The purpose of this paper is to contribute to this debate through a comparative analysis of savings behaviour in countries in developing Asia¹ from a historical perspective. The focus on Asia is motivated by two reasons. First, the experiences of these countries as ‘model savers’ figure prominently in the contemporary policy debate on the role of domestic savings in economic development and how to bridge the domestic investment-savings gap that constrains the growth process in most developing countries.² Second, notwithstanding their ‘model saver’ image, which is based mainly on the experience of high-performing East Asian economies, there are considerable differences in the savings behaviour among countries and over time within individual countries in the region. Therefore, the region provides an ideal laboratory to study the determinants of savings in the process of economic growth and structural transformation.

The paper aims to add to the existing knowledge of the savings behaviour of countries in developing Asia in several ways. First, for the first time in the study of comparative savings behaviour in the region,³ the analysis distinguishes between private and the government savings rates, with specific emphasis on the former. The specific focus on private savings is important from the policy point of view because public savings is mostly driven by unobservable political factors. Second, export orientation in the development process is explicitly included in the savings function as a conditioning variable in examining the relationship between the savings rate and per capita income growth. Third, benefiting from recent improvement in the national data reporting systems, we use an annual balance panel data set for the period 1980–2019 with a wider regional coverage, encompassing countries in Northeast Asia, Southeast Asia, and South Asia. Finally, we use improved econometric techniques. The panel data Auto-Regressive Distribution Lag (ARDL) methodology used in estimation, the savings function, may offer a solution to the problem of bias caused by

¹ For the purpose of this paper, developing Asia is defined to encompass all member countries of the Asian Development Bank. The coverage of countries and the time coverage of individual countries in the analysis depends, of course, on data availability.

² See Hussein and Thirlwall 1999; Ranis 1995; Stiglitz 1996; Loayza et al. 2000; and Grigoli et al. 2018.

³ The previous studies are Collins (1991), World Bank (1993, Chapter 5), Radelet et al. (1997), Asian Development Bank (1997, Chapter 2), and Horioka and Terada-Hagiwara (2012). The sole focus of these studies is on the aggregate national savings rate.

unobserved heterogeneity among countries, a common problem in estimation with cross-sectional data, while minimizing endogeneity bias in the savings-growth nexus.

The paper is structured in five sections. Section 2 presents a comparative analytical narrative of savings performance in Asia in the global context, with emphasis on policy regime shifts. Section 3 undertakes an econometric analysis of the determinants of the savings rate. Section 4 discusses the findings of the econometric analysis in the context of the comparative savings performance surveyed in Section 2 and makes policy inferences.

2 Savings behaviour in developing Asia: a historical perspective

2.1 Overall patterns

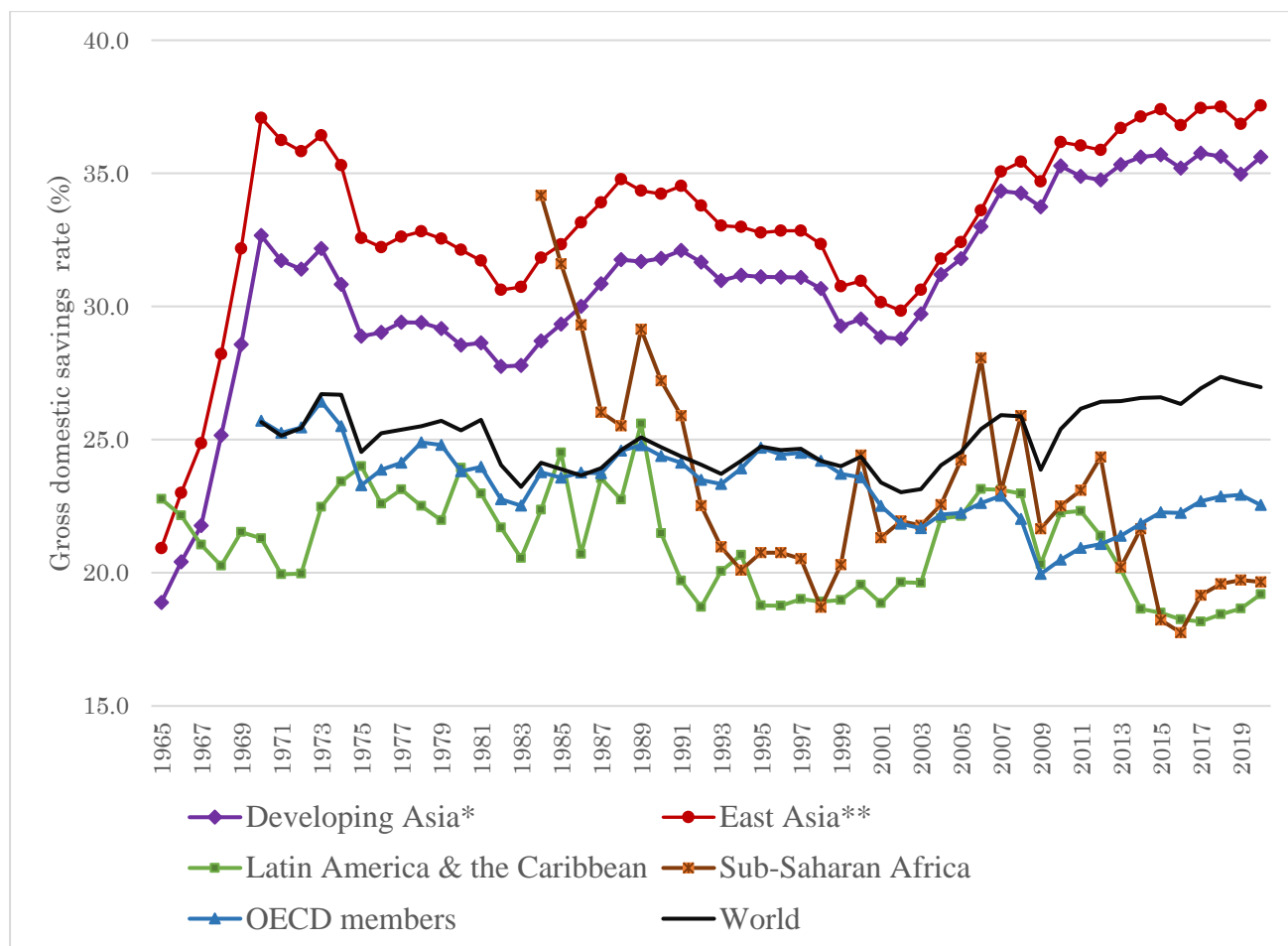
The savings rates in Asian countries were not unusually large in the early post-war years. Rosenstein-Rodan (1961), in a pioneering study undertaken to inform the policy debate on international development aid, estimated the average gross savings rate of Asian countries at 7.0 per cent compared to 9.4 per cent in Latin America and only one percentage higher than that in Africa (5.9 per cent). Interestingly, at the individual country level, Burma (Myanmar) and India had a higher similar savings rate of 8.5 per cent compared to Taiwan (8.0 per cent) and South Korea (6.5 per cent) (Rosenstein-Rodan 1961, Table 3-A).

The patterns began to change from about the late 1960s. By the late 1970s, the average Asian savings rate exceeded that of Latin America and was more than double the average rate recorded in Sub-Saharan Africa. During the ensuing years, the Asian rate and those of the other major regions and the overall world savings rate has widened. Overall, the Asian savings rates have also been much more stable (Figure 1 and Table 1).

The regional average hides substantial sub-regional and individual country differences in savings behaviour in Asia. Countries in Northeast Asia top the savings rate ranking followed by Southeast Asia. Savings rates in countries in South Asia are much lower compared to Southeast Asia but are still higher compared to the other regions. Within Northeast Asia, the high savings rates of Taiwan, South Korea, and Hong Kong have begun to taper off from about the late 1990s, but this has been more than counterbalanced by the spectacular increase in savings in China. China now accounts for over two-thirds of total national savings (in value) in the region. In Southeast Asia, the savings rate of Singapore has continued to

increase in contrast to the recent decline in the savings rates of the other three Asian ‘tigers’ (South Korea, Taiwan, and Hong Kong). In recent years, Singapore has recorded the highest savings rate in the region (and perhaps in the world).

Figure 1: World’s gross domestic savings rates by major regions, 1965–2019 (%)



Note: * member countries of the Asian Development Bank (ADB); ** includes countries of Northeast Asia, Southeast Asia, and the Pacific Island small states.

Source: World Bank, World Development Indicators database.

Table 1: Gross domestic investment rate (%)

Country/region	1960–69	1970–79	1980–89	1990–99	2000–09	2000–09	2020
<i>Developing Asia</i> ^{1,2}	16.5	30.5	29.5	31.1	31.5	35.3	35.6
<i>East Asia</i> ^{1,3}	18.1	34.4	32.6	33.0	32.5	36.8	37.5
<i>Northeast Asia</i> ¹	21.6	31.9	33.1	37.1	40.0	41.4	39.2
China	30.7	36.7	35.0	39.6	44.2	47.1	45.2
Hong Kong SAR, China	24.0	30.8	33.6	32.0	31.6	24.5	20.8

Korea, Rep.	8.7	22.5	33.0	37.7	33.9	35.4	35.5
Taiwan	20.3	31.2	33.2	27.4	29.8	26.2	25.3
<i>Southeast Asia</i> ¹	12.9	22.9	28.6	31.7	30.9	33.1	30.0
Cambodia	12.4	---	---	-0.3	12.4	17.8	24.9
Indonesia	5.1	19.9	26.7	28.4	28.3	33.8	31.7
Malaysia	21.4	28.0	33.3	40.6	43.0	34.0	26.2
Philippines	0.0	0.0	23.1	18.2	17.2	16.9	9.6
Singapore	9.7	28.8	43.0	49.0	48.0	53.8	54.6
Thailand	25.7	21.4	26.0	35.7	31.5	32.3	29.4
Vietnam	---	---	---	16.2	27.5	26.9	25.4
<i>Pacific Island small states</i> ¹	---	---	-15.4	6.5	11.2	10.1	7.7
Papua New Guinea	---	---	35.7	27.0	16.8	---	---
Fiji	---	---	15.6	20.3	18.6	17.9	16.4
Solomon Islands	---	---	-94.1	-23.9	-2.4	6.7	0.5
Vanuatu	---	---	12.2	15.0	16.9	19.2	15.1
<i>Central Asia</i>	---	---	---	---	---	---	---
Azerbaijan	---	---	---	11.1	39.2	40.1	23.5
Georgia	---	---	---	-3.9	5.4	10.6	4.5
Uzbekistan	---	---	---	16.7	29.9	23.7	25.0
Mongolia	---	---	19.4	30.6	22.9	29.8	23.7
Kazakhstan	---	---	---	11.1	37.1	39.9	34.3
Kyrgyz Republic	---	---	13.3	4.8	3.0	-5.0	7.8
<i>South Asia</i> ¹	8.6	11.4	14.6	21.8	26.9	28.1	26.2
Bangladesh	8.4	1.9	12.3	15.4	20.6	22.7	23.8
India	8.2	12.5	15.7	23.9	29.9	31.3	28.9
Pakistan	10.8	10.2	9.7	15.3	14.0	7.9	7.9
Nepal	0.0	6.0	11.0	12.0	10.6	10.0	6.3
Sri Lanka	11.8	15.2	17.8	18.0	16.9	23.1	18.9
<i>Memo items</i>	---	---	---	---	---	---	---
Japan	---	37.0	33.3	32.9	27.2	24.1	25.5
Latin America and the Caribbean	21.3	22.1	22.9	19.5	21.1	19.7	19.2
Sub-Saharan Africa	---	0.0	32.4	21.8	23.5	20.6	19.7
Middle East and North Africa	25.7	32.8	24.9	24.9	33.9	28.5	15.6
OECD member countries	---	24.9	23.7	24.1	22.2	21.9	22.5
World	---	25.6	24.4	24.3	24.4	26.5	26.98

Note: (1) GDP-share weighted average, (2) East Asia and South Asia, (3) Northeast Asia, Southeast Asia, Pacific Island small economies, and Central Asia.

Source: Compiled from the World Bank, *World Development Indicators* database.

It is important to note that there was a dramatic structural change in the composition of national savings in China following the market-oriented policy reforms. Until about the early 1990s when the reforms gained momentum, government savings (channelled through public enterprises) dominated national savings. For instance, household savings during 1960–69,

1970–79, and 1980–89 amounted to 3.8 per cent, 5.0 per cent, and 6.2 per cent, respectively (Modigliani and Cao 2004, Table 1). During the era of central planning, the government extracted revenue from farmers and consumers through an officially managed pricing mechanism. The resultant modern sector savings went to the state coffers through profit remittances of state-owned enterprises (SOEs) (Brandt et al. 2008). As discussed in Section 2.3, the rapid expansion of China’s savings over the past three decades has been driven by household and corporate savings against the backdrop of rapidly dissipating the role of the SOEs in the economy.

When these observed patterns of savings rates are placed in the context of the trajectory of policy reforms in these countries,⁴ we can see a clear relationship between the timing and nature of market-oriented policy reforms and savings transitions. Korea, Taiwan, Hong Kong, and Singapore⁵ were the earliest reformers in the region. The main Southeast Asian countries followed suit about a decade later. The dramatic savings transition in China began following the country’s gradual shift from ‘plan to market’ in the late 1970s. India, which had lost its early lead in savings ranking in the devaluing world for over four decades, has begun to catch up following the liberalization reforms initiated in the early 1990s. Sri Lanka recorded a significant increase in the savings rate following the liberalization reforms in the later 1970s, but the trend has begun to reverse in recent years, underpinned by a notable reversal of reforms. Within Southeast Asia, a comparison of the savings rates for the past three decades with those during 1965–79 points to the impact of policy regime shifts on savings. In Indonesia, the domestic savings rate has recorded a notable increase following reforms that began earlier in that decade. Vietnam began to replicate the early experiences of Korea and Taiwan as the reform process gathered momentum in the early 2000s.

At the formative stage of the emergence of development economics as a separate discipline, Sir Arthur Lewis (1954) made the following highly cited observation on the role of the savings transition in the process of economic development:

⁴ See World Bank (1993), Perkins (2013), McCawley (2017), and Athukorala (2021) for comprehensive surveys.

⁵ From about the early 1980s, Singapore has recorded by far the highest savings rate in the region (and perhaps in the world). This ‘exceptional saver’ status of Singapore is partly the result of a unique government policy that required all workers to make very large annual contributions to a pension fund (which can be used ahead of retirement for a variety of purposes other than current consumption).

The central problem in the theory of economic development is to understand the process by which a community which was previously saving and investing 4 or 5 per cent of its national income or less, converts itself into an economy where voluntary saving is running at about 12 to 15 per cent of national income or more. This is the central problem because the central fact of economic development is rapid capital accumulation (including knowledge and skills with 'capital'). We cannot explain any 'industrial' revolution (as the economic historians pretend to do) until we can explain why saving increased relatively to national income (Lewis 1954, p. 155).

When we take the data reported in this section at face value and assume a capital consumption allowance of 10 per cent (following Srinivasan 1994), the countries in Northeast Asia had already passed the Lewisian threshold by the early 1980s, all major Southeast Asian countries other than Indonesia and the Philippines by the early 1990s, and India in the early 2000s.

2.2 Private and government savings

The data on gross national savings disaggregated by private and public (government) savings are summarized in Table 2 for 13 Asian countries for which data are available for the past four decades. It is important to note that these data are not strictly comparable with those reported in Table 1. The gross national savings rate additionally captures remittances by migrant workers. The savings rates reported here are, therefore, larger for countries that receive a significant inflow of migrant worker remittances (in particular in Sri Lanka and the Philippines). Nonetheless, overall, the general picture presented is comparable.

Overall, both intercountry differences in national savings behaviour and intertemporal patterns within countries are dominated by private savings. The rate of public (government) savings is not as high as observed in some comparative studies.⁶ During 1981–2009, on average, government savings in Asia as a percentage of GNP amounted to 4 per cent compared to a private savings rate of 26 per cent. That is, the government directly accounted for only about 15 per cent of total national savings in the region.

⁶ For instance, Edwards (1996, p. 26) wrote that government savings accounted for between 30 per cent and 40 per cent of total national savings in East Asian countries.

Table 2: Gross national savings (percentage of GNP), 1981–2019

	Total national savings				Government savings				Private savings			
	1981–89	1990–99	2000–09	2010–19	1981–89	1990–99	2000–09	2010–19	1981–89	1990–99	2000–09	2010–19
<i>Northeast Asia</i>	32.5	34.2	40.7	44.8	5.0	-0.6	1.7	5.2	27.5	34.8	39.0	39.6
China	34.4	37.3	44.7	46.9	6.9	-2.6	1.5	5.2	27.5	39.8	43.1	41.7
Korea	27.3	33.5	33.5	35.4	-0.4	-0.4	1.2	6.4	27.7	34.0	32.3	29.0
Taiwan	33.3	27.4	29.8	29.6	6.2	4.0	2.5	2.2	27.1	23.4	27.3	27.5
<i>Southeast Asia</i>	28.1	32.8	31.4	32.7	6.6	9.7	6.9	5.0	21.6	23.1	24.5	27.6
Indonesia	28.9	28.7	26.1	32.7	8.3	10.3	10.0	6.5	20.6	18.4	16.1	26.1
Malaysia	29.2	37.5	37.5	30.2	10.5	12.0	9.4	4.3	18.7	25.5	28.0	25.9
Philippines	20.8	18.5	23.7	25.2	4.7	6.5	3.9	3.1	16.1	12.0	19.8	22.1
Singapore	33.1	48.3	46.0	48.3	1.8	15.2	5.7	8.1	31.2	33.0	40.3	40.2
Thailand	25.8	34.0	30.2	31.0	3.4	7.6	5.2	5.1	22.5	26.4	25.0	25.9
Vietnam	---	9.5	31.1	28.5	---	5.9	-0.9	-3.0	---	10.2	31.9	31.5
<i>South Asia</i>	16.6	23.0	30.4	31.2	0.1	0.0	0.8	-0.4	16.5	23.0	29.6	31.6
Bangladesh	3.6	17.6	22.5	27.4	-2.7	5.3	6.0	5.9	6.4	12.3	16.4	21.6
India	17.8	23.9	32.4	32.9	-0.3	-1.4	-0.3	-1.5	18.1	25.3	32.7	34.3
Pakistan	16.2	21.3	21.9	20.3	4.2	4.8	4.5	3.1	12.0	16.5	17.4	17.2
Sri Lanka	10.0	19.2	22.0	29.0	8.4	7.1	2.1	4.5	1.6	12.1	20.0	24.5
<i>Asia</i>	26.7	31.7	37.3	41.0	3.9	1.8	2.5	4.3	22.8	29.9	34.9	36.7
<i>Asia excluding China</i>	23.8	29.5	31.5	32.7	2.7	3.5	2.9	3.1	21.0	26.0	28.6	29.6
<i>Memo item</i>												
China's share (in total value) (%)	35.1	34.5	54.5	67.8	48.6	53.7	43.3	70.1	32.8	39.1	55.4	67.5

Source: Compiled from Asian Development Bank *Key Indicators for Asia and Pacific* database.

Government savings in the East Asian countries are notably higher than in South Asia. During 1980–2019, the combined government savings rates in Northeast Asia and Southeast Asia were 2.8 per cent and 4.2 per cent, respectively, compared to just 1.5 per cent in South Asia. The government savings rates are notably high in Singapore and Indonesia, averaging to around 9–11 per cent of gross national income in both countries. The high government savings rate in Indonesia, notwithstanding its relatively lower ranking in overall savings performance in East Asia, seems to reflect the country’s longstanding strict fiscal discipline, enforced by a rule that prohibits the government from borrowing domestically to finance expenditures (see Box).

Balance budget rule in Indonesia

During the early independence period until the mid-1960s, hyperinflation, with large budget deficits at its roots, plagued the Indonesian economy. Alternative governments of the day resorted to stop-go measures in the form of a combination of *ad hoc* monetary policy and trade and exchange controls to win reprieve (Hill 2018).

Under the military-backed Suharto regime (‘The New Order’ regime) that came into power in 1965, there was a conscious attempt to insulate public finances from the vagaries of politics (Boediono 2005; Radelet et al. 1997). Early in the New Order regime, technocrats (the *Berkeley mafia*—a group of economists trained in the University of California, Berkeley) persuaded President Suharto to introduce a ‘balance budget’ rule, under which the government expenditure was capped at the level of government revenue and foreign aid receipts with a view to liberate the Central Bank (Bank Indonesia) from its commitment to deficit financing. Unlike the 2013 fiscal rule (discussed below), this was simply a behavioural norm endorsed at the highest political level rather than a rule enshrined in the law.

From then on, except for the special short-lived case of the Asian Financial Crisis (AFC) during 1997–98, Indonesian macroeconomic management has been a success story: the annual budget had a modest surplus of 1–3 per cent of GDP and public debt was relatively low, around 25 per cent of GDP. During this period, fiscal discipline facilitated Bank Indonesia (the Central Bank) in achieving its conventional goal of keeping inflation under control. This experience was instrumental in achieving a broad political consensus on never to return to the 1960s episodes of hyperinflation and macroeconomic chaos. Even at the height of the AFC, the budget deficit was 2.5 per cent, even though public debt reached almost 100 per cent of GDP.

The IMF stabilization programme of 1997–2003 forced Indonesia to implement stringent macroeconomic policies to control inflation, stabilize the exchange rate, and restore macroeconomic stability. In late July 2003, with the elections looming in the first half of 2004, the government decided against the IMF recommendation to extend the programme for political reasons. However, in order to sustain the macroeconomic stability restored under the IMF programme, Law Number 17 of 2003 was enacted, inspired by the Maastricht criteria for the economic and monetary union in Europe. The new fiscal rule (the budget balance rule) set a ceiling of 3 per cent of GDP for the central government and a similar percentage of regional GDP for the regional governments and set a ceiling of 60 per cent of GDP on overall public debt. The aim was to solidify gains from fiscal stabilization as part of the crisis management and to promote future fiscal discipline. There was broad political agreement for the fiscal rule, reflecting the general consensus that a stable macroeconomy was an essential framework condition for sustained growth (Blöndal et al. 2009; Hill 2018). So far, the budget balance rule has effectively applied only to the central government budget pending the adoption of an internationally recognized classification system for fiscal reporting for the regional governments.

During the ensuing years until the onset of the COVID-19 pandemic, the fiscal rule has acted as an anchor for macroeconomic stability in the economy. During this period, the budget surplus ranged between 0.12 per cent and 1.2 per cent of GDP, and public debt levels had come down substantially, reaching 30 per cent of GDP by 2019.

Following the onset of the pandemic, the government passed Law Number 1 of 2020 to suspend the 3 per cent deficit ceiling until the 2013 fiscal year. During this period, there was no cap on the public debt. In 2020 and 2021, the budget deficit were 6.1 per cent and 4.7 per cent, respectively, and the debt–GDP ratio stood at 41 per cent by early 2022.

2.3 Corporate savings

In analysing savings behaviour in the context of market-oriented policy reforms, it is important to examine how corporate savings have behaved compared to household and government savings. In a labour-abundant economy, the expansion of the modern sector in the economy is expected to result in faster growth in corporate sector savings within overall national savings (Lewis 1954; Paauw and Fei 1973). Unfortunately, disaggregated data are not available for a sufficient number of countries in

the regional sector for a comparative analysis.⁷ The available data for China, Taiwan, Korea, the Philippines, and India are plotted in Figure 2.⁸

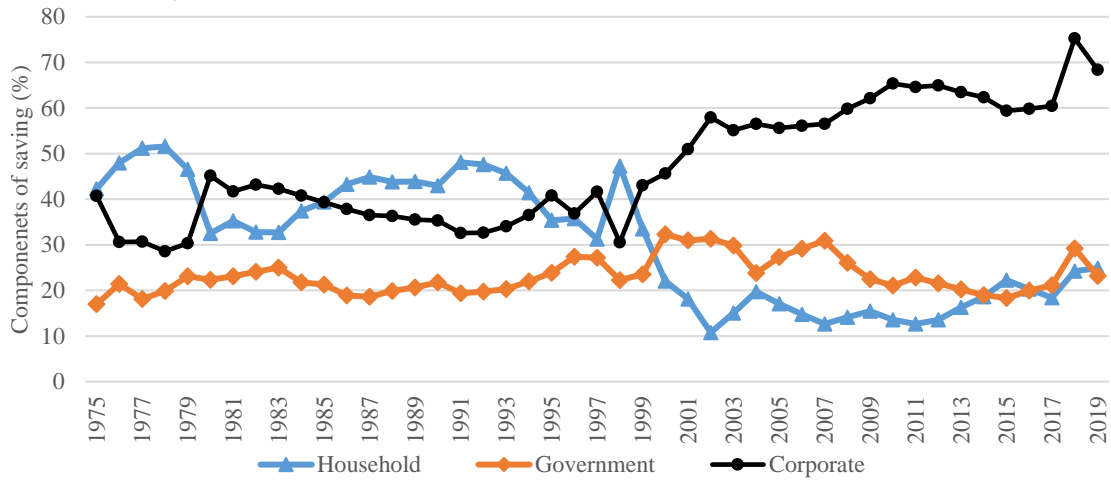
In Korea and Taiwan, corporate savings has been the prime mover of national savings over the past two decades or so, with the gap between household and corporate savings widening over the years. In China, corporate and household savings have contributed almost equally to an increase in national savings during the entire period of 1992–2019, without any notable change in their relative contribution. The unique role of the corporate sector in savings behaviour in China is an interesting subject for in-depth study, but the patterns seem consistent with the process of structural transformation in a surplus-labour economy. Because of unprecedented export-oriented economic expansion in the modern sector fuelled by massive labour migration from the rural economy, the modern sector of the economy seems to have fuelled corporate profits and hence corporate savings as postulated by the Lewisian surplus-labour model (Athukorala and Wei 2018). Seemingly replicating the same process, corporate savings in India has begun to increase following the first wave of liberalization reforms in the mid-1980s and gained impetus from the second-wave reforms initiated in the early 1990s; the gap between household savings and corporate savings has narrowed over the past decade or so. In the Philippines, corporate savings has virtually stagnated at a much lower level compared to household savings in recent years.

⁷ Previous country case studies that have covered corporate savings patterns include Jongwanich (2010, Thailand), Ha et al. (2010, South Korea), Athukorala and Tsai (2003, Taiwan), and Horioka and Terada-Hagiwara (2014, 11 Asian countries). Singh (1998) and Prasad (2011) compare the relative importance of corporate savings of the five countries covered in this section.

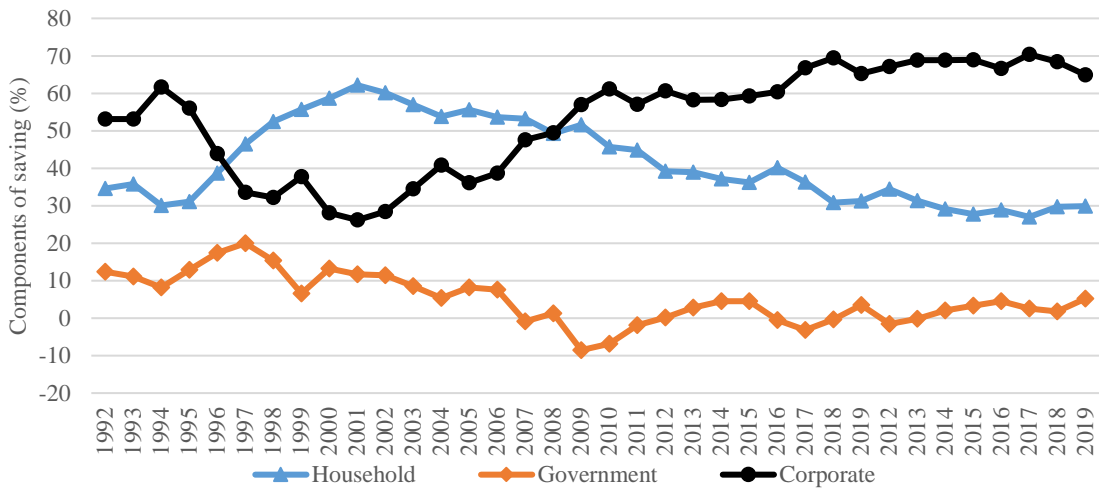
⁸ We are grateful to Wannaphong Durongkaveroj for compiling the corporate savings data for us from the CEIC database.

Figure 2: Composition of national savings, South Korea, Taiwan, China, the Philippines, and India (%)

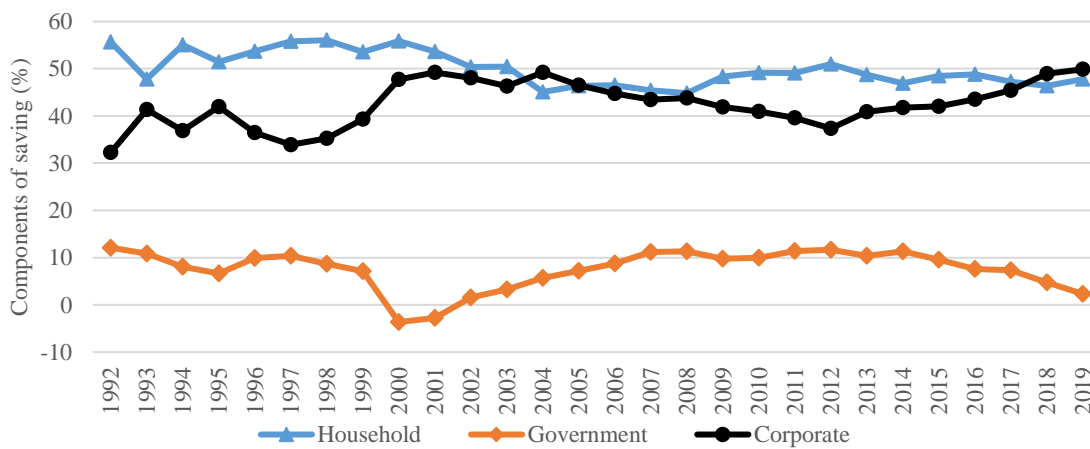
2.1: South Korea, 1975–2019



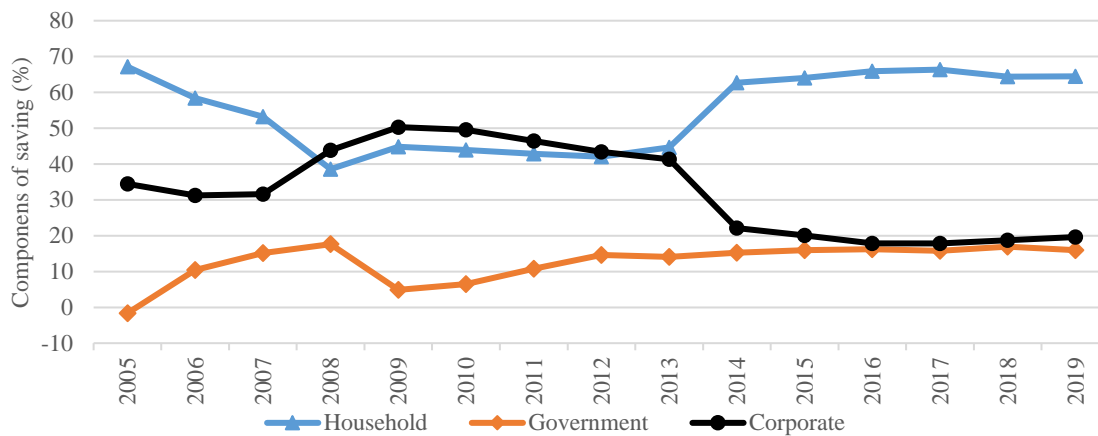
2.2: Taiwan, 1992–2019



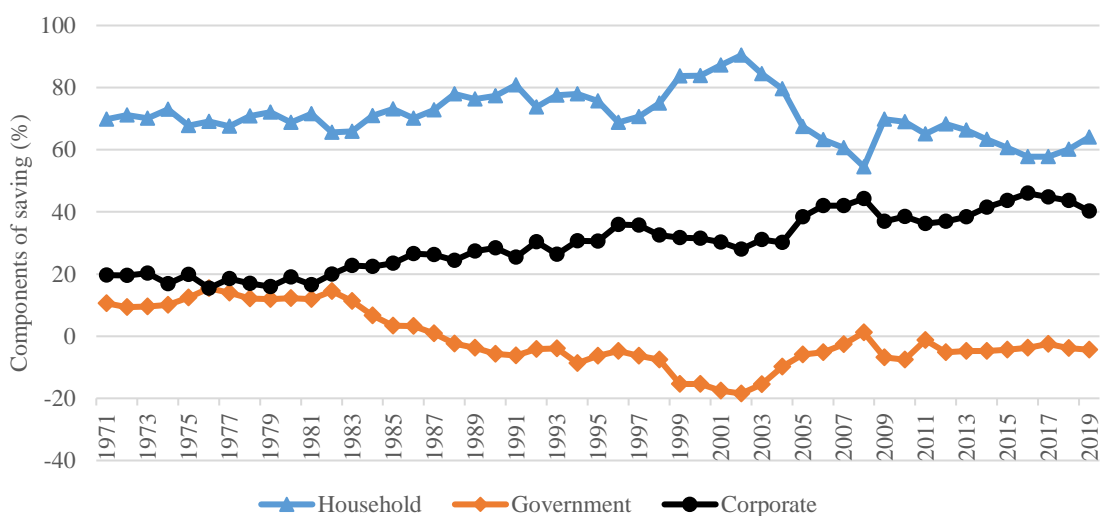
2.3: China, 1992–2019



2.4: The Philippines, 2005–2019



2.5: India



Source: authors' illustrations using data compiled from the CEIC database.

2.4 Domestic savings, investment gap and capital mobility

The data relating to the open-economy dimension of the domestic investment-savings relationship—how the savings ‘deficit’ is a field by foreign capital inflow (foreign savings) and how ‘excess’ savings make a country a capital exporter—are summarized in Table 3.

Table 3: National savings, investments, and foreign capital inflow/outflow (percentage of GNI), 1981–2019

	Savings rate				Investment rate				Foreign capital inflow/outflow ¹			
	1981–89	1990–99	2000–09	2010–19	1981–89	1990–99	2000–09	2010–19	1981–89	1990–99	2000–09	2010–19
<i>Northeast Asia</i>	32.5	34.2	40.7	44.8	29.8	31.6	31.8	38.9	-2.7	-2.6	-8.9	-5.9
China	34.4	37.3	44.7	46.9	35.7	37.3	39.5	44.8	1.3	0.0	-5.1	-2.0
Korea	27.3	33.5	33.5	35.4	33.1	37.0	32.2	31.2	5.8	3.5	-1.3	-4.2
Taiwan	33.3	27.4	29.8	29.6	22.3	24.0	22.9	19.3	-11.0	-3.5	-7.0	-10.4
<i>Southeast Asia</i>	28.1	32.8	31.4	32.7	25.1	26.5	20.1	25.0	-3.1	-6.3	-11.2	-7.7
Indonesia	28.9	28.7	26.1	32.7	26.5	29.5	25.0	33.9	-2.5	0.8	-1.1	1.3
Malaysia	29.2	37.5	37.5	30.2	30.7	36.3	23.0	24.5	1.5	-1.2	-14.5	-5.6
Philippines	20.8	21.6	18.2	22.7	20.8	18.5	23.7	25.2	0.0	-3.1	5.5	2.4
Singapore	33.1	48.3	46.0	48.3	40.7	34.7	25.2	27.2	7.6	-13.6	-20.8	-21.2
Thailand	25.8	34.0	30.2	31.0	29.5	36.5	24.9	24.7	3.6	2.4	-5.3	-6.3
Vietnam	---	9.5	31.1	28.5	---	23.5	34.6	28.0	---	14.1	3.6	-0.4
<i>South Asia</i>	16.6	23.0	30.4	31.2	21.7	25.1	31.5	32.1	5.1	2.1	1.1	0.9
Bangladesh	3.6	17.6	22.5	27.4	16.3	19.4	25.3	29.0	12.7	1.7	2.8	1.6
India	17.8	23.9	32.4	32.9	22.5	26.7	34.3	34.4	4.7	2.8	1.9	1.5
Pakistan	16.2	21.3	21.9	20.3	18.7	21.6	27.1	27.6	2.5	0.3	5.3	7.2
Sri Lanka	10.0	19.2	22.0	29.0	25.4	24.9	25.5	31.6	15.4	5.7	3.5	2.6
<i>Asia</i>	26.7	31.7	37.3	41.0	26.4	29.4	30.1	36.2	-0.3	-2.3	-7.3	-4.8
<i>Asia excluding China</i>	23.8	29.5	31.5	32.7	24.7	28.6	27.6	28.7	0.9	-0.8	-3.9	-4.0

Note: (1) defiance between the investment rate and the savings rate. Figures with negative values show capital outflow, and positive values show capital inflows (contribution of foreign savings to domestic investment).

Source: authors' compilation based on data from the Asian Development Bank *Key Indicators for Asia and Pacific* database.

. There are notable intercountry differences in terms of the capital-importing ('deficit' savings) and capital-exporting ('excess' savings) status. In the four South Asian countries, domestic savings performance has lagged behind domestic investments, necessitating relying on foreign savings (capital importers) to fill the gap. In Northeast Asia, Taiwan has been a net capital exporter throughout this period, with capital exports relative to domestic national income increasing over the past three decades. China and Korea have become net capital exporters in the 2000s, following drawing on foreign savings to meet the investment-savings gap in the 1980s and 1990s. Countries in Southeast Asia exhibit a mixed picture. Malaysia, Thailand, and Singapore have become capital exporters over time, with Singapore becoming by far the largest capital exporter relative to national income in the Asian region. Overall, the countries' relative performance in terms of their evolving investment-savings gap seems to mirror differences relating to the timing and depth of the market-oriented reforms noted above

3 Savings rate determination: empirical analysis

We proceed in this section to undertake an econometric analysis of the determinants of savings behaviour using a panel data set for 12 Asian countries⁹ with data that are available for the entire period 1981–2019. We focus specifically on private savings because preliminary analysis suggested that public savings is mostly driven by unobservable political factors. As already noted, data are not available for most of the countries under study for further disaggregating private savings into household savings and corporate (business) savings in the empirical analysis. Apart from this data constraint, the focus on aggregate private savings is justified by the 'consideration that corporate savings, just like personal (or household) saving, will tend to result, at least in the long run, in an increase in private net

⁹ The countries listed in Table 3 except Vietnam.

worth by way of its net effect on the market value of corporate equity' (Modigliani 1966, pp 184–5). Provided the shareholders look through the *corporate veil* to corporate earnings and take into account corporate retained earnings (profits that are not distributed as dividends) in their lifetime savings/consumption decisions, the appropriate dependent variable for savings analysis is aggregate private savings; no separate treatment of household and corporate savings is needed to understand the saving behaviour of the economy. This view is no doubt an approximation (Gersovitz 1988; Poterba 1991). Shareholders may be myopic and fail to devote the necessary resources to monitor corporate performance. Moreover, various factors encountered by companies such as liquidity constraints, tax policies, and other kinds of capital market imperfections could hamper the shareholders' ability to pierce the corporate veil and thus limit the extent to which personal savings behaviour counterbalances corporate savings (retained earnings) or vice versa.¹⁰

3.1 The model

There is no single model that is capable of dealing with every dimension of savings behaviour. Our modelling strategy is to use the life cycle model (LCM) as the foundation and draw on the subsequent development in the related literature to formulate the final empirical model used in this paper. The attractiveness of the LCM for our analysis lies in both its elegant formulation of the impact of income growth and demographic dynamics, which are central to understanding the savings transition in the process of growth and structural change. The LMC also has the flexibility for incorporating other relevant theoretical considerations to form an integrated analytical framework, without changing the basic structure of the model.

¹⁰ There is a dearth of empirical studies comparing corporate and personal savings behaviour. The findings of Horioka (1991) for Japan and Aron and Muellbauer (2000) for South Africa supports the 'piercing of the corporate veil by individual savers'. Poterba (1991) has come up with mixed results for the United States, UK, and Canada.

The LCM is specifically designed to explain the savings behaviour of a representative individual (the agent) based on the simplifying assumptions of perfect capital markets and perfect foresight of the individual about the income generation process during his lifetime. The agent chooses to maximize utility derived from lifetime resources by allocating them between current and future consumption: as income tends to fluctuate systematically over the course of the agent's life, savings behaviour is determined by his stage in the life cycle (Modigliani 1966, 1986).¹¹ When the model is extended to the national level, the rate of growth of per capita income and the rate of population growth are the key determinants of the savings rate. To the extent that the economy is growing, workers are saving on a larger scale compared to retirees, resulting in an increase in the measured aggregate savings. At the same time, an increase in the population growth rate increases the working-age population (savers) relative to the number of retirees (dissavers). Thus, even if all the individuals in two given economies have the same savings profile over their life cycles, the aggregate savings rate can be different depending on the rate of population growth.

The other variables suggested by the LCM as relevant for allocating lifetime resources between current and future consumption (and hence savings behaviour) include the real interest rate, social security payments (and other government transfers to households by the government), and wealth. These three variables have the potential to impact the savings rate by conditioning the impact of economic growth and population dynamics on the households' ability to make an intertemporal transfer of resource.

The real interest rate has two countervailing effects on savings depending on whether the person is a net borrower or a net lender. In the former case, a higher interest rate increases the present price of consumption relative to the future price and thus provides an incentive to increase savings (the substitution effect). By contrast, in the latter case, an increase in the interest rate raises lifetime income and thus tends to increase consumption and decrease

¹¹ For a succinct formal presentation of the basic model, see Gersovitz (1988).

savings (the income effect). Social security payments could have a negative impact on personal savings as individuals substitute these expected government transfers for personal savings otherwise accumulated for retirement (Feldstein 1974, 1996; Modigliani and Cao 2004). As in the case of social security payments, wealth can have a negative effect on private savings because the ability to draw on accumulated wealth to maintain consumption levels diminishes the need to save for retirement (Deaton 1992).

The empirical implementation of the core model described above for analysing the savings behaviour in developing countries raises a number of issues. First, the LCM postulates that the savings rate is related to the growth of per capita income, *not* the current level of per capita income as postulated by the standard Keynesian theory of consumption (absolute income hypothesis). This postulate stems from the assumption that individuals are forward-looking and, therefore, base their savings decisions on lifetime income rather than current income. The relevance of LCM for analysing the savings behaviour of a country depends on the existence of a significantly large core of households that are able to carry over resources to provide for old age at a standard of living commensurate with that of preretirement. In fact, the LCM was formulated for developed market economies for which this assumption holds fairly well. However, in developing countries the portion of the population in the bottom rungs of the income distribution may find it impossible or too burdensome to set aside resources now in order to provide for later consumption. For these reasons, Modigliani (1993, p 276) has admitted that ‘conceivably for a sufficiently low value of per capita income, ... the saving-income ratio for given growth would ... tend to rise with income’. We, therefore, include both the growth and level of household disposable income (GY and YD , respectively) as explanatory variables.

Second, there is a sizeable body of empirical evidence that the degree of export orientation of the development strategy plays an important role in explaining intercountry differences in growth and the savings rate (Maizels 1971; Weisskopf 1972; Papanek 1973; Chow and Papanek 1981; Michaelley 1977; Balassa 1989). Export orientation leads to better growth

performance than policies favouring import substitution by facilitating resource allocation according to comparative advantage, allowing for greater capacity utilization, permitting exploitation of scale and greater technological improvement in response to competition from abroad, and contributing to increasing employment. To the extent that the propensity to save is associated with marginal rates of growth exceeds that associated with the average rates as postulated by the LCH, the rates of savings would be higher under export orientation.

Moreover, as already discussed, a labour surplus economy growth through greater export orientation in a labour surplus economy has the potential to tilt income distribution in favour of the capitalist (entrepreneurs) whose propensity to save might be higher. Foreign direct investment, attracted by high returns in export-oriented production, would also add to domestic savings. We therefore include export orientation (*EOR*) on its own as well as interactive integration with economic growth (*EOR*GY*) as explanatory variables in the model. The *EOR* variable would capture the direct effect of export orientation on the savings rate, while *EOR*GY* is expected to capture the conditional (savings-enhancing) effect of *EOR* on the savings impact of a given growth rate (*GY*). The coefficients of both variables are expected to be positive.

Third, the original formulation of the LCM postulates that an increase in the population growth rate increases the aggregate savings rate by increasing the number of active workers (savers) relative to the number of retirees (dissavers). However, in reality, an increase in the population growth is naturally associated with not only an increase in the labour force but also a change in the relative shares of the young and elderly dependents in the population. Moreover, a given change in the degree of ‘childhood dependency’ may not have the same impact on savings compared to a similar change in ‘aged dependency’ (Masson 1988; Deaton and Paxson 1999; Kelley and Schmidt 1996; Curtis et al. 2017). Economies of scale in family consumption enable large families to provide a child with the same welfare with a less-than-proportionate increase in expenditure compared to a small family. Furthermore, when they decide to have large families, parents may choose to decrease their consumption or increase

savings in advance of a birth by increasing their work time (or effort). In the cultural tradition of Asian countries, the young generation is supposed to take care of the older members of the family, while the elders will bequeath the house and other assets to their children. Under such a system, a child is an effective substitute for life cycle savings, and investing in children's education is considered a source of old age support. Households with young children are therefore likely to save to finance their education (Ge et al. 2018; Curtis et al. 2017). These considerations make a strong case for the inclusion of the aged dependency ratio (*ADEP*) and young dependency ratio (*YDEP*) as separate variables in place of population growth as explanatory variables in the savings function in order to capture the impact of population dynamics on savings. Since the aged and young dependents generally consume without generating income, normally the coefficients of both variables are negative. However, the magnitudes of the two coefficients can be different because of the differential impact of the socio-economic factors discussed here.

Fourth, the hypothesized link between income growth and the savings rate is based on the stringent assumption of perfect capital markets that enable households to borrow freely against future income in order to smooth consumption over their lifetime. If the households are liquidity constrained—they are unable to borrow freely against future income—the consumption behaviour might be linked to current income rather than to lifetime income (Liu and Woo 1994). Thus, the borrowing constraint, in addition to forcing households to maintain consumption at current income levels, can in fact convert a negative saver into a positive saver by forcing them to save more at present in order to undertake lumpy (indivisible) expenditure plans in the future (Gersovitz 1988). We therefore include in the savings equation a control variable to represent the availability of institutional credit (*CPR*).

Fifth, the accumulation-based explanation of savings behaviour of the LCM is based on the implicit assumption of certainty of future income streams in the mind of the individual. This assumption presumably holds reasonably well for households in developed countries who save in large part for future consumption (accumulate wealth). However, income prospects

are much more uncertain for most households in developing countries. Saving is, therefore, not only about accumulation for future consumption but also about consumption smoothing in the face of volatile incomes. In other words, a precautionary motive rooted in economic uncertainty can be an important driver of savings behaviour (consideration behind saving). Guided by previous studies (Corbo and Schmidt-Hebbel 1991; Deaton 1989; Loayza et al. 2000), we include the rate of inflation (*INF*) to capture precautionary savings effects of macroeconomic uncertainty. Inflation can have a positive effect on saving, as uncertainty about future real incomes in an inflationary environment may encourage saving for maintaining future consumption levels. However, it can also have negative effects on saving by increasing the uncertainty about future value of accumulated savings. The direction of the impact of *INF* is, therefore, indeterminate *a priori*.

Sixth, the impact of foreign resource inflows ('foreign savings') on domestic savings remains a debatable issue (Papanek 1972, 1973; Weisskopf 1972; Reinhart and Talvi 1998; Obstfeld 1999; Adams and Klobodu 2018). Foreign savings can act as a substitute for domestic savings if the agents draw on foreign savings to smooth current expenditure over time. However, there is room for developed-oriented governments to harness foreign resources to meet the gap between domestic investment and domestic savings without an adverse effect on domestic savings. Also, foreign resource inflows are not a homogenous phenomenon. Foreign direct investment, which directly contributes to the domestic production capacity of the economy unlike concessionary foreign aid and other forms of capital inflows, has the potential to help promote domestic savings.

Finally, the fiscal policy stance of the country can affect private savings behaviour. There are two possible channels with opposing effects. First, the Ricardian equivalence proposition (*a la* Barro 1974) postulates that issuing bonds to finance government dis-saving (budget deficit) results in an equal increase in private savings because the private sector saves in anticipation of a future increase in taxes to service the bonds. While the government can choose the level of its own savings directly, a change in this variable need not imply a one-

for-one change in national savings if the private agents respond in such a way as to offset the government action, at least to some extent. Second, government savings behaviour can be indicative of the soundness of macroeconomic management, including a lower rate of inflation, prudential exchange rate policies, and capable monetary management. Stable economies, in turn, lower the risk for investors and therefore lower the cost of capital for long-term investment and encourage savings (and investment) by the private sector. Moreover, when governments shift funds from consumption to particular types of investments, such as infrastructure that the private sector is unlikely to undertake, the return to, and the volume of, private savings may increase. To test the net effects on the private savings rate of these countervailing effects of the fiscal policy stance, we include a government budget balance (*BBL*) measured as a percentage of gross national income as an explanatory variable in the model.

Based on the above discussion, the empirical savings function in a panel data setting is specified as follows:

$$\begin{aligned}
 PSR_{it} = & \beta_0 + \beta_1 GY_{it} + \beta_2 YD_{it} + \beta_3 YDEP_{it} + \beta_4 ADEP_{it} + \beta_5 EOR_{it} + \\
 & \beta_6 EOR * GY_{it} + \beta_7 CRP_{it} + \beta_8 RID_{it} + \beta_9 INF_{it} + \beta_{10} SSP_{it} + \beta_{11} WL_{it} + \beta_{12} FS + \\
 & \beta_{13} BBL_{it} + \gamma_i + \eta_t + \epsilon_{i,t}
 \end{aligned}
 \tag{1}$$

Where *PSR* is a private savings rate; γ_i and η_t are country- and time-specific effects; β'_{ik} are coefficient vectors; and $\epsilon_{i,t}$ is an error term. The explanatory variables are listed below with the expected signs of β'_{ik} given in brackets:

- GY* (+) The rate of growth of per capita private income
- YD* (+) Per capita real private income
- YDEP* (-) Young dependency measured as the ratio of the population aged 15 and under to the working-age population (aged 16–64)

- ADEP* (-) Aged dependency measured as the ratio of the population aged 65 and older to the working-age population (aged 16–64)
- EOR* (+) Export orientation measured as exports relative to GDP
- RID* (?) The real interest rate on bank deposits
- INF* (?) Inflation rate
- CRP* (-) Institutional lending to the private sector as a ratio of private income
- SSP* (-) Social security payments as a ratio of private income
- WL* (-) Household wealth as a ratio of household disposable income
- FS* (?) Foreign capital inflow as a percentage of gross national income
- BBL* (?) Government budget balance as a percentage of gross national income

3.2 Data source and variable measurement

The estimation of the savings function (Equation 1) is undertaken using an annual unbalanced panel data set of 12 Asian countries, covering the period 1981–2019.¹² Data on the savings rate for all countries other than Taiwan are compiled from the *Key Indicators of Asia and the Pacific (KIAP)* database of the Asian Development Bank. The KIAP database is a direct compilation of data from the official records of individual ADB member countries. In the national accounts of these countries, the data on national savings are estimated indirectly, subtracting net resource inflows (‘foreign savings’) (after allowing for changes in the holding of foreign exchange reserves) from aggregated domestic investment. Data on national savings disaggregated into private savings and public savings are available from the national data

¹² Bangladesh, China, India, Indonesia, Malaysia, Pakistan, the Philippines, Singapore, South Korea, Sri Lanka, Taiwan, and Thailand.

systems only for India and South Korea.¹³ For the other countries, we derived private savings by deducting government savings from total national savings. Government savings is derived as the difference between government revenue and government recurrent expenditure using data from the same data source. Any data series that is derived as a ‘residual’ from two other national account aggregates naturally incorporates possible estimation errors of the latter two magnitudes. Therefore, the use of the savings data used in the econometric analysis is based on the assumption that, in the data series for each country, the estimation errors remain consistent over the period under study.¹⁴

The data on the other variables are collected or compiled from several sources. The deposit interest rate of India is compiled from the reserve bank of India. The data on deposit interest rates of other countries¹⁵ and money stocks are retrieved from the International Monetary Fund. All other data series (except for Taiwan) are extracted from the World Bank World Development Indicator database. All data series for Taiwan are compiled from various issues of the *Taiwan Statistical Data Book* (Council for Economic Planning and Development, Taipei).

Nominal private income is converted into real terms using the consumer price index (CPI =2010).¹⁶ The real national currency value of private income (*YD*) is converted into US

¹³ In India and South Korea, the available private savings data are estimated as the difference between indirectly estimated private savings and public savings directly obtained from the fiscal records.

¹⁴ This ‘tyranny of residual is a common, and in fact by far the worst, problem besetting the study of saving behaviour in developing countries’ (Srinivasan 1994; Deaton 1989).

¹⁵ The missing value of interest rate of a bank deposit in Thailand in 2002 and 2003 is filled in with the average minimum and maximum values of the interest rates of bank deposits provided by the Bank of Thailand.

¹⁶ The results are remarkably resilient to the use of the GDP deflator as an alternative price deflator.

dollars using the average annual exchange rate of national currency per USD exchange rate for 2010. The young-age dependency ratio (*YDEP*) is the percentage of the population aged 15 and under relative to the working population aged 15–64. Similarly, the old-age dependency ratio (*ADEP*) is constructed by dividing the population aged 65 and older by the working population aged 15–64.¹⁷ Private wealth is proxied by the money stock (broad money), including money in circulation plus checkable deposits in banks, savings deposits, money market mutual funds, and so on. Social security payments are measured by the government transfer payment, including subsidies, grants, and other social benefits. The real interest rate (*RID*) is measured as $\ln[(1 + NID)/(1 + INF)]$, where *NID* is the average time deposit rate in commercial banks and *INF* is the current rate of inflation calculated from the CPI. Data series *YD* is used in natural logarithms. All other variables (except all dummy variables) are in percentage form.

3.3 Econometric procedure

We began the estimation process by examining the time series properties of the panel data using the CIPS test (Pesaran 2007).¹⁸ The results reported in Table 4 indicate that the saving

¹⁷ In some savings studies of Japan and Taiwan, the age 20 (instead of 14) has been used as a more appropriate lower cut-off age for separating young and adult populations because of the heavy emphasis placed in these countries on upper-secondary education (e.g., Horioka 1991, 1996; Athukorala and Tsai 2004). To see the sensitivity of results to the particular definition adopted, we re-estimated the savings function using alternative measures of *YDEP* and *ADEP* using age 20 as the lower bound. The results (available from the corresponding author on request) are closely comparable, but the results reported here are statistically superior in terms of the overall fit of the savings function, its other statistical properties, and the significance of the coefficients of *ADEP* and *YDEP*.

¹⁸ The CIPS test is a modified version of the t-bar test proposed by Im et al. (2003)—hence the acronym ‘CIPS’. It is now considered more powerful than the test proposed by Maddala and Wu

series, SR, and all other explanatory variables except GY are non-stationary (I(1)). Based on this result, we conducted the Pedroni test to examine the existence of a long-run relationship among the variables (Pedroni 1999, 2004). The results indicate that two of the four test statistics relating to cointegration of the ‘within dimension’ of the data panel and all three relating to cointegration of the ‘between dimension’ of the data panel are statistically significant (Table 5). These results provide us with sufficient grounds to use the panel-data ARDL estimator to estimate the savings function.

(1999) as it relaxes the assumption of independence among cross-sections and allows for the possible correlation between cross-sections.

Table 4: The unit root tests

Variables	CIPS (Z statistic)
<i>PSR</i>	-0.8
<i>GY</i>	-1.7**
<i>YD</i>	3.4
<i>YEDP</i>	-1.0
<i>ADEP</i>	9.9
<i>RID</i>	-0.9
<i>WL</i>	2.2
<i>SSP</i>	-0.04
<i>CRP</i>	1.0
<i>INF</i>	-0.99
<i>BBL</i>	0.41

Note: the null hypothesis is ‘the data series is I(1)’; the time trend is included in the test equations, and maximum selected lag length is 2; the Chi-square stats are reported in the table where ** denotes statistical significance at the 5 per cent level.

Table 5: Pedroni cointegration tests¹

Test statistic	Panel test ²	Group test ³
V	2.9***	
Rho	3.6***	4.6***
T	-0.5	-1.7**
ADF	-0.01	-1.6*

Note: (1) Data are time-demeaned, and a time trend has been included. The maximum lag length is 1 (based on the Akaike information criterion). The level of statistical significant is denoted as *** (0.01), ** (0.05), and * (0.1). (2) Cointegration along the ‘within dimension’ of the data panel. (3) Cointegration along the ‘between dimension’ of the data panel.

Equation (1) can be rewritten in ARDL form as follows:

$$PSR_{i,t} = \sum_{k=1}^p \phi_i PSR_{i,t-k} + \sum_{k=0}^q \beta'_{ik} X_{i,t-k} + \gamma_i + \eta_t + \epsilon_{i,t} \quad (2)$$

where $PSR_{i,t}$ is the saving rate; $X_{i,t}$ is a vector of explanatory variables; and ϕ_i is scalars or the coefficient of the lagged dependent variable.

Equation (2) can be reparametrized in an error correction form to examine short-run and long-run relationships between variables as follows:

$$\Delta PSR_{i,t} = \rho_i [PSR_{i,t-1} - \lambda'_i X_{i,t-1}] + \sum_{k=1}^{p-1} \zeta_{ik} \Delta PSR_{i,t-k} + \sum_{k=0}^{q-1} \beta'_{ik} \Delta X_{i,t-k} + \gamma_i + \eta_t + \epsilon_{i,t} \quad (3)$$

where $\rho_i = -(1 - \phi_i)$ is the speed of adjustment coefficient (expected that $\rho_i < 0$), representing the speed of adjustment of imports to a shock to move back to the long-run equilibrium; λ'_i is the vector of long-run coefficients; $ECT = [PSR_{i,t-1} - \lambda'_i X_{i,t-1}]$ is the error correction term; and ζ_{ik} and β'_{ik} are the short-run dynamic coefficients.

The error correction formulation (Equation 3) permits us to examine short- and long-run dynamics and the speed of adjustment of the model to equilibrium. It is also ‘less immune to the endogeneity problem, at least as far as the long-run properties of the model are concerned’. The possible endogeneity bias could be asymptotically negligible due to the super consistency property resulting from the reparametrization of the model in levels and divergences ((Pesaran 2015, p 726).

The Akaike information criterion (AIC) is used to decide the choice of lags for each country group per variable, and then the most common lag for each variable is chosen to represent the lags for the model. We use two alternative estimators to explore the potential heterogeneity of parameters among the countries within the data panel. We utilize two alternative estimators: the Dynamic Fixed Effects (DFE) estimator and the Mean Group (MG) estimator (Pesaran 2015). The DFE estimator allows the intercepts to differ freely across groups, while all other coefficients and error variances are constrained to be the same. Although this estimator could

be biased when applied to dynamic models, the size of the bias tends to zero as the time dimension increases (Nickell 1981). The MG estimator allows coefficients to differ freely across groups, by first estimating one equation per group (a country in our case) and taking the average across groups (countries). The most appropriate estimator is selected using the test proposed by Hausman (1978).

3.4 Results

The savings function (Equation 1) is estimated separately for the 12 countries and the countries other than China to see the possible sensitivity of the results of China's dominance in the overall savings performance in Asia. The results are reported in Table 6. The summary statistics of the data series for the total sample and the individual countries are given in the Appendix to facilitate interpretation of the results.

Per capita real private income (YD) was dropped by the ARDL estimator because of its high collinearity with the growth rate of GY . In alternative estimates that excluded GY , the coefficient of YD was not statistically significant even though it had the expected positive sign.¹⁹ Dropping YD for the final estimates was supported by the standard variable deletion F test.

¹⁹ The alternative estimates are available on request.

Table 6: Determinants of private savings (PSR)

Long-run estimates	All 12 countries	Excluding China
GY [Growth rate of GNI (%)]	1.268*** (0.124)	1.448*** (0.241)
YDEP [Young dependency (%)]	-0.169*** (0.054)	-0.169*** (0.044)
ADEP [Aged dependency (%)]	0.286 (0.417)	0.371 (0.403)
EOR [Export/GNI (%)]	0.032*** (0.005)	0.030*** (0.007)
GY*EOR	0.085*** (0.020)	0.048** (0.023)
RID [Real interest rate (%)]	0.387* (0.226)	0.419* (0.225)
BBL [Budget balance/GNI (%)]	0.347 (0.291)	0.290 (0.308)
INF [Inflation rate(%)]	-0.018 (0.485)	0.020 (0.555)
FS [Foreign capital inflow/GNI (%)]	0.300*** (0.043)	0.279*** (0.020)
CRP [Bank lending/GNI (%)]	-0.159** (0.065)	-0.159** (0.071)
WL [Wealth/GNI (%)]	0.026 (0.138)	0.022 (0.155)
ECT [Ettor correction term]	-0.154***	-0.156***

	(0.016)	(0.013)
Short-run estimates		
ΔGY_t	0.252*** (0.050)	0.256*** (0.056)
ΔRID_t	-0.061** (0.030)	-0.063* (0.035)
ΔBBL_t	-0.101** (0.044)	-0.115*** (0.040)
AFC	0.004** (0.002)	0.004*** (0.002)
GFC	0.005*** (0.000)	0.005*** (0.000)
Constant	0.109*** (0.033)	0.108*** (0.032)
ARDL	(1,1,0,0,1,1,0,0,0,0, 0)	(1,1,0,0,1,1,0,0,0, 0,0)
Hausman test stat (MG, DFE)	0.01	0.01
Estimator	DFE	DFE
Adjust-R square	0.317	0.315
Number of observations	456	418
Number of countries	12	11

Note:

heteroscedasticity corrected standard errors are in parentheses; ***, **, and * denote statistically significant at 0.01, 0.05, and 0.1 levels, respectively; ARDL indicates the lag length of each variable used in the original ARDL.

The social security payment (*SSP*) is dropped from the reported equations because data were not available for three countries (China, Indonesia, and India) and data for some years are missing for other countries. In the equation estimated for the other nine countries, the coefficient had the expected negative sign but was not statically significant, and its inclusion had no notable impact on the estimated coefficients of the other variables.

In both equations, the coefficient of the *ECM* term is highly statistically significant with the expected negative sign, suggesting the appropriateness of the *ARDL* specification of the model. In the equation for all countries, both the short-run and steady-state (long-run) coefficients of *GY* are statistically significant at the one per cent level. The results suggest that a one per cent increase in the growth rate of per capita private income is associated with a 0.25 percentage point increase in the private savings rate in the short run and a 1.27 percentage point increase in the long run. The results are remarkably resilient to the inclusion or exclusion of China from the country coverage.

Relating to the interpretation of this result, an important issue is the possible endogeneity of *GY* in the model (Deaton 1989; Gersovitz 1988). However, as noted, the *ARDL* estimator has the advantage of minimizing possible endogeneity of the right-hand variables by reparametrizing the model in levels and differences. To supplement the results, we performed the Granger causality test for the relationship between *GY* and *PSR* using the methodology of Dumitrescu and Hurlin (2012). The results suggest that the causation runs for growth to the savings rate—not the other way around (Table 7). Thus, our results are consistent with the ‘virtuous circle’ growth-savings nexus in which the initial spurt of savings comes from growth. It is important to note that this inference is also consistent with the discussion in Section 2 on the relationship between the timing of market-oriented policy reforms and the time profile of savings patterns, both among and within the Asian countries.

There is strong evidence that export orientation (*EOR*) is significantly associated with the intercountry difference in the savings rate. A one percentage point increase in the degree of

export orientation is associated with a 0.03 per cent increase in the savings rate in the long run. Moreover, the coefficient of $EOR*GY$ indicates that export orientation adds 0.09 percentage points to the association between the per capita income growth rate and the savings rate.

Table 7: Savings-growth nexus: Granger non-causality test results

H_0 : $\ln PSR$ does not Granger-cause $\ln GY$	H_0 : $\ln GY$ does not Granger-cause $\ln PSR$
H_1 : $\ln PSR$ does Granger-cause $\ln GY$	H_1 : $\ln GY$ does Granger-cause $\ln PSR$
Z-bar = 1.2765 (p-value = 0.2018)	Z-bar = 4.0666 (p-value = 0.0000)
Z-bar tilde = 0.6285 (p-value = 0.5297)	Z-bar tilde = 2.7814 (p-value = 0.0054)

Relating to the implications of demographic dynamics on the savings rate, the coefficient on (YDEP) is statistically significant with the expected negative sign, suggesting that a one percentage point increase in the share of young dependents in the population contributes to a 0.17 percentage point decline in the savings rate. However, interestingly, there is no statistically significant evidence to support the standard LCH that aged dependency (*ADEP*) contributes to dampening savings propensity. This result is not consistent with the available evidence for development countries (Leff 1969; Modigliani 1966; Horioka 1996; Bloom et al. 2007). There are a number of possible reasons why ageing of the population in developing countries may not necessarily lead to lower savings rates. First, given the prevalence of informal sector employment and the limited coverage of retirement benefit schemes even in formal employment, the line of demarcation between the working age and formal retirement remains blurred in the Asian context. Second, the rise in life expectancy as an integral facet of economic growth could have a significant effect on savings behaviour in old age. This effect has the potential to be especially pronounced in developing Asia, particularly in the East Asian high-performing countries because mortality transition has been very rapid (Kinugasa and Masson 2007). Third, households in developing countries generally tend to be larger than in advanced countries, and resources are shared between members actively

engaged in the labour force and dependents. Finally, relating to the third point, bequeath motive can be a much more potent determinant of savings behaviour in developing countries (Deaton 1989; Gersovitz 1988).

There is strong evidence that foreign capital inflows (FS) are complementary to private savings, in contrast to the findings of some previous studies that foreign capital inflows tend to crowd out domestic savings. This finding is consistent with the evidence that foreign capital inflows to Asian countries have mostly taken the form of direct foreign investment (which directly contributes to the production capacity of the countries) rather than foreign aid (which mostly takes the form of budgetary supports) (Athukorala and Rajapatirana 2003). Our result is also consistent with the inference of Reinhart and Talvi (1998) that, unlike in Latin America, capital inflows were complementary to domestic savings in Asia because the development strategy in these countries specifically focussed on using these resource inflows for investment.

The bank credit variable (*CRP*) has a significant negative effect on private savings, as expected. This result is consistent with the hypothesis that, in the presence of easy access to bank credit, there is no compelling reason for people to save more at present in order to undertake lumpy (indivisible) expenditure plans in the future (Gersovitz 1988). The coefficient of the proxy variable for wealth (*WL*) has the expected positive sign but is not statistically different from zero.

The coefficient of the real interest rate variable (*RID*) is not statistically significant, and its magnitude is barely different from zero. It seems that the income effect of the real interest rate counterbalances its substitution effect in the Asian context. The coefficient of the budget balance to GNI ratio (*BBL*) does not support for the Ricardian equivalence hypothesis. On the contrary, the result provides some weak support for the view that fiscal discipline helps promotion savings.

We estimated the savings equation (Equation 1) for the total national savings rate (NSR) for comparison. The results are reported in Table 8.

Table 8: Determinants of total national savings (NSR)¹

Long-run estimates	All (12) countries	Excluding China
GY [Growth rate of GNI (%)]	1.048*** (0.084)	1.104*** (0.213)
YDEP [Young dependency (%)]	-0.086* (0.048)	-0.084* (0.044)
ADEP [Aged dependency (%)]	0.542 (0.330)	0.655** (0.322)
EOR [Export/GNI (%)]	0.064*** (0.005)	0.061*** (0.005)
GY*EOR	-0.043*** (0.014)	-0.064** (0.032)
RID [Real interest rate (%)]	0.312 (0.248)	0.386 (0.262)
BBL [Budget balance/GNI (%)]	0.328 (0.261)	0.375 (0.275)
INF [Inflation rate (%)]	-0.025 (0.364)	0.028 (0.414)
FS [Foreign capital inflow/GNI (%)]	0.319*** (0.107)	0.302*** (0.090)
CRP [Bank lending/GNI (%)]	-0.167*** (0.039)	-0.157*** (0.041)
WL [Wealth/GNI (%)]	0.015 (0.097)	-0.005 (0.106)
ECT [Error corection term]	-0.139***	-0.139***

	(0.027)	(0.025)
Short-run estimates		
ΔGY_t	0.113*** (0.039)	0.112*** (0.043)
ΔRID_t	-0.040 (0.033)	-0.039 (0.037)
ΔBBL_t	0.093*** (0.019)	0.095*** (0.018)
AFC	0.0001 (0.002)	0.0001 (0.002)
GFC	-0.001*** (0.0001)	-0.001*** (0.0001)
Constant	0.048** (0.024)	0.046* (0.024)
ARDL	(1,1,0,0,1,1,0,0,0,0, 0)	(1,1,0,0,1,1,0,0,0,0,0,)
Hausman test stat (MG, DFE)	0.01	0.01
Estimator	DFE	DFE
Adjust-R square	0.221	0.217
Number of observations	456	418
Number of countries	12	11

Note: (1) heteroscedasticity corrected standard errors are in parentheses; ***, **, and * denote statistically significant at the 0.01, 0.05, and 0.1 levels, respectively; ARDL(.) indicates the lag length of each variable used in the original ARDL equation from which the long-term coefficients are derived.

Both the long-run and short-run coefficients of *GY* are highly significant as in the private savings equations, but their magnitudes are slightly smaller. The coefficients of the other variables except *EOR&GY* are broadly similar but only in terms of the coefficient signs and statistical significance. The negative and statistically significant coefficient of *EOR*GY* perhaps captures the fiscal costs (tax incentives and other expenditures) involved, which counterbalance the direct positive effect of export orientation on national savings under the export-oriented development strategy. The magnitude of the coefficient of *YDEP* in the national savings equation (-0.089) amounts to almost half of that of the private savings equation (-0.169).

The impact of exogenous political factors on government savings seems to understate the impact of changes in the age profile of the population on national behaviour. In sum, this comparison alerts the risk of making inferences about the impact of demographic dynamics on savings behaviour using aggregate national savings data.

Finally, how do our multi-country results for Asia compare with the findings of the few available individual country studies of private savings in the region (Sun and Liang 1982; Athukorala and Tsai 2003; Athukorala and Sen 2004; Modigliani and Cao 2004; Park and Rhee 2005; Ang 2008; Ang and Sen 2011; Jongwanich 2010; Curtis et al. 2015; Ge et al. 2018)? There are vast differences among these studies in terms of the specification of the savings function, reflecting the nature of data availability and presumably reflecting the researchers' own preferences dictated by methodological reasons. The only explanatory variable commonly used in all studies is the per capita income growth rate. The results for this variable support a positive association between per capita income growth and private savings rates, with the magnitude of the effect varying in the range of 0.03 to 1.7 per cent. Only Athukorala and Tsai (2003) for Taiwan and Jongwanich (2010) for Thailand have included young and aged dependency ratios separately for testing the impact of the demographic transition on the private savings rate. The results in both studies suggest that both young and aged dependency have a negative impact on the private savings rate and the impact of the former is greater in magnitude compared to that of the latter. However,

household survey-based studies of Park and Rhee (2005) for South Korea and Curtis et al. (2015) for China failed to detect a significant impact of population aging on the savings rate. These mixed results seem consistent with the failure of our savings function estimates to detect a negative relationship between population ageing and the savings rate. Consistent with our results, Ang (2008) for Malaysia, Ang and Sen (2011) for Malaysia and India, and Jongwanich (2010) for Thailand find that the availability of access to bank credit is negatively associated with the savings rate.

4 Concluding remarks

The savings rates in Asia were broadly comparable to those in the rest of the developing world in the early post-war years. The patterns began to change from around the late 1960s. During the ensuing year, the difference between the average Asian rate and those of the other major regions and the overall world savings rate has widened. Overall, the Asian savings rates have been much more stable.

The regional average hides substantial sub-regional and individual country differences in savings behaviour in Asia. Countries in Northeast Asia top the savings rate ranking followed by Southeast Asia. Savings rates in countries in South Asia, though much lower compared to Southeast Asia, are higher compared to the other regions. Within Northeast Asia, the high savings rates of Taiwan and South Korea began to decline around the late 1990s, but the spectacular increase in savings in China has more than counterbalanced this decline. China now accounts for over two-thirds of total national savings (in value) in the region. Within Southeast Asia, the savings rate of Singapore has continued to increase in contrast to the recent decline in the savings rates of the other three Asian ‘tigers’ (South Korea, Taiwan, and Hong Kong). In Southeast Asia, a comparison of the savings rates for the past three decades with those during 1965–79 points to the impact policy regime shifts on savings. Notwithstanding these sub-regional differences, a unifying theme of overall savings

behaviour in Asia is that policy regime shifts in favour of an outward-oriented development strategy have underpinned the time patterns of savings behaviour.

The trends and patterns of saving in Asia have been predominantly driven by the private sector: the governments directly accounted for only about 15 per cent of total national savings in the region. The data available for Taiwan, Korea, and China for more recent years point to the emergences of the corporate sector as the prime mover of national savings. There are notable intercountry differences in terms of the capital-importing ('deficit' savings) and capital-exporting ('excess' savings) status in Asia. Overall, the countries' relative performance in terms of their evolving investment-savings gap seems to mirror differences relating to the timing and depth of the market-oriented reforms noted above.

The findings of the econometric analysis are consistent with the idea of the 'virtuous circle' between savings and growth, with growth initiating the savings transition. There is no evidence from the Asian experience to suggest that the prior phase of promoting savings through a specific policy initiative to promote domestic savings or filling the investment-savings gap is needed to initiate the process of growth and structural transformation. There is strong evidence that export orientation contributes to higher private savings both by its direct contribution and by compounding the impact of the rate of income growth on the savings rate. Foreign capital inflows are complementary to domestic savings.

As regards the nexus of demographic transition and domestic savings, only the change in the young dependency ratio seems to have significant impact on national savings behaviour. The pattern of the aged dependency ratio dampening national savings in developed countries is not revealed by the data in Asia presumably because, given the prevalence of informal sector employment and the limited coverage of retirement benefit schemes even in formal employment, the line of demarcation between working age and formal retirement remains blurred in these countries.

Finally, it is important to emphasize that the econometric evidence reported in the paper simply reflects the *average* macroeconomic pattern of the savings behaviour of the 12 countries covered in the analysis. Obviously there can be notable exceptions to the depicted average pattern. Also, the results are subject to the well-known limitations of savings data derived as a residual from the related macroeconomic variables (the ‘tyranny of residual’). Presumably, the magnitude of the measurement error varies among countries and even over time in given countries. Because of these reasons, the inferences made in this paper need to be treated only as *a point of departure* for informing the policy debate in individual countries. Multi-country studies, regardless of methodological issues, are not a substitute for systematic case studies of individual countries undertaken by taking into account socio-economic and structural peculiarities and paying due attention to data quality and consistency.

References

- Adams, S., and E.K.M. Klobodu (2018). ‘Capital Flows and Economic Growth Revisited: Evidence from Five Sub-Saharan African Countries’. *International Review of Applied Economics*, 32(5): 620–40. <https://doi.org/10.1080/02692171.2017.1355357>
- Ang, J.B. (2008). *Financial Development and Economic Growth in Malaysia*. London: Routledge. <https://doi.org/10.4324/9780203886885>
- Ang, J.B., and K. Sen (2011). ‘Private Saving in India and Malaysia Compared: The Roles of Financial Liberalization and Expected Pension Benefits’. *Empirical Economics*, 41(2): 247–67. <https://doi.org/10.1007/s00181-010-0386-3>
- Aron, J., and J. Muellbauer (2000). ‘Personal and Corporate Saving in South Africa’. *The World Bank Economic Review*, 14(3): 509–44. <https://doi.org/10.1093/wber/14.3.509>
- Asian Development Bank (1997). *Emerging Asia: Changes and Challenges*. Manila: ADB.

- Athukorala, P.-C. (2021). 'Introduction to Asian Economic Development'. In P.-C. Athukorala (ed), *Asian Economic Development*, Vol. 1. Cheltenham, UK: Edward Elgar, Xxii–xxix. <https://doi.org/10.4337/9781788978453>
- Athukorala, P.-C., and S. Rajapatirana (2003). 'Capital Inflows and the Real Exchange Rate: A Comparative Study of Asia and Latin America'. *World Economy*, 26(4): 613–37. <https://doi.org/10.1111/1467-9701.00539>
- Athukorala, P.-C., and K. Sen (2004). 'The Determinants of Private Saving in India'. *World Development*, 32(3): 491–503. <https://doi.org/10.1016/j.worlddev.2003.07.008>
- Athukorala, P.-C., and P.-L. Tsai (2003). 'Determinants of Household Saving in Taiwan: Growth, Demography and Public Policy'. *The Journal of Development Studies*, 39(5): 65–88. <https://doi.org/10.1080/00220380412331333149>
- Athukorala, P.-C., and Z. Wei (2018). 'Economic Transition and Labour Market Dynamics in China: An Interpretative Survey of the “Turning Point” Debate'. *Journal of Economic Surveys*, 32(2): 420–39. <https://doi.org/10.1111/joes.12206>
- Balassa, B. (1989). 'Outward Orientation.' In Hollis Chenery and T.N. Srinivasan (eds.), *Handbook of Development Economics* (Volume 2), New York: North Holland, 1645–1689. [https://doi.org/10.1016/S1573-4471\(89\)02018-8](https://doi.org/10.1016/S1573-4471(89)02018-8)
- Banerjee, A., J. Dolado, J.W. Galbraith, and D. endry (1993). *Co-Integration, Error Correction, and the Econometric Analysis of Non-Stationary Data*. New York: Oxford University Press. <https://doi.org/10.1093/0198288107.001.0001>
- Barro, R.J. (1974). 'Are Government Bonds Net Worth?' *Journal of Political Economy*, 82(6): 1095–117. <https://doi.org/10.1086/260266>
- Blöndal, J.R., I. Hawkesworth, and H. Deok Choi (2009). 'Budgeting in Indonesia'. *OECD Journal on Budgeting*, 9(2): 1–31. <https://doi.org/10.1787/budget-9-5ks72wv89p48>

- Bloom, D.E., D. Canning, R.K. Mansfield, and M. Moore (2007). 'Demographic Change, Social Security Systems, and Savings'. *Journal of Monetary Economics*, 54(1): 92–114. <https://doi.org/10.1016/j.jmoneco.2006.12.004>
- Boediono (2005). 'Managing the Indonesian Economy: Some Lessons from the Past'. *Bulletin of Indonesian Economic Studies*, 41(3): 309–24. <https://doi.org/10.1080/00074910500411906>
- Brandt, L., C.-T. Hsieh, and X. Zhu (2008). 'Growth and Structural Transformation in China'. In L. Brandt and T.G. Rawski (eds) *China's Great Economic Transformation*. Cambridge: Cambridge University Press, 683–728. <https://doi.org/10.1017/CBO9780511754234.018>
- Chow, S.C., and G.F. Papanek (1981). 'Laissez-Faire, Growth and Equity-Hong Kong'. *The Economic Journal*, 91(362): 466–85. <https://doi.org/10.2307/2232597>
- Collins, S.M. (1991). 'Saving Behaviour in Ten Developing Countries'. In B.D. Bernham and J.B. Shoven (eds), *National Saving and Economic Performance*. Chicago: University of Chicago Press, 349–76.
- Corbo, V., and K. Schmidt-Hebbel (1991). 'Public Policies and Saving in Developing Countries'. *Journal of Development Economics*, 36(1): 89–115. [https://doi.org/10.1016/0304-3878\(91\)90006-H](https://doi.org/10.1016/0304-3878(91)90006-H)
- Curtis, C.C., S. Lugauer, and N.C. Mark (2015). 'Demographic Patterns and Household Saving in China'. *American Economic Journal: Macroeconomics*, 7(2): 58–94. <https://doi.org/10.1257/mac.20130105>
- Curtis, C.C., S. Lugauer, and N.C. Mark (2017). 'Demographics and Aggregate Household Saving in Japan, China, and India'. *Journal of Macroeconomics*, 51: 175–91. <https://doi.org/10.1016/j.jmacro.2017.01.002>
- Deaton, A. (1989). 'Saving in Developing Countries: Theory and Review'. *The World Bank Economic Review*, 3(suppl_1): 61–96. https://doi.org/10.1093/wber/3.suppl_1.61
- Deaton, A.S. (1992). *Understanding Consumption*. Oxford: Clarendon Press. <https://doi.org/10.1093/0198288247.001.0001>

- Deaton, A.S., and C.H. Paxson (1999). 'Saving, Growth, and Aging in Taiwan'. In D.A. Wise (ed.), *Studies in the Economics of Aging*. Chicago: University of Chicago Press, 331–61.
- Dumitrescu, E.-I., and C. Hurlin (2012). 'Testing for Granger Non-Causality in Heterogeneous Panels'. *Economic Modelling*, 29(4): 1450–60. <https://doi.org/10.1016/j.econmod.2012.02.014>
- Edwards, S. (1996). 'Why are Latin America's Savings Rates so Low? An International Comparative Analysis'. *Journal of Development Economics*, 51(1): 5–44. [https://doi.org/10.1016/S0304-3878\(96\)00424-5](https://doi.org/10.1016/S0304-3878(96)00424-5)
- Feldstein, M. (1974). 'Social Security, Induced Retirement, and Aggregate Capital Accumulation'. *Journal of Political Economy*, 82(5): 905–26. <https://doi.org/10.1086/260246>
- Feldstein, M. (1996). 'Social Security and Saving: New Time Series Evidence'. *National Tax Journal*, 49(2): 151–64. <https://doi.org/10.1086/NTJ41789194>
- Ge, S., D.T. Yang, and J. Zhang (2018). 'Population Policies, Demographic Structural Changes, and the Chinese Household Saving Puzzle'. *European Economic Review*, 101(2): 181–209. <https://doi.org/10.1016/j.euroecorev.2017.09.008>
- Gersovitz, M. (1988). 'Saving and Development'. In H. Chenery and T.N. Srinivasan (eds), *Handbook of Development Economics*, 1. North Holland: Elsevier, 381–424. [https://doi.org/10.1016/S1573-4471\(88\)01013-7](https://doi.org/10.1016/S1573-4471(88)01013-7)
- Grigoli, F., A. Herman, and K. Schmidt-Hebbel (2018). 'Saving in the World'. *World Development*, 104: 257–70. <https://doi.org/10.1016/j.worlddev.2017.11.022>
- Ha, J., J.-W. Lee, and L. Sumulong (2010). 'Rebalancing Growth in the Republic of Korea.' ADBI Working Paper. Tokyo: Asian Development Bank Institute. <https://doi.org/10.2139/ssrn.1638788>
- Hausman, J. (1978). 'Specification Tests in Econometrics'. *Econometrica*, 46(6): 1251–71. <https://doi.org/10.2307/1913827>

- Hill, H. (2018). 'Asia's Third Giant: A Survey of the Indonesian Economy'. *Economic Record*, 94(307): 469–99. <https://doi.org/10.1111/1475-4932.12439>
- Horioka, C.Y. (1991). 'The Determinants of Japan's Saving Rate: The Impact of the Age Structure of the Population and Other Factors'. *The Economic Studies Quarterly*, 42(3): 237–53.
- Horioka, C.Y. (1996). 'The Determinants of Japan's Saving Rate: The Impact of the Age Structure of the Population and Other Factors.' *Review of Economics and Statistics*, 78(4): 511–6. <https://doi.org/10.1162/rest.1997.79.3.511>
- Horioka, C.Y., and A. Terada-Hagiwara (2012). 'The Determinants and Long-Term Projections of Saving Rates in Developing Asia'. *Japan and the World Economy*, 24(2), 128–37. <https://doi.org/10.1016/j.japwor.2012.01.006>
- Horioka, C.Y., and A. Terada-Hagiwara (2014). 'Corporate Cash Holding in Asia'. *Asian Economic Journal*, 28(4): 323–45. <https://doi.org/10.1111/asej.12039>
- Hussein, A., and A.P. Thirlwall (1999). 'Explaining Differences in the Domestic Savings Ratio Across Countries: A Panel Data Study'. *Journal of Development Studies*, 36(1): 31–52. <https://doi.org/10.1080/00220389908422610>
- Im, K.S., M.H. Pesaran, and Y. Shin (2003). 'Testing for Unit Roots in Heterogeneous Panels'. *Journal of Econometrics*, 115(1): 53–74. [https://doi.org/10.1016/S0304-4076\(03\)00092-7](https://doi.org/10.1016/S0304-4076(03)00092-7)
- Jongwanich, J. (2010). 'The Determinants of Household and Private Savings in Thailand'. *Applied Economics*, 42(8), 965–76. <https://doi.org/10.1080/00036840701721067>
- Kelley, A.C., and R.M. Schmidt (1996). 'Saving, Dependency and Development'. *Population Economics*, 9(3): 365–86. <https://doi.org/10.1007/BF00573070>
- Kinugasa, T., and A. Mason (2007). 'Why Countries Become Wealthy: The Effects of Adult Longevity on Saving'. *World Development*, 35(1): 1–23. <https://doi.org/10.1016/j.worlddev.2006.09.002>

- Leff, N.H. (1969). 'Dependency Rates and Saving Rates'. *American Economic Review*, 59(5): 886–96.
- Lewis, W.A. (1954). 'Economic Development with Unlimited Supplies of Labour'. *Manchester School of Economics and Social Studies*, 25(1): 1–94. <https://doi.org/10.1111/j.1467-9957.1958.tb00922.x>
- Levine, R., and D. Renelt (1992). 'A Sensitivity Analysis of Cross-Country Growth Regressions'. *The American Economic Review*, 82: 942–63.
- Liu, L.-Y., and W.T. Woo (1994). 'Saving Behaviour Under Imperfect Capital Markets and the Current Account Consequences'. *The Economic Journal*, 104(424): 512–27. <https://doi.org/10.2307/2234628>
- Loayza, N., K. Schmidt-Hebbel, and L. Servén (2000). 'Saving in Developing Countries: An Overview'. *The World Bank Economic Review*, 14(3): 393–414. <https://doi.org/10.1093/wber/14.3.393>
- Maddala, G.S., and S. Wu (1999). 'A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test'. *Oxford Bulletin of Economics and Statistics*, 61(1): 631–52. <https://doi.org/10.1111/1468-0084.0610s1631>
- Maizels, A. (1971). *Exports and Economic Growth in Developing Countries*. Cambridge: Cambridge University Press.
- Masson, A. (1988). 'Saving, Economic Growth and Demographic Change'. *Population and Development Review*, 14(1): 113–44. <https://doi.org/10.2307/1972502>
- McCawley, P. (2017). *Banking on the Future of Asia and the Pacific: 50 Years of the Asian Development Bank*. Manila: ADB. <https://doi.org/10.22617/TCS178707>
- Meier, G.M. (1984). 'The Formative Period'. In G.M. Meier and D. Seers (eds), *Pioneers in Development*. New York: Oxford University Press, 3–16.
- Michaely, M. (1977). 'Exports and Growth: An Empirical Investigation'. *Journal of Development Economics*, 4(1): 49–53. [https://doi.org/10.1016/0304-3878\(77\)90006-2](https://doi.org/10.1016/0304-3878(77)90006-2)

- Modigliani, F. (1966). 'The Life Cycle Hypothesis of Saving, the Demand for Wealth and the Supply of Capital'. *Social Research*, 160–217.
- Modigliani, F. (1986). 'Life Cycle, Individual Thrift, and the Wealth of Nations'. *American Economic Review*, 76(2): 297–313.
- Modigliani, F. (1993). 'Recent Declines in the Savings Rate: A Life Cycle Perspective'. In M. Baldassarri, L. Paganetto, and E.S. Phelps (eds), *World Saving, Prosperity and Growth*. London: Macmillan, pp 249–86. https://doi.org/10.1007/978-1-349-22925-3_8
- Modigliani, F., and S.L. Cao (2004), 'The Chinese Saving Puzzle and the Life-Cycle Hypothesis'. *Journal of Economic Literature*, 42(1): 145–70. <https://doi.org/10.1257/002205104773558074>
- Nickell, S. (1981). 'Biases in Dynamic Models With Fixed Effects'. *Econometrical: Journal of the Econometric Society*, 49(6): 1417–26. <https://doi.org/10.2307/1911408>
- Obstfeld, M. (1999). 'Foreign Resource Inflows, Saving, and Growth'. In K. Schmidt-Hebbel and L. Serven (eds), *The Economics of Saving and Growth*. Cambridge: Cambridge University Press, 107–41. <https://doi.org/10.1017/CBO9780511625923.006>
- Paauw, D.S., and J.H. Fei (1973). *The Transition in Open Dualistic Economies: Theory and Southeast Asian Experience*. New Haven: Yale University Press.
- Papanek, G.F. (1972). 'The Effect of Aid and Other Resource Transfers on Savings and Growth in Less Developed Countries'. *The Economic Journal*, 82(327): 934–50. <https://doi.org/10.2307/2230259>
- Papanek, G.F. (1973). 'Aid, Foreign Private Investment, Savings, and Growth in Less Developed Countries'. *Journal of Political Economy*, 81(1): 120–30. <https://doi.org/10.1086/260009>
- Park, D., and C. Rhee (2005). 'Saving, Growth, and Demographic Change in Korea'. *Journal of the Japanese and International Economies*, 19(3): 394–413. <https://doi.org/10.1016/j.jjie.2003.12.005>

- Pedroni, P. (1999). 'Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors.' *Oxford Bulletin of Economics and Statistics*, 61(1), 653–70. <https://doi.org/10.1111/1468-0084.61.s1.14>
- Pedroni, P. (2004). 'Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis'. *Econometric Theory*, 20(3): 597–625. <https://doi.org/10.1017/S0266466604203073>
- Perkins, D. (2013). *East Asian Development: Foundations and Strategies*. Cambridge, MA: Harvard University Press. <https://doi.org/10.4159/harvard.9780674726130>
- Pesaran, H. (2007). 'A Simple Panel Unit Root Test in the Presence of Cross-Section Dependence.' *Journal of Applied Econometrics*, 22(2): 265–312. <https://doi.org/10.1002/jae.951>
- Pesaran, H. (2015). *Time Series and Panel Data Econometrics*. Oxford: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198736912.001.0001>
- Poterba, J.M. (1991). 'Dividends, Capital Gains and the Corporate Veil: Evidence from Britain, Canada and the United States'. In B.D. Douglas and J.B. Shoven (eds), *National Saving and Economic Performance*. Chicago: University of Chicago Press, 49–71.
- Prasad, E.S. (2011). 'Rebalancing Growth in Asia'. *International Finance*, 14(1): 27–66. <https://doi.org/10.1111/j.1468-2362.2011.01276.x>
- Prichett, L. (2006). 'The Quest Continues: After Decades of Growth Research, What Can Academic Economists Really Say about Policy?' *Finance and Development*, 43(1), 7–11.
- Radelet, S.C., J. Sachs, and J.-W. Lee (1997). 'Economic Growth in Asia'. Harvard Institute for International Development. https://pdf.usaid.gov/pdf_docs/Pcaaa746.pdf
- Ranis, G. (1995). 'Another Look at the East Asian Miracle'. *World Bank Economic Review*, 9(3): 509–34. <https://doi.org/10.1093/wber/9.3.509>
- Reinhart, C.M., and E. Talvi (1998). 'Capital Flows and Saving in Latin America and Asia: A Reinterpretation'. *Journal of Development Economics*, 57(1): 45–66. [https://doi.org/10.1016/S0304-3878\(98\)00077-7](https://doi.org/10.1016/S0304-3878(98)00077-7)

- Rosenstein-Rodan, P.N. (1961). 'International Aid for Underdeveloped Countries'. *The Review of Economics and Statistics*, 43(2): 107–38. <https://doi.org/10.2307/1928662>
- Sala-i-Martin, X.X. (1997). 'I Just Ran Two Million Regressions'. *The American Economic Review*, 87(2): 178–83. <https://doi.org/10.3386/w6252>
- Singh, A. (1998). 'Savings, Investment and the Corporation in the East Asian Miracle'. *The Journal of Development Studies*, 34(6): 112–37. <https://doi.org/10.1080/00220389808422548>
- Solow, R.M. (1956). 'A Contribution to the Theory of Economic Growth'. *The Quarterly Journal of Economics*, 70(1): 65–94. <https://doi.org/10.2307/1884513>
- Srinivasan, T.N. (1994). 'Data Base for Development Analysis: An Overview'. *Journal of Development Economics*, 44(1): 3–27. [https://doi.org/10.1016/0304-3878\(94\)00003-4](https://doi.org/10.1016/0304-3878(94)00003-4)
- Stiglitz, J.E. (1996). 'Some Lessons from the East Asian Miracle'. *World Bank Research Observer*, 11(2): 151–77. <https://doi.org/10.1093/wbro/11.2.151>
- Sun, C., and M.-y. Liang (1982). 'Savings in Taiwan, 1953-1980'. In K.-t. Li and T.-S. Yu (eds), *Experiences and Lessons of Economic Development in Taiwan*. Taipei: Academia Sinica, 295–312.
- Taiwan (Republic of China) (various years). *Taiwan Statistical Data Book*. Taipei: Council for Economic Planning and Development.
- Weisskopf, T.E. (1972). 'The Impact of Foreign Capital Inflow on Domestic Savings in Underdeveloped Countries'. *Journal of International Economics*, 2(1): 25–38. [https://doi.org/10.1016/0022-1996\(72\)90043-8](https://doi.org/10.1016/0022-1996(72)90043-8)
- World Bank (1993). *The East Asian Miracle: Economic Growth and Public Policy*. New York: Oxford University Press.

Appendix: Summary statistics, 1980–2019

Country/Variable	Mean	S.D.	Min	Max
Bangladesh				
PSR [Private savings rate (%)]	16.0	6.9	4.3	26.9
NSR [National savings rate (%)]	18.2	9.0	1.9	29.1
GY [Growth rate of GNI %]	3.3	3.0	-4.0	11.2
YDEP [Young dependency (%)]	36.8	5.5	27.2	44.6
ADEP [Aged dependency (%)]	6.6	0.8	5.7	7.8
RID [Real interest rate (%)]	3.0	3.7	-5.7	11.7
BBL [Budget balance/GNI (%)]	-1.6	2.1	-5.5	3.8
INF [Inflation rate (%)]	6.6	3.1	0.2	13.7
FS [Foreign capital inflow/GNI (%)]	4.5	4.9	-1.0	15.5
CRP [Bank lending/GNI (%)]	27.6	13.6	7.0	51.5
WL [Wealth/GNI (%)]	42.0	18.2	14.6	69.8
EOR [Export/GNI (%)]	11.4	4.9	3.4	20.2
China				
PSR [Private savings rate (%)]	46.5	8.0	30.3	57.4
NSR [National savings rate (%)]	41.0	6.1	30.9	51.1
GY [Growth rate of GNI %]	8.7	2.9	3.1	14.6
YDEP [Young dependency (%)]	24.3	5.3	17.8	34.8
ADEP [Aged dependency (%)]	10.3	2.0	8.0	16.2
RID [Real interest rate (%)]	0.0	3.7	-8.0	6.6
BBL [Budget balance/GNI (%)]	-2.8	2.6	-8.7	0.6
INF [Inflation rate (%)]	5.0	4.8	-1.3	20.6
FS [Foreign capital inflow/GNI (%)]	-1.6	3.3	-9.8	5.6
CRP [Bank lending/GNI (%)]	128.8	39.6	71.6	205.9
WL [Wealth/GNI (%)]	154.6	68.5	42.8	267.9
EOR [Export/GNI (%)]	19.2	8.2	7.2	36.0

India				
PSR [Private savings rate (%)]	31.0	7.7	18.1	42.2
NSR [National savings rate (%)]	27.0	6.8	16.3	38.0
GY [Growth rate of GNI %]	4.2	2.4	-2.1	8.4
YDEP [Young dependency (%)]	34.2	4.0	26.6	39.2
ADEP [Aged dependency (%)]	7.4	0.9	6.4	9.5
RID [Real interest rate (%)]	1.7	2.8	-3.7	7.5
BBL [Budget balance/GNI (%)]	-4.5	1.0	-6.6	-2.6
INF [Inflation rate (%)]	6.7	2.9	0.0	13.8
FS [Foreign capital inflow/GNI (%)]	2.7	2.0	-1.8	6.4
CRP [Bank lending/GNI (%)]	39.0	13.6	23.3	60.7
WL [Wealth/GNI (%)]	64.1	18.7	20.5	89.4
EOR [Export/GNI (%)]	14.0	6.7	5.2	25.4
Indonesia				
PSR [Private savings rate (%)]	24.7	6.6	1.3	34.6
NSR [National savings rate (%)]	29.1	4.4	14.0	35.7
GY [Growth rate of GNI %]	3.7	4.6	-15.6	10.3
YDEP [Young dependency (%)]	32.4	4.5	26.2	40.8
ADEP [Aged dependency (%)]	7.1	0.7	6.3	8.9
RID [Real interest rate (%)]	3.0	8.4	-31.5	21.8
BBL [Budget balance/GNI (%)]	-1.6	1.5	-5.3	2.2
INF [Inflation rate (%)]	10.9	11.7	0.0	75.3
FS [Foreign capital inflow/GNI (%)]	-0.3	3.6	-12.1	8.1
CRP [Bank lending/GNI (%)]	42.4	17.4	18.4	87.0
WL [Wealth/GNI (%)]	51.1	12.7	25.4	75.6
EOR [Export/GNI (%)]	27.7	6.5	18.6	53.0
Rep. of Korea				

PSR [Private savings rate (%)]	29.8	5.0	15.7	36.3
NSR [National savings rate (%)]	32.5	4.1	19.1	36.9
GY [Growth rate of GNI %]	5.0	5.0	-13.3	13.0
YDEP [Young dependency (%)]	21.3	6.0	12.7	33.0
ADEP [Aged dependency (%)]	11.3	4.3	6.7	20.9
RID [Real interest rate (%)]	3.0	2.7	-0.7	14.7
BBL [Budget balance/GNI (%)]	0.3	1.6	-3.5	3.1
INF [Inflation rate (%)]	3.6	2.8	-1.2	10.1
FS [Foreign capital inflow/GNI (%)]	0.8	5.0	-6.8	13.0
CRP [Bank lending/GNI (%)]	115.9	60.7	50.1	224.5
WL [Wealth/GNI (%)]	107.8	65.4	38.2	225.9
EOR [Export/GNI (%)]	34.9	8.8	23.7	54.1
Malaysia				
PSR [Private savings rate (%)]	31.4	5.8	20.8	44.3
NSR [National savings rate (%)]	33.7	5.2	24.9	45.7
GY [Growth rate of GNI %]	3.9	4.2	-7.4	11.0
YDEP [Young dependency (%)]	32.4	5.0	23.7	39.1
ADEP [Aged dependency (%)]	7.0	1.1	6.2	10.0
RID [Real interest rate (%)]	1.8	4.8	-6.5	19.2
BBL [Budget balance/GNI (%)]	-4.2	3.9	-16.6	2.4
INF [Inflation rate (%)]	3.1	3.8	-8.7	10.4
FS [Foreign capital inflow/GNI (%)]	-5.1	8.9	-21.1	12.2
CRP [Bank lending/GNI (%)]	148.0	31.1	83.6	222.1
WL [Wealth/GNI (%)]	163.1	29.6	48.3	214.5
EOR [Export/GNI (%)]	83.5	21.4	50.9	121.3
Pakistan				
PSR [Private savings rate (%)]	18.7	3.6	10.5	27.5

NSR [National savings rate (%)]	20.0	3.0	13.3	26.4
GY [Growth rate of GNI (%)]	2.0	4.6	-13.0	23.0
YDEP [Young dependency (%)]	40.5	2.9	35.1	43.3
ADEP [Aged dependency (%)]	7.3	0.1	7.1	7.5
RID [Real interest rate (%)]	-0.5	4.6	-11.4	5.9
BBL [Budget balance/GNI (%)]	-6.1	1.8	-9.0	-1.6
INF [Inflation rate (%)]	8.7	5.3	0.0	22.3
FS [Foreign capital inflow/GNI (%)]	-2.4	3.7	-9.8	5.0
CRP [Bank lending/GNI (%)]	26.1	4.9	16.8	33.1
WL [Wealth/GNI (%)]	52.6	8.6	22.9	66.8
EOR [Export/GNI (%)]	13.3	2.4	8.2	17.3
Philippines				
PSR [Private savings rate (%)]	20.3	5.1	11.5	28.6
NSR [National savings rate (%)]	22.1	3.5	15.9	28.1
GY [Growth rate of GNI %]	2.4	5.0	-10.2	23.4
YDEP [Young dependency (%)]	37.7	3.8	30.5	42.9
ADEP [Aged dependency (%)]	6.2	0.8	5.4	8.3
RID [Real interest rate (%)]	1.4	5.7	-25.7	15.6
BBL [Budget balance/GNI (%)]	-2.4	1.6	-5.2	1.0
INF [Inflation rate (%)]	7.3	8.6	-0.7	53.0
FS [Foreign capital inflow/GNI (%)]	-1.3	4.3	-9.4	6.3
CRP [Bank lending/GNI (%)]	34.9	10.6	18.0	65.5
WL [Wealth/GNI (%)]	54.0	15.7	26.4	80.5
EOR [Export/GNI (%)]	28.4	8.9	13.9	43.3
Singapore				
PSR [Private savings rate (%)]	45.7	6.6	32.7	55.4
NSR [National savings rate (%)]	45.7	4.0	38.0	51.3

GY [Growth rate of GNI %]	4.3	6.9	-5.7	25.9
YDEP [Young dependency (%)]	18.5	4.3	12.2	26.1
ADEP [Aged dependency (%)]	9.2	2.2	7.0	16.5
RID [Real interest rate (%)]	1.0	3.3	-5.0	8.6
BBL [Budget balance/GNI (%)]	6.9	4.3	-2.7	16.3
INF [Inflation rate (%)]	1.5	2.3	-3.6	5.9
FS [Foreign capital inflow/GNI (%)]	-14.0	9.3	-28.3	7.1
CRP [Bank lending/GNI (%)]	116.5	150.7	65.1	1,029.8
WL [Wealth/GNI (%)]	126.6	25.4	40.2	164.3
EOR [Export/GNI (%)]	183.3	20.2	148.7	229.0
Sri Lanka				
PSR [Private savings rate (%)]	17.6	10.7	-0.4	33.4
NSR [National savings rate (%)]	20.3	7.2	7.8	33.9
GY [Growth rate of GNI (%)]	4.3	2.9	-1.7	11.2
YDEP [Young dependency (%)]	28.5	3.8	24.0	35.6
ADEP [Aged dependency (%)]	10.3	2.4	7.5	16.6
RID [Real interest rate (%)]	3.7	4.2	-3.7	17.0
BBL [Budget balance/GNI (%)]	-8.5	3.0	-17.4	-5.3
INF [Inflation rate (%)]	8.4	4.5	0.0	20.0
FS [Foreign capital inflow/GNI (%)]	6.6	5.8	0.3	22.9
CRP [Bank lending/GNI (%)]	34.3	12.2	11.5	59.8
WL [Wealth/GNI (%)]	47.9	9.8	36.3	74.8
EOR [Export/GNI (%)]	28.4	5.9	19.6	39.0
Taiwan				
PSR [Private savings rate (%)]	32.4	3.1	27.3	41.4
NSR [National savings rate (%)]	30.8	3.0	26.0	38.1
GY [Growth rate of GNI%]	5.3	3.6	-0.4	13.6

YDEP [Young dependency (%)]	31.2	10.2	17.7	49.4
ADEP [Aged dependency (%)]	12.5	3.8	6.9	21.2
RID [Real interest rate (%)]	4.5	3.2	-1.8	11.4
BBL [Budget balance/GNI (%)]	-1.9	2.2	-7.1	1.1
INF [Inflation rate (%)]	0.8	1.9	-2.6	3.8
FS [Foreign capital inflow/GNI (%)]	-7.8	5.2	-20.9	1.2
CRP [Bank lending/GNI (%)]	110.7	31.8	52.4	149.7
WL [Wealth/GNI (%)]	212.8	48.9	82.2	260.8
EOR [Export/GNI (%)]	44.1	8.1	31.2	56.7
Thailand				
PSR [Private savings rate (%)]	30.9	3.6	22.8	39.3
NSR [National savings rate (%)]	30.4	4.0	21.3	36.0
GY [Growth rate of GNI %]	3.8	3.6	-7.0	10.2
YDEP [Young dependency (%)]	25.2	6.5	16.8	38.6
ADEP [Aged dependency (%)]	10.1	3.3	6.5	17.5
RID [Real interest rate (%)]	3.1	4.5	-3.8	13.6
BBL [Budget balance/GNI (%)]	-0.6	3.2	-9.5	4.7
INF [Inflation rate (%)]	3.2	2.2	-2.6	8.1
FS [Foreign capital inflow/GNI (%)]	-1.5	6.5	-14.1	8.3
CRP [Bank lending/GNI (%)]	121.1	43.3	40.2	175.9
WL [Wealth/GNI (%)]	123.9	35.0	56.4	177.8
EOR [Export/GNI (%)]	50.9	17.8	20.1	71.4
All 12 countries				
PSR [Private savings rate (%)]	28.8	11.5	-0.4	57.4
NSR [National savings rate (%)]	29.2	9.7	1.9	51.3
GY [Growth rate of GNI %]	4.3	4.5	-15.6	25.9
YDEP [Young dependency (%)]	30.3	8.5	12.2	49.4

ADEP [Aged dependency (%)]	8.8	3.0	5.4	21.2
RID [Real interest rate (%)]	2.1	4.7	-31.5	21.8
BBL [Budget balance/GNI (%)]	-2.2	4.4	-17.4	16.3
INF [Inflation rate (%)]	5.5	6.0	-8.7	75.3
FS [Foreign capital inflow/GNI (%)]	-1.6	7.7	-28.3	22.9
CRP [Bank lending/GNI (%)]	78.8	69.0	7.0	1,029.8
WL [Wealth/GNI (%)]	100.0	64.7	14.6	267.9
EOR [Export/GNI (%)]	44.9	47.4	3.4	229.0