

Lee, Sang-Hyop; Mason, Andrew

Working Paper

Are Current Tax and Spending Regimes Sustainable in Developing Asia?

ADB Economics Working Paper Series, No. 414

Provided in Cooperation with:

Asian Development Bank (ADB), Manila

Suggested Citation: Lee, Sang-Hyop; Mason, Andrew (2014) : Are Current Tax and Spending Regimes Sustainable in Developing Asia?, ADB Economics Working Paper Series, No. 414, Asian Development Bank (ADB), Manila,
<https://hdl.handle.net/11540/4210>

This Version is available at:

<https://hdl.handle.net/10419/128532>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/3.0/igo/>

ARE CURRENT TAX AND SPENDING REGIMES SUSTAINABLE IN DEVELOPING ASIA?

Sang-Hyop Lee and Andrew Mason

NO. 414

November 2014

**ADB ECONOMICS
WORKING PAPER SERIES**



ADB Economics Working Paper Series

Are Current Tax and Spending Regimes Sustainable in Developing Asia?

Sang-Hyop Lee and Andrew Mason

No. 414 | 2014

Sang-Hyop Lee (leesang@hawaii.edu) is a Professor of Economics and Director of the Center for Korean Studies at the University of Hawaii at Manoa, and an Adjunct Senior Fellow at the East-West Center. Andrew Mason (amason@hawaii.edu) is a Professor of Economics at the University of Hawaii at Manoa, a Senior Fellow at the East-West Center, and a member of the Center on the Economics and Demography of Aging (CEDA) at the University of California, Berkeley.

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org

© 2014 by Asian Development Bank
November 2014
ISSN 2313-6537 (Print), 2313-6545 (e-ISSN)
Publication Stock No. WPS146929-3

The views expressed in this paper are those of the author and do not necessarily reflect the views and policies of the Asian Development Bank (ADB) or its Board of Governors or the governments they represent.

ADB does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use.

By making any designation of or reference to a particular territory or geographic area, or by using the term “country” in this document, ADB does not intend to make any judgments as to the legal or other status of any territory or area.

Note: In this publication, “\$” refers to US dollars.

The ADB Economics Working Paper Series is a forum for stimulating discussion and eliciting feedback on ongoing and recently completed research and policy studies undertaken by the Asian Development Bank (ADB) staff, consultants, or resource persons. The series deals with key economic and development problems, particularly those facing the Asia and Pacific region; as well as conceptual, analytical, or methodological issues relating to project/program economic analysis, and statistical data and measurement. The series aims to enhance the knowledge on Asia’s development and policy challenges; strengthen analytical rigor and quality of ADB’s country partnership strategies, and its subregional and country operations; and improve the quality and availability of statistical data and development indicators for monitoring development effectiveness.

The ADB Economics Working Paper Series is a quick-disseminating, informal publication whose titles could subsequently be revised for publication as articles in professional journals or chapters in books. The series is maintained by the Economics and Research Department.

CONTENTS

TABLES AND FIGURES	iv
ABSTRACT	v
I. INTRODUCTION	1
II. DATA	4
III. METHODOLOGY	5
A. Age Profiles of Education, Health, and Social Protection	5
B. Gross Domestic Product Growth	7
C. Incorporating Population	7
D. Aggregate Controls	8
E. Projection Method in Brief	9
IV. FISCAL PROJECTIONS	10
V. INTERPRETATION AND KEY IMPLICATIONS	16
VI. POLICY ISSUES AND FINAL OBSERVATIONS	23
REFERENCES	25

TABLES AND FIGURES

TABLES

1	Model Public Sector Expenditure Profiles	5
2	Per Capita Gross Domestic Product Growth Rate Assumptions	7
3	Public Spending as a Percentage of Gross Domestic Product for Asia and the Pacific, 2010	8
4	Government Expenditure on Education	11
5	Government Expenditure on Health	13
6	Government Expenditure on Social Security and Welfare	15
7	Government Expenditure as a Percentage of GDP, Decomposition of Change, and Education	18
8	Government Expenditure as a Percentage of GDP, Decomposition of Change, and Health	19
9	Government Expenditure as a Percentage of GDP, Decomposition of Change, Social Security and Welfare	20
10	Government Expenditure as a Percentage of GDP, Decomposition of Change, Education, Health, and Social Security and Welfare	22

FIGURES

1	Percentage of Population of the World Under 25 (horizontal axis) and 60 or Older (vertical axis) by Region	2
2	Per Capita Public Transfer Inflows by Age and Purpose in the Philippines, 1999	3
3	Aggregate Public Transfer Inflows by Age and Purpose in the Philippines, 1999	3
4	Model Profiles of Public Sector Spending in Asia by Age of Recipient	6

ABSTRACT

Changes in population age structure matter for public finances because the beneficiaries of public programs are primarily children and the elderly. This paper projects government spending on education, health care, and social protection in developing Asia up to 2050 using the National Transfer Accounts data set, United Nations' population projections, and other long-range projections for real gross domestic product (GDP) to estimate likely fiscal burdens as a result of demographic changes and economic growth. The share of GDP devoted to public spending on health care and social protection will increase as demographic change and economic growth are mutually reinforcing. On the contrary, the share devoted to public spending on education will decline in Asia and the Pacific as a decline in fertility and the share of the school-age population dominates the increase in per capita benefits. The magnitude and the pattern by program, however, vary substantially as demographic change, growth, and the current level of public spending are quite different across economies. Social spending in the Republic of Korea; the People's Republic of China; and Taipei, China is projected to more than double as a share of GDP by 2050, while it will be more modest in other areas of Asia and the Pacific.

Keywords: fiscal projection, population aging, social welfare expenditure

JEL Classification: H51, H53, H68, J11

I. INTRODUCTION

Changes in population age structure in Asia and the Pacific have been very dramatic over the last few decades and are certain to be so in the future. The changes in the People's Republic of China (PRC) have been particularly rapid but are nonetheless illustrative of the changes experienced elsewhere. In 1990, the population of the PRC was heavily concentrated in young ages with just over half of its people under the age of 25. Because of rapid fertility declines before and after 1990, the share of children in the population dropped to 35.0% in 2010. This will continue over the coming decades until by 2050 about 25.0% of the population will be under the age of 25.

The decline in the share of children over the last 30 years was matched primarily by an increase in the population of the working ages of 25–59 that rose from 41.0% in 1990 to 52.0% in 2010. This had favorable implications for economic growth—referred to as the demographic dividend—but also favorable implications for public finances. A larger share of the population in the PRC was concentrated in high tax-paying ages and a smaller share in school-going ages. The share of the working ages is expected to peak during the current decade and then begin decades of steady decline. By 2050, the percentage of the population aged 25–59 is projected to be 42.0%, very close to the level in 1990.

The decline in the shares of children and working-age populations over the coming decades will be offset by an increase in the share of the population aged 60 and older. In 2050, one-third of the PRC's population is projected to fall into the 60 and older age range compared with 13.0% in 2010 and 9.0% in 1990 (UN 2013b).

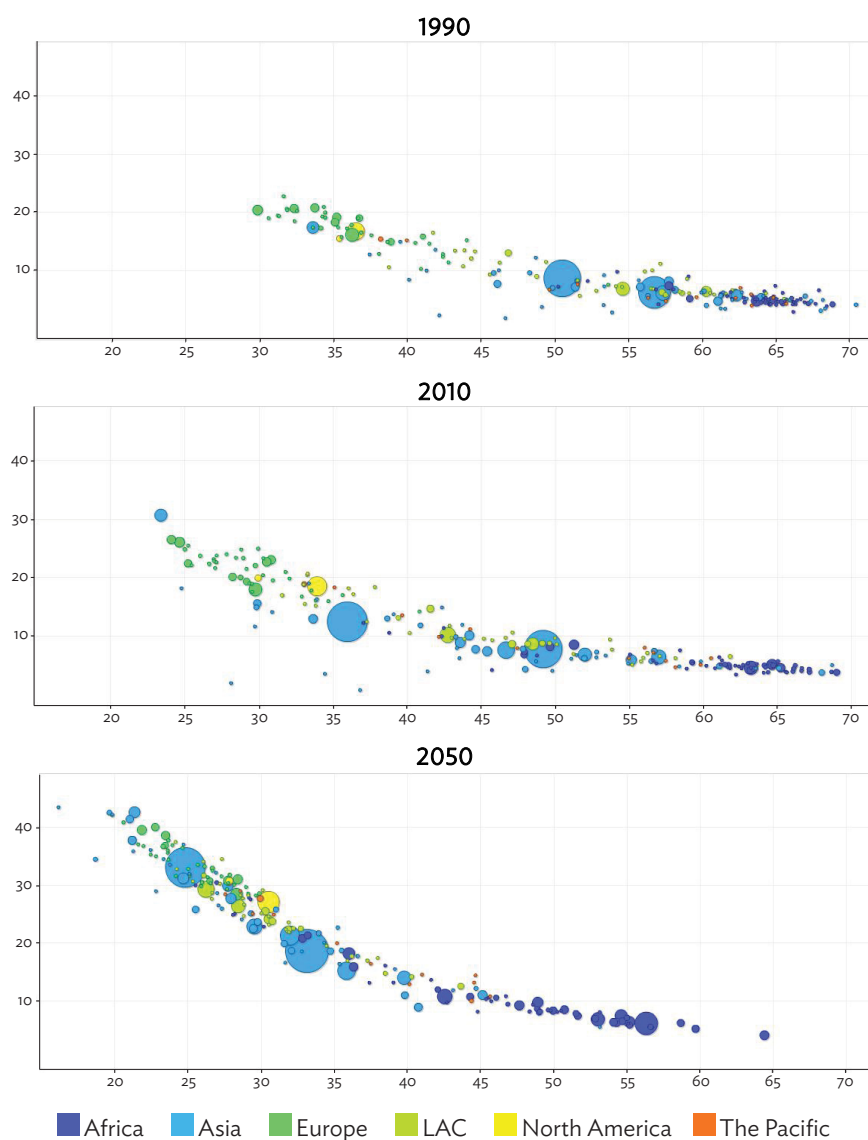
The demographic changes in the PRC are part of a regionwide and a worldwide phenomenon, as shown in the three snap shots of the population age structure of the world in 1990, 2010, and 2050 in Figure 1. In many rich and developing economies, the share of the working-age population has increased during the last few decades, while the share of children has declined. Likewise, the future will be increasingly dominated by population aging. In most economies, these changes have occurred more slowly than in the PRC, but in Hong Kong, China; Japan; the Republic of Korea; Singapore; Taipei, China; and Thailand, rapid changes in population age structure have been the rule.

A clear understanding of the source of population aging is essential to understanding the kinds of policy responses that may be considered. One cause of population aging is that people are living longer and that gains in survival rates are increasingly concentrated at older ages. Life expectancy at birth for both sexes combined now exceeds 80 in Hong Kong, China; Japan; the Republic of Korea; and Singapore, with steady increases expected in the coming decades. Other Asian economies lag in varying degrees with the life expectancy at birth for both sexes in the mid-70s for the PRC and Viet Nam, around 70 in Bangladesh and Indonesia, and the mid-60s in India. As life expectancy rises in these countries, the share of the population concentrated at older ages will inevitably rise.

Lower fertility is the other major reason why populations are aging. Cohorts that bear fewer children during their reproductive ages will subsequently live out their old ages in societies with relatively few members of the working-age population. In some East Asian economies, fertility is particularly low. The total fertility rate—the average number of births per woman over her reproductive years—is less than 1.3 births per woman in Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China; and 1.5 births per woman or fewer in Japan and Thailand, and possibly in the PRC. Low fertility is leading particularly to rapid aging in these economies (UN 2013b).

Population aging can be slowed to some extent by immigration. Migrants tend to be relatively young and often, their fertility is somewhat higher than the population of the receiving country. The effects of migration are relatively modest, however, except in a few places with expansive immigration policies. In very large countries like the PRC and India, immigration will never have an important impact on population age structure. The role of immigration as a moderating influence on aging is likely to diminish over time as the world as a whole becomes older. As seen in Figure 1, the current age structure is much more diverse now than it will be in 2050. This is particularly the case for Asia and the Pacific as the populations of Bangladesh, the PRC, India, and Indonesia age. In the future, young populations will increasingly be concentrated in Africa.

Figure 1: Percentage of Population of the World Under 25 (horizontal axis) and 60 or Older (vertical axis) by Region

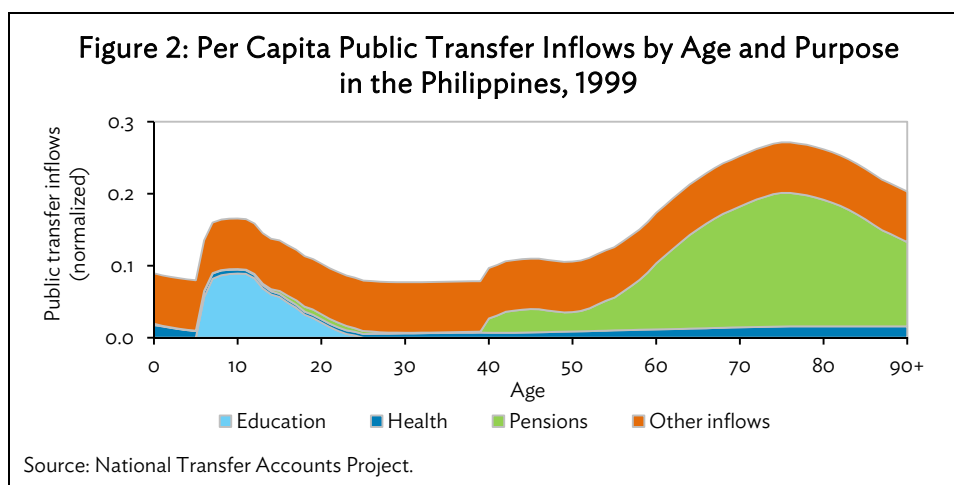


LAC = Latin America and the Caribbean.

Note: Size of bubble is proportional to the population.

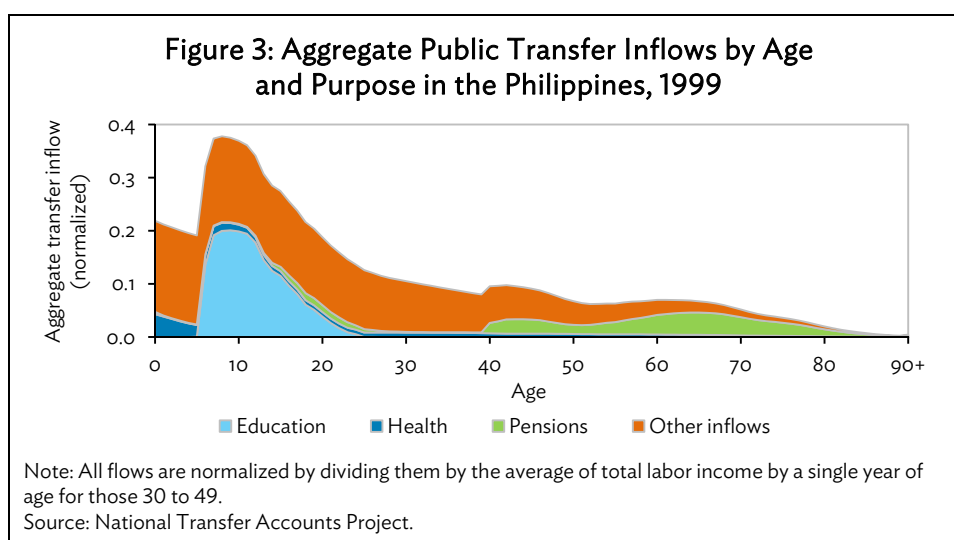
Source: United Nations, Department of Economic and Social Affairs, Population Division. 2013b. *World Population Prospects: The 2012 Revision*. New York.

Changes in population age structure matter for public finances for a very simple reason; the beneficiaries of public programs are primarily children and the elderly. The age profiles of public transfer inflows are so central to the analysis in this paper that they are shown for the Philippines in Figures 2 and 3. Figure 2 shows per capita public transfer inflows by age for education, health, pensions, and other purposes. The inflows are normalized by dividing the annual flows by the annual per capita labor income of persons aged 30–49, the prime working ages in most economies.



The inflow profiles for the Philippines shows two peaks. The first is for children driven primarily by public spending on education. The peak inflows occur at ages 9–11 and amounts to 16.5% of prime adult labor income. The second peak for transfer inflows occurs at older ages driven primarily by public pensions but also by rising publicly funded health-care spending. Public transfer inflows peak at ages 75 and 76, which are equal to 27.1% of the labor income of a prime-age adult.

The aggregate flows by age are determined as the product of per capita flows and population by age shown in Figure 2. These values are shown for the Philippines in Figure 3. The influence of the Philippines' young population age structure is clearly evident. Most public transfers go to children and not to seniors because they dominate the population more than seniors.



The age structure in the Philippines is changing relatively slowly, but it is changing. As the share of the population at young ages declines, it will push public spending on education lower relative to other public spending or to gross domestic product (GDP). For an extended period of time, the share of the population at young and old ages will be small so that the demographically related demand for public programs will be moderated. As the Philippines begins to age, however, public spending on health and pensions will begin to rise, and in the absence of other changes, public spending as a share of GDP will increase.

Lower-income economies in general and in Asia and the Pacific have low spending on public sector programs for reasons that are largely unrelated to demographic conditions. Public spending on education, health care, and pensions increases as economies prosper. This is very evident in Asia and the Pacific where the roles of the public sector are very different in high- and middle-income economies than in low-income economies. For the wealthier ones with well-developed public sectors, the key issue is whether those programs can be sustained as their populations age. As lower-income economies develop, the key issue for them is whether public programs can be expanded at the same time that their populations are aging.

II. DATA

The analysis is based on two sources of data. The first is population projections by age produced by the United Nations (UN) Population Division of the Department of Social and Economic Affairs. The most recent population estimates and projections are *World Population Prospects 2012* (UN 2013b). Data on public sector finances are based on National Transfer Accounts (NTA), a new set of economic accounts that document economic flows to and from ages in a manner consistent with the UN System of National Accounts. Research teams in 40 economies on 6 continents are currently collaborating in the construction of NTA, and 11 have been constructed for the Asia and Pacific economies: Australia; Cambodia; the PRC; India; Indonesia; Japan; the Republic of Korea; the Philippines; Taipei, China; Thailand; and Viet Nam.

The theoretical foundations of the accounts build on Lee (1994a and 1994b), and some details and preliminary results are reported in Lee, Lee, and Mason (2008); and Mason et al. (2009). The most recent and comprehensive treatment is Lee and Mason (2011). Methods are fully documented and explained in UN (2013a) and on the NTA website (<http://www.ntaccounts.org>).

NTA estimates are constructed using household surveys, administrative data from government agencies, and data from the UN System of National Accounts. The NTA measure how much people at each age consume and produce through their labor, and how the gap between consumption and labor income is funded relying on public and private transfers, and public and private asset-based reallocations. Public transfer inflows to each age distinguish in-kind and cash transfers for education, health, pensions, and other purposes. Public transfer outflows—the taxes and other public revenues that fund these transfers—are also classified by the age of those who pay the taxes.

NTA data are used to construct age profiles of public transfer inflows to each age group. These values are adjusted, however, to match aggregate values of public spending on education, health, and social security and welfare available in 2010 or earlier in some instances. More details are provided in Section III.

III. METHODOLOGY

The public transfer projections incorporate two factors: changes in population age structure and changes in age-specific transfers due to projected changes in per capita income.

A. Age Profiles of Education, Health, and Social Protection

Public spending on education, health, and social protection is much lower in low-income economies in Asia than in high-income ones in not only per capita terms, but also relative to standards of living. As incomes grow in the region, public spending will become increasingly important. How governments adjust to higher incomes is a matter of policy and will be determined by political decisions, so there is little basis to make a long-term forecast of how public sector spending will rise. Consequently, the projections use current (or recent) spending in higher income Asian economies as a guide to how spending is likely to change in lower income Asian economies.

This is accomplished using age profiles of public spending on education, health, and social protection for Asian economies for which NTA profiles are available. All profiles are per capita flows to persons at each age expressed relative to the average of per capita labor income of adults aged 30–49. Thus, given a particular profile, per capita spending rises at the same rate as the projected per capita labor income of prime-age adults. In addition, we assume that as economies become members of higher income groups, they will experience additional changes in their public spending profiles. The four model profiles constructed for varying levels of income shown in Table 1 are used to allow for the effects of income.

Table 1: Model Public Sector Expenditure Profiles

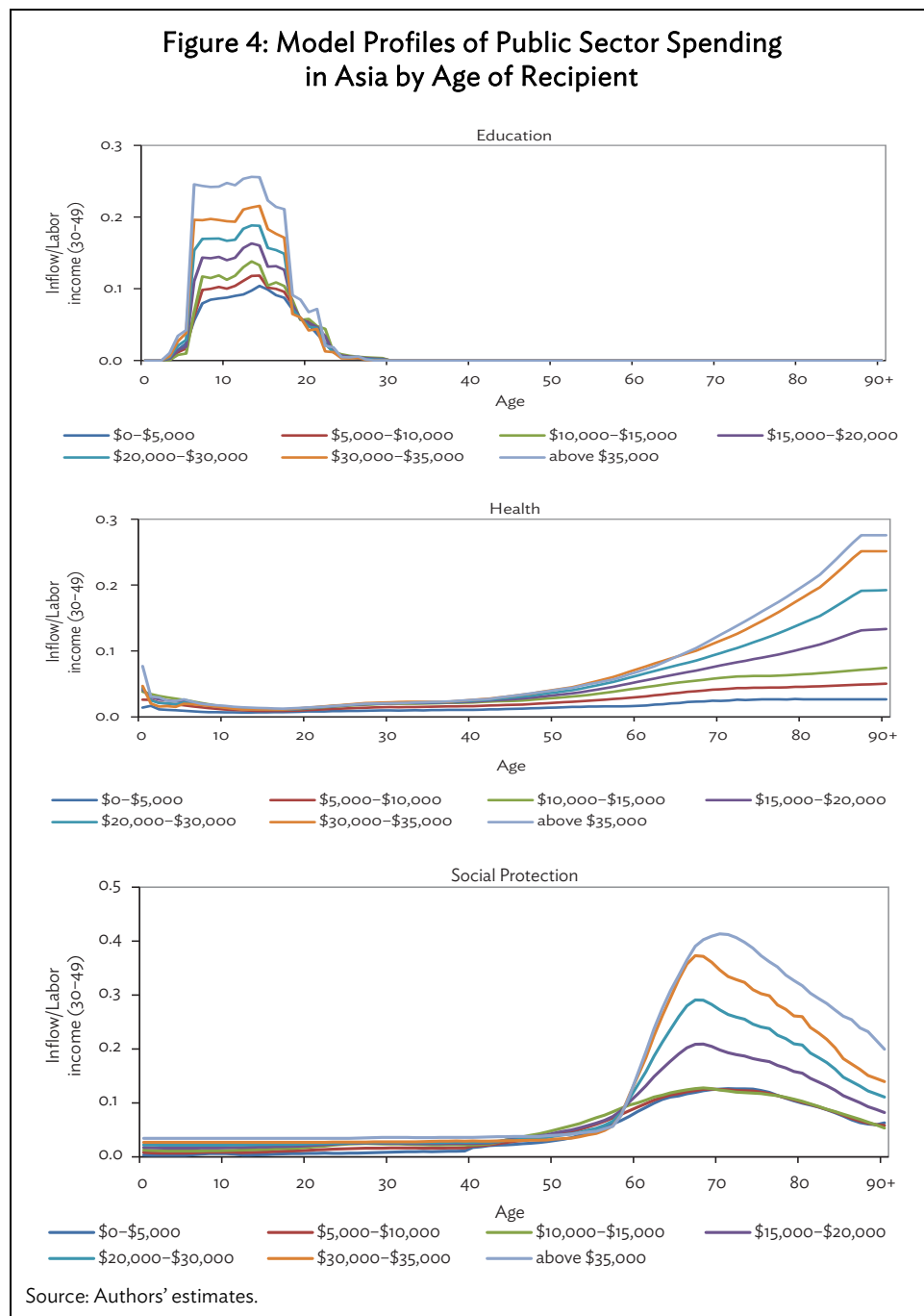
Income Range (Per capita gross domestic product in \$ 2005 prices)	Model Profiles
Below \$5,000	Asian low-income economies for education and health (PRC 2002, India 2004, Indonesia 2005, Philippines 1999, Thailand 2004, and Viet Nam 2008); for social protection (PRC 2002, Philippines 1999, and Thailand 2004).
\$5,000–\$10,000	Interpolated
\$10,000–\$15,000	Republic of Korea 2000 and Taipei, China 1998
\$15,000–\$20,000	Interpolated
\$20,000–\$30,000	Interpolated
\$30,000–\$35,000	Japan 1994
Above \$35,000	Japan 1999

PRC = People's Republic of China.

Note: Years on the right column indicate years of data of the profiles.

Source: Authors.

The profiles obtained for each income group are shown in Figure 4. The level of spending rises as per capita income reaches higher levels. There are also changes in the age pattern of transfers that are particularly notable for health. For low-income economies, spending on health care is only slightly elevated at older ages. For higher income economies, health-care spending rises very sharply with age.



B. Gross Domestic Product Growth

Long-term projections of real GDP are difficult to construct. Based on three sources, economies were classified into four groups (Table 2).¹ The projection results are influenced by GDP growth assumptions only when they graduate to a new income group. Many low-income economies do not exceed \$5,000 per capita income throughout the entire projection, and many others reach a higher income level only near the end of the simulation.

Table 2: Per Capita Gross Domestic Product Growth Rate Assumptions

Group and Economy	Annual Rate of Real per Capita Gross Domestic Product Growth (%)	
	2010–2030	2030–2050
A: Bhutan, Cambodia, People’s Republic of China, India, Lao People’s Democratic Republic, Mongolia, Myanmar, Sri Lanka, Viet Nam	6.0	3.0
B: Bangladesh; Indonesia; Macau, China; Papua New Guinea; Solomon Islands; Thailand,	4.0	2.5
C: Afghanistan; Armenia; Azerbaijan; Georgia; Hong Kong, China; Kazakhstan; Republic of Korea; Malaysia; Nepal; Pakistan; Philippines; Singapore; Taipei, China; Tajikistan; Turkmenistan; Uzbekistan	3.0	2.0
D: Brunei Darussalam, Japan, all others	1.0	1.0

Source: Authors’ estimates based on data indicated in footnote 1.

C. Incorporating Population

The size of the population has no direct effect on public spending as a percentage of GDP because the model age profiles of benefits are assumed to grow at the same rate as per capita income. Population age structure does have an important effect on public spending as a share of GDP, however, because benefits are concentrated at particular age groups—primarily the young for education and the old for health and social welfare spending.

One way to measure the effect of changes in age structure is to calculate the increase in benefits that would arise given the base-year age profile of benefits and the projected population age structure:

$$\frac{\sum \tilde{\tau}(x, t_0) N(x, t) / N(t)}{\sum \tilde{\tau}(x, t_0) N(x, t_0) / N(x)} \quad (1)$$

This expression has a simple interpretation. It is the ratio of per capita spending on a public program in year t relative to per capita spending on the program in the base year necessary to maintain the level of benefits per beneficiary at each age.

¹ Organisation for Economic Co-operation and Development (OECD) projections for the PRC, Japan, the Republic of Korea, India, Indonesia, and non-OECD members up to 2060; 2) Asian Development Bank (ADB) projections for its members up to 2030; and 3) The International Macroeconomic Data Set from the United States Department of Agriculture (USDA) for 190 countries up to 2030. As ADB and USDA provide projections only up to 2030, OECD member and non-member projections are used as a benchmark for extended projections up to 2050.

The United Nations' *World Population Prospects, 2012 Revision* prepared by the UN Population Division of the Department of Economic and Social Affairs was used for the analysis presented here. All projections are based on the medium fertility scenario. This scenario assumes that fertility will continue to decline in high-fertility economies and will recover toward replacement in low-fertility economies. Details are available on the UN Population Division website (<http://www.un.org/en/development/desa/population/>).

D. Aggregate Controls

All projections are scaled—adjusted proportionately—to match observed values of public expenditures in 2010 as a percentage of GDP for each economy. The value of interest in all cases is general government spending for education, health, and social welfare.

For health spending, National Health Accounts (NHA) estimates of general government expenditure are available from the World Health Organization (WHO). These data are quite complete and consistent over time. An alternative estimate that is available from the Asian Development Bank (ADB) is for central government spending. In general, this will be lower than general government expenditure but inconsistently so because of differences in government organization and in some cases, over time. For the Republic of Korea, for example, government expenditure on health in 2010 was 0.3% of GDP according to ADB's Key Indicators for Asia and Pacific compared with 4.1% according to WHO. WHO data were used for country baseline values for health.

Education spending estimates from three sources were compared: the World Bank; the United Nations Educational, Scientific and Cultural Organization (UNESCO); and ADB. Generally, the World Bank and UNESCO data are slightly higher than ADB data, but there are many missing values from the World Bank and UNESCO compared with ADB. The difference between ADB and World Bank data was small; hence, the more complete ADB data were used.

Our preference was to construct separate estimates for pension spending. Unfortunately, the availability of pension data is limited and inconsistently constructed when available. As a consequence, central government spending on social protection available from ADB was employed.

The simple average, the high, and the low of public spending for the region, according to our aggregate estimates, are reported in Table 3.

Table 3: Public Spending as a Percentage of Gross Domestic Product for Asia and the Pacific, 2010

	Health	Education	Social Protection
Average	3.0	3.5	3.4
High	12.6	6.7	17.0
Low	0.8	1.6	0.1

Source: Authors' estimates based on data from the World Bank, UNESCO, WHO, and ADB.

Health and social protection exhibit the greatest variation. The highest health-care spending as a percentage of GDP was in the Federated States of Micronesia (12.6%), Japan (7.4%), and Solomon Islands (6.9%). In lower income economies, values of close to 1.0% of GDP were not uncommon

(Bangladesh, Cambodia, India, Indonesia, and Pakistan). Spending on social protection was particularly high in Armenia (7.1%), Georgia (6.9%), Japan (17.0%), and Mongolia (12.9%).

Public spending on education was somewhat less variable across the region. Spending 6.0% of GDP or more on education was reported for Bhutan, Malaysia, and the Maldives. Public spending in Japan and the Republic of Korea was about 3.0% of GDP.

E. Projection Method in Brief

Let per capita transfers to persons age x in year t in country z be designated by $b(z)\tau(x, t)$. For purposes of projection we used a normalized support ratio equal to public transfers per person relative to per capita income, $y(t)$, so that public transfers per person age x in year t in country z is equal to $b(z)\tilde{\tau}(x, t)y(t)$ where $\tilde{\tau}(x, t) = \tau(x, t)/y(t)$. Thus, given the normalized transfer profile, per capita transfers are assumed to increase at the same rate as per capita income.

The normalized profile shifts upward in stepwise fashion as per capita income increases. In general, the normalized profile in year t is given by

$$\tilde{\tau}(x, t) = \sum_{k=1}^K D_k [y(t)] \tilde{\tau}(x, k) \quad (2)$$

where $D_k [y(t)]$ is a dummy variable that takes the value of 1 if per capita income in year t falls in per capita income growth k (otherwise the dummy variable is zero), and $\tilde{\tau}(x, k)$ is the model profile for income group k . See the income groupings and the utilized model profiles for each group in Table 1.

Total transfers as a share of per capita gross national product (GNP) is computed as

$$\begin{aligned} \text{Transfers as a percentage of GNP} &= \frac{b(z)y(t) \sum \tilde{\tau}(x, t)N(x, t)}{y(t)N(t)} \\ &= b(z) \sum \tilde{\tau}(x, t)N(x, t)/N(t) \end{aligned} \quad (3)$$

The model is applied separately to education, health, and social welfare spending using transfer profiles estimated separately for each of these programs.

Several features of this specification should be noted. Growth in per capita income within income groups does not affect transfers as a percentage of GNP, all other things equal. It is assumed that governments increase spending as per capita income rises. Second, changes in age structure increase (reduce) transfers as a percentage of GNP, if the population becomes increasingly concentrated in ages where public benefits are relatively large (small). Third, public transfers are scaled to match the initial level of spending in each economy.

The results should be interpreted as the cost (share of GNP) required to realize the model per capita transfers (indexed to per capita income) in the presence of changes in population age structure. As the effects of population age structure are experienced, governments are likely to adjust benefits if a big government is viewed as a problem.

IV. FISCAL PROJECTIONS

Estimates of public spending on education as a percentage of GDP from 1990 to 2010 and projections to 2050 are presented in Table 4. This is public spending only, and in some Asian economies (e.g., the PRC; Japan; the Republic of Korea; and Taipei,China) private spending on education is quite substantial. For a few (see table notes), spending at all levels of government are included; but in most, the values refer to central government spending only. As noted in Table 3, public spending averaged 3.5% of GDP (simple average of values) and ranged between 1.6% and 6.7% in 2010. Based on these summary values, the importance of education is projected to decline to an average value of 2.7% of GDP in 2050 ranging between 0.6% and 5.0% of GDP.

The projected decline in education spending is driven by declines in fertility and in the share of the population of school-going ages. This is analyzed in more detail below.

The declines are quite uniform in a qualitative way, as in every economy, education spending as a percentage of GDP is projected to decline. The rate of decline does vary, with the greatest declines projected for South and Southeast Asia as well as for Taipei,China.

Table 4: Government Expenditure on Education
(% of GDP)^a

Economy	1990	1995	2000	2005	2010	2020	2030	2040	2050
Developing Economies					3.5	3.1	3.1	2.8	2.7
Central and West Asia					3.7	3.3	3.4	2.9	2.8
Afghanistan	...	...	...	...	...	...	...	...	...
Armenia	...	...	2.8	2.7	2.8	2.5	2.3	2.0	1.9
Azerbaijan	7.7	3.5	3.9	3.0	2.8	2.3	2.5	2.1	2.0
Georgia	...	...	2.2	2.5	2.9	2.9	2.9	2.5	2.5
Kazakhstan	...	...	...	...	...	...	...	...	...
Kyrgyz Republic	7.5	6.6	3.5	4.9	5.8	5.2	5.6	4.8	4.4
Pakistan	...	...	...	...	...	...	...	...	...
Tajikistan	...	2.2	2.3	3.5	4.0	3.7	3.8	3.3	3.2
Turkmenistan	...	...	...	...	...	...	...	...	...
Uzbekistan	...	...	...	...	...	...	...	...	...
East Asia					3.5	3.1	3.4	3.2	3.2
China, People's Republic of ^b	...	2.0	...	3.3	3.1	3.0	3.0	2.9	3.3
Hong Kong, China	2.8	3.0	3.9	3.8	3.4	3.4	3.9	3.5	3.3
Korea, Republic of	2.9	2.4	3.2	3.2	3.2	2.4	3.3	3.2	3.0
Mongolia	11.5	3.6	6.7	4.9	5.9	5.4	5.5	4.6	4.9
Taipei, China	1.0	1.4	2.3	1.6	1.8	1.5	1.4	1.7	1.6
South Asia					3.8	3.3	3.2	2.7	2.5
Bangladesh	1.4	2.2	2.0	1.9	2.2	1.9	1.6	1.4	1.2
Bhutan	...	...	...	5.1	6.7	5.5	5.6	4.8	4.7
India	...	...	3.3	2.4	2.3	2.1	1.9	1.7	1.8
Maldives	...	4.8	7.4	6.7	6.0	4.9	5.1	4.1	3.5
Nepal	1.6	2.2	2.3	2.9	3.9	3.4	2.8	2.5	2.2
Sri Lanka	3.0	2.9	2.4	2.6	1.9	1.8	2.0	1.7	1.7
Southeast Asia					2.9	2.5	2.4	2.2	2.2
Brunei Darussalam	4.0	4.6	4.2	3.8	4.0	3.5	3.3	3.0	3.5
Cambodia	0.8	0.9	1.3	1.4	1.6	1.3	1.3	1.1	1.0
Indonesia	1.7	1.3	...	...	1.1	1.1	0.9	0.8	0.9
Lao PDR	0.5	0.1	1.0	...	1.0	0.8	0.8	0.7	0.6
Malaysia	5.5	4.8	5.6	4.9	6.3	5.1	5.2	4.8	5.0
Myanmar	...	...	...	...	...	...	...	...	...
Philippines	3.1	3.2	3.3	2.3	2.5	2.3	2.1	2.0	1.8
Singapore	4.0	2.9	3.9	3.2	3.1	2.5	2.3	2.2	2.0
Thailand	2.7	3.4	3.9	3.5	4.0	3.3	3.1	2.9	3.1
Viet Nam	...	...	...	...	...	...	...	...	...
The Pacific					3.8	3.8	3.4	3.2	3.1
Fiji	3.5	4.0	4.2	3.7	3.4	3.3	3.1	2.8	3.0
Micronesia, Federated States of	...	...	...	...	...	...	...	...	...
Papua New Guinea	7.3	4.7	5.1	...	5.1	4.9	4.5	4.3	4.0
Samoa	...	4.4	4.9	4.4	4.8	4.9	4.4	4.1	4.0
Solomon Islands	...	...	...	...	...	...	...	...	...
Timor-Leste	...	...	...	0.9	1.7	1.6	1.5	1.5	1.3
Tonga	3.9	3.8	4.4	3.7	3.7	3.8	3.3	3.1	3.1
Vanuatu	5.0	5.2	4.9	4.5	4.2	4.1	3.7	3.4	3.2
Developed Economy									
Japan	3.5	3.7	3.9	3.0	3.1	2.9	2.9	2.8	2.9

... = data not available, GDP = gross domestic product, LAO PDR = Lao People's Democratic Republic.

^a Data refer to central government, except for Bangladesh, Georgia, Kiribati, the Kyrgyz Republic, Pakistan, and Tajikistan, where data refer to consolidated government or general government.

^b Prior to 2006, includes health data.

Sources: ADB Key Indicators and projections by authors.

Estimates and projections of health spending from 1995 to 2050 are provided in Table 5. The situation is very different for education spending because demographic change and economic growth are mutually reinforcing when it comes to health care. Populations are aging so that the share in older ages with high health-care spending is increasing. At the same time, higher levels of per capita income push per capita spending on health care higher, particularly in older ages. In no economy is the share of GDP devoted to health care projected to decline.

On average, the increase amounts to a 64.0% rise in the percentage of GDP spent on publicly funded health. The simple average increases from 2.8 % of GDP in 2010 to 3.6% in 2030 and to 4.7% in 2050.

The rise in publicly funded health-care spending in East Asian economies is particularly dramatic with the average share of GDP rising from 3.4% in 2010 to 8.5% in 2050. In the PRC, the projected rise is from 2.7% to 9.8% of GDP, an increase of 264.0%. These increases reflect the particularly rapid aging anticipated in East Asia combined with high rates of economic growth expected for economies like the PRC. Outside of East Asia, the percentage devoted to health is projected to more than double in Azerbaijan, Bhutan, Brunei Darussalam, Cambodia, Kazakhstan, Malaysia, and the Maldives. Health spending as a share of GDP is projected to triple in Thailand.

Health-care spending is already at relatively high levels in many Pacific island countries, but projected increases are relatively modest. By 2050 the regional average is projected to reach 6.4% compared with 5.5% in 2010.

In 2050, health-care spending in Pakistan, Bangladesh, and India is projected to reach 0.9%, 1.7%, and 2.0% of GDP, respectively, because projected economic growth and population aging are not that significant.

Table 5: Government Expenditure on Health
(% of GDP)^a

Economy	1995	2000	2005	2010	2020	2030	2040	2050
Developing Economies				2.9	3.2	3.7	4.1	4.8
Central and West Asia				2.0	2.3	2.5	2.6	3.0
Afghanistan	...	...	0.6	2.4	2.4	2.4	2.5	2.7
Armenia	2.0	1.1	1.5	1.8	1.9	2.0	2.1	2.6
Azerbaijan	1.4	0.9	0.9	1.2	1.2	2.1	2.2	2.4
Georgia	...	1.2	1.6	2.3	2.4	2.5	2.6	2.6
Kazakhstan	3.0	2.1	2.5	2.5	4.1	4.2	4.4	6.2
Kyrgyz Republic	4.0	2.1	2.4	3.7	3.8	3.9	4.1	4.2
Pakistan	0.9	0.7	0.7	0.8	0.8	0.8	0.9	0.9
Tajikistan	1.3	0.9	1.1	1.6	1.6	1.7	1.7	1.8
Turkmenistan	1.9	3.2	2.0	1.5	1.6	2.6	2.7	2.9
Uzbekistan	3.6	2.5	2.3	2.7	2.8	3.0	3.2	3.3
East Asia				3.4	4.4	5.5	6.9	8.5
China, People's Republic of	1.8	1.8	1.8	2.7	4.6	5.0	7.4	9.8
Hong Kong, China	2.1	2.9	2.6	3.0	3.7	4.4	5.2	5.7
Korea, Republic of	1.4	2.2	3.0	4.1	4.9	7.1	8.5	9.6
Mongolia	2.6	3.8	2.6	3.1	3.3	3.4	3.6	6.1
Taipei, China	3.3	3.4	3.8	4.0	5.5	7.6	9.9	11.3
South Asia				2.2	2.3	3.3	3.6	4.5
Bangladesh	1.3	1.1	1.1	1.3	1.4	1.5	1.6	1.7
Bhutan	2.7	5.3	3.2	3.5	3.6	6.1	6.6	10.0
India	1.0	1.1	0.9	1.0	1.1	1.1	1.2	2.0
Maldives	3.3	4.1	4.2	3.7	3.9	6.5	7.2	8.0
Nepal	1.4	1.3	2.0	1.9	2.0	2.1	2.2	2.3
Sri Lanka	1.6	1.8	1.9	1.6	1.6	2.8	2.9	3.0
Southeast Asia				1.9	2.0	2.6	2.8	3.5
Brunei Darussalam	2.3	2.6	2.2	2.5	3.0	4.0	4.8	5.8
Cambodia	1.0	1.3	1.5	1.3	1.4	1.4	1.5	1.6
Indonesia	0.7	0.7	0.9	1.0	1.1	1.1	1.2	2.0
Lao PDR	2.5	1.2	0.7	1.2	1.2	1.3	1.4	1.5
Malaysia	1.7	1.7	1.7	2.3	2.4	3.5	3.8	4.9
Myanmar	...	...	...	...	...	...	...	...
Philippines	1.4	1.5	1.4	1.5	1.5	1.6	1.6	1.7
Singapore	1.5	1.2	1.0	1.4	1.5	1.6	1.7	1.8
Thailand	1.7	1.9	2.3	2.9	3.2	5.6	6.1	8.9
Viet Nam	1.8	1.6	1.5	2.5	2.7	2.9	3.1	3.3
The Pacific				5.5	5.6	5.8	5.9	6.4
Fiji	2.5	3.2	2.9	2.9	3.1	3.2	3.3	5.6
Micronesia, Federated States of	8.7	7.3	11.3	12.6	13.0	13.3	13.6	14.3
Papua New Guinea	3.0	3.3	3.1	3.1	3.1	3.2	3.3	3.4
Samoa	3.3	4.6	4.0	5.6	5.7	5.9	6.1	6.2
Solomon Islands	3.0	4.3	7.4	6.9	7.0	7.2	7.4	7.7
Timor-Leste	...	6.3	8.8	4.3	4.3	4.3	4.3	4.4
Tonga	2.7	3.4	5.6	3.9	3.9	4.0	4.2	4.3
Vanuatu	1.9	2.7	2.4	4.6	4.7	4.8	5.0	5.2
Developed Economy								
Japan	5.6	6.1	6.7	7.4	8.5	9.4	10.0	10.5

... = data not available, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.

^a Data refer to central government, except for Bangladesh, Georgia, Kiribati, the Kyrgyz Republic, Pakistan, and Tajikistan, where data refer to consolidated government or general government.

Sources: WHO and calculations by authors.

The final fiscal projection is for public spending on social security and welfare (Table 6). For developing Asia as a whole, the percentage of GDP devoted to social security and welfare, a simple average of values, is projected to rise from 2.8% in 2010 to 4.9% in 2050. The importance of social security and welfare spending, currently and in the future, varies considerably from government to government, however. Spending is relatively large in higher income economies; for example, by 2050, spending in the Republic of Korea and Taipei, China is projected to reach 12.0% and 10.0%, respectively. These values represent significant growth in spending, but are still well short of what we find for Japan from 17.0% in 2010 to 21.0% in 2050. Note that spending in Singapore is quite low, but its Central Provident Fund is not included in the figures.

Mongolia is a significant outlier in the data and projections. In 2010, 12.9% of GDP was devoted to social security and welfare. This is much greater than in any other economy and less than what we found in Japan for that year, although Japan has a much older population than Mongolia. By 2050, projected spending rises to 29.6% of GDP, which is much higher than the projection for Japan. This is not a realistic option, however, and more detailed information about the situation in Mongolia would be very helpful.

High public spending on social security and welfare is not limited to higher income Asian economies. Armenia, Georgia, and the Kyrgyz Republic in Central Asia; Bhutan and Maldives in South Asia; and Timor-Leste in the Pacific have high levels projected for 2050.

The projected increase in social security and welfare spending is quite substantial. In many economies, the percent of GDP devoted to social security and welfare is projected to double or more between 2010 and 2050. The greatest increases are concentrated in East and Southeast Asia.

These projections may be conservative. Many economies have relatively underdeveloped public pension systems. Should they choose to introduce these schemes in the future, public spending could rise much more rapidly than anticipated in the projections. Social security and welfare is also a very broad category. The kind of programs emphasized and the age structure of benefits may vary considerably from government to government in ways that are not captured by relying on the model constructed from a subset of those in Asia. This can only be assessed with more extensive data on this important component of public spending.

Table 6: Government Expenditure on Social Security and Welfare
(% of GDP)^a

Economy	1990	1995	2000	2005	2010	2020	2030	2040	2050
Developing Economies					2.8	2.9	3.7	4.2	4.9
Central and West Asia					5.0	5.7	6.8	7.4	8.1
Afghanistan	...	...	...	...	...	...	...	...	...
Armenia	...	...	2.1	2.0	7.1	8.1	9.5	10.4	11.6
Azerbaijan	3.9	1.7	3.0	2.4	2.6	3.2	4.7	5.3	5.8
Georgia	...	...	4.3	5.4	6.9	7.6	8.5	8.9	9.1
Kazakhstan	...	...	...	...	...	...	...	...	...
Kyrgyz Republic	4.9	5.7	1.7	2.8	5.0	5.6	6.6	7.3	8.1
Pakistan	...	...	...	...	...	...	...	...	...
Tajikistan ^b	...	0.1	1.8	3.2	3.5	3.9	4.6	5.1	5.7
Turkmenistan	...	...	...	...	...	...	...	...	...
Uzbekistan	...	...	...	...	...	...	...	...	...
East Asia					5.1	6.6	8.9	10.6	12.6
China, People's Republic of	0.3	0.2	0.7	1.4	2.3	3.3	3.8	4.7	6.4
Hong Kong, China	0.9	2.5	2.1	2.4	2.3	3.4	4.1	4.5	4.6
Korea, Rep. of	1.3	1.0	3.2	3.8	4.8	5.9	10.1	11.5	12.0
Mongolia	7.7	3.6	6.2	6.1	12.9	15.3	19.2	22.7	29.6
Taipei, China	2.8	3.4	5.7	3.4	3.2	4.9	7.1	9.5	10.5
South Asia					1.4	1.5	2.2	2.5	3.1
Bangladesh	0.1	0.1	0.1	0.3	0.4	0.5	0.6	0.7	0.9
Bhutan	...	...	...	2.1	1.8	2.1	3.2	3.9	5.2
India	...	...	0.8	0.7	...	0.9	1.0	1.1	1.5
Maldives	...	1.1	1.0	3.9	2.1	2.5	3.9	4.7	5.6
Nepal	1.1	0.5	0.8	0.7	1.0	1.1	1.3	1.5	1.8
Sri Lanka	3.8	5.1	2.8	3.8	1.9	2.3	3.0	3.2	3.4
Southeast Asia					1.0	1.2	1.5	1.7	2.1
Brunei Darussalam	1.1	1.3	1.2	...	0.9	1.2	1.8	2.1	2.6
Cambodia	...	0.4	0.2	0.4	0.5	0.6	0.7	0.8	1.0
Indonesia	...	0.9	...	...	...	1.2	1.5	1.7	2.2
Lao PDR	...	0.0	0.7	...	...	0.8	1.0	1.2	1.4
Malaysia	1.2	0.8	0.9	0.9	1.2	1.4	1.9	2.1	3.0
Myanmar	...	...	...	...	...	...	...	...	...
Philippines	0.2	0.4	0.7	0.8	0.8	0.9	1.0	1.1	1.3
Singapore	0.4	0.8	0.7	0.3	1.1	1.4	1.6	1.8	1.9
Thailand	0.5	0.5	0.9	1.4	1.4	1.8	2.5	2.8	3.1
Viet Nam	...	...	...	...	...	...	...	...	...
The Pacific					1.6	1.2	1.2	1.3	1.5
Fiji	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Micronesia, Federated States of	...	...	...	...	...	...	...	...	...
Papua New Guinea	0.3	0.2	0.5	...	...	0.6	0.7	0.8	0.9
Samoa	...	...	...	1.0	1.2	1.3	1.5	1.6	1.7
Solomon Islands	...	...	...	...	...	...	...	...	...
Timor-Leste	...	...	...	...	3.4	3.4	3.3	3.3	3.9
Tonga	0.4	0.5	1.6	1.5	...	1.6	1.7	1.9	2.0
Vanuatu	...	...	0.0	...	...	0.0	0.0	0.0	0.1
Developed Economy									
Japan	7.4	9.1	10.6	13.7	17.0	18.6	19.1	20.5	21.0

... = data not available, 0.0 = Magnitude is less than half of unit employed, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.

^a Data refer to central government, except for Bangladesh, Georgia, Kiribati, the Kyrgyz Republic, Pakistan, and Tajikistan, where data refer to consolidated government or general government.

^b From 2000 onward, includes defense.

Source: Authors' estimates.

V. INTERPRETATION AND KEY IMPLICATIONS

The projections of public sector spending are driven by changes in age structure and in the level of spending, i.e., per capita spending at each age. Although the level of spending was indexed on per capita income, it would be a mistake to interpret this as a causal connection between income and the level of spending. Correlates of income may account for some or all of the changes in the level of spending.

The analysis presented in tables 7–10 is based on a simple decomposition procedure. In each table, the value in the first column of numbers, the 2010 value, is the share of GDP devoted to each sector in 2010. If the actual value was available, it was used, otherwise the projected value was used. (These values are identical when the actual is available.) The second column is the projected change in the percent of GDP devoted to each sector between 2010 and 2050. The third column reports the effect of the changing age structure calculated by holding the level of spending at the 2010 level using population age structures for 2010 and 2050. The fourth column reports the amount due to age-specific changes in the level of spending as the difference between the total change and the change due to age structure. The interaction between changes in the level of benefits and age structure is reported in the next column.

The final three columns in each table report the change due to age structure, the age-specific level of spending, and the interaction between the two as a percentage of the 2010 value. These values control for the large effect of the initial level of spending and allow us to focus on the importance of age structure and the age-specific level of spending.

The decomposition analysis for education is presented in Table 7. The share of the population in school-going ages is declining in every economy; hence, the impact of changing population age structure is to reduce spending on education. The impact is quite substantial in many economies. On average, changing age structure could reduce education spending by 30.0%–40.0% in East Asia, South Asia, and Southeast Asia from 2010 to 2050. The effects in other regions are smaller but still substantial, i.e., a decline of 25.0% on average for Central and West Asia and by 20.0% in the Pacific. The smallest effect for any economy is found in Japan because the share of children in the population has already reached very low levels; the key change there is the share of the elderly population.

The effect of changes in the level of spending is positive (or zero) in every economy as the per capita age-specific level of spending is assumed to rise as income rises. The effects are largest where rapid economic growth is expected, but also in relatively high-income economies. Again this goes back to the assumptions underlying the projections which are based on observed data.

The age-specific level effects are very small in Central and West Asia, most of South and Southeast Asia, and most Pacific island countries. Only in East Asia, except for Mongolia, do we see large effects from the level of age-specific spending. The rising level of age-specific spending is never sufficient to offset the effects of changing age structure, but in East Asia and in some other economies, the effects are large enough to greatly moderate the savings in education spending that population aging would otherwise be expected to deliver.

The interaction effect is all negative and substantial in several East Asian economies where a rise in per capita benefits is interacted with a decline in the share of children. The biggest effects are found in Taipei, China.

For health (Table 8), and social security and welfare (Table 9), the effects of changing age structure and changing levels of spending are mutually reinforcing. The age structure effects are largest by far in East Asia, particularly in Hong Kong, China; the Republic of Korea; and Taipei, China. In those economies, age structure changes will lead to an increase in health-care spending of 70.0%–85.0% by 2050. The effects elsewhere are large, but not nearly this large.

This may come as a surprise to those who are familiar with Asia's demography because the gains are much smaller in other economies like the PRC and Thailand that are aging rapidly. There are two reasons for this. The first is that aging in low-income economies has a smaller impact because health-care spending does not rise too rapidly with age. Their per capita health-care spending is projected to reach much higher levels between now and 2050, but the effect is captured by the interaction effect. The second factor is that demographic measures of age structure count all individuals above a threshold—60 or 65—equally, but in advanced economies, the elderly at different ages count very differently when it comes to health spending. An increase in the population of those aged 90 and above has a much bigger impact on health spending than the same increase in the number of those aged 60. East Asia is further along in the aging process; hence a large share of the increase in the old-age population is occurring among the very elderly.

The effects of shifts in the age-specific level of health-care spending are also large and vary widely across economies. Few effects occur in very rich economies like Hong Kong, China or Singapore or in those that are very poor or are growing very slowly, and hence do not reach the income threshold that leads to an upward shift in the health profile. This is the case for 20 economies for which projects were constructed. The upward shift in spending profiles led to a doubling of health-care spending relative to GDP in Bhutan and Thailand. The largest effects are projected in the PRC.

As expected, the interaction effect is quite important where population aging and a rise in per capita benefits at older ages are both occurring. The effects are particularly large in Bhutan; the PRC; the Republic of Korea; Malaysia; Taipei, China; and Thailand with a decline of 30.0%–90.0%. In Bhutan, the PRC, Malaysia, and Thailand, the effect is even larger than the normal age-structure effect.

Many observations about health-care projections also apply to social security and welfare. The age structure and the age-specific level effects are both positive and mutually reinforcing. The age structure effects are largest in East Asia and South Asia, but are substantial in other regions as well. The age effects are greater for social security and welfare than for health for two reasons. The first is that, spending on social security and welfare is strongly influenced by age even at low spending levels. Second, high values are concentrated among the younger elderly rather than the oldest old. Consequently, the early years of aging, when the young elderly population is growing most rapidly, have a large effect on spending.

Table 7: Government Expenditure as a Percentage of GDP, Decomposition of Change, and Education

Economy	Value in 2010	Percentage Point Change, 2010–2050				As a Percent of 2010 Value		
		Total Change	Due to Age Structure	Due to Age-Specific Level	Due to Interaction	Due to Age Structure	Due to Age-Specific Level	Due to Interaction
Developing Economies								
Central and West Asia								
Afghanistan	...	...	...	...	...	...	...	...
Armenia	2.8	–0.9	–0.9	0.0	0.0	–32.2	0.0	0.0
Azerbaijan	2.8	–0.8	–1.0	0.3	–0.1	–35.6	12.3	–4.1
Georgia	2.9	–0.4	–0.4	0.0	0.0	–13.7	0.0	0.0
Kazakhstan	...	...	...	...	...	...	...	...
Kyrgyz Republic	5.8	–1.4	–1.4	0.0	0.0	–23.6	0.0	0.0
Pakistan	...	...	...	...	...	...	...	...
Tajikistan	4.0	–0.8	–0.8	0.0	0.0	–20.9	0.0	0.0
Turkmenistan	...	...	...	...	...	...	...	...
Uzbekistan	...	...	...	...	...	...	...	...
East Asia	3.7	–0.9	–0.9	0.1	0.0	–25.2	2.5	–0.8
China, People's Republic of	3.1	0.2	–0.9	1.4	–0.3	–27.8	44.1	–9.5
Hong Kong, China	3.4	–0.2	–0.8	0.9	–0.2	–24.3	26.0	–6.4
Korea, Republic of	3.2	–0.2	–1.1	1.3	–0.4	–34.1	41.5	–13.8
Mongolia	5.9	–0.9	–1.5	0.7	–0.2	–25.2	12.3	–2.8
Taipei, China	1.8	–0.3	–0.9	1.1	–0.5	–47.0	61.9	–28.7
South Asia	3.5	–0.3	–1.0	1.1	–0.3	–31.7	37.2	–12.3
Bangladesh	2.2	–1.0	–1.0	0.0	0.0	–43.3	0.0	0.0
Bhutan	6.7	–2.0	–2.9	1.7	–0.7	–43.8	25.1	–11.0
India	2.3	–0.5	–0.7	0.3	–0.1	–31.9	12.6	–4.0
Maldives	6.0	–2.5	–2.9	0.8	–0.4	–48.8	12.5	–6.0
Nepal	3.9	–1.7	–1.7	0.0	0.0	–43.6	0.0	0.0
Sri Lanka	1.9	–0.2	–0.4	0.2	0.0	–21.0	12.5	–2.5
Southeast Asia	3.8	–1.3	–1.6	0.5	–0.2	–38.7	10.4	–3.9
Brunei Darussalam	4.0	–0.5	–1.5	1.7	–0.7	–38.3	42.5	–16.5
Cambodia	1.6	–0.5	–0.5	0.0	0.0	–35.0	0.0	0.0
Indonesia	1.1	–0.2	–0.3	0.1	0.0	–29.5	12.6	–3.7
Lao PDR	1.0	–0.4	–0.4	0.0	0.0	–39.8	0.0	0.0
Malaysia	6.3	–1.3	–2.4	2.0	–0.8	–38.9	31.1	–12.3
Myanmar	...	...	...	...	...	...	...	...
Philippines	2.5	–0.7	–0.7	0.0	0.0	–27.1	0.0	0.0
Singapore	3.1	–1.1	–1.1	0.0	0.0	–34.9	0.0	0.0
Thailand	4.0	–0.9	–1.5	1.0	–0.4	–37.5	25.2	–9.4
Viet Nam	...	...	...	...	...	...	...	...
The Pacific	2.9	–0.7	–1.1	0.6	–0.2	–35.1	13.9	–5.2
Fiji	3.4	–0.4	–0.8	0.4	–0.1	–22.7	12.4	–2.7
Micronesia, Federated States of	...	...	...	...	...	...	...	...
Papua New Guinea	5.1	–1.1	–1.1	0.0	0.0	–21.9	0.0	0.0
Samoa	4.8	–0.9	–0.9	0.0	0.0	–17.7	0.0	0.0
Solomon Islands	...	...	...	...	...	...	...	...
Timor-Leste	1.7	–0.4	–0.4	0.0	0.0	–22.9	0.0	0.0
Tonga	3.7	–0.7	–0.7	0.0	0.0	–17.6	0.0	0.0
Vanuatu	4.2	–1.0	–1.0	0.0	0.0	–24.3	0.0	0.0
Developed Economy	3.8	–0.7	–0.8	0.1	0.0	–21.2	2.1	–0.4
Japan	3.1	–0.3	–0.3	0.0	0.0	–8.1	0.0	0.0

... = data not available, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.

Source: Authors' estimates.

Table 8: Government Expenditure as a Percentage of GDP, Decomposition of Change, and Health

Economy	Value in 2010	Percentage Point Change, 2010–2050				As a Percent of 2010 Value		
		Total Change	Due to Age Structure	Due to Age-Specific Level	Due to Interaction	Due to Age Structure	Due to Age-Specific Level	Due to Interaction
Developing Economies								
Central and West Asia								
Afghanistan	...	...	...	...	...	...	...	...
Armenia	1.8	0.8	0.4	0.2	0.2	20.9	12.5	12.6
Azerbaijan	1.2	1.2	0.3	0.7	0.3	23.7	56.7	21.8
Georgia	2.3	0.3	0.3	0.0	0.0	12.9	0.0	0.0
Kazakhstan	...	...	...	...	...	...	...	...
Kyrgyz Republic	3.7	0.5	0.5	0.0	0.0	12.8	0.0	0.0
Pakistan	...	...	...	...	...	...	...	...
Tajikistan	1.6	0.2	0.2	0.0	0.0	11.5	0.0	0.0
Turkmenistan	...	...	...	...	...	...	...	...
Uzbekistan	...	...	...	...	...	...	...	...
East Asia	2.1	0.6	0.3	0.2	0.1	16.4	13.8	6.9
China, People's Republic of	2.7	7.1	0.7	4.0	2.5	24.8	148.4	90.9
Hong Kong, China	3.0	2.7	2.3	0.1	0.3	78.2	3.9	8.4
Korea, Republic of	4.1	5.5	3.4	0.8	1.4	81.6	19.5	33.4
Mongolia	3.1	3.0	0.6	1.7	0.7	20.5	54.0	20.8
Taipei, China	4.0	7.3	2.9	1.4	3.0	72.7	35.3	75.2
South Asia	3.4	5.1	2.0	1.6	1.5	55.6	52.2	45.8
Bangladesh	1.3	0.4	0.4	0.0	0.0	27.4	0.0	0.0
Bhutan	3.5	6.6	1.0	4.0	1.6	29.0	114.7	46.9
India	2.3	0.9	0.2	0.6	0.1	7.8	26.0	5.9
Maldives	3.7	4.3	1.2	2.1	1.0	32.0	56.8	27.2
Nepal	1.9	0.4	0.4	0.0	0.0	21.6	0.0	0.0
Sri Lanka	1.6	1.5	0.3	0.9	0.2	18.2	59.8	15.2
Southeast Asia	2.4	2.3	0.6	1.3	0.5	22.7	42.9	15.9
Brunei Darussalam	2.5	3.2	2.1	0.3	0.8	84.1	13.7	31.2
Cambodia	1.3	0.3	0.3	0.0	0.0	23.0	0.0	0.0
Indonesia	1.0	1.0	0.2	0.6	0.2	20.7	58.7	15.8
Lao PDR	1.2	0.2	0.2	0.0	0.0	19.7	0.0	0.0
Malaysia	2.3	2.6	0.7	1.1	0.9	28.8	49.1	37.6
Myanmar	0.0	...	...	...	...	...	...	...
Philippines	1.5	0.2	0.2	0.0	0.0	14.1	0.0	0.0
Singapore	1.4	0.4	0.4	0.0	0.0	27.1	0.0	0.0
Thailand	2.9	6.0	0.9	3.5	1.6	31.8	118.4	56.0
Viet Nam	2.5	...	...	...	...	...	...	...
The Pacific	1.7	1.7	0.6	0.7	0.4	31.2	30.0	17.6
Fiji	2.9	2.6	0.5	1.7	0.4	17.1	58.5	13.7
Micronesia, Federated States of	...	...	...	...	...	...	...	...
Papua New Guinea	3.1	0.3	0.3	0.0	0.0	10.3	0.0	0.0
Samoa	5.6	0.6	0.6	0.0	0.0	11.4	0.0	0.0
Solomon Islands	...	...	...	...	...	...	...	...
Timor-Leste	4.3	0.1	0.1	0.0	0.0	3.2	0.0	0.0
Tonga	3.9	0.4	0.4	0.0	0.0	9.3	0.0	0.0
Vanuatu	4.6	0.6	0.6	0.0	0.0	14.0	0.0	0.0
Developed Economy								
Japan	7.4	3.1	3.1	0.0	0.0	41.6	0.0	0.0

... = data not available, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.

Source: Authors' estimates.

Table 9: Government Expenditure as a Percentage of GDP, Decomposition of Change, Social Security and Welfare

Economy	Percentage Point Change, 2010–2050					As a Percent of 2010 Value		
	Value in 2010	Total Change	Due to Age Structure	Due to Age-Specific Level	Due to Interaction	Due to Age Structure	Due to Age-Specific Level	Due to Interaction
Developing Economies								
Central and West Asia								
Afghanistan	...	...	...	...	...	...	...	...
Armenia	7.1	4.6	4.6	0.0	0.0	65.5	–0.3	–0.2
Azerbaijan	2.6	3.1	2.4	0.7	0.0	92.4	27.6	–1.6
Georgia	6.9	2.3	2.3	0.0	0.0	33.5	0.0	0.0
Kazakhstan	...	...	...	...	...	...	...	...
Kyrgyz Republic	5.0	3.1	3.1	0.0	0.0	61.5	0.0	0.0
Pakistan	...	...	...	...	...	...	...	...
Tajikistan	3.5	2.2	2.2	0.0	0.0	62.8	0.0	0.0
Turkmenistan	...	...	...	...	...	...	...	...
Uzbekistan	...	...	...	...	...	...	...	...
East Asia	5.0	3.1	2.9	0.1	0.0	63.1	5.4	–0.4
China, People's Republic of	2.3	4.1	1.7	1.7	0.8	75.4	72.6	33.6
Hong Kong, China	2.3	2.3	1.6	0.4	0.4	68.0	17.8	16.3
Korea, Republic of	4.8	7.2	3.5	1.7	2.0	72.4	35.6	41.8
Mongolia	12.9	16.7	12.6	4.3	–0.2	98.0	33.7	–1.8
Taipei, China	3.2	7.2	2.5	1.9	2.8	76.2	58.6	87.2
South Asia	5.1	7.5	4.4	2.0	1.1	78.0	43.7	35.4
Bangladesh	0.4	0.5	0.5	0.0	0.0	113.5	0.0	0.0
Bhutan	1.8	3.4	2.2	1.2	0.0	124.5	65.4	–1.6
India	2.3	0.7	0.5	0.2	0.0	22.4	9.3	0.0
Maldives	2.1	3.5	2.9	0.7	0.0	135.2	32.3	–0.8
Nepal	1.0	0.8	0.8	0.0	0.0	85.4	0.0	0.0
Sri Lanka	1.9	1.5	1.1	0.4	0.0	56.1	22.7	–2.6
Southeast Asia	1.6	1.7	1.3	0.4	0.0	89.5	21.6	–0.8
Brunei Darussalam	0.9	1.7	1.0	0.3	0.5	109.7	33.9	52.3
Cambodia	0.5	0.5	0.5	0.0	0.0	92.2	0.0	0.0
Indonesia	1.0	1.2	0.9	0.3	0.0	83.9	28.9	–1.3
Lao PDR	0.7	0.7	0.7	0.0	0.0	94.9	0.0	0.0
Malaysia	1.2	1.8	0.9	0.6	0.4	71.8	46.5	29.3
Myanmar	...	...	...	...	...	...	...	...
Philippines	0.8	0.5	0.5	0.0	0.0	62.7	0.0	0.0
Singapore	1.1	0.7	0.7	0.0	0.0	65.0	0.0	0.0
Thailand	1.4	1.7	1.2	0.6	–0.1	86.8	41.9	–8.2
Viet Nam	...	...	...	...	...	...	...	...
The Pacific	1.0	1.1	0.8	0.2	0.1	83.3	18.9	9.0
Fiji	0.1	0.1	0.0	0.0	0.0	66.5	28.5	–1.9
Micronesia, Federated States of	...	...	...	...	...	...	...	...
Papua New Guinea	0.6	0.3	0.3	0.0	0.0	54.6	0.0	0.0
Samoa	1.2	0.5	0.5	0.0	0.0	46.2	0.0	0.0
Solomon Islands	...	...	...	...	...	...	...	...
Timor-Leste	3.4	0.5	0.5	0.0	0.0	14.6	0.0	0.0
Tonga	1.5	0.6	0.6	0.0	0.0	39.2	0.0	0.0
Vanuatu	0.0	0.0	0.0	0.0	0.0	69.6	0.0	0.0
Developed Economy								
Japan	17.0	4.0	4.0	0.0	0.0	23.6	0.0	0.0

... = data not available, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.

Source: Authors' estimates.

The level effects for social security and welfare are similar but generally smaller than the level effects for health. In East Asia, the greatest effects are found in the PRC; the Republic of Korea; and Taipei, China. The interaction effects for social security and welfare are also large in these economies, even larger than the interaction effects for health in the Republic of Korea and Taipei, China.

Table 10 presents projections for education, health, and social security and welfare combined. This is only a portion of public spending, but it is a substantial portion in most governments that is most likely to grow in the coming years. It is certainly the portion that will be influenced by changes in population age structure.

Table 10: Government Expenditure as a Percentage of GDP, Decomposition of Change, Education, Health, and Social Security and Welfare

Economy	Value in 2010	Percentage Point Change, 2010–2050				As a Percent of 2010 Value		
		Total Change	Due to Age Structure	Due to Age-Specific Level	Due to Interaction	Due to Age Structure	Due to Age-Specific Level	Due to Interaction
Developing Economies								
Central and West Asia								
Afghanistan	...	...	...	...	...	...	...	...
Armenia	11.7	4.5	4.1	0.2	0.2	35.0	1.7	1.8
Azerbaijan	6.6	3.6	1.7	1.7	0.1	26.2	26.3	1.5
Georgia	12.1	2.2	2.2	0.0	0.0	18.1	0.0	0.0
Kazakhstan	...	...	...	...	...	...	...	...
Kyrgyz Republic	14.6	2.2	2.2	0.0	0.0	15.1	0.0	0.0
Pakistan	...	...	...	...	...	...	...	...
Tajikistan	9.1	1.5	1.5	0.0	0.0	16.9	0.0	0.0
Turkmenistan	...	...	...	...	...	...	...	...
Uzbekistan	...	...	...	...	...	...	...	...
East Asia	10.8	2.8	2.3	0.4	0.1	22.3	5.6	0.7
China, People's Republic of	8.1	11.5	1.5	7.0	2.9	18.7	86.9	36.1
Hong Kong, China	8.7	4.9	3.1	1.4	0.4	35.2	16.2	4.6
Korea, Republic of	12.1	12.5	5.7	3.8	2.9	47.3	31.7	24.2
Mongolia	21.9	18.8	11.8	6.8	0.3	53.8	30.9	1.2
Taipei, China	9.1	14.3	4.5	4.4	5.3	50.0	49.0	58.7
South Asia	12.0	12.4	5.3	4.7	2.4	41.0	42.9	25.0
Bangladesh	3.9	–0.1	–0.1	0.0	0.0	–3.2	0.0	0.0
Bhutan	12.0	8.0	0.3	6.8	0.9	2.5	57.0	7.1
India	2.3	1.1	0.0	1.1	0.0	–1.8	47.8	1.9
Maldives	11.8	5.3	1.1	3.5	0.6	9.4	29.9	5.3
Nepal	6.7	–0.5	–0.5	0.0	0.0	–6.8	0.0	0.0
Sri Lanka	5.4	2.7	1.0	1.6	0.1	18.2	30.1	2.7
Southeast Asia	7.0	2.8	0.3	2.2	0.3	3.1	27.5	2.8
Brunei Darussalam	7.4	4.5	1.5	2.3	0.6	20.8	31.7	7.8
Cambodia	3.4	0.2	0.2	0.0	0.0	6.5	0.0	0.0
Indonesia	3.2	1.9	0.8	1.0	0.1	23.7	32.9	3.4
Lao PDR	2.9	0.6	0.6	0.0	0.0	18.9	0.0	0.0
Malaysia	9.8	3.2	–0.9	3.6	0.4	–9.3	37.2	4.5
Myanmar	0.0	...	...	...	...	...	...	...
Philippines	4.8	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Singapore	5.6	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Thailand	8.3	6.9	0.7	5.0	1.1	8.1	60.9	13.8
Viet Nam	0.0	...	...	...	...	...	...	...
The Pacific	4.5	2.2	0.4	1.5	0.3	8.7	20.3	3.7
Fiji	6.4	2.3	–0.2	2.2	0.3	–3.4	33.8	4.9
Micronesia, Federated States of	...	...	...	...	...	...	...	...
Papua New Guinea	8.8	–0.5	–0.5	0.0	0.0	–5.6	0.0	0.0
Samoa	11.6	0.3	0.3	0.0	0.0	2.8	0.0	0.0
Solomon Islands	...	...	...	...	...	...	...	...
Timor-Leste	9.4	0.3	0.3	0.0	0.0	2.8	0.0	0.0
Tonga	9.1	0.3	0.3	0.0	0.0	3.1	0.0	0.0
Vanuatu	8.8	–0.4	–0.4	0.0	0.0	–4.0	0.0	0.0
Developed Economy								
Japan	27.5	6.8	6.8	0.0	0.0	24.8	0.0	0.0

... = data not available, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.

Source: Authors' estimates.

The first observation to be made about combined spending is that as a share of GDP it is projected to decline in Bangladesh, Nepal, Papua New Guinea, and Vanuatu or to remain constant over the 40-year projection in the Philippines and Singapore. In all of these countries, education spending is high relative to health, social security, and welfare spending. Thus, the decline in education spending is sufficient to offset or more than offset the projected rise in health, social security, and welfare spending.

In most of these countries, education spending is high because they have relatively young age structures because their fertility is high or has been high until recently. In every country but Singapore, more than half of the population is under 25 years of age. Singapore is quite a different situation because of their heavy reliance on publicly mandated individual accounts to fund public pensions and health care. Thus, 55.0% of their spending on education, health, social security, and welfare went to education even though fertility is low and only 31.0% of the population was under the age of 25 in 2010.

In Fiji, India, and Malaysia, public spending is projected to rise over the next 40 years but not because of changes in age structure as measured by the age effect. In these three, education spending is also quite high ranging from 53.0% of the total in Fiji to 64.0% in Malaysia. These countries also have young populations, but not quite half of their populations are under the age of 25.

Another feature of the results that is interesting is that very low growth in public sector spending is projected for all Pacific island nations except for Fiji. Along with Cambodia, public sector spending as a share of GDP is projected to increase by less than 10.0% over the 40-year period. These populations are very young with 53.0% or more under the age of 25 in 2010.

In contrast, public sector spending by 11 governments is projected to increase by more than 50.0% relative to GDP by 2050. The East Asian economies lead with social spending projected to more than double as a share of GDP in the PRC; the Republic of Korea; and Taipei, China. In all three, public sector spending is driven by the confluence of rapid population aging and high and increasing incomes.

VI. POLICY ISSUES AND FINAL OBSERVATIONS

Population aging is a universal feature in Asia and the Pacific. Only the timing and speed vary from economy to economy. For those experiencing very rapid aging and for others that are “growing old before they are rich,” anticipating and responding to needs of aging societies may be all the more difficult.

The data needed to document the current demographic situation and to project the course of population aging are comprehensive and widely available. Long-term projections of population age structure inevitably involve considerable uncertainty, but framing public policy is greatly aided by the availability of these data.

Data about the interface between population age structure and the economy are much more rudimentary and underdeveloped. In only a few economies and for only a few years do we have data on which age groups are being targeted by public programs. Even less is known about trends in the age patterns of public program benefits. This is a very serious gap in the information base needed to understand how population aging will influence public sector programs and spending needs over the coming decades. An urgent need is to improve the quality of data, particularly data on pension and health-care spending in Asia and the Pacific.

The results presented here for individual economies are based less on what we know about them as individuals and more on what we see as the broad patterns in the region based on selective data available for economies at different levels of development. The analyses based on these data do point to some important issues and considerations.

First, public programs are providing important sources of support for the elderly mostly in higher income economies. The highest levels of spending on the elderly are of course found in the richest, but spending is highest relative to per capita income or to labor income in the richest economies in the region: Japan; the Republic of Korea; and Taipei, China. The exception to this generalization is Singapore which relies heavily on mandatory personal accounts to fund pensions and health care rather than publicly funded transfer systems. For these more advanced economies, Singapore aside, the key question is how to sustain or reform current systems in the face of rapid population aging. Population aging will lead to very substantial increases in public spending even if they are not enhanced.

For much of the region, the overwhelming issue is very different, which is how to improve existing health and social security systems in the face of population aging. Governments could choose to simply stick with the kinds of public programs they now have with modest enhancements knowing that population aging would then have only modest effects on the size of public programs. They would avoid fiscal problems that might otherwise arise, but they would have large elderly populations that will be left to their own devices when it comes to their economic security and their health-care needs. Some people may consider families to play an important role in supporting the elderly in aging societies, but this seems to be increasingly unlikely.

A very important issue everywhere is to improve our understanding of the connection between age, abilities, and needs. Current policies, e.g., retirement and pension policies, often depend on definitions of old age that are arbitrary and perhaps increasingly out of touch. Policies should not rely on a “one-old-age-fits-all” approach and on age-based mandates that are increasingly out of date. Many elderly are perfectly able to work at the age of 70 or beyond, but many are not.

Some portion of population aging can be traced to people living longer lives. Hence, changes in the life cycle, e.g., extending work life, are appropriate responses. The years spent in good health are increasing, but so too are the years spent in disability.

Aging is also a consequence of low fertility; it is unclear how economic flows across generations should change as the relative numbers of elderly and of the next generation of workers change. To what extent should taxes be increased to maintain net transfers to the elderly? The answer to this question is not apparent.

Demographic policies can be employed in response to population aging and concerns about the fiscal impacts. Pronatalist policies can be pursued or immigration policies can be relaxed. Immigration, however, is not likely to have a major impact on population age structure, except in small economies that opt for very pro-immigration policies.

In countries with very low fertility, pronatalist policies may be advisable, but in countries with moderately low fertility, the value of pronatalist policies is unclear. The efficacy of such programs is uncertain, and the fiscal impact of population aging is only one consideration when it comes to formulating population policy.

REFERENCES

- ADB. Various years. *Key Indicators for Asia and the Pacific*. Manila. <http://www.adb.org/publications/series/key-indicators-for-asia-and-the-pacific/>
- . 2011. *Long-Term Projections of Asian GDP and Trade*. Manila. <http://www.adb.org/publications/long-term-projections-asian-gdp-and-trade>
- Government of the United States, Department of Agriculture (USDA). International Macroeconomic Data Set. <http://www.ers.usda.gov/data-products/international-macroeconomic-data-set/> (accessed 5 November 2013).
- Lee, R. D. 1994a. The Formal Demography of Population Aging, Transfers, and the Economic Life Cycle. In L. G. Martin and S. H. Preston, eds. *Demography of Aging*. Washington, DC: National Academy Press.
- . 1994b. Population, Age Structure, Intergenerational Transfers, and Wealth: A New Approach, with Applications to the US. Special Issue: The Family and Intergenerational Relations. *Journal of Human Resources*. 29 (4). pp. 1027–1063.
- Lee, R. and A. Mason. 2011. *Population Aging and the Generational Economy: A Global Perspective*. Cheltenham, UK: Edward Elgar.
- Lee, R. D., S.-H. Lee, and A. Mason. 2008. Charting the Economic Life Cycle. In A. Prskawetz, D. E. Bloom, and W. Lutz, eds. *Population Aging, Human Capital Accumulation, and Productivity Growth: A Supplement to Population and Development Review*. Volume 33. New York: Population Council.
- Mason, A., R. Lee, A.-C. Tung, M.-S. Lai, and T. Miller. 2009. Population Aging and Intergenerational Transfers: Introducing Age into National Accounts. In D. Wise, ed. *Developments in the Economics of Aging*. Chicago: National Bureau of Economic Research and University of Chicago Press.
- National Transfer Accounts Project. 2013. *Country Summaries*. <http://www.ntaccounts.org/web/nta/show/Country%20Summaries>
- Organisation for Economic Co-operation and Development (OECD). 2014. Shifting Gear: Policy Challenges for the Next 50 Years. *OECD Economics Department Policy Note* No. 24. Paris. <http://www.oecd.org/eco/outlook/lookingto2060.htm>
- United Nations (UN), Department of Economic and Social Affairs, Population Division. 2013a. *National Transfer Accounts Manual: Measuring and Analysing the Generational Economy*. New York.
- , ———. 2013b. *World Population Prospects: The 2012 Revision*. New York.

United Nations Educational, Scientific and Cultural Organization (UNESCO). Various years. UIS Datacenter Database. <http://www.uis.unesco.org/datacentre/pages/default.aspx/> (accessed 5 November 2013).

World Bank. Various years. EdStats Database. <http://datatopics.worldbank.org/education/> (accessed 5 November 2013).

World Health Organization (WHO). Various years. Health Accounts—Global Health Expenditure Database. <http://www.who.int/health-accounts/en/> (accessed 5 November 2013).

Are Current Tax and Spending Regimes Sustainable in Developing Asia?

This study projects government spending on education, health care, and social protection in developing Asia up to 2050 as a result of demographic changes and economic growth. The share of GDP devoted to public spending on health care and social protection will increase as demographic change and economic growth are mutually reinforcing, while the share of public spending on education will decline as a decline in fertility dominates the increase in per capita benefits. The magnitude and the pattern by program, however, vary substantially as demographic change, growth, and the current level of public spending are quite different across economies.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to approximately two-thirds of the world's poor: 1.6 billion people who live on less than \$2 a day, with 733 million struggling on less than \$1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.



ASIAN DEVELOPMENT BANK

6 ADB Avenue, Mandaluyong City

1550 Metro Manila, Philippines

www.adb.org