"Emerging Asian Regionalism: Ten Years after the Crisis"
– A Study by the Asian Development Bank –

Background paper on

"Will Demographic Change Undermine Asia's Growth Prospects?"

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Demographic change is rapid throughout Asia with fundamental implications for both national and regional economies. Often population change is viewed with alarm – that economic prosperity will be undermined because population growth is too fast or too slow; because populations are too young or too old. On balance, however, demographic change is likely to provide a positive impetus for economic growth in Asia during the first half of the 21st Century especially if regional cooperation continues to improve. Of particular importance are policies that facilitate the flows of immigrants and capital between countries with young and growing populations and countries that are old and facing population decline. The prosperity of Asia's aging countries will depend, as well, on domestic policies that encourage investment in human capital, flexible labor markets, well-functioning financial markets, and macroeconomic stability and discourage excessive reliance on large-scale transfer programs for the elderly.

The countries of Asia are experiencing two fundamental changes in their populations that will influence standards of living and regional economic forces. First, population growth is slowing but more rapidly in some countries than in others. Differential population growth will lead to regional shifts in population, labor force, the number of consumers, and related economic activity.

Second, populations are experiencing important changes in their age structures. In all countries the percentage of children in the population is declining or has already reached low levels. The share of the working age population is increasing or has reached very high levels. This change has had a very direct and favorable impact on growth in per capita income called the first demographic dividend.

The large working share in the population is a transitory phenomenon, however. Low birth rates and increasing life expectancy are leading to an increase in the older population. The share of the working age population will decline and as that happens the first demographic dividend will turn negative. Eventually, the share of the population in the working ages will be no greater than early in the demographic transition. The key difference will be populations with many more elderly and many fewer children.

Although children and the elderly are both referred to as *dependents,* they differ in a very important way. Children rely almost exclusively on transfers to the fill the large gap between what they consume and what they earn. The elderly, in contrast, rely on a combination of transfers and lifecycle saving to fill the gap between what they consume and what they earn. Thus, aging – and the anticipation of aging – will lead to an enormous increase in transfers and/or assets.

Whether countries will rely on transfers or assets to fund the needs of a growing elderly population will depend on policies, culture, and institutions. As compared with European and Latin American countries, Asia has relied less on public PAYGO pension programs. But health care for the elderly is a large and increasing cost that is often heavily subsidized by the public sector. Moreover, familial transfers to the elderly may be very important in Asia. Thus, aging in Asia may lead to large implicit debts that are shared by taxpayers and the adult children of elderly.

If the needs of a growing elderly population are met through greater reliance on lifecycle saving, population aging will lead to an increase in assets with favorable implications for economic growth. Previous studies and the analysis presented below show that through this mechanism changes in age structure can lead to a second demographic dividend – higher standards of living that persist long after the favorable effects of the first dividend have ended.

The economic effects are not confined by national borders. Divergent demographic trends in the region are likely to generate international capital flows from those countries experiencing the most rapid increase in saving rates to countries which are aging more slowly (but have rapidly growing labor forces).

The demographic processes described here – known as the demographic transition – are general to almost every country in the world. However, important details of the transition vary from country to country. Some countries in Asia have experienced very rapid transitions. Japan, Korea, China and some members of ASEAN are examples of countries in which changes in age structure are particularly dramatic. Moreover, the timing of the demographic transitions varies across the region. Japan is furthest along, while India and some ASEAN countries are relatively early in the transition. As a consequence, the impact of age structure for any particular decade varies considerably from country to country. Moreover, the differences in the transition create the demographic divergence that leads to differences in factor shares with implications for trade, foreign investment, and immigration.

The remainder of this paper addresses these issues in more detail. In keeping with the approach of this study, we contrast the experiences and prospects in Japan, Korea, India, ASEAN, and greater China – consisting of the PRC, Hong Kong, and Taipei, China. Demographic trends are discussed in Section I. The information presented there is based on the most recent estimates and projections prepared by the United Nations (United Nations Population Division 2007).[1]

The economic implications of demographic changes are addressed in section II following the broad outlines discussed in the introduction. We discuss research on the relationship between population and economics and we present new analysis of how demographic change will influence key macroeconomic variables in ASEAN, greater China, India, Japan and Korea.

The final section discusses the implications of the analysis for policy. First, we discuss social and economic policies that respond to or accommodate the expected changes in population in the region. Second, we discuss population policy itself.

I.   The Demography: Two Important Trends

The demographic transition is a pervasive and important phenomenon in Asia. Death rates and birth rates have declined throughout the region with important implications for population growth and population age structure. Migration has played a less important role in Asia's demography, except in a few countries.

Although the focus of this study is from the 1990s financial crisis forward, demographic changes are slowly evolving, relatively long-term, and best understood in historical context. Hence, the data presented in this section covers 1950 to 2050 drawing primarily on estimates and projections of the United Nations Population Division. Demographic data for Taipei, China are drawn from a variety of sources available in more detail from the authors by request.

A.   Demographic Transition and Population Growth

Asian countries, like other countries around the world, are in the midst of the demographic transition. In the middle of the 20th Century birth rates were high in every Asian country but Japan. Death rates had begun to decline in a number of Asian countries with two important demographic effects. First, a lower death rate led to more rapid population growth. Second, a lower death rate led to a population with many more children because the declines in mortality were concentrated at young ages.
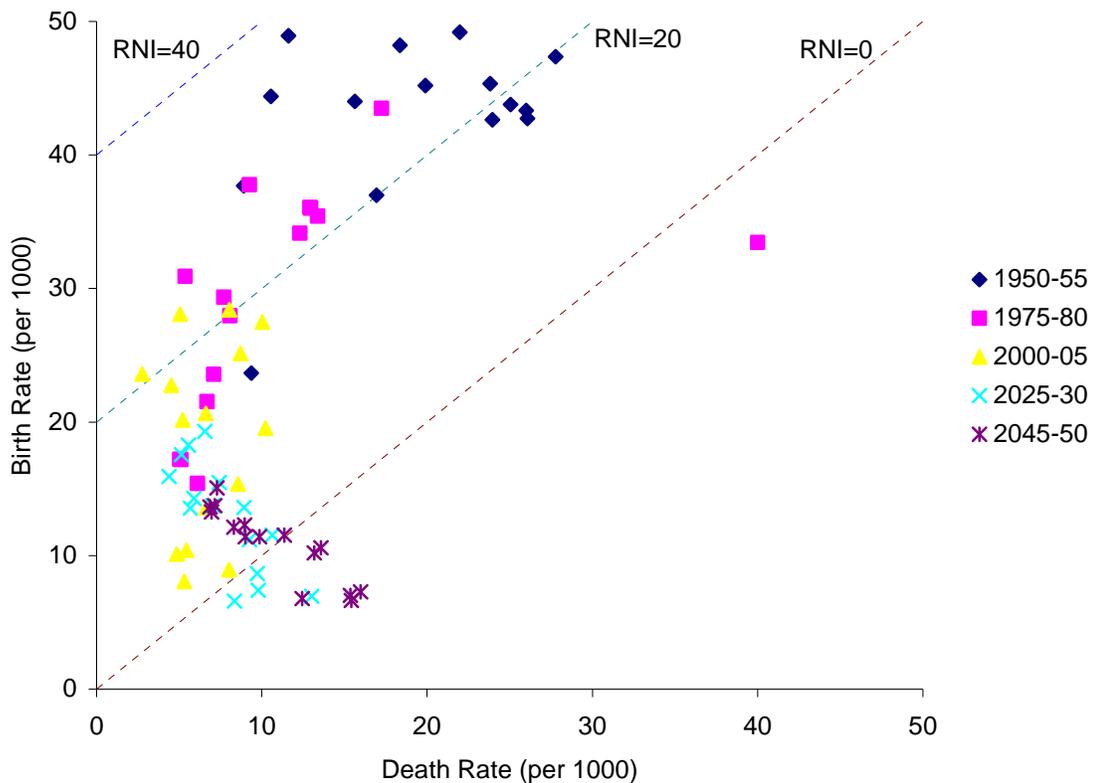
Annual births per woman hovered near historic highs at over 40 births per 1000 population in 1950-55 according to population estimates from the United Nations Population Division (UN 2007). Death rates varied from nearly 30 per 1000 population

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[1] UN estimates do not include Taipei, Taiwan. Demographic estimates for Taipei are drawn from various publications of DGBAS and projections from the Department of Manpower and Planning.

to 10 per 1000 persons. The rate of natural increase (RNI), the difference between the birth rate and the death rate, measures the rate at which the population would grow in the absence of immigration. The RNI varied from around 20 to almost 40. In other words, population growth rates varied from roughly 2 percent to 4 percent per year – rapid rates of population growth (Figure 1).

During the next 50 years death rates declined very substantially. By 2000-05, the death rate was near or below 10 per 1000 in every country. Birth rates also declined. In some countries the birth rate declined by more than the death rate leading to slower population growth, but population growth rates remained close to 2 percent per year or more in many countries in 1975-80. By 2000-05, however, further declines in the birth rate are apparent in Figure 1. In Japan, births and deaths were nearly equal during this period. In other countries population growth ranged from near 0 to about 2 percent per year.

Figure 1: Birth Rates and Death Rates for Selected Asian Countries, 1950-55 to 2045-50

Source: *World Population Prospects: The 2006 Revision,* United Nations Population Division, 2007.

To complete the story requires that we rely on projections about which there is some uncertainty. The values plotted in Figure 1 are based on the UN Population Divisions' medium scenario which assumes that countries will continue to experience steady improvements in their life expectancy. Populations in which fertility rates are currently very low, e.g., Japan, South Korea, Taipei, China, Hong Kong, China, and Singapore, are assumed to increase. While fertility rates in countries with relatively high fertility, e.g., the Philippines and India, are assumed to experience further decline.

If this projection proves to be accurate, population growth will vary between plus or minus one percent per year depending on the country. Death rates will rise moderately in many countries because of changes in age structure – a larger share of the population will be concentrated at older, high-risk ages. The change in birth rates will also be influenced by age structure as the share of the population concentrated at reproductive ages declines.

The broad outlines of the demographic transition are similar in every country of Asia, but the speed and the timing of the transition vary across countries. The transition began first in Japan, then in other East and Southeast Asian countries, and more recently in some ASEAN countries and India. The transition has been very rapid in Korea and China + as compared with countries elsewhere in Asia, other parts of the developing world, or in Western countries.

Population growth rates are reported for ASEAN, greater China, India, Japan, and Korea in Table 1. For 2000-05, Japan's population growth was almost zero. The PRC and Taipei, Taiwan had population growth rates well below one percent per annum. Among the ASEAN countries only Thailand and Myanmar were growing at less than 1 percent per annum. Two Asian countries had growth rates that would have been well below 1 percent were it not for substantial rates of immigration – Singapore and Hong Kong, China. The population growth rates for 2000-05 of other ASEAN countries vary from 1.3 percent in Indonesia to 2.3 percent in Brunei. India's growth rate is moderately high at 1.6 percent per year for 2000-05.
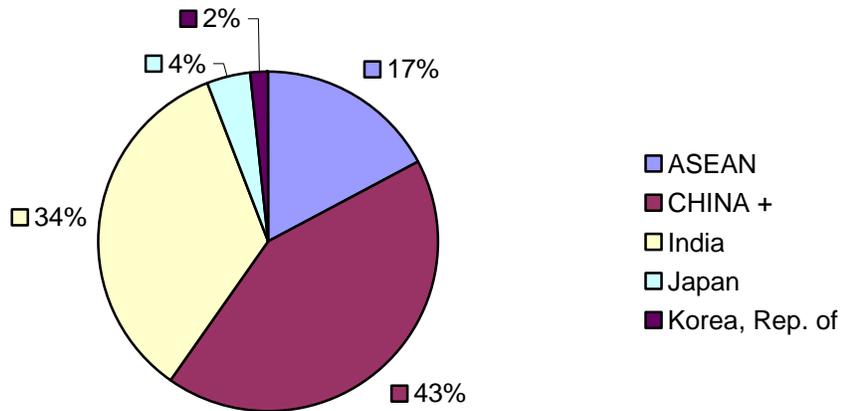
Table 1: Population Growth Rates (%), 1950-2050

		1950-55	1975-80	2000-05	2025-10	2045-50
ASEAN		2.10	2.14	1.39	0.69	0.19
	Brunei Darussalam	5.56	3.65	2.29	1.28	0.78
	Cambodia	2.15	-1.01	1.76	1.26	0.77
	Indonesia	1.67	2.20	1.31	0.61	0.10
	Lao PDR	2.73	1.30	1.62	1.08	0.50
	Malaysia	2.72	2.32	1.95	0.87	0.41
	Myanmar	1.96	2.19	0.89	0.47	0.01
	Philippines	2.99	2.70	2.08	1.09	0.50
	Singapore	4.90	1.30	1.49	0.38	-0.37
	Thailand	2.84	2.08	0.76	0.12	-0.27
	Viet Nam	1.87	1.99	1.45	0.75	0.21
CHINA +		1.90	1.49	0.67	0.17	-0.32
	China, People's Rep. of	1.87	1.48	0.67	0.17	-0.32
	Hong Kong, China	4.64	2.73	1.15	0.54	0.11
	Taipei, China	3.63	1.95	0.54	-0.06	-0.89
	India	1.73	2.30	1.62	0.79	0.32
	Japan	1.43	0.93	0.14	-0.56	-0.78
	Korea, Rep. of	2.55	1.55	0.46	-0.25	-0.89

Note: Values for ASEAN and China + are for the combined populations not simple average across the group members.

Source: *World Population Prospects: The 2006 Revision*, United Nations Population Division, 2007. Taipei, China: see text.

Differences in the timing of the demographic transition are leading to regional shifts in the concentration of population. In terms of population, Asia is dominated by two giants and this will continue to be the case. Over 40% of the population lives in greater China and 34% in India. The combined population of the ASEAN states is 17% of the total. Japan and Korea have relatively small populations as compared with their neighbors.
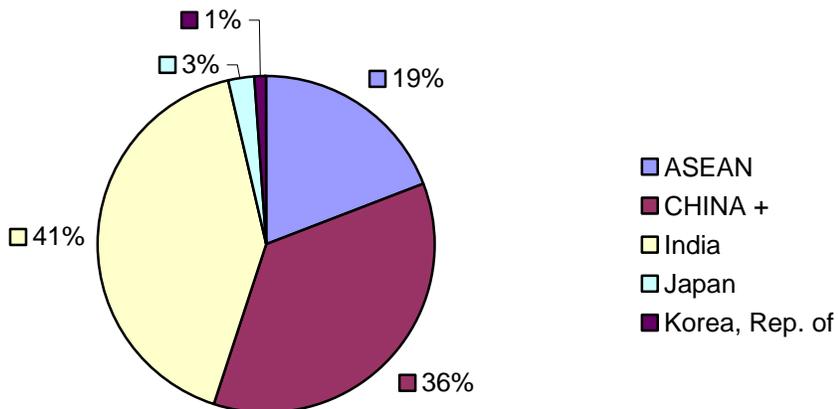
Figure 2: Regional Distribution of Population for Major Country Groupings, 2000

Source: See text.

Because of differences in population growth rates, the populations of ASEAN and India are increasing relative to China, Japan, and South Korea. India's population is projected to exceed greater China's population by 2030.

Figure 3: Regional Distribution of Population for Major Country Groupings, 2050

Source: See text.

B. Population Age Structure

Population age structure changes in a very predictable way over the demographic transition. Early in the transition, the percentage of the population who are children increases as a result of declines in infant and child mortality rates. Later the child share declines and the percentage of the population in the working ages increases. In the final stages of the transition the share of the working age population declines while the share at old ages increases.

The rise in the child share of the population occurred in ASEAN, China, and India between 1950 and 1975. In ASEAN, for example, the percentage of the population under age 20 increased from 49.0% to 53.0% (Table 2). The decline in the population under age 20 has been extraordinarily rapid in some Asian countries – notably greater China and South Korea. In 1975, just over 50 percent of South Korea's population consisted of children under the age of 20. The projected value for 2025 is 16.8 percent.

Table 2: Percentage of Population Under Age 20, 1950-2050

	1950	1975	2000	2025	2050
ASEAN	49.0	53.0	41.8	30.3	24.1
Brunei Darussalam	46.0	50.5	40.0	29.6	24.7
Cambodia	52.6	52.8	54.3	39.0	29.4
Indonesia	50.0	52.3	40.6	28.9	23.6
Lao PDR	49.5	54.3	54.1	38.7	26.9
Malaysia	50.4	53.2	43.6	31.7	24.5
Myanmar	44.3	51.7	40.4	27.9	23.0
Philippines	53.7	55.4	48.4	37.3	26.6
Singapore	50.0	45.7	28.1	16.4	15.5
Thailand	53.0	53.3	32.1	24.4	21.4
Viet Nam	41.9	53.8	44.1	29.4	23.1
CHINA +	43.4	48.8	32.8	23.7	20.5
China, People's Rep. of	43.3	48.9	32.9	23.8	20.5
Hong Kong, China	41.2	42.3	23.7	15.7	15.2
Taipei, China	52.5	47.4	29.7	20.6	18.6
India	47.7	50.6	45.1	33.3	24.4
Japan	45.8	31.5	20.5	15.5	15.3
Korea, Rep. of	51.7	50.3	28.9	16.8	14.2

Source: *World Population Prospects: The 2006 Revision*, United Nations Population Division, 2007. Taipei, China: see text.

The low level reflects the fact that South Korea has one of the lowest total fertility rate of any country in the world. Other countries in which the child share are expected to drop to or remain at very low levels over the coming decades are Singapore, China, Hong Kong, China, Taipei, China, and Japan.

The percentage of the population in the working ages, defined here as those between age 20 and 64 inclusive, increased between 1975 and 2000 in every member of greater China, India, Japan, Korea, and every ASEAN country but Cambodia and Lao PDR. The percentage reached 60 percent or more in Singapore, Thailand, greater China, Japan, and Korea. These countries are at or near the peak and will not

experience any substantial change in the share of their working age population between 2000 and 2025. Japan is an exception and it will experience a significant decline in the working-age share (Table 3).

The largest increases in the working-age populations are occurring in ASEAN and India. Between 2000 and 2025 the working-age share will increase 7 percentage points in ASEAN and almost 9 percentage points in India. Within ASEAN, the gains will be dramatic in Cambodia (13 points), Lao PDR (14 points), and Viet Nam (11 points).

Population aging is coming very rapidly to the countries of East Asia. Japan, with the percentage 65 and older increasing from 17.2 in 2000 to 29.5 in 2025, has the oldest population in the world. Other East Asian countries are experiencing rapid aging. The percentage 65 and older will double between 2000 and 2025 in greater China, from 6.9 percent to 13.8 percent, and in Thailand from 6.7 percent to 14.9 percent. Even more rapid aging will occur in Singapore and Korea where 22.8 percent and 19.6 percent of the populations are projected to be 65 and older by 2025 (Table 4).

Table 3: Percentage of Population Age 20-64, 1950-2050

		1950	1975	2000	2025	2050
ASEAN		47.2	43.4	53.3	60.6	58.3
	Brunei Darussalam	49.2	46.0	57.0	62.8	60.5
	Cambodia	44.7	44.4	42.7	56.0	60.9
	Indonesia	46.1	44.4	54.5	62.1	57.8
	Lao PDR	48.4	42.7	42.5	56.5	62.5
	Malaysia	44.6	43.0	52.5	59.6	59.2
	Myanmar	52.3	44.0	54.1	62.9	58.1
	Philippines	42.7	41.6	48.0	56.3	60.4
	Singapore	47.6	50.1	64.8	60.8	51.7
	Thailand	43.8	43.1	61.2	60.7	55.3
	Viet Nam	53.9	41.3	50.5	61.9	57.7
CHINA +		52.1	46.8	60.3	62.5	55.7
	China, People's Rep. of	52.2	46.7	60.3	62.5	55.8
	Hong Kong, China	56.3	52.3	65.4	62.6	52.1
	Taipei, China	45.0	49.2	62.1	62.3	55.5
	India	49.2	46.0	50.3	58.9	61.1
	Japan	49.3	60.6	62.2	55.1	47.0
	Korea, Rep. of	45.2	46.1	63.7	63.6	50.6

Source: *World Population Prospects: The 2006 Revision*, United Nations Population Division, 2007. Taipei, China: see text.

Elsewhere the share of the population 65 and older will not reach 10 percent until after 2025. By 2050, however, the ASEAN share is projected to reach 17.7 percent and India's share 14.5 percent. At first glance demographic characteristics in 2050 may appear to be remote to the economic concerns of today. Nothing could be further from the truth, however. The elderly population of 2050 is the working population of today. The prospect of old-age and retirement will influence current behavior – with respect to saving, for example. Moreover, policies implemented by governments today will

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determine the success with which the working population of today can adequately prepare for an extended period of old age.

Table 4: Percentage of Population 65 and Older, 1950-2050

	1950	1975	2000	2025	2050
ASEAN	3.8	3.6	4.9	9.1	17.7
Brunei Darussalam	4.9	3.5	2.9	7.6	14.8
Cambodia	2.7	2.8	2.9	5.0	9.8
Indonesia	4.0	3.3	4.9	9.0	18.6
Lao PDR	2.2	3.1	3.4	4.7	10.6
Malaysia	5.1	3.7	3.9	8.7	16.3
Myanmar	3.4	4.2	5.5	9.3	18.9
Philippines	3.6	3.1	3.5	6.5	12.9
Singapore	2.4	4.1	7.2	22.8	32.8
Thailand	3.2	3.6	6.7	14.9	23.3
Viet Nam	4.2	4.9	5.5	8.7	19.2
CHINA +	4.4	4.4	6.9	13.8	23.8
China, People's Rep. of	4.5	4.4	6.8	13.7	23.7
Hong Kong, China	2.5	5.4	11.0	21.7	32.6
Taipei, China	2.4	3.4	8.1	17.2	25.9
India	3.1	3.4	4.6	7.7	14.5
Japan	4.9	7.9	17.2	29.5	37.7
Korea, Rep. of	3.0	3.6	7.4	19.6	35.1

Source: *World Population Prospects: The 2006 Revision*, United Nations Population Division, 2007. Taipei, China: see text.

C.   Role of Immigration[2]

Immigration plays a relatively modest role in determining population growth and age structure as compared with births and deaths. Immigrant flows are heavily regulated and limited – mostly by receiving countries. With a few exceptions the countries of Asia have not opened their borders to immigrants and there is little to suggest that will change soon irrespective of economic or demographic pressures that may emerge in the coming years.

Asia's largest countries are net sending countries. Net migration from India, China, Indonesia, and the Philippines has consistently been negative (outward). The rate of net migration is quite small in India and China and, thus, has little effect on the size of their national populations. In 2000-2005, for example, China lost 0.03 percent per year of its population and India lost 0.02 percent per year of its population due to immigration. The rate of out-migration from the Indonesia and the Philippines is relatively great as compared with most other countries - .09 percent per year in Indonesia and 0.23 percent per year in the Philippines. But even in these two countries, the impact on the growth of the population in any year is modest (Table 5).

These four countries do contribute relatively large shares to global migration flows because their populations are so large. For 2000-2005 the annual net numbers of

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[2] Estimates presented in this section are all drawn from two sources: United Nations 2006. *International Migration 2006;* and United Nations 2007. *World Population Prospects 2006.*

immigrants were 390,000 from China, 280,000 from India, 200,000 from Indonesia, and 180,000 from the Philippines. Combined they contributed just over 1 million immigrants a year to the global flow. This compares with a total outflow of 2.6 million per year from the less developed regions to the more developed regions of the world during the same period.

For the most part these immigrants were not moving to other Asian countries. Total net inflows, including immigrants from outside Asia, were approximately 100,000 immigrants per year to the net receiving countries of ASEAN, 60,000 per year for Hong Kong, and only 54,000 per year for Japan.

For a few countries in the region migration is significant relative to their domestic populations. The Philippines has sustained immigrant outflows at a significant level for many years. As a consequence, remittances are currently about 13% of GDP. Hong Kong, Brunei, and Singapore have actively encouraged immigration to their countries. Over 40 percent of Hong Kong's and Singapore's populations and one-third of Brunei's population are immigrants.

Japan falls at the other end of the immigration spectrum with its relatively closed borders. Given the high wages of its workers relative to those of its neighbors and the declining numbers in the working ages, one might well expect substantial immigration into Japan.   Currently about 2 million immigrants live in Japan or 1.6% of its population. This compares with an immigrant share for the "more developed regions" of the world of 9.5% and a figure of 12.9% for the US population.

Table 5: Annual Net Migration Rate (net migrants per thousand population)

	1950-1955	1955-1960	1960-1965	1965-1970	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2005
ASEAN											
Brunei Darussalam	18.0	13.6	11.0	17.3	13.6	10.9	2.5	4.7	2.6	2.2	2.0
Cambodia	-0.0	-0.0	-0.0	-0.1	-12.8	-3.6	—	3.4	2.8	1.3	0.2
Indonesia	-0.0	-0.0	-0.1	-0.1	-0.0	-0.1	-0.1	-0.5	-0.8	-0.9	-0.9
Lao PDR	-0.0	0.0	0.0	0.0	0.0	-13.2	-2.1	0.0	-1.4	-3.5	-4.2
Malaysia	1.9	1.3	1.0	-1.5	-1.6	1.5	-0.3	1.8	3.0	4.5	1.2
Myanmar	—	—	—	—	—	—	-0.3	-0.7	-0.6	0.0	-0.4
Philippines	—	—	—	-0.7	-1.1	-1.6	-3.0	-2.7	-2.8	-2.5	-2.2
Singapore	15.0	11.6	1.1	0.4	1.3	0.9	11.7	9.7	15.4	19.6	9.6
Thailand	—	—	—	—	0.4	0.9	0.0	0.0	0.6	1.7	0.7
Viet Nam	—	—	—	—	—	-3.2	-0.9	-0.8	-0.7	-0.5	-0.5
China +											
China	-0.1	-0.1	-0.2	—	-0.2	-0.1	-0.0	-0.1	-0.2	-0.2	-0.3
China, Hong Kong SAR	17.4	13.0	9.5	-5.0	7.3	15.1	5.1	0.9	10.1	9.3	8.7
Taipei, China	—	—	0.1	-0.0	-0.5	-0.4	-0.4	-0.3	-0.2	-0.2	-0.2
Japan	-0.0	-0.1	-0.0	-0.1	-0.1	-0.0	0.0	0.3	0.4	0.4	0.4
Republic of Korea	5.4	-0.0	-0.2	-0.2	-0.8	-1.0	-1.0	-0.9	-0.5	-0.3	-0.3
India	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.3	-0.2

Sources: *World Population Prospects: The 2006 Revision*, United Nations Population Division, 2007; Taiwan-Fuchien Demographic Fact Book, various years.

II.   Economic and Social Implications

Population change has important implications for individual countries, but also for regional economies and regional integration. First, national and regional populations are growing at very different rates, with India and ASEAN increasing relative to greater China, Japan, and Korea. Inevitably changes in the size of populations influence the size of regional economies. More people means more consumers, more workers, and more savers and investors.   The extent to which larger populations result in greater aggregate consumption, aggregate earners, aggregate saving and investment will be influenced by a host of factors beyond the size of national and regional populations. None the less, population size is an important consideration.

Second, changes in population age structure that vary across Asia have important social and economic implications. Current thinking, as reflected in recent research, is that the major effects of population on per capita income and consumption arise because of changes in age structure. Many countries in Asia have experienced an increase in the share of the working-age population with rather direct favorable effects for income per person. This effect, called the "first demographic dividend", is a transitory phenomenon because as populations age the share of the working-age population will return to levels near those that prevailed early in the demographic transition. Population aging will, thus, serve as a drag on growth in per capita income.

This view may prove to be unduly pessimistic because of the possibility of a second demographic dividend. Population aging will lead to a substantial increase in the demand for wealth to fund retirement. This wealth can be accumulated in the form of capital with implications for productivity, wages, and per capita income. Or in open economies with implications for international capital flows. But if countries rely on intergenerational transfers to fund retirement, wealth is accumulated in the form of transfer wealth for current generations and implicit debt for future generations.

National and regional differences in the growth of consumer demand, labor forces, and aggregate saving and investment will influence international flows of workers, goods and services, and capital. The classic approach to this issue is that international flows arise in response to international differences in relative factor endowments (Deardorff 1987). In this context a key issue is whether divergent population trends lead to divergent factor endowments.

The impact of divergent factor endowments will depend to a great extent on the institutional context. This issue is surely addressed more extensively elsewhere in this volume, but should be kept in mind here. Divergent capital-labor ratios can lead to immigration, capital flows, and/or trade depending on the policy context. As should be clear from the brief description in the preceding section, international labor flows are relatively limited in Asia. In the absence of radical changes in policy, population aging is more likely to influence international capital flows and trade than immigration.
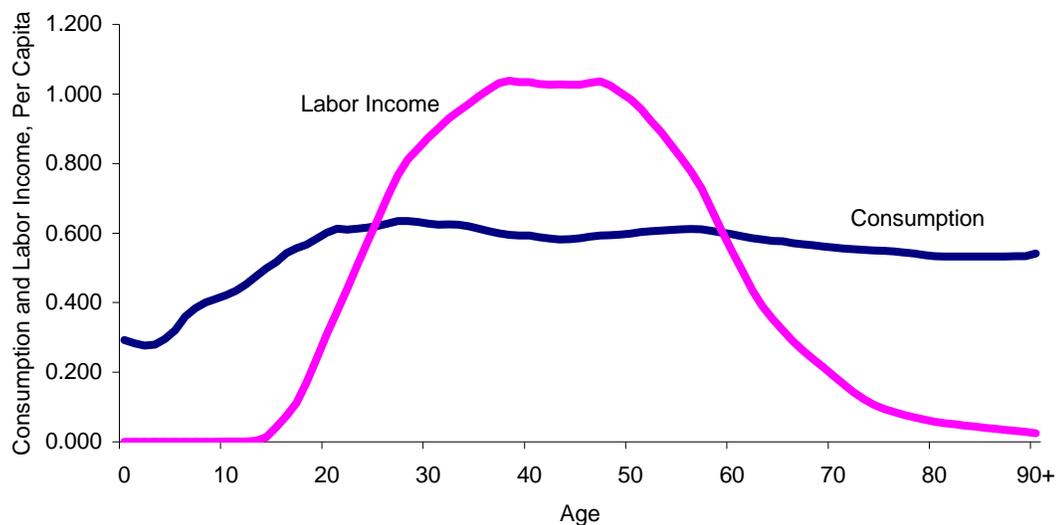
A.   The economic lifecycle

The economic lifecycle is fundamental to understanding the relationship between population age structure and the economy.   In all populations there are extended periods of dependency. Children consume more resources than they produce through their own labor and must rely heavily on intergenerational transfers from their parents (and grandparents) and from taxpayers. The elderly also consume more than they produce. They rely on intergenerational familial and public transfers, but also on personal assets to fill the gap between what they consume and what they produce through their own labors.

Figure 4 is an estimate of the economic lifecycle based on analysis of consumption and labor income data for four developing economies. The figure is a cross-sectional profile constructed from per capita measures of labor income and consumption by single year of age. The values are normalized on average labor income of adults aged 30-49. Labor income includes all returns to labor: earnings, benefits, and self-employment income, estimated as a proportion of the operating surplus or mixed income of the household sector. The age profiles are based on nationally representative household surveys of income and adjusted to match National Income Account data.

Labor income is a composite. It includes the labor income of both men and women. It is influenced by labor force participation rates, by variation in hours worked, and by variation in wages for employees and productivity for the self-employed. Earnings, which can be measured with relative accuracy, is a dominant share of labor income in developed countries, However, self-employment income, which is poorly measured, is a substantially large share of labor income in low-income countries.

Consumption includes both public and private consumption. Private consumption of health, education, and other goods and services has been estimated separately from nationally representative surveys of consumption. Public consumption has also been estimated separately for education, health, and other publicly provided goods and services. Private and public consumption have also been adjusted to match NIPA values.[3]

Figure 4: The Economic Lifecycle, Developing World Profile

Note: Values normalized on per capita labor income of persons 30-49.

Source: R. Lee and A. Mason, 2007, "Population Aging, Wealth, and Economic Growth: Demographic Dividends and Public Policy." *UN World Economic and Social Survey Background Paper*.

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[3] Detailed information about the methodology is available in Lee, R. D., S.-H. Lee, et al. (2007 forthcoming). Charting the Economic Lifecycle. *Population Aging, Human Capital Accumulation, and Productivity Growth, a supplement to Population and Development Review 33*. A. Prskawetz, D. E. Bloom and W. Lutz. New York, Population Council. and at www.ntaccounts.org.

One must be very careful to avoid interpreting these figures as longitudinal or cohort profiles rather than as cross-sectional profiles. In a growing economy with these cross-sectional profiles, labor income will rise more steeply for young cohorts, peak at a later age, and decline more slowly for the elderly. Consumption will not be flat for a cohort – rather it will rise with age at a rate roughly equal to the rate of aggregate per capita consumption growth.

The age at which children become economically independent is surprisingly old. Children under age 25 are producing less than they consume. Likewise, old age dependency occurs at a surprisingly early age. Those 60 and older are producing less from their labor than they consume. The lifecycle surplus is confined to 34 years – from ages 25 to 59.

The extent of dependency varies across the dependent ages, however. Those in their early twenties are producing almost as much as they consume as are those in their early sixties. Young children produce nothing, but they also consume much less than a teenager or someone over the age of 60.

The subsequent sections will make extensive use of the economic lifecycle to provide a more refined measure of how changes in population age structure will influence trends in consumption, labor, and their magnitudes relative to one another.

B.   The First Dividend

Recent studies on the macroeconomic effects of population age structure are based on growth models that explicitly incorporate population age structure. The simplest form for these models distinguishes two components of per capita income:

$$\frac{Y}{N} = \frac{L}{N}\frac{Y}{L}. \tag{1}$$

The exact definitions of the terms vary across studies, but broadly speaking Y/N is per capita income, L/N is the share of the population in the working ages – also called the support ratio, and Y/L is income per worker or working age person. Letting gr[.] represent the growth rate, equation (1) can be readily transformed into growth terms:

$$gr\left[\frac{Y}{N}\right] = gr\left[\frac{L}{N}\right] + gr\left[\frac{Y}{L}\right] \tag{2}$$

Equation (2) identifies two channels through which population can influence per capita income. First, the support ratio varies with changes in the population age structure. Given the rate of growth in Y/L, a one percentage point increase in the support ratio yields a one percentage point increase in per capita income. This effect is referred to as the accounting effect or the first dividend. Second, changes in population age structure, other population changes, and non-demographic factors influence productivity growth, i.e., the growth of Y/L.

Elaborations on this simple growth model have been used to study population and economic growth using three approaches. First, aggregate panel data have been used to estimate growth models, usually adapting equation (2) to a Barro-type growth framework (Kelley and Schmidt 1995; Bloom and Williamson 1998; Bloom and Canning 2001; Kelley and Schmidt 2001; Kelley and Schmidt 2007). A second approach relies on growth accounting methods (Mason 2001). A third method uses simulation modeling (Cutler, Poterba et al. 1990; Mason 2005; Attanasio, Kitao et al. 2006; Mason and Lee 2006; Mason 2007).

A simple refinement of the growth model incorporates the age variation in the economic lifecycle into the calculation of the support ratio. In this formulation, L is the effective labor force calculated using the age-profile of labor income to weight population data. The effective labor force then incorporates age variation in labor force participation, hours worked, and productivity. The denominator N should also incorporate age variation in consumption to measure the effective number of consumers. Thus, if income per effective consumer, Y/N, increases by 1 percent the per capita age profile of consumption in Figure 4 can increase by 1 percent holding the consumption ratio (the ratio of consumption to national income) constant. To be explicit, the effective number of producers, L, and the effective number of consumers, N, are defined to be:

$$L(t) = \sum_x \gamma(x) P(x,t)$$

$$N(t) = \sum_x \alpha(x) P(x,t)$$

(3)

where P(x,t) is the population aged x in year t, $\gamma(x)$ is the age-profile of labor income, and $\alpha(x)$ is the age-profile of consumption. Both age-profiles are held constant with respect to time.[4]

The economic support ratio for five countries/groups from 1950 to 2050 is plotted in Figure 5. Japan's support ratio has peaked and is beginning to decline, but for all others in Asia the economic support ratio is rising and thus contributing to more rapid growth in income per effective consumer. The size of the contribution – the first dividend - is more easily judged from the growth rate of the support ratio (Figure 6).

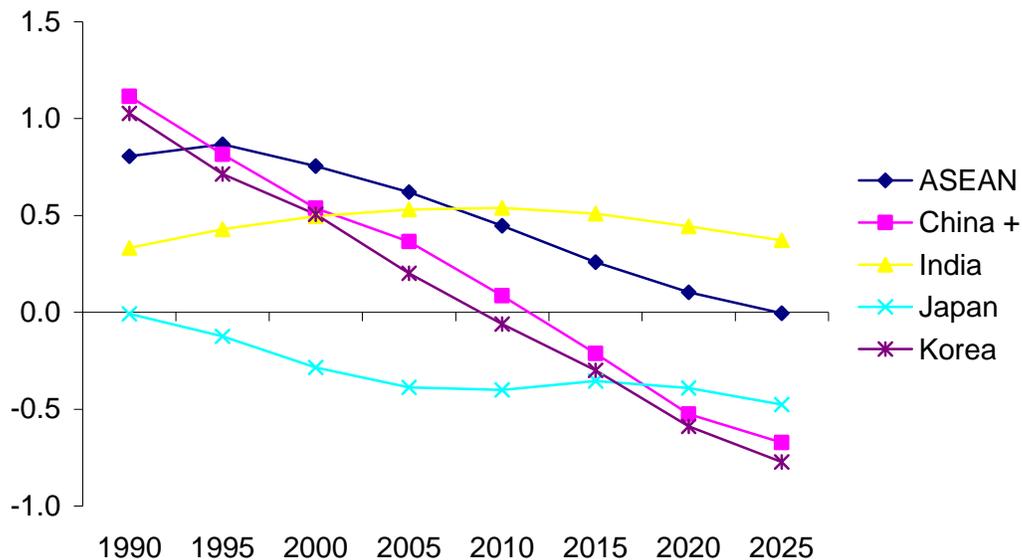**Figure 5: Economic Support Ratio, Country Groupings, 1950-2050**

Source: Calculated by authors.

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[4] An interesting and important question is how the economic lifecycle changes over time and how that will influence the analysis presented here.

Given the emphasis of the broader study on a shorter time frame, the first dividend is presented for 1990 to 2025. In the early 1990s the first dividend was turning negative in Japan, increasingly so as time progressed. By 2025 the decline in the economic support ratio will be depressing growth in income per effective consumer by 0.5% per year.

The experiences of greater China and South Korea are similar with the first dividend marginally larger in greater China in each year. In the early 1990s, the first dividend added about 1 percent per year to growth in income per effective consumer. The impact has declined steadily. It is still positive, but will soon disappear and after 2020 will depress growth by 0.5% per year. In India and ASEAN the dividend is positive for the entire 35 year period. Currently, the increase in the economic support ratio is adding approximately 0.5 percent per year to growth in income per effective consumer. Over the period 1990 to 2025, the first dividend has raised income per effective consumer in total by 21 percent in ASEAN and by 18 percent in India.

Figure 6: The First Demographic Dividend (%), 1990-2025, Country Groupings

Source: Calculated by authors.

Changes in the economic support ratio emphasize the implications of population age structure for per capita values. The changes in total number of effective consumers and producers are also of interest because of their implications for trade, capital flows, and immigration. The most rapid growth in the effective number of consumers is in ASEAN and India. For the period 2005-10, the annual growth rate in the effective number of consumers is 1.4 percent per annum in ASEAN and 1.7 percent per annum in India. The effective number of consumers is growing much more slowly in China and Korea and declining slowly in Japan (Table 6).

Currently the effective number of producers is growing more rapidly than the effective number of consumers except in Japan. The growth rate is about 2 percent per annum in ASEAN and India, 1 percent in greater China, 0.7 percent per annum in Korea, and declining by 0.4 percent per annum in Japan.

Table 6: Annual Growth Rates (%), Effective Numbers of Consumers and Producers

	1990	1995	2000	2005	2010	2015	2020
Effective Consumers							
ASEAN	2.0	1.8	1.6	1.4	1.2	1.1	0.9
China +	1.3	1.1	0.9	0.7	0.6	0.5	0.3
India	2.2	2.0	1.8	1.7	1.5	1.3	1.1
Japan	0.5	0.3	0.1	-0.1	-0.2	-0.3	-0.5
Korea	1.1	0.9	0.7	0.5	0.3	0.1	-0.1
Effective Producers							
ASEAN	2.8	2.7	2.3	2.1	1.7	1.3	1.0
China +	2.4	1.9	1.4	1.1	0.7	0.3	-0.2
India	2.5	2.4	2.3	2.2	2.0	1.8	1.6
Japan	0.5	0.2	-0.1	-0.4	-0.6	-0.7	-0.8
Korea	2.2	1.6	1.2	0.7	0.2	-0.2	-0.7

The differences in growth rates may seem small but their cumulative effect is not because they are persistent. The coming decades will see a significant shift to the West and to the South. India will supplant China as the largest country in terms of effective number of consumers and effective number of producer. ASEAN's share will grow to approach about 20 percent by 2050. Japan and Korea will shrink relative to their neighbors. Korea's share of effective producers will be cut in half by 2050 and Japan's by over 60 percent (Table 7).

Tables 7: Distribution of Effective Consumers and Producers

	1990	2025	2050
ASEAN	16.4	18.0	19.0
China +	45.3	39.5	36.0
India	31.7	37.8	41.4
Japan	4.9	3.3	2.6
Korea	1.7	1.3	1.1
Total	100.0	100.0	100.0
Effective Producers			
ASEAN	15.4	18.1	19.1
China +	47.2	40.5	34.3
India	29.9	37.0	43.5
Japan	5.7	3.0	2.2
Korea	1.8	1.4	0.9
Total	100.0	100.0	100.0

C.   The second dividend
The first dividend depends entirely on changes in the size of the effective work force relative to the population (or the effective number of consumers). Output and income

per working-age adult are held constant and, hence, the possible effects of population growth or changing age structure on the second component in the basic growth identity, equation (2), are set aside. Here we explore the possibility that demographic trends are influencing income per effective worker.

There are many potentially important channels through which productivity may be influenced by population. First, the contribution of women to measured output has increased substantially as they have increased their educational attainment, both absolutely and relative to men, and as they have increased their labor force participation (Bauer 2001). Second, the tradeoff between child quality and quantity has been realized with substantial increases in investment in children's education (Becker 1991). A simple causal model in which exogenous fertility decline precipitated changes in education and female labor force participation is untenable, however. Childbearing, investment in children, and the economic role of women are responding to a variety of forces, e.g., the decline in infant and child mortality, the shift in the relative values of brawn and brain, and the increased returns to investment in education. Despite the importance of these channels, the relationship between population, capital accumulation, and productivity are emphasized here.

A fundamental result that follows from the neo-classical growth model is that slower population growth (or growth in the effective labor force) leads to capital deepening and an increase in output per worker (Solow 1956). If the workforce is growing more rapidly, a larger share of current investment must be devoted to providing capital to new workers (capital widening). Less is available for increasing capital per worker (capital deepening). The steady state capital output ratio (K/Y) depends only on the saving rate and the rate of population growth (n) and technological change (λ): $K/Y = s/(n+\lambda)$. Any decline in the population growth rate leads to a rise in the capital output ratio.

This is an important point because the decline in the economic support ratio at the end of the demographic transition is a direct result of slower growth in the labor force. The first dividend will be negative, but, given a constant saving rate, output per worker will rise. Hence, population aging may lead to higher not lower per capita income. Indeed, this was the conclusion reached by Cutler et al. in their analysis of US aging (Cutler, Poterba et al. 1990).

Given the objective of this analysis two assumptions underlying the simple neo-classical growth model are unattractive: that the saving rate is exogenous and that the economy is closed.

The lifecycle saving model is widely used to analyze the effects of population and other factors on saving (Modigliani and Brumberg 1954; Modigliani 1988) and capital (Tobin 1967). In the classic lifecycle model, individuals save when they are young and dis-save during their retirement years. Thus, given the age profile of saving, an increase in the old-age population leads to lower aggregate saving. A lower saving rate does not unambiguously lead to a decline in capital because of the capital deepening effect. If n and s both decline K/Y may increase or fall.

The validity of the lifecycle model is widely debated. Factors other than the desire to provide for old age may motivate saving. Old age support may be provided through public or through familial support. Models estimated using aggregate data support very large effects of age structure (Kelley and Schmidt 1996; Higgins and Williamson 1997; Williamson and Higgins 2001). Models based on survey data suggest more modest influences from age structure (Deaton and Paxson 2000). Simulation models imply that age structure has an important effect, but one that is smaller than found in aggregate empirical work (Lee, Mason et al. 2000).

A potentially important elaboration on the life cycle model incorporates the effects of life expectancy on the age profile of saving in addition to the composition of the population. People are living longer and, hence, the duration of their retirement is longer. Although a possible response would be to retire at a later age, this has not occurred for reasons that are not entirely understood. Several recent studies have found support for a strong positive life expectancy effect on aggregate saving rates (Bloom, Canning et al. 2003; Kinugasa 2004; Kinugasa and Mason 2007). Fertility decline may also have a significant effect on saving. A number of studies have concluded that populations with high child dependency have lower saving rates (Mason 1987; Higgins 1994; Kelley and Schmidt 1996).

An important issue is the role of transfers. In principal, old age consumption can be financed entirely through intergenerational transfers as in Samuelson's consumption-loan economy (Samuelson 1958). More realistically intergenerational transfers vary in their importance from country to country. Some countries rely heavily on PAYGO public pension programs. Other countries rely heavily on familial support systems, although much less is known about this form of intergenerational transfer and its implication for saving.

In Asia, the familial support system is particularly salient. A high percentage of elderly and adult children live together in most Asian countries. In Japan and Korea the extent of co-residence has declined substantially in recent decades. Moreover, young adults have much lower expectations about receiving old-age support in the future than was previously the case (Ogawa and Retherford 1993).

There are currently no comprehensive measures of familial transfers and, hence, no empirical studies of their effect on aggregate saving rates. But Lee, Mason, and Miller (Lee, Mason et al. 2000; Lee, Mason et al. 2002; Lee, Mason et al. 2003) use a simulation model to explore their potential effect on aggregate saving. In their analysis of Taiwan, they find that changes in age structure and life expectancy alone can account for only a portion of the rise in aggregate saving rates that accompanied its demographic transition. However, demographic change combined with a widespread abandonment of familial support systems can explain the boom in saving that occurred in Taiwan.

The results presented here make use of a similar simulation model to assess the implications of population change for wealth and income. The details of the model are described in Mason and Lee (2007) and only its key features are sketched out here.

The economy is open to international capital flows and interest rates and domestic wages are unaffected by the supply of capital by residents. The age profile of labor income is fixed, i.e., relative productivity and labor force participation rates do not change over time, but the labor income profile shifts upward in response to technological growth which is exogenously determined. These aspects of the model are relatively conventional.

A distinctive feature of the model is the manner in which consumption is determined. A standard approach is to assume that each adult establishes a lifetime consumption plan that maximizes its utility subject to a budget constraint: the present value of consumption equals current assets plus the present value of future earnings and, in some models, net transfers.

The model used here implicitly assumes that intergenerational altruism is a pervasive feature of the society. The cross-sectional consumption profile incorporates those preferences for the well-being, for example, of children and the elderly. The shape of the age profile does not change over time but it shifts upward (or downward) depending on the accumulation of assets, technological progress, and changes in age structure. Consumption is determined only indirectly by the economic success of an individual. Likewise total consumption by a cohort at each age is only indirectly

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influenced by the lifetime economic success of that cohort. This approach is far more consistent with the consumption patterns observed in Asia which in each year are quite constant across all adult ages, regardless of the income histories of each generation.[5]

Consumption at older ages is realized through a combination of intergenerational transfers and lifecycle saving. The importance of transfers relative to lifecycle saving is exogenously determined and treated in this model as a policy variable. The economy is subject to an aggregate budget constraint on flows that, along with other features of the model, determines the time path of assets, transfer wealth and implicit debt, and income.

In each period t aggregate wealth is equal to the present value of current and future consumption of all individuals who are adults in year t less the present value of current and future labor income of all individuals who are adults in year t. Wealth (W) defined in this way is a broad measure of wealth that includes both real assets (A) and the present value of current and future net transfers to year t adults, called transfer wealth (T). Transfer wealth consists of two components: child transfer wealth and pension transfer wealth. Child transfer wealth is the present value of transfers from year t adults to living dependent children and to children who will be born in the future. Child transfer wealth is negative and it is equal to the present value of the future cost of children to those who are adults in year t.

Pension transfer wealth is the present value of net transfers that year t adults will receive from year t children and from future generations. These transfers may be familial transfers or public transfers. Pension transfer wealth is the counterpart of implicit debt – the transfer wealth of those who are adults today is equal in magnitude to the implicit debt of future generations. Implicit debt as calculated here is not limited to public transfers programs, e.g., PAYGO pension programs. It includes all intergenerational transfers whether public or private (familial).

The impact of demographic change on capital accumulation and economic growth depends on the extent to which the economy in question relies on pension transfer wealth versus capital accumulation to support consumption in old age. We treat this as an exogenous policy variable by specifying the relative shares of assets and pension transfer wealth. Two sets of results are presented below. In one a very low percentage of pension wealth is transfer wealth (35%) with assets accounting for the other 65%. In the alternative simulation, transfer wealth is 65% of pension wealth and assets are 35%.
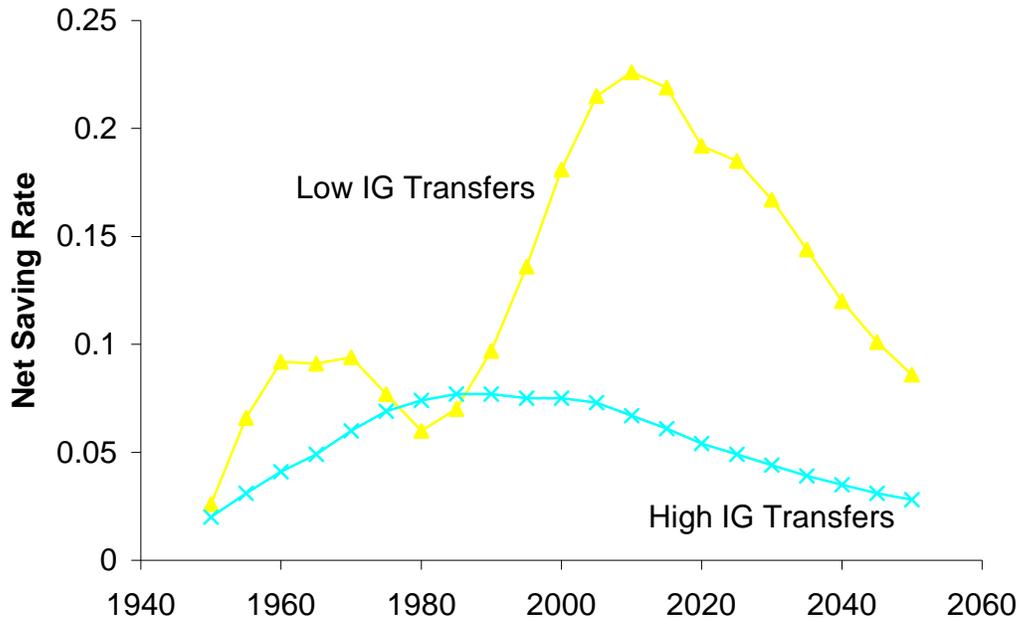
Before we turn to the results it should be clearly stated that the model is not intended to be a complete and comprehensive model of the economy. Its purpose is quite specific to showing how demographic changes are likely to influence wealth and assets, and with what implication for economic growth. There are three ways in which demographic change will influence wealth. First, changes in the support ratio influence consumption at each age. If the support ratio is high, perhaps due to low fertility, then a higher consumption ratio can be sustained. Higher consumption at old ages means that more wealth must be held at every age to finance that consumption. Second, people are living longer. To support consumption over an extended period of retirement, they must accumulate more wealth during their working years. Third, given the age profile of wealth, changes in age structure influence aggregate wealth. Up to a point wealth increases with age and, hence, a population concentrated in the late working years and early retirement years has greater wealth.

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[5] Models based on the standard lifecycle theory or the Ramsey approach produce broadly similar results.

D.   Simulation Results for ASEAN

Simulated net saving rates in ASEAN for 1950 to 2050 are shown in Figure 7. Comparative results will be presented in the next section. Productivity growth is assumed to be 2 percent per annum here and in all other results presented. The high IG transfer simulation gives the saving rate if 65% of the wealth required to support consumption in old age is provided through public and familial transfer programs. The low IG transfer simulation gives the saving rate if intergenerational transfers cover only 35% of the consumption needed during retirement.

Figure 7: Net Saving Rate Simulations, ASEAN population, 1950-2050. Low (high) IG transfer assumes that transfer wealth is 35% (65%) of pension wealth

Changes in age structure lead to a rise and then to a decline in net saving rates. One might incorrectly infer from the pattern that population aging is leading to a decline in saving rates, but this is not correct. Saving rates are rising in anticipation of population aging. The change in saving rates is transitory, however. As the population stabilizes at an older age structure, saving rates decline to levels closer to their pre-transition level.

Saving rates are strongly influenced by the size of intergenerational transfers. If transfers play a modest role in supporting the consumption of older adults, changes in age structure have a very substantial effect on net saving rates which rise from about 3 percent of national income in 1950 to peak at 23 percent of national income in 2010.
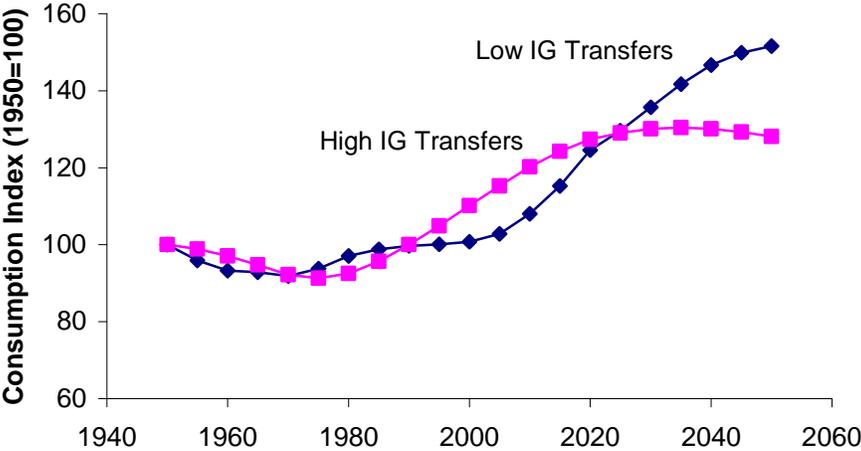
If intergenerational transfers play a dominant role in providing support to the elderly, then the effect of age structure on saving is moderate. Net national saving rates rise from 2 percent in 1950 to peak at around 8 percent in 1985 before gradually declining.

Figure 8: Assets/Labor Income, ASEAN Population, 1950-2050. Low (high) IG transfer assumes that transfer wealth is 35% (65%) of lifecycle pension wealth

The impact of age structure on assets is substantial. In 1950 the ratio of total assets to total labor income is about 0.3 for both intergenerational transfer systems. By 1990 assets have increased to 1.5 times labor income for the low IG transfer case and to 1.2 time labor income in the high IG transfer case. After 1990 the systems diverge with assets relative to labor income increasing to 7 in 2050 for the low IG transfer case, but only to 2 in 2050 for the high IG transfer case. Total wealth in 2050 in the low IG transfer case is also 350% greater than in the high IG transfer case in 2050.[6]

Figure 9: Consumption Index, ASEAN, 1950-2050, Low (high) IG transfer assumes that transfer wealth is 35% (65%) of lifecycle pension wealth. Consumption index equals 100 in 1950. Effect of age structure only; effect of productivity increases not included.

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[6] Because a small open economy assumption is used labor income growth is the same in either case. The greater wealth is accumulated as foreign assets in the low IG transfer economy.

As compared with 1950 changes in age structure lead to about a 30% increase in consumption per equivalent consumer in 2030 given the high IG transfer policy. Using the low IG transfer policy, changes in age structure lead to an increase in consumption per equivalent consumer of about 50% in 2050. Note that the higher consumption after 2025 for the low IG transfer policy comes with a cost. The higher saving rates and lower consumption rates necessary lead to lower consumption between 1995 and 2020 under the low IG transfer policy than under the high IG transfer policy. Consumption remains permanently higher under the low IG transfer policy. Over the next 100 years (not shown) consumption is 20 percent higher on average given the low IG transfer policy. In a closed economy these differences would be larger.

E.   Comparative Results

The results presented in this section focus more narrowly on two periods: 1995-2005 and 2005-2020. The effects of changes in age structure on saving rates depend on the importance of intergenerational transfers to the elderly (Table 8). Given low reliance on intergenerational transfers, net national saving rates reach very high peaks in 1995 in greater China, Japan, and Korea. In these countries saving rates decline to intermediate levels in 2005 and to much lower levels in 2025. In India and ASEAN, the saving effects are somewhat more modest and are delayed reflecting the slower and later changes in age structure.

If intergenerational transfers play a very important role, the effects of age structure on saving are muted.

Table 8: Net Saving/National Income (%), Country Groupings

	IG trans share low (0.35)			IG trans share high (0.65)		
	1995	2005	2025	1995	2005	2025
ASEAN	13.6	21.5	18.5	7.5	7.3	4.9
China +	32.4	21.6	6.5	7.6	5.3	2.8
India	7.0	15.0	21.6	7.1	7.6	5.7
Japan	38.6	15.9	3.5	4.5	2.9	1.4
Korea	52.9	32.4	2.6	7.9	4.7	1.4

Accumulated assets are reported in Table 9. Age structure has a substantial influence on the lifecycle demand for assets if intergenerational transfers are moderate. The ratio of assets to labor income in 1995 ranged from 1.1 given the demography of India to 10.2 given the demography of Japan. The demand for lifecycle assets grows in all cases between 1995 and 2005 and between 2005 and 2025. By 2025, Korea is approaching the simulated level of assets for Japan. Percentage growth rates are very strong in ASEAN and India. Between 1995 and 2025, assets relative to labor income increase three-fold in both cases.

Table 9: Assets/Labor Income, Country Groupings

	IG trans share low (0.35)			IG trans share high (0.65)		
	1995	2005	2025	1995	2005	2025
ASEAN	1.6	2.4	5.0	1.3	1.5	1.8
China +	2.6	4.4	7.1	1.5	1.7	2.0
India	1.1	1.5	3.9	1.0	1.2	1.7
Japan	10.2	13.6	14.9	2.5	2.6	2.8
Korea	5.2	8.9	12.7	2.1	2.2	2.3

The complexities of the relationship between age structure and consumption growth are apparent in Table 10. Consumption growth changes because of changes in income per effective consumer and changes in the ratio of consumption to national income that underlie the second dividend. If the consumption ratio changes very little, the trend in consumption is dominated by changes in the support ratio, i.e., the first dividend. Thus, consumption per equivalent consumer will grow more rapidly during the dividend period and then decline as population aging dominates the support ratio.

However, if there is a strong response in the consumption ratio the outcome is more complex. Rapid accumulation of capital is realized through a decline in the consumption ratio and slow growth in consumption per effective consumer. As the consumption ratio rises from low levels, however, consumption growth can be very rapid.

Consumption growth in ASEAN shows this pattern. Given a strong saving response (low intergenerational transfers), consumption growth is slow in 1995-2005, but very substantial in 2005-2025. In contrast, given a modest saving response (high intergenerational transfers), consumption growth is more rapid in 1995-2005 and dissipates in 2005-2025.

The situation in India is somewhat different. In 1995-2005 consumption is actually declining modestly (relative to productivity gains) as a result of a decline in the share of national income consumed. Consumption rebounds after 2005. For the two decades taken as a whole consumption growth rates are the same given either policy, but more detailed results show that consumption growth is substantially more rapid given the high saving scenario after 2015.

Table 10: Annual Growth in Consumption Due to Age Structure (%), Country Groupings

	IG trans share low (0.35)		IG trans share high (0.65)	
	1995-2005	2005-2025	1995-2005	2005-2025
ASEAN	0.3	1.2	0.9	0.6
China +	3.0	1.4	1.0	0.1
India	-0.2	0.7	0.6	0.7
Japan	4.1	0.5	0.0	-0.3
Korea	5.9	2.6	1.0	0.0

Greater China, Japan, and Korea are in similar situations given a low level of intergenerational transfers. For 1995-2005 consumption growth is very rapid – ranging from 3 percent to nearly 6 percent above the assumed rate of productivity growth of 2 percent per year. During this period saving rates are declining from the high levels of 1995 and earlier and income growth is strong leading to rapid growth in consumption. After 2005, consumption growth rates are well above those possible in the absence of a strong saving response.

III.   Analysis of International Migration

Economists disagree about the economic importance of immigration. The analysis presented in this section suggests that for East Asian countries realistic immigration policy is not likely to have a substantial influence on population age structure and its economic consequences. There are non-economic effects of immigration and economic effects of immigration unrelated to the major demographic changes countries are experiencing.

Many economists judge the potential gains from increased international migration to be very important. Take one recent statement, for example.

> "Here is the question for policy makers at the WTO, World Bank, the OECD, trade and finance ministries around the world: which remaining impediments to international economic exchange would probably produce upon their removal the greatest bang in terms of improved efficiency in the global allocation of resources? (a) agricultural protection? (b) differential tax treatment of investment? (c) weak protection of intellectual capital? (d) inadequate prudential regulation in financial markets? Or (e) immigrations restrictions? Without any doubt, the answer is (e)" (Rodrik, 2002 p. 314).

A fundamental point is that restrictions on immigration lead to an inefficient allocation of human resources that reduces standards of living for potential immigrants and their families and for consumers in receiving countries. The net gains from immigration are supported by many simulation models (e.g. Hamilton and Whaley, 1984; Smith and Edmonston, 1997; World Bank, 2006).

One of the most important and difficult issues being addressed is whether the elimination of barriers to trade and to international capital flows can realize the same gains that would be achieved by allowing the free flow of labor. Viewed through the lens of a simple economic model, factor equalization can be achieved by either labor flows or capital flows. This is played out in dramatic fashion as an increasingly broad range of services to industrial countries are being provided by workers in India, China, and other emerging economies.

Several recent studies investigate the extent to which increased international capital mobility can substitute for immigration. Raut (2007) uses a simulation model to compare relocating production overseas to allowing increased immigration of labor in Japan and concludes that immigration is a superior approach as long as the productivity levels of migrant workers are close to those of Japanese workers. In contrast Goto (2007) concludes that immigration is inferior to either foreign direct investment or trade liberalization in terms of welfare improvement. Goto argues that utilizing more female workers is a better option than allowing more migration as a mean of mitigating the problems due to population aging. Because their models are based on quite different assumptions about the social costs of immigration, import barriers, and the labor productivity of immigrants, it is hard to compare one result with the other. Political realities underlie this debate with very different "sentiments" about immigration versus foreign investment.

Even if all barriers to trade and capital mobility were eliminated, labor shortages still emerge in particular sectors. Many industries in advanced industrial countries face critical vacancies, especially for 3D (dirty, dangerous, and difficult) low-paid jobs and these industries can benefit from tapping into cheap labor from developing countries. A particularly important feature of aging is the increased demand for health care workers and care-givers.

Immigration can generate substantial benefits for sending countries. One channel is remittances – an important source of external funding for several Asian economies. According to the 2004 *IMF Balance of Payment Yearbook*,[7] India and China were the top two remittance-recipient countries in the world (around $21 billion, respectively). Other Asian countries, such as the Philippines ($11.6 billion), Vietnam ($3.2 billion), Pakistan ($3.9 billion), and Bangladesh, ($3.4 billion) are also among the top 20. Calculated as a share of GDP remittances account for more than 10% of GDP for the Philippines, and about 5~6% of GDP for Vietnam and Bangladesh. If remittances sent through informal channels are included, this share will increase substantially.[8] Remittances in the region are growing very rapidly in large part due to increases in international migration flows, although some of the increase might reflect a shift from informal to formal channels in response to the convenient remittance services and the tightened regulatory scrutiny. India, for example, has reported a spectacular increase in remittance inflow, from $13 billion in 2001 to $20 billion in 2003. Remittances to East Asia and the Pacific also doubled between 2001 ($20 billion) and 2004 ($41 billion), mainly due to the surge in remittances to China. Officially recorded remittances to developing countries in the world rose from $97 billion to $167 billion between 2001 and 2005, up 73 percent. More than half of that increase occurred in China, India, and Mexico (World Bank, 2006).

A growing literature addresses the role of remittances in poverty reduction (Adams and Page, 2005; IMF, 2005; Hugo, 2003; Yang and Martinez, 2005). Some researchers have argued that remittances are an important poverty reduction tool because overseas contract workers are mostly unskilled workers with little education. Remittances from these workers directly and immediately flow to poor families in sending countries and thus they have an economic impact at the grass roots level. Remittances may not attenuate income inequality in developing countries. Empirical evidence on this point is mixed, from widening disparities (Stark et al. 1986) to equalizing income inequality (McKenzie and Rapoport, 2004) even for the same country, Mexico.

Remittances are the second largest source of foreign exchange, behind foreign direct investment (FDI). Many researchers argue that remittances have an advantage over FDI, however, because remittances are usually less volatile than FDI (Ratha, 2003). Studies have shown that remittance inflows are countercyclical. Disasters and economic downturns increase the inflow of remittances, suggesting that remittances serve as a mechanism for consumption smoothing (e.g. Lucas and Stark, 1985; Yang and Choi, 2005; Clarke and Wallsten, 2004).

The purpose of the analysis presented here is to judge an important but specific issue – the feasibility and desirability of using immigration policy to influence population age structure and its economic effects. Two issues are considered in turn. The first

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[7] These numbers are calculated by the World Bank staff members as the sum of workers' remittances, compensation of employees, and migrant transfers. There are several issues on the definition, quality, and coverage of data on remittances. See *Global Economic Prospects: Economic Implications of Remittances and Migration*, World Bank, 2006 for details.

[8] Household surveys provide information on the percentage of remittances via informal remittance channels, ranging from 5% for Guatemala to 54% for Bangladesh (*Global Economic Prospects: Economic Implications of Remittances and Migration*, World Bank, 2006).

issue is the potential for immigration policy to influence age structure for both sending and receiving countries. This analysis distinguishes permanent immigration from guest worker programs. Second, we turn to the economic effects of immigration making use of the simulation model described in the preceding section. This analysis does not consider the guest worker program because guest workers leave the receiving country and, hence, do not affect the lifecycle demand for wealth in the receiving country.

The analysis considers three scenarios that encompass different approaches to increasing immigration into Japan and South Korea (Table 11). Two of the scenarios assume that immigration is permanent. The "Guest workers" scenario assumes that immigrants remain only for five years and are then repatriated to the sending country. The permanent family migration allows for immigration by family members. Immigrants tend to be concentrated in the working ages, but a portion of the immigrant stream consists of children and older adults. The distribution of immigrants is based on the United Nations, 2001. *Replacement Migration: Is it a solution to declining and ageing populations?* The UN study uses the age and sex pattern of immigrants to Australia, Canada, and the US. Males were 47.4% and females 52.6% of the total. Forty-one percent were between the ages of 20 and 34. About one-third were under the age of 20 and fewer than 5 percent were 60 or older.

Table 11: Three Immigration Scenarios

	Age distribution of immigrants	Status in receiving country
Permanent family migration	Average of immigrants to US, Canada, and Australia (UN 2001).	Permanent residents
Permanent worker migration	Same as UN 2001, but restricted to 20-34 years of age.	Permanent residents
Guest workers	Same as UN 2001 but restricted to 20-34 years of age.	Remain five years.

Rate of immigration is 4.5 immigrants per 1000 members of the indigenous population. Immigrant flow is reduced to zero if the number of immigrants and their descendants, assuming no inter-marriage between the indigenous and the immigrant populations, reaches 30% of the total population. Descendants of guest workers live in their home country.

The "Permanent family migration" scenario uses the age and sex distribution from the UN study. The "Permanent worker migration" and the "Guest workers" scenarios restrict immigrants to young working ages (20-34) using the sex and age distribution for those age groups from the UN study.

Immigrants are subject to the same mortality rates as the country in which they reside. The total fertility rate of immigrants continues at the level of the sending country until 2045, thereafter converging to the level in the receiving country over a period of 30 years. The annual immigration rate is 4.5 immigrants per 1000 members of the non-immigrant population. This is the net rate of immigration to the US for 2000-05, a high rate by international standards. Immigration is increased beginning in 2010 and continues until the immigrant population, including descendants, reaches 30% of the indigenous population (the surviving 2010 population and descendants).

Immigration influences the sending countries as well as the receiving countries. In the analysis presented here, we assume that immigrants are drawn entirely from ASEAN countries.

The first questions we consider are demographic ones. Can immigration policy be used to influence age structure to a significant degree? Or more to the point "Can

aging countries substantially increase the working-age share of their population through immigration?"
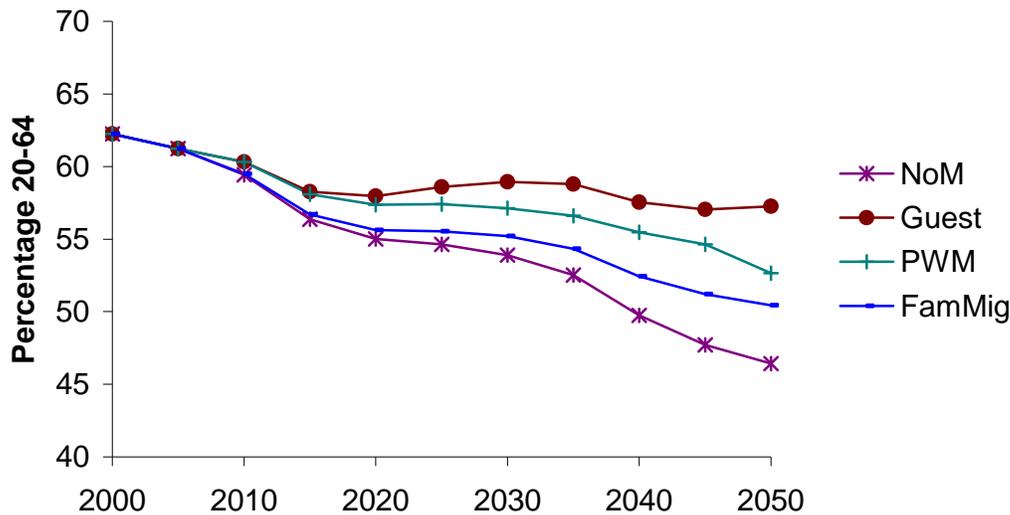
In answering this question, the distinction between permanent immigration and guest worker programs is critical. With a guest worker program targeted at immigrants of the preferred age, a receiving country that is small relative to sending countries can achieve virtually any age distribution it so chooses. Singapore, for example, could increase the share of its population in the 30-39-year-old age group, by allowing 30-year-olds to immigrate from China and then sending them home when they reach age 40. Of course, the size of the guest worker program relative to the domestic population will increase to the extent that a country tries to exert more influence over the age structure of its population.

With permanent immigration programs, however, the situation is more complex. Permanent immigrants marry, have children, and grow old as residents of the receiving country. Over time their vital rates – birth and death rates – converge to the rates that characterize the indigenous population. As a consequence, over the very long term, the immigrant population will come to have the same age distribution as the indigenous population. In the shorter term, however, large-scale immigration programs can influence the age structure of the receiving country.

The share of the population in the working ages (20-64) is plotted for Japan in Figure 10 and for Korea in Figure 11 in the absence of any change in immigration rates and given a radical departure to a policy much more open to immigration.
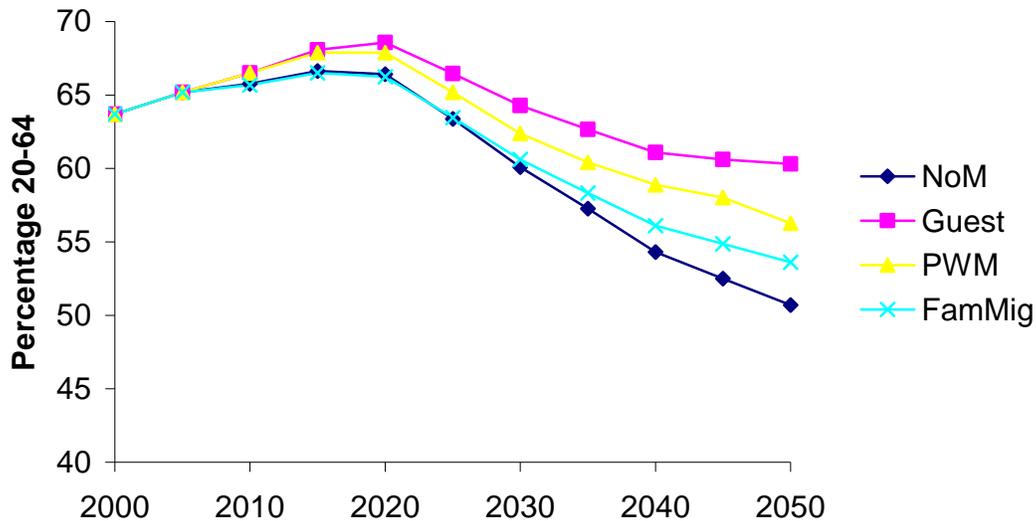
In the absence of immigration (NoM) Japan's working-age population is projected to decline to a little over 45% of the total population by 2050 from the current level of 62%. Allowing permanent immigration on a very large scale will slow the rate of decline. With a family migration program (FamMig) the working-age population will be higher by almost 5 percentage points in 2050. With a permanent worker migration program (PWM) the working-age population will be higher by about 7 percentage points. Note, however, that worker immigrant policy has a much larger impact than a family immigrant policy in earlier years. The guest worker program (Guest) has a larger, sustained effect on the working-age population. Once the policy comes on line, the deterioration in the share of the working-age population essentially stops.

Figure 10: Working-age Population, Japan, 2000-2050

In Korea the share of the working-age population is still increasing until 2020 irrespective of the immigration policy, but in the absence of a more liberal immigration policy the working-age share declines from over 65% in 2020 to about 50% in 2050. Immigration slows the decline. The impact of the guest worker program is largest followed by the permanent worker migration policy and the family migration policy.
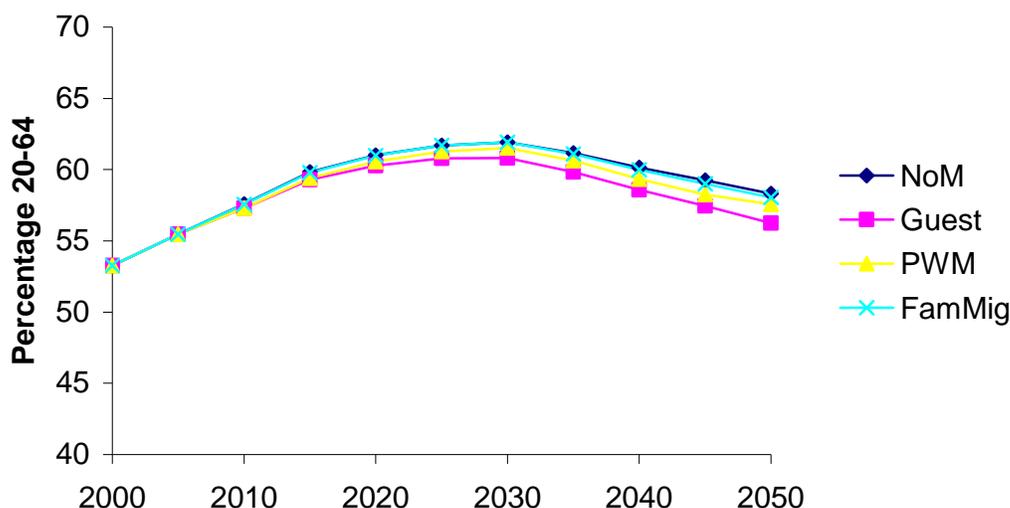
Figure 11: Working-age Population, Korea, 2000-2050

What are the implications for the age-structure of the ASEAN sending countries? The answer to that question will depend on the population size of the receiving countries (or the immigrant stream) relative to the population size of the sending countries and on the extent to which the age distribution of the immigrant stream, eventually including their descendants, is different than the age distribution of the sending country. In 2010 when the immigration policies take force, the ASEAN population is projected to be 589 million as compared with a combined population of Japan and Korea of 177 million. Hence, a net in-migration rate of 4.5 per 1000 for Japan and Korea translates into a net out-migration rate of 1.4 per 1000 for ASEAN. Moreover, the ASEAN population is increasing relative to the populations of Japan and Korea. By 2050, an out-migration rate for ASEAN of 0.9 per 1000 would produce an in-migration rate for Japan and Korea of 4.5 per 1000.

The extent to which the age distribution of the ASEAN migrant stream (and their descendants) differs from the age distribution of the ASEAN population depends very much on the particulars of the migration policy implemented.   The permanent immigration policies have a very small effect on the share of the working-age population. In 2050, the year for which the effect is largest, the permanent family migration policies of Japan and Korea would reduce the working-age population of ASEAN by 0.3 percentage points. The permanent worker migration policy has a larger impact, but the maximum loss in the working age population is one percentage point realized in 2040. The guest worker program has the largest effect, as expected, but the working-age population is only lower by two percentage points by 2050 with smaller effects before then (Figure 12).

Figure 12: Working-age population, ASEAN, 2000-2050

As with any simulation analysis, the results are based on a particular set of assumptions. Are there general lessons? First, the immigration policies analyzed are very substantial departures from current policy. It is a remote possibility that Japan or Korea will adopt an immigration policy as liberal as the US policy or that it will keep such a policy in place until the immigrant population reaches 30% of the total. Any realistic immigration policy will have considerably smaller demographic effects than the ones shown in the simulations. If Japan and Korea choose to accommodate a substantial increase in the number of immigrants, the share of the working age population will decline somewhat more slowly. The effect is likely to be greater if Japan and Korea continue to favor guest worker programs.

Second, the impact of immigration policy on sending countries may be diluted as compared with the analysis presented here. In Asia, in particular, the countries which are likely to import significant numbers of immigrants within the next few decades have small populations relative to the sending countries (most of ASEAN, China and India). By importing workers, Japan and Korea will not have a substantial impact on the relative size of the labor forces of the rest of Asia. Of course it is possible that highly targeted policies – on particular countries or particular skill sets – could have a measurable effect.

A.   Demographic dividends and immigration

The effect of immigration on demographic dividends varies with the immigration policy.
In the permanent immigration scenarios, the immigrant population severs all ties with the sending country and fully integrates into the population and economy of the receiving country. Permanent immigrants earn wages, consume, give and receive transfers in exactly the same way as the native population.[9] The most immediate and direct effect of permanent immigration on the economies of both the receiving and the sending countries is that immigration influences the first dividend, i.e., growth in the effective number of producers relative to the effective number of consumers. The support ratio
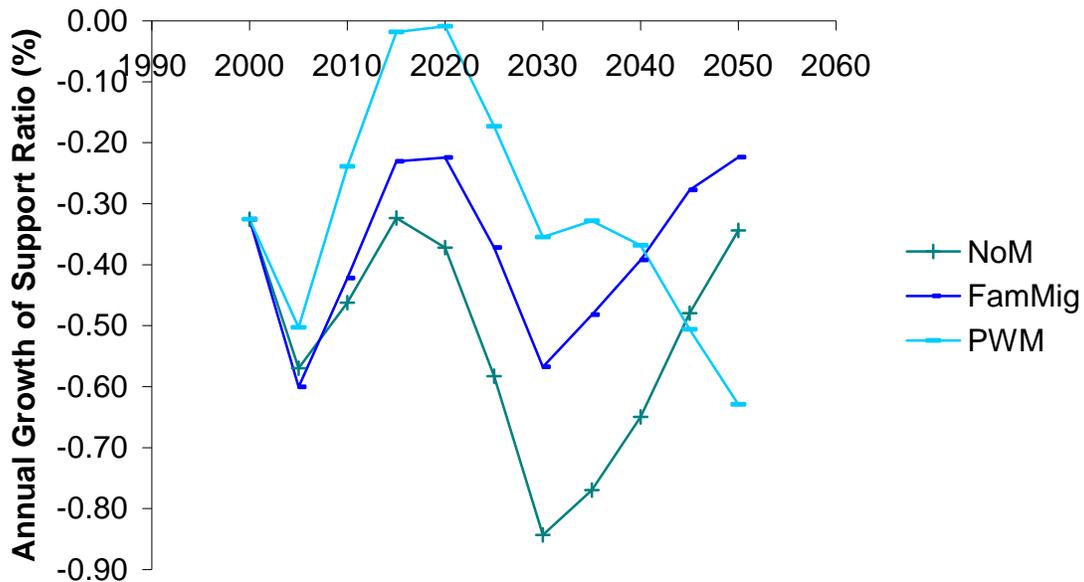
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[9] For simplicity sake we assume that immigrants arrive without wealth. Given the heavy concentration of immigrants at young ages and the relatively low wage levels in the sending countries, this assumption has little impact on the outcome.

grows more rapidly to the extent that immigrants are concentrated in the working ages. However, they are also concentrated in the reproductive ages. Their rates of childbearing are also moderately higher than in the native population. Because child dependency is higher in the immigrant than the native population, the difference between the economic support ratio for the native and the immigrant population is smaller than would otherwise be the case.

When the immigration policy is first implemented – and for several decades thereafter – the permanent worker migration (PWM) policy has the largest effect on the first dividend. In Japan, the PWM policy is sufficient to avoid a negative first dividend between 2015 and 2025 (Figure 13). In 2010-2015 the migration policy increases growth in output per effective consumer by 0.3 percentage points per year and this increases to 0.5 percentage point per year for 2030-2035. The cumulative gain in labor income per effective consumer reaches 14 percent in 2045. The policy only postpones population aging. Beginning in 2045 the PWM support ratio declines more rapidly than the no migration support ratio and eventually converges on the no migration support ratio. Why does this occur? First, the immigrant population has become sufficiently large that it reaches the assumed 30% limit and essentially no further migration occurs after 2050. Second, the immigrant population is aging. By 2050 the first waves of immigrants are in their sixties and seventies.
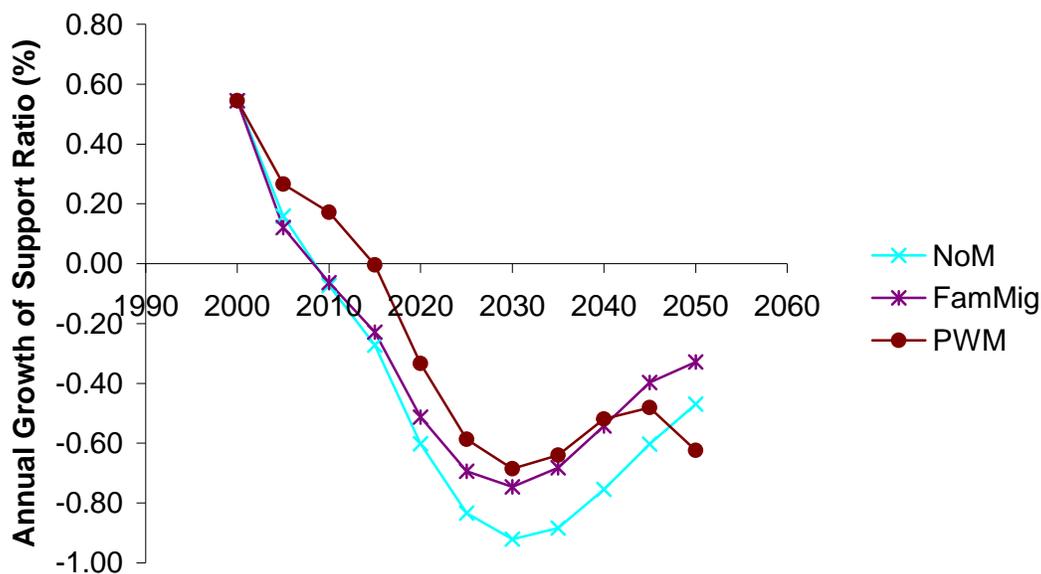
The permanent family migration policy has a more modest effect on the support ratio. The total gain in labor income per effective consumer by 2050 is only 8 percent.

Figure 13: The First Dividend and Immigration, Japan, 2000-2050

The effect of immigration on the first dividend is even smaller in Korea than in Japan (Figure 14). For some periods, the immigration policy produces additional economic growth of about 0.2 percent per year. The cumulative gain in the dividend by 2050 is only 10 percent from permanent worker immigration and only 5 percent from permanent family migration.

Figure 14: The First Dividend and Immigration, Korea, 2000-2050

The effect on ASEAN's first dividend is close to negligible. The cumulative impact by 2050 is to reduce the economic support ratio by 1.1 percent in the case of the PWM policy and by 0.5 percent in the case of the FamMig policy.

The first dividend arises solely because of the compositional effects associated with immigration – that a larger share of the population is concentrated in the working ages. The immigration policy has additional implications because of the effects on intergenerational transfers and capital accumulation. Immigrants pay taxes that support children and the elderly, they have children who are supported by native taxpayers, and they grow old and rely on future generations of taxpayers. Some of these tax payers will be the children of immigrants and some will be the descendants of members of the native population. These effects are components of what we have termed the second demographic dividend.

Analysis is based on the simulation model described in section II and in more detail in Mason and Lee (2007). The model assumes that fiscal policy is unaffected by immigration in the following sense. First, the relative magnitudes of transfers to children by taxpayers and parents (1/3 vs 2/3) are held constant. Second, pension transfer wealth, the net present value of current and future transfers to living adults, is held constant relative to the values of assets held by living adults (1:1). In other words, one-half of the resources needed in old age are financed through saving and one-half through transfer programs.
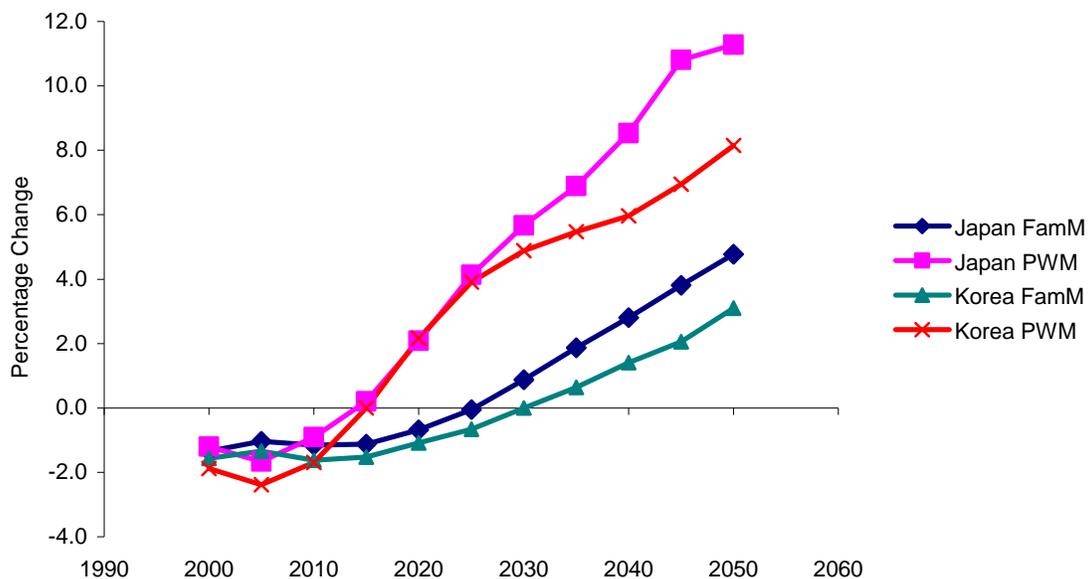
The simulation captures a number of important effects associated with the immigration policies being considered. First, both immigration policies increase the number of children and hence public spending on them. This occurs because immigrants are heavily concentrated in the reproductive ages and because they have higher fertility than members of the native population. The effect is greatest for the family migration policy, but substantial for the worker migration policy. Second, both immigration policies lead to an increase in the value of unfunded pension benefits that must be paid by future generations. This is not necessarily a burden for the native population because the implicit debt in the pension system will be paid by descendants

of immigrants as well as descendants of the native population. Third, both immigration policies lead to an increase in saving rates and assets because one-half of the retirement needs of the elderly are met through asset accumulation. Although the immediate effect of this is to increase per capita saving and to reduce per capita consumption, the eventual effect is to raise per capita assets, asset income, and consumption.

The combined effect of immigration policies is evaluated using consumption per equivalent consumer. Figure 15 reports the percentage change in consumption per equivalent consumer relative to the no change in immigration policy for Korea and Japan. In all cases, the impact of a relaxed immigration policy is to depress standards of living by a small amount because taxes for programs for children must rise and because saving rates must increase. Over time, however, the favorable effects of a relaxed immigration policy emerge. This reflects the first dividend – that there are more workers relative to the number of children – and the effects on capital accumulation. The favorable effects emerge first and are strongest for the immigration policy that emphasizes young workers rather than family migration. By 2050 consumption is higher by 11 percent in Japan and by 8 percent in Korea.

These effects are not inconsequential, but note that they are not a free lunch. They are realized in part by foregoing consumption in earlier periods.   In the case of family migration to Korea, higher consumption is not realized until 20 years after the implementation of the immigration policy. Also note that this benefit is associated with an enormous increase in the number of immigrants. By 2050, 30% of the populations of Korea and Japan consist of immigrants and their descendants.

Figure 15: Effect of Immigration Policy on Consumption per Effective Consumer

The economic effects of immigration on the sending country are quite modest. The impact of immigration policy on per capita consumption varies between -1 percent and +2 between 2000 and 2050. This is not surprising given the very small effects of the immigration policies on the age structure of ASEAN countries.

IV.   Policy Implications and Conclusions

The connections between population change and the macroeconomy lead to two broad sets of policy implications. One set of implications is related to influencing population change and age structure, per se. A second set of policy implications has to do with how economic policy can best accommodate population policy.

A.   Population Policy Options

Countries in Asia and elsewhere are debating and reforming policies that influence fertility and immigration.

1.   Family and Fertility Policy

Countries in the region exhibit considerable diversity in their demographic characteristics and, hence, in the demographic challenges that they confront in the immediate future. ASEAN and India will enjoy the first demographic dividend until 2025, but for other countries rapid population aging and, in some cases, depopulation is a more immediate concern.

Increased life expectancy is partly responsible for population aging, but low rates of fertility play a critical role. The total fertility rates of Korea, Hong Kong, Taipei, Japan, and Singapore are at 1.3 births per woman or less. Perhaps China's fertility and that of other countries will drop to such low levels, as well, in the coming years. If such low levels of fertility persist, substantial depopulation will occur and population aging will be even greater than anticipated in the population projections presented above. Thus, it is not surprising that low fertility Asian countries are becoming more interested in pro-natalist population policies. Japan heavily subsidizes child care services and is trying to change the institutional environment to facilitate marriage, childbearing, and childrearing. Recently the Japanese government has implemented measures that require employers to provide very costly childcare leave benefits. In South Korea and Singapore, the government offers financial and housing incentives to couples with more than two children. These are just a few examples of the many ways that Asian countries are trying to encourage young adults to marry and bear more children.

The experiences with such policies are not entirely satisfactory, however. The total fertility rate in Japan bounced back slightly, but remains at a very low level. While fertility may have declined even more without these measures, the incentives appear to be insufficient to change young couples' reproductive behavior even with the sizable amount of funding. Furthermore, there are dangers that employers will respond to these policies by hiring fewer women of childbearing age. Moreover, firms could become less efficient and less competitive in the global economy.

It is possible that fertility rates will recover in response to social or economic developments that are difficult to anticipate. If not, Asian governments will surely explore a broader (and more expensive) range of pro-natalist policies.

2.   Immigration Policy

A second policy option is immigration. Immigration may attenuate the pace of aging in countries further along in their demographic transitions and speed the aging process in countries earlier in the transition. The region's countries with young populations (India, Pakistan, Bangladesh) are sufficiently large to supply a steady stream of migrant workers to countries with older populations (Japan, Korea, and to a more limited extent China).

Most Asian countries, however, have very restrictive immigration policies. Even in the face of severe labor shortages, Japan and South Korea have admitted only a

limited number of foreign workers, many on a temporary basis. Instead, Japanese and Korean firms have shifted industrial production to countries with ample labor forces and have relied on automation and skill intensive technologies to reduce their dependence on unskilled labor. Policies and attitudes towards immigration may change as populations age and as labor force growth slows and, in some instances, turns negative. More likely foreign investment and trade will respond more readily than immigration to demographic change in the region.

In some Asian countries immigration will continue to be an important economic and demographic phenomenon. For them and the countries to which they are sending immigrants, immigration policy will continue to be important and potentially contentious.

For sending countries an important issues is remittances. Weakness in the financial sector in many developing countries imposes substantial transaction costs on remittance flows. Removing this barrier will substantially increase remittances through formal channels. This is also an area in which host countries need to cooperate to provide better financial services to immigrants. Increasing remittances through formal financial sectors may actually benefit host countries, as well, because it generates more fees for financial services and also generate more tax revenues for governments. Needless to say, facilitating international labor mobility itself is the most crucial means of increasing remittance flows to developing countries.

Perhaps the most difficult question for policymakers is equal treatment of migrants. The fundamental dilemma is that "differences prompt migration, but most international and many national standards call for equal treatment of migrants" (Martin, 2005). Although increasingly large number of conventions and standards are approved to protect migrants and their families, notably by the International Labour Organization, most of these are ratified only by sending countries, and also are widely violated in practice. It should be emphasized, however, that providing minimum social protection for non-permanent workers may enhance the productivity of workers especially for the longer term. It will also contribute to diminishing the severe inequality that characterizes the region.

B.   Social and Economic Policy Options

In the absence of demographic solutions to the problems accompanied with population aging, Asian countries must depend on economic and social policies that meet the needs of the elderly and promote strong economic performance. Traditionally, old people in Asia have been supported and cared for by their families, but there are clear indications that family support systems are eroding. The challenge for public policy in Asia is to develop systems of support for the elderly that are consistent with poverty reduction goals, that do not undermine work and saving incentives, and that are financially sustainable.

1.   Policy Options for Self-Support

What aging societies lose in sheer numbers of workers they can gain back through more productive economies. A top priority is to tap the productive potential of older workers by promoting continued employment for older people. This is especially true in the region where public support systems are not well developed. Throughout Asia and much of the world, however, older workers are withdrawing from the labor force at younger and younger ages. For some, deteriorating health may dictate early retirement but, in general, older adults are healthier and have lower rates of disability than in the past. Rising incomes are only partly responsible for the decline in work among older adults because retirement is still a luxury available only to the relatively well off in Asia.

While it is far from clear what mechanisms underlie early retirement, it appears that individuals' decisions to work are increasingly governed by complex forces that reflect the influence of firms, labor unions, and public officials. The resulting rigidities in the labor market often discourage or, in some instances, virtually prohibit continued employment by older workers. Perhaps most important of all is that governments impose mandatory retirement ages. For most Asian countries the statutory retirement age is either 65 or below 65. Many countries have been slow to adjust mandatory retirement ages upward despite rapid improvements in health and life expectancy that enable people to continue to be productive longer than in the past. Many people today want to work longer than laws permit. In practice, retirement often comes earlier than the statutory retirement age. Firms often force older workers into early retirement and many Asian governments do not prohibit this practice. This is particularly true when there are general downturns in the economy, when particular sectors or firms decline, or when firms restructure their production processes.

Despite evidence to the contrary, dismissing older workers is thought to help job prospects for young employed men, who are often viewed as the primary breadwinners for their families. Older women may be especially vulnerable to such policies as they are frequently viewed as secondary rather than primary breadwinners in the family. During South Korea's economic crisis, for example, female employment declined more rapidly than male employment, unemployed female workers were more likely to withdraw from the labor force, and when women were reemployed they were less likely to obtain full-time regular positions than their male counterparts.

There is little reason, however, for governments to encourage early retirement. The early retirement practice reduces employment and income and can dampen economic welfare in general. Cutting the number of older workers does not appear to increase employment among young workers, either. Older and younger workers frequently have different skills, and labor markets rarely shrink and grow in the same sectors or occupations. Most of all, as long as wages are flexible and adjust to productivity differences, there is no reason to replace older workers with young workers.

Unfortunately, this is not the case for many countries. It is well-known that wages are usually downwardly rigid and, thus, do not adjust when a worker's productivity is in decline. To make matters worse, wage systems in some Asian countries, Japan and Korea in particular, are partially based on seniority and firms find themselves paying older workers far more than the value of their marginal product. While the rigidity of wage system varies across countries and appears to be easing in Japan and Korea, efforts to tie wages more closely to performance and to increase flexibility in job assignments and hours will be increasingly important for many Asian governments as the population aging accelerates.

2.   Policy Options for Public Support Systems

Public pension programs offer two important advantages over self-support or family support. First, they represent a politically acceptable means of providing an economic safety net for those elders who might otherwise experience severe levels of poverty. Second, national programs allow risk pooling. Individuals who must provide for their own retirement needs may make poor investments. They may suffer a disability that curtails their income-earning capacity or experience unusual longevity and outlive their savings. Familial support systems provide very limited diversification of this risk. Public programs, however, can spread these risks over the entire population and provide a monthly benefit that lasts as long as the beneficiary survives. Most public pension programs also include some form of disability insurance not limited to the elderly.

However, studies in developed countries have shown that the incentive structure of public pension programs causes a decline in retirement ages (Gruber and Wise 1999). In the United States large increases in Social Security benefits have been partly responsible for the decline in the percentage of older people who remain in the labor force. Programs in Europe that impose very high effective tax rates on older workers have led to very low rates of labor force participation among older Europeans.

In most of Asia, public pension programs have been modest to this point and, consequently, have not greatly influenced older workers. While many Asian countries offer some type of support for the elderly, only a few Asian countries, such as Japan and Singapore, have pension schemes that currently cover more than a fraction of the elderly population. Some of the provinces and cities of China are experimenting with various approaches to financing retirement benefits. In other countries of the region, however, pension schemes exist in theory but cover very few workers. It is likely that the expansion of public benefit programs currently being considered in many Asian countries would lead to further declines in the average age at retirement.

Public programs entail other drawbacks, too. Public pension programs that are not carefully designed will prove to be unsustainable as the number of elderly increases relative to the working-age (and taxpaying) population. Many countries have pay-as-you-go systems in which current retirees are supported not by their own savings but by contributions from current workers. Current workers will, in turn, be supported in old age by the next generation of workers. As the number of retirees increases relative to the number of workers, either payroll taxes must rise to high levels, or benefits must be reduced to low levels, or some combination of the two. There is little doubt, for example, that Japan's public pension program will face enormous difficulties in the coming years.

Providing wide coverage may also encounter serious administrative hurdles, particularly in low-income countries with large numbers of agricultural, self-employed, casual, domestic, and informal-sector workers. It is notoriously difficult to collect pension payments in sectors where labor turnover is high and documentation is weak. Recent legislation in the Philippines, for example, requires that household help and self-employed workers be covered, but there is a substantial gap between coverage under the law and coverage in practice.

Finally, public pension programs are only feasible in countries with a substantial degree of political stability. The ability of a government to collect taxes may decline, or the political regime may change, with new leaders backing out of promises made by their predecessors. As governments obtain privileged access to large pension reserves, they may also make unwise investments or pursue large-scale public infrastructure projects without adequate scrutiny of potential risk and return (World Bank, 1994).

In addition to funding and implementing pension schemes, policymakers in Asia will face particularly hard choices in the allocation of health-care resources. Demand for healthcare increases as countries develop and per capita income rises, reflecting the increased resources available to meet the demand. The costs of treating chronic diseases that affect the elderly are skyrocketing, whereas childhood diseases and infectious diseases are still widespread in some countries.

The public pension system and health-care plans that are formulated and implemented over the next few years will influence the well-being of people in Asia for decades to come. While the degree of challenge will vary depending on the speed of population aging and the level of development, population aging presents challenges in the finance of pension and healthcare. Asian governments increasingly will be faced with decisions about what type of pension and healthcare to provide, for whom, and how to do so efficiently.

Asia's demographic situation is unique in the world, characterized by remarkable diversity and rapid change. Many countries are only mid-way through their demographic transitions while others are quite far along. The relationship between demographic change and the economies of Asia are complex. Policies suited to countries with large numbers of school-age children and rapidly growing labor forces are no longer appropriate for populations with large numbers of older workers and retirees. The challenges are many, but with sound domestic policy and effective regional cooperation, Asia's demographic change will be conducive to greater prosperity throughout the region.

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