Demographic Dividends and Public Policy
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Every country in the Asia-Pacific region is in the midst of a demographic transition that is producing large changes in age structure with important implications for economic growth and standards of living. In the early stages of the transition, high fertility and declining infant and child mortality produce a bulge in the population at young ages. The middle of the transition is marked by an increase in the share of the population concentrated at the working ages as large cohorts of children reach adulthood and as the relative number of children are depressed by fertility decline. At the end of the transition, the share of the older population increases. In part, this is a consequence of continued reductions in mortality rates, but of greater consequence are the low fertility rates that characterize the final stages of the demographic transition.

The details of the demographic transition vary from one country to the next. In many Asia-Pacific countries the population in the working ages is growing quite rapidly. India, as we will see in more detail below, is a case in point. Many other countries, mostly in East and Southeast Asia, are further along in their demographic transitions and, thus, are experiencing or will soon begin to experience rapid growth in their older populations. Japan is now the oldest population in the world, but others are catching up to Japan in large part because their fertility rates have dropped rapidly and to very low levels. Singapore's TFR has reached 1.2 births per woman and South Korea has the lowest fertility rate in the world – slightly less than 1.1 births per woman. China's TFR is somewhat higher than these extreme cases – 1.6 births per woman (Population Reference Bureau 2006). Even so it will soon begin to experience rapid aging. Just how rapid is unknown and will depend in part on how quickly China moves to relax the one-child policy.

The economic significance of these changes in age structure and the implications for development policy are the topics to which we now turn.

The Economic Lifecycle

The economic lifecycle is fundamental to understanding how age structure influences the economy. Life begins with an extended period of childhood or economic dependency. Children consume, but they produce little or nothing at all. At some point children become economically independent and begin to produce as much or more than they consume. In contemporary societies the older ages are marked by another period of dependency as workers withdraw from the labor force.

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An estimate of the economic lifecycle for developing Asian economies is shown in Figure 1.[2] Labor income is a per capita estimate of the return to work effort at each age. It includes the value of production in both the formal and informal sectors and the value of all fringe benefits before taxes. Consumption is a per capita estimate of all consumption by age, including both private and public consumption. The values in the figure are normalized by dividing by the average annual labor income of adults in the age range 30-49. The labor income profile incorporates a variety of behavioral, cultural, institutional, and economic factors that influence labor force participation, the relationship between earnings and age, etc. Labor income rises sharply during the twenties and thirties, reaches a peak in the 40s, and the declines rapidly in the 50s and 60s. Consumption is lowest for young children but rises steeply in large part due to spending on education. The consumption profile peaks near age 30 when the average person is consuming about 60% of the average labor income of adults 30-49. Thereafter, the consumption profile declines very gradually with age. Those at age 85 are consuming about 50% of the average labor income of adults 30-49. All-in-all the consumption profile is remarkably flat and very different from the labor income profile.

<Figure 1. Here.>

The lower panel of the figure, the lifecycle deficit, shows the difference between consumption and labor income and provides an empirically-based, continuous measure of economic dependency. Several features of the estimate should be noted. First, the dependent age groups are surprisingly broad. Those 25 and younger and 60 and older are consuming more than they are earning through their labor. Based on estimates recently constructed for other countries, these values are not atypical either in low- or high-income countries (Lee, Lee and Mason 2006). Child dependency does not end until the mid-20s and old-age dependency begins in the mid- to late-50s or early 60s. Second, not all dependents are equally burdensome. Adults in their early twenties or early 60s do not produce more than they consume, but they also do not consume substantially more than they produce. Likewise, young children impose a smaller dependency burden than teenagers who are consuming substantially more in the form of food, clothing, and education.

The Economic Support Ratio and the First Demographic Dividend

A decline in the share of the population concentrated in the lifecycle deficit ages has a direct and immediate effect on per capita income (Bloom and Williamson 1998; Mason 2005; Mason and Lee 2006 forthcoming). This effect, called the first demographic dividend, can be formalized using simple algebra. First, the age structure of the population is summarized by the economic support ratio defined as the effective number of producers (L) divided by the effective number of consumers (N). The effective number of producers is calculated using the population weighted by the age-specific labor income values shown in Figure 1. The effective number of consumers is calculated in

[2] The profile is a composite based on estimates for three Asian economies: Indonesia in 1998, Thailand in 1998, and Taiwan in 1977. Details of the estimation methods and sources are available at www.ntaccounts.org.

similar fashion using age-specific consumption weights. Thus, the economic support ratio (L/N) is:

$$\frac{L}{N} = \frac{\sum_x w_y(x)P(x)}{\sum_x w_c(x)P(x)}, \quad (1)$$

where $w_y(x)$ are age-specific labor income weights, $w_c(x)$ are age-specific consumption weights, and $P(x)$ is the population in age group x.

Income per effective consumer, a measure of per capita income adjusted for age-variation in consumption, is the product of the support ratio and income per worker:

$$\frac{Y}{N} = \frac{L}{N}\frac{Y}{L}. \quad (2)$$

In growth terms, the growth rate of income per effective consumer depends on an age structure effect and a productivity effect that measures the income (or output) produced by the "average" prime age (30-49) adult:

$$g\left[Y/N\right] = g\left[L/N\right] + g\left[Y/L\right]. \quad (3)$$

Given productivity (output per effective producer), an increase in the support ratio yields a percentage point for percentage point increase in income per effective consumer. The first dividend, then, is realized when the rate of growth of the support ratio is positive.

The economic support ratio and its growth rate are tracked for India in Figure 2 over a 150 year period, 1950-2100, that encompasses the major changes in age structure over its demographic transition.[3] In the early part of the transition, the economic support ratio declined because improvements in infant and child mortality led to an increase in the number of child dependents. This served to depress income per equivalent consumer. The dividend period began in 1975 and is projected to last for 65 years. During that time, the first dividend pushes income per effective consumer higher by 26%. Between 1985 and 2030, the first dividend contributes at least 0.3% per year to economic growth. Clearly, the first dividend by itself explains only a modest part of the rapid economic growth enjoyed by India in recent decades. In many other less successful countries, however, the first dividend would account for a larger share of economic growth.

<Figure 2. Here>

The dividend period does not continue forever. Indeed, the first dividend turns negative as increases in the older population become more important and depress the economic support ratio. This is projected to begin in India around 2045 and continue into the distant future. If the population projections prove to be correct, India's support ratio will decline by about 12% between 2045 and 2100. At that point, India's support ratio will be 13% higher than the low-point realized in 1975, but by 2150 (not shown) the projected support ratio is at a record low.

[3] The population data for 1950-2050 are from World Population Prospects (United Nations Population Division 2005) and the projection data for 2050-2100 are from (United Nations Population Division 2004).

The Window of Opportunity and the Second Demographic Dividend

The effect of age structure on the economy would be captured entirely by the first dividend if all of the gains in per capita income were used to increase current consumption. Those alive during the dividend period would be able to achieve higher standards of living, but the gains would be lost to future generations. The possibility of a second dividend arises because some of the gains in per capita income can be diverted to raising productivity and thereby raising standards of living for future generations. This outcome can be realized in a variety of ways. One important possibility is by increasing investment in human capital, but here I want to emphasize increasing investment in physical capital.

The same demographic changes that lead to a decline in the support ratio have a potentially strong and favorable effect on asset demand. For three reasons the aggregate demand for resources to support retirement rise. The first is simply growth in the size of the older population which, on average, holds much higher per capita assets than do younger members of the population. Second, the decline in the relative size of the dependent child population means that consumption at all ages can rise – including at older ages. This increases the demand for wealth necessary to support old age consumption. Finally, steady improvements in life expectancy mean that the duration of retirement is rising and with it the demand for retirement resources.

The rise in the demand for wealth to support old-age consumption may or may not lead to an increase in assets and capital. The reason is that demand for wealth can be satisfied by expanding transfer programs rather than by increasing saving and investment. Expanded transfer programs can meet the increased consumption needs of the elderly but they do so by claiming a larger share of the output produced by younger (and future) generations of workers. Relying on transfer programs, however, will not produce greater investment nor the more rapid economic growth it enables.

If countries rely on capital accumulation to finance old-age consumption, how much more is consumption per effective consumer likely to be? The answer to this question for India is shown in Figure 3, which compares two scenarios. In the asset-based scenario I assume that the percentage of old age support provided through assets increased from 40% in 1950 to 65% in 1975. In the transfer-based scenario I assume that the percentage of old-age support provided through assets declined from 40% to only 15%. The remaining support comes from some combination of public and familial transfers.[4] The values charted in Figure 3 are the percentage gains (or losses) in consumption from the asset-based retirement system.

<Figure 3. Here. >

During the transition in the old-age support system (1950-1975) consumption must be reduced (and saving increased) under the asset-based scenario. The greatest sacrifice comes in 1975 when consumption is seven percent lower under the asset-based scenario

[4] For a detailed description of the simulation model see (Mason and Lee 2007 forthcoming).

than the transfer-based scenario. Workers in 1975 must sacrifice current consumption. As a result, they realize somewhat greater consumption during retirement, but the greatest beneficiaries are future generations. By 2100 consumption is higher by nearly 25%.

Implications for Policy

The analysis has clear implications for the broad outlines of policy. Above all, a high priority should be accorded to creating an environment conducive to the accumulation of assets. An important part of reaching this goal is to improve the availability and quality of financial services in the developing world. An equally important part of the answer is creating investment opportunities that provide an adequate and reliable rate of return. Although economies are becoming increasingly globalized and barriers to international capital flows are declining, a strong home bias for investors remains the norm. Hence, the economic status of the elderly in societies with asset-based retirement systems will depend critically on the ability of elderly to realize adequate rates of return on their assets.

Delay must be avoided. The prospects of aging may seem relatively remote in many developing countries, but delay could prove to be very costly. Many of those who will retire between 2040 and 2050, for example, are already entering the workforce. An asset-based retirement system is most easily achieved if they begin to save early in their careers. If workers are not in a position to accumulate assets during their working years, they will face an old-age of poverty and/or dependence. Moreover, as the number of elderly increases in the future, their political power will rise. If they are not in a position to support themselves in retirement, the pressure to implement large scale public pension programs will increase. Once such programs are in place, they will undermine efforts to build an asset-based system of retirement.

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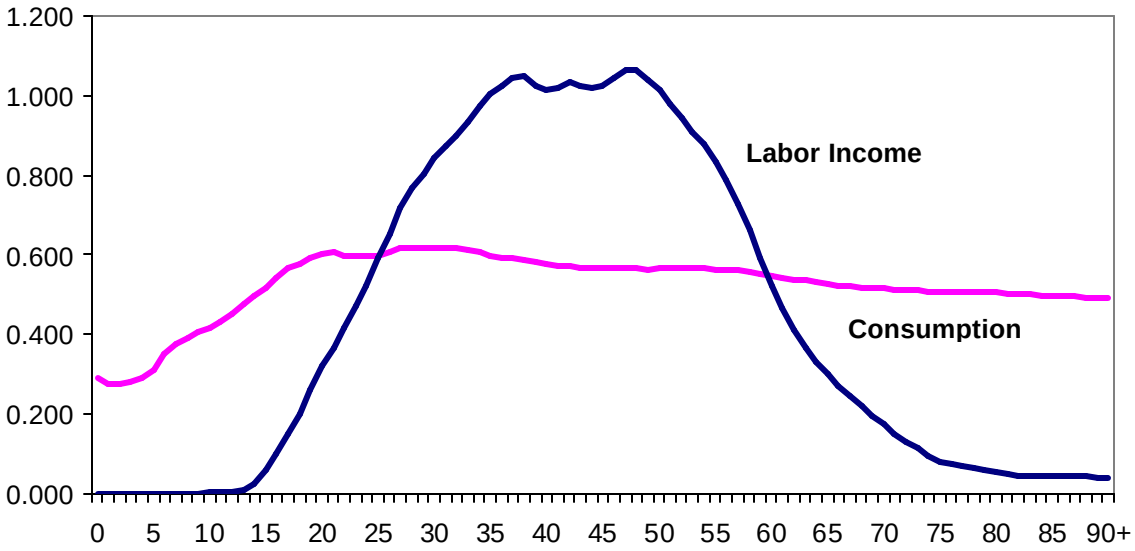
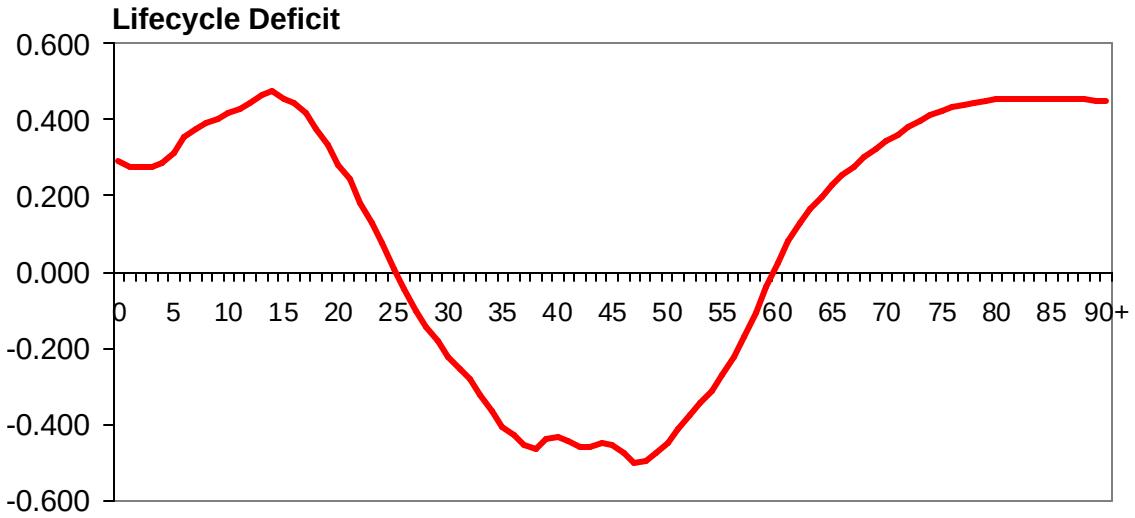
Figure 1
The Economic Lifecyle, Asian Developing Country Composite.





Note. All values expressed relative to simple average of labor income earned between ages 30 and 49. Average of profiles for Indonesia 1996, Thailand 1996, and Taiwan 1977. See www.ntaccounts.org for sources and methodological details.

Figure 2. The Economic Support Ratios and its Growth Rate, India, 1950-2100.

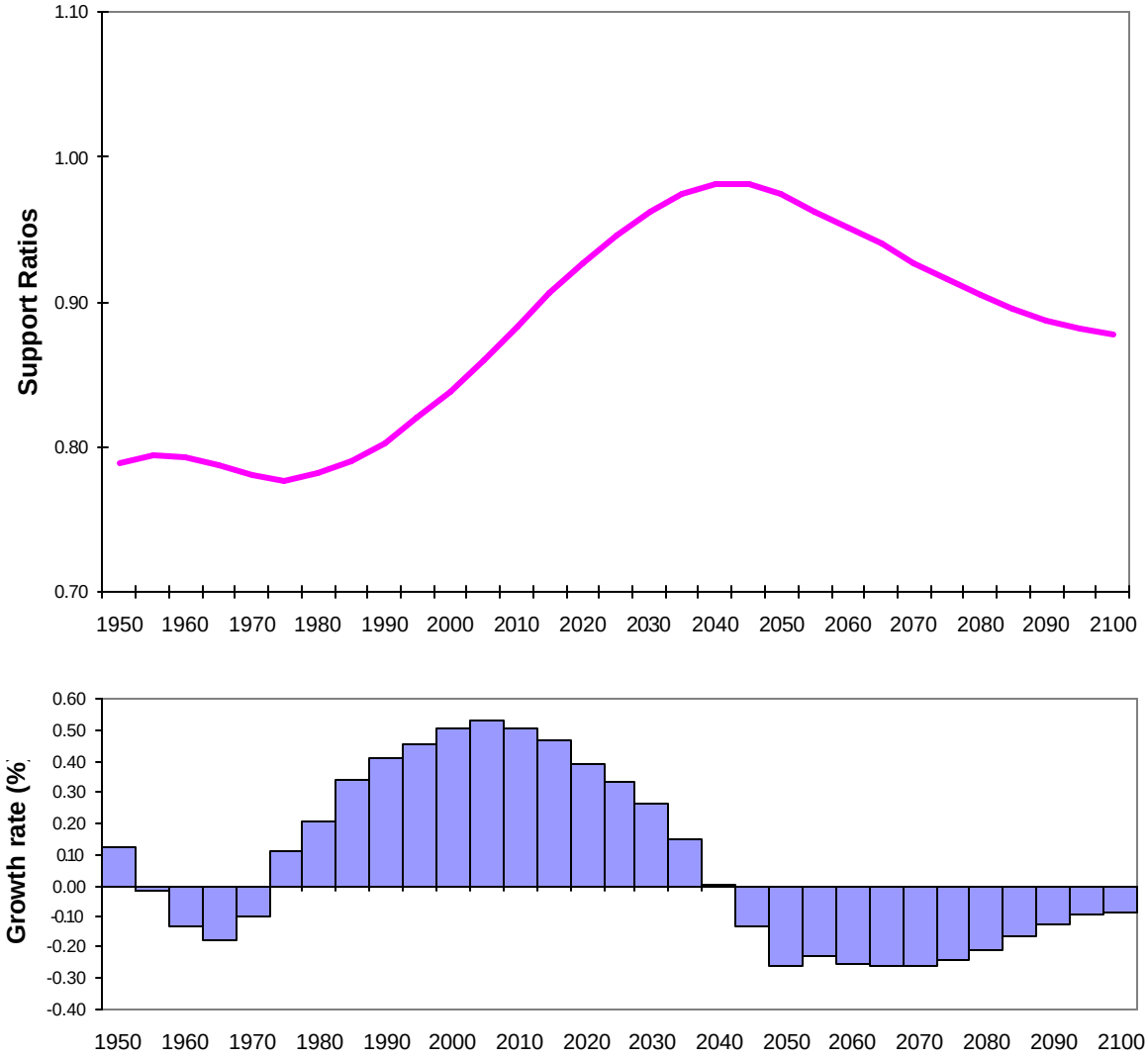


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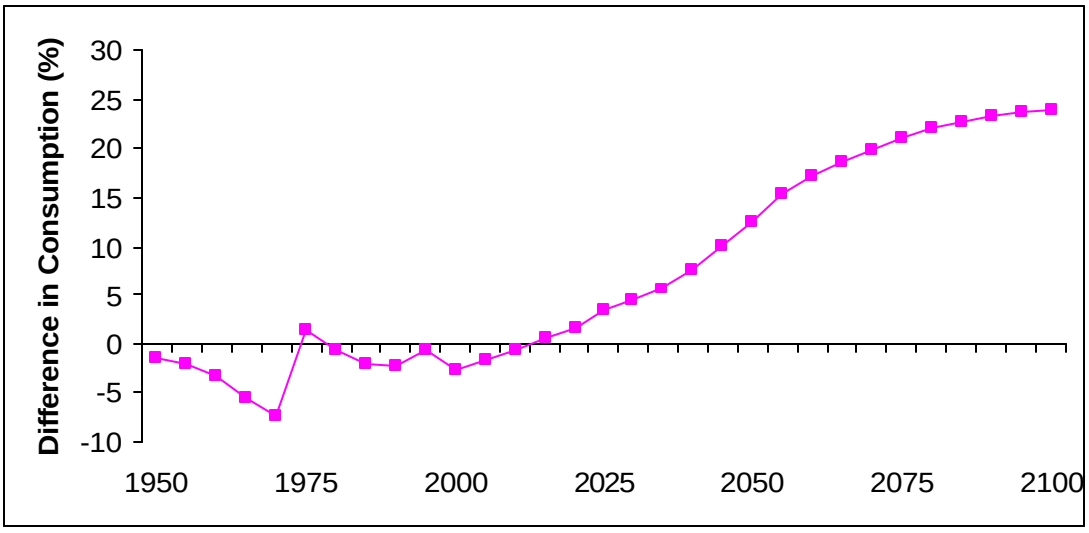
Figure 3. Increase in Consumption,
Asset-Based Retirement System vs. Transfer-Based Retirement System.



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