

## ADB Economics Working Paper Series



### Population Aging and Aggregate Consumption in Developing Asia

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Gemma Estrada, Donghyun Park, and Arief Ramayandi

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Gemma Estrada is Economics Officer, Macroeconomics and Finance Research Division, Economics and Research Department, Asian Development Bank. Donghyun Park is Principal Economist, Macroeconomics and Finance Research Division, Economics and Research Department, Asian Development Bank. Arief Ramayandi is Economist, Macroeconomics and Finance Research Division, Economics and Research Department, Asian Development Bank. This paper was prepared as a background paper for the Asian Development Outlook 2011 Update. We thank the participants of the ADB Workshop on Demographic Transition and Economic Growth in Asia, held in Seoul on 19-20 May 2011 and the ADB Forum on Demographic Transition and Economic Growth in Asia held in Manila on 22 July 2011 for their many useful comments.

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Asian Development Bank  
6 ADB Avenue, Mandaluyong City  
1550 Metro Manila, Philippines  
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## **Abstract**

One of developing Asia's foremost structural economic challenges is the need to rebalance demand and growth toward domestic sources in the face of one of its most significant structural shifts—the demographic transition to an older population. The scope for investment-led growth may be quite limited, so the key to growth is stronger domestic demand, and the key to stronger domestic demand is greater consumption. We examined the impact of the old-age dependency ratio on the share of consumption in the gross domestic products of 31 developing Asian economies and 122 from outside the region from 1998 to 2007. In addition, we tested for a possible difference in its effect in the Asian economies relative to the rest of the sample. The analysis suggests a positive relationship between population aging and consumption though evidence for developing Asia was weaker than that for the rest of the sample. This implies that the aging population may not be contributing as significantly to robust consumption and domestic demand as it does in the rest of the world. In order to rebalance their economies, developing Asian governments must therefore continue to pursue a wide range of policies to promote stronger domestic demand.



## I. Introduction

While developing Asia's financial systems were largely unscathed by the global financial crisis in 2008 and 2009, its real economies were hit hard by the deep recession in the European Union (EU) and the United States (US). Nevertheless, overall developing Asia recovered from the global crisis with remarkable resilience. The region managed to grow by 6.7% in 2008 and 5.9% even in 2009 when the world economy as a whole contracted. Growth has picked up further to 9.0% in 2010 and is projected at 7.8% in 2011 and 7.7% in 2012. Although these growth rates are below those before the crisis—9.4% in 2006 and 10.1% in 2007 (ADB 2011)—the speed and strength of the region's rebound has surpassed all expectations. It was initially driven by fiscal and monetary stimuli, but subsequently private demand is playing a bigger role.

It is tempting to view this resilience as evidence of the region's decoupling from the economies of Germany, Japan, and the US (G3) as the region has continued to grow robustly despite their fragile and uncertain recoveries. The region's exports and economic growth did, however, plummet during the depth of the global crisis, primarily due to severe recessions in the G3, so the crisis has far reaching implications for the region's growth and development in the medium and long term. The G3 are saddled with a wide range of structural problems—high household debt and impaired housing markets—that will weaken their economic growth in the future. The obvious but troubling medium-term implication is that this weakness will deprive developing Asia of a traditionally important engine for demand and growth, so it is very much in the region's interest to achieve a more even balance between domestic demand and external demand.

Rebalancing ultimately requires robust domestic demand that can come from robust consumption, robust investment, or both. Since diminishing marginal returns on capital eventually set in as an economy's stock grows, there is a limit on investment as a source of demand and growth. Because developing Asia has relied on high savings and high investment rates to power much of its growth in the past, the scope for investment-led growth may be quite limited.<sup>1</sup> In contrast, there is still considerable room for growth in consumption especially as the region becomes increasingly middle-income. Large numbers of individuals and households are joining the middle class and purchasing middle-class goods and services for the first time. In addition, there is evidence that developing Asia's large and persistent current account surplus reflects underconsumption rather than underinvestment (Park and Shin 2009). Therefore, strengthening domestic

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<sup>1</sup>This is especially true in the absence of productivity growth.

consumption will not only promote economic rebalancing but may also deliver sizable economic gains.

Aggregate consumption and the share of aggregate consumption in national income depend on a number of factors. Of particular interest for our purposes are demographic variables especially the old-age dependency ratio—the share of the elderly in the working-age population. Since individuals tend to save for retirement when they are working and dissave for their consumption when they are retired, higher dependency is likely to increase aggregate private consumption. Furthermore, higher government outlays on health care and pensions may also boost aggregate public consumption. This is quite important for developing Asia because the population in the region as a whole is aging. While some countries are at a much more advanced stage of population aging than others, there is nevertheless a clear, regionwide trend toward older populations driven by falling fertility and rising life expectancy. This transition implies greater aggregate consumption.

Our central objective is to examine the relationship between demography and the share of aggregate consumption in national incomes for a large cross-section of Asian economies. First, however, to find out whether older populations led to higher consumption in the past, we examined trends in the old-age dependency ratio and the share of consumption in the gross domestic product (GDP) over time and measured the time-series correlation between the two. Our goal was to estimate the relationship using a simple econometric model. A positive relationship would bode well for rebalancing. Just as youthful populations drove the high-savings, high-investment growth model, older populations that consume more and save less could lead to more vibrant domestic demand and to more balanced economies.

## **II. Review of Literature**

The economic lifecycle theory suggests that individuals tend to smooth out consumption over their lifetimes. People tend to accumulate savings during the productive working ages and dissave during the early and later stages of life. Higher percentages of young (aged 0–14) and elderly (aged 65 and older) people relative to those of working age (15–64)—the youth and old-age dependency ratios—are associated with lower aggregate savings rates since those age groups are not generally economically active.

There is a vast amount of literature investigating the economic implications of a changing demographic structure, and many studies have examined how demographic factors affect economic growth and savings. Age distribution has been found to be an important variable in explaining variations in economic growth across countries and over time. Based on a sample of 78 countries, Bloom and Williamson (1998) found that age

distribution rather than population growth was the primary demographic determinant of economic growth though its effects were temporary and depended on the stage of the demographic transition. In the early stage, per capita income growth is reduced by youth dependency and by small cohorts of working-age adults. This stage is followed by a demographic dividend in which youth dependency decreases and the working-age population increases. Later, the favorable impact on economic growth diminishes as the share of the elderly rises and the demographic dividend dissipates. When the growth rate of the economically active population exceeds that of the population, per capita GDP grows. Conversely, if the dependent population grows faster than the overall population, then the model predicts lower economic growth. They found, however, that the effect of an elderly population on economic growth was positive but insignificant, which they attributed in part to the smaller percentage of elderly relative to youth. In other words, the impact of the young population tended to dominate.

Other studies have also looked at the impact of population age structure on aggregate savings to better understand the macroeconomic implications of the demographic transition. In general, these studies support the lifecycle hypothesis and conclude that a higher proportion of youth and elderly tend to decrease the aggregate savings rate. One of the earliest studies to test this relationship was done by Leff (1969) who found that the old-age and youth dependency ratios taken separately and combined had a significant negative influence on the savings rate. He tested this relationship in 74 countries and again after disaggregating them into developed or underdeveloped. While Adams (1971), Goldberger (1973), and Ram (1982) have questioned the robustness of Leff's findings, subsequent studies have supported the inverse association between dependency ratios and savings rates.

Kelley and Schmidt (1996) applied the Leff model to a data set of 88 countries to estimate the impact of dependency ratios on savings in the 1960s, 1970s, and 1980s. They found that dependency reduced savings in the 1980s but that the impact was small and not statistically significant in the 1960s and 1970s suggesting change over time. Higgins and Williamson (1997) estimated the relationship between the youth and old-age dependency ratios and national savings in some Asian countries and found that higher dependency ratios tended to decrease savings rates. Higgins (1998) studied 100 countries and also found a negative relationship between dependency and savings rates. He noted, however, that the negative association between the old-age dependency ratio and savings did not necessarily indicate that elderly households were drawing down on their assets to finance consumption as it could be due to the growing aggregate burden of supporting the elderly.

Bloom et al. (2003) also confirmed the negative relationship between savings and dependency ratios. In their empirical model, they included both age structure and life expectancy to examine the impact of these variables on savings rates and showed theoretically that the pure effect of longer life expectancy was to increase savings rates.

Longer life expectancy increases the optimal length of working life but not enough to offset the greater need for retirement income, so the savings rate has to rise. However, since longer life expectancy may be associated with better health and higher productivity, its impact on savings may be ambiguous. To analyze the separate effect of longer life expectancy on savings, they studied 68 countries from 1960 to 1994 and found that both life expectancy and age structure were significant determinants of savings rates—longer life expectancy had a positive effect and the dependency ratios had a negative effect.

In a subsequent study, Bloom et al. (2007) also incorporated the impact of both life expectancy and old-age dependency in their model. They explored the hypothesis that the effect of life expectancy on national savings rates depends on the nature of the social security system and found that an increase in life expectancy increased savings when the system provided universal pensions and strong incentives to retire but that the effect dissipated with pay-as-you-go systems and high replacement rates. As in other studies, they found that an increase in the old-age dependency ratio was linked to lower savings rates.

Lifecycle theory predictions of the effects of age structure on savings thus seem to be very well supported. At the macro level, higher old-age dependency ratios tend to reduce savings rates since older individuals dissave or save less to finance consumption. Population aging, therefore, affects economic growth through at least two channels: it reduces the size of working-age cohorts and reduces the savings rate, and hence the investment rate.

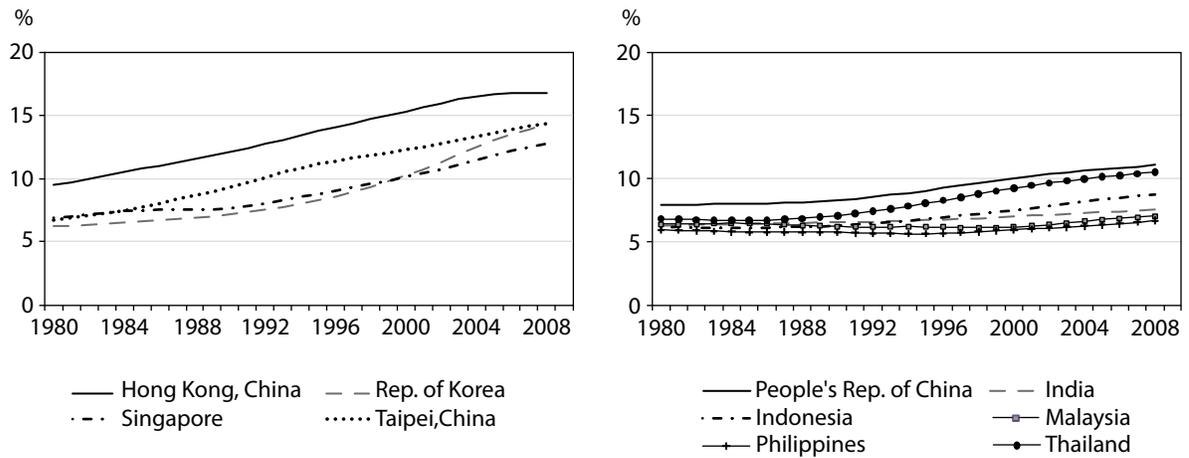
### **III. Trends in Aging and Consumption Patterns in Asia**

Since older populations are associated with lower savings rates, there should be a positive relationship between population aging and aggregate consumption rates because savings represent income that is not consumed. It is now widely accepted that if Asian economies were to consume a higher share of their output, it would significantly help to address global imbalances. In this context, understanding the effects of population aging on consumption in Asia may provide valuable policy insights. For example, if the old-age dependency ratio has a strong positive effect on consumption, then to some extent population aging will naturally and gradually promote domestic demand and hence rebalancing. On the other hand, if the ratio does not have a perceptible effect on consumption, the need for policies that promote rebalancing will be greater.

Figure 1 charts the old-age dependency ratio in 10 Asian economies between 1980 and 2008 and shows that the ratio has risen steadily and more rapidly in the newly-industrializing economies (NIEs) of Hong Kong, China; the Republic of Korea; Singapore, and Taipei, China than it has in the People's Republic of China (PRC), India, Indonesia,

Malaysia, the Philippines, and Thailand and that the old-age dependency ratios in the latter group in recent years have been close to those of the NIEs 25 years ago, i.e., between 5% and 10%.

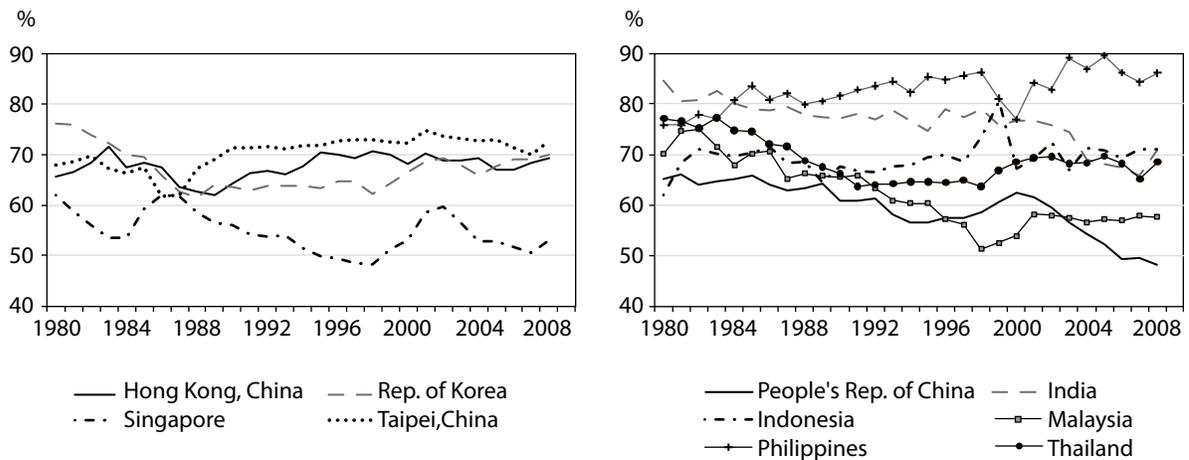
**Figure 1: Old-Age Dependency Ratios for 10 Asian Developing Economies, 1980–2008**



Source: World Bank (2010) accessed 1 June 2011.

Figure 2 shows trends in the share of consumption in GDP. In Hong Kong, China; the Republic of Korea; and Taipei, China, the rates fell between 1980 and 1990 but increased slightly after that while in Singapore, consumption has been erratic with visible declines in the early 1980s, between the late 1980s and 1990s, and again in recent years.

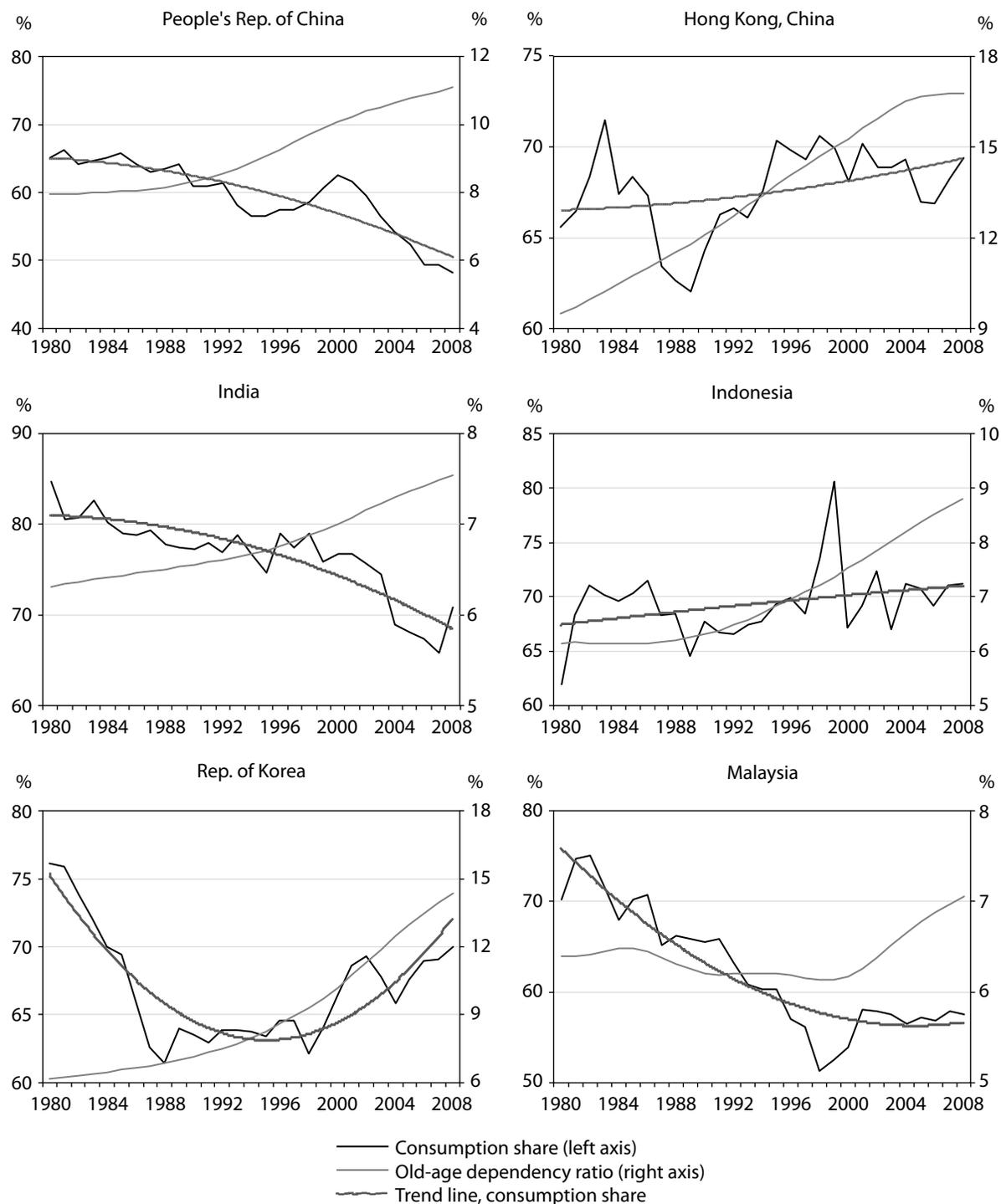
**Figure 2: Share of Consumption in Gross Domestic Product for 10 Asian Developing Economies, 1980–2008**



Source: World Bank (2010) accessed 1 June 2011.

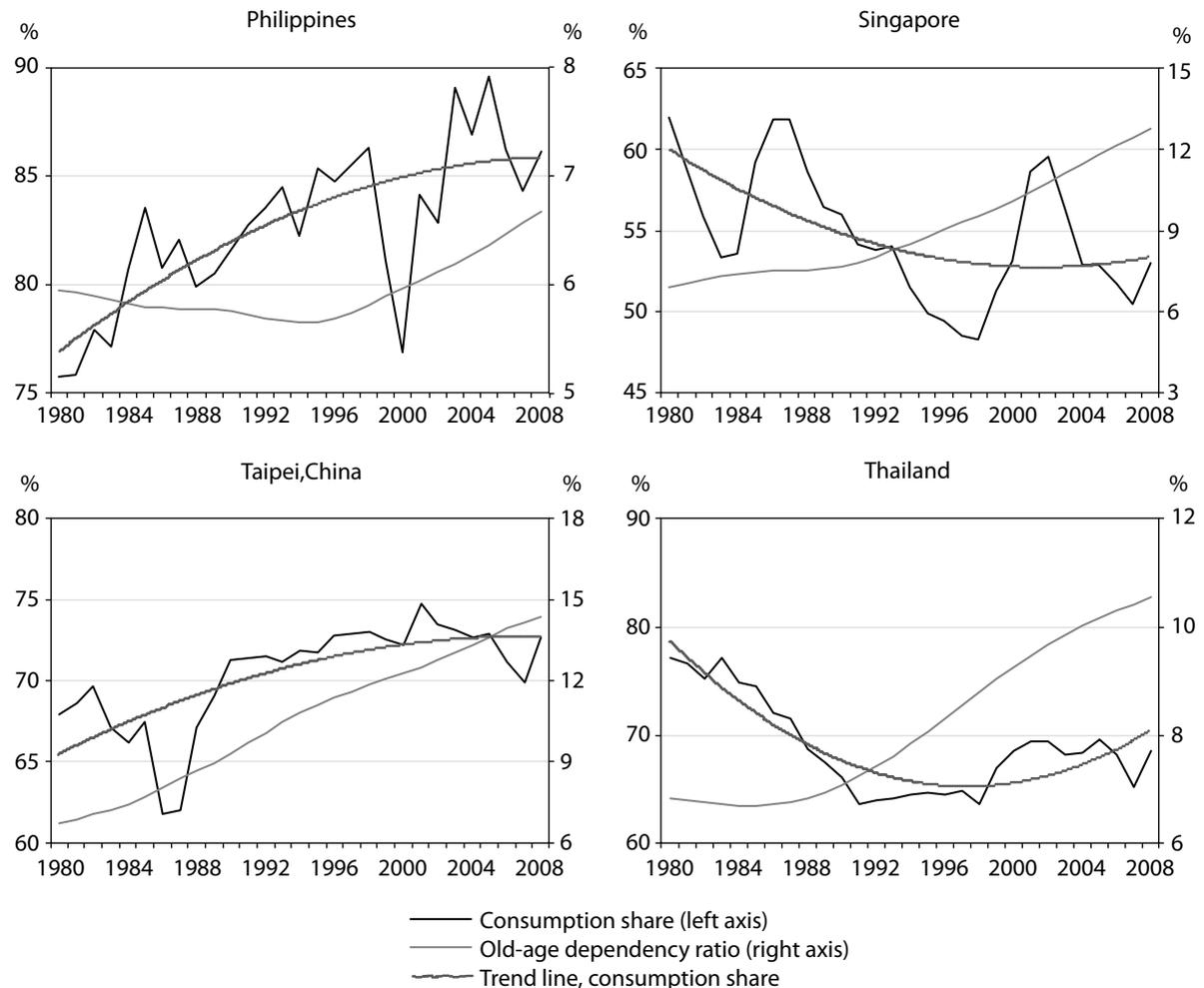
Consumption patterns have also varied among the less developed economies. Rates in the PRC and India have steadily declined since 1980 while in the Philippines they have generally increased. In both Malaysia and Thailand, consumption declined in the 1980s and 1990s but began to rise at the turn of the century.

**Figure 3: Aging and Consumption for 10 Asian Developing Economies, 1980–2008**



*continued.*

Figure 3. continued.



Source: World Bank (2010) accessed 1 June 2011.

Figure 3 shows the trends in both aging and consumption for each economy. In Hong Kong, China; Philippines; and Taipei, China, the old-age ratio and share of consumption in GDP have been gradually rising since the 1980s, but there was no discernible positive association between aging and consumption in the other economies. We further checked for an overall correlation between consumption and the old-dependency ratios in the 10 economies from 1980 to 2008 and found that it was negative in five and positive in five but relatively low (Table 1). A time-series correlation for each economy for the whole sample period found strong negative correlations for the PRC and India and a strong positive correlation for Taipei, China. Singapore and Thailand also had negative correlations although weaker than those for the PRC and India. Overall, our results cast doubt on the robustness of a positive link between aging and consumption in developing Asia, so we performed a more formal, econometric analysis of this relationship.

**Table 1: Correlation between Old-Age Dependency Ratio and Share of Consumption in Gross Domestic Product for 10 Asian Developing Economies, 1980–2008**

Economy	
China, People's Rep. of	−0.84
India	−0.88
Hong Kong, China	0.39
Korea, Rep. of	0.01
Singapore	−0.42
Taipei, China	0.71
Indonesia	0.33
Malaysia	−0.02
Philippines	0.37
Thailand	−0.40
All 10 Asian Economies	−0.24 <sup>c</sup>
Developing Asia <sup>a</sup>	−0.38 <sup>c</sup>
Non-Developing Asia <sup>b</sup>	−0.26 <sup>c</sup>
All Economies	−0.20 <sup>c</sup>

<sup>a</sup> Covers 16 economies.

<sup>b</sup> Covers 90 economies.

<sup>c</sup> Correlations are significant at 1% level.

Source: Authors' calculations based on World Bank (2010) accessed 1 June 2011.

## IV. Econometric Analysis

To examine the link between age structure and consumption more formally, we analyzed data from the World Bank's World Development Indicators (WDI) online database from 153 countries averaged over the decade 1998–2007. The time period was relatively short, but the use of more recent data allowed us to include more economies. We used a cross-section regression analysis to explore variations between economies rather than the changes in a given economy captured by panel econometric techniques. As Higgins (1998) points out, differences in age distributions among countries tend to be more visible than changes within a country. For example, in 2007 the old-age dependency ratio in the Republic of Korea was 13.9% compared with 6.4% in the Philippines, but changes in their elderly populations over time were not that pronounced. Between 2002 and 2007, the elderly population increased by 2.6% in the Republic of Korea and by 0.5% in the Philippines (World Bank 2010).

### A. Framework and Data

We did a regression analysis on a decade of data on the average share of consumption in GDP ( $\frac{C}{Y}$ ) on a set of control variables. Although we were mainly interested in the link between population aging and consumption, we included a set of additional, standard control variables to minimize misspecification. The basic model is as follows:

$$\frac{C}{Y} = \alpha + \beta_1 D_o + \beta_2 D_y + \beta_3 \frac{Y}{P} + \beta_4 P + \varepsilon$$

The dependent variable ( $\frac{C}{Y}$ ) is the share of total consumption in GDP. We included both the youth and old-age dependency ratios in the model ( $D_y$  and  $D_o$ , respectively).  $D_o$ , our proxy for an aging population, was computed as the decade-long average of the ratio of people older than 64 to the working-age population aged 15–64.  $D_y$  refers to the decade-long average of the ratio of people younger than 15 to the working-age population.

Real GDP per capita ( $\frac{Y}{P}$ ) was included as a control variable. As this variable is averaged over a relatively long period of time, it can be a proxy for permanent income and is often used to analyze the consumption smoothing hypothesis. This variable can have both income and substitution effects on consumption (or savings). Therefore, its effect on the consumption rate will depend on which effect dominates. If the income effect dominates, individuals feel wealthier due to higher permanent incomes and therefore will prefer leisure to work, will retire earlier, and thus will tend to save more for retirement. In contrast, if the substitution effect dominates, higher permanent incomes will induce consumers to work longer thus reducing the need to accumulate more savings for retirement (Bloom et al. 2003). In short, a lower share of consumption in GDP—a high savings rate—is associated with the income effect while a higher consumption rate—a low savings rate—is associated with the substitution effect.

Another control in the model was population growth ( $P$ ); its effect on consumption was ambiguous. On one hand, population growth could imply a growing youth population that would lead to increased consumption and lower savings rates. On the other hand, population growth could also imply a declining elderly population and a rising working population that would reduce consumption and increase savings. The first is the dependency effect and the second is the rate-of-growth effect (Mason 1988).

Our data set covered 31 developing Asian economies and 122 countries outside the region. Table 2 highlights the differences in consumption shares and old-age dependency ratios between the Asian economies and the rest of the sample. To accomplish our main objective, we extended the basic model to test for a possible difference in the way dependency ratios affected the rate of consumption in the Asian economies relative to the rest of the sample.

**Table 2: Descriptive Statistics**

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Consumption, share in GDP	153	80.962	13.115	44.231	112.604
Developing Asia	31	77.187	14.605	53.541	112.604
Non-Developing Asia	122	81.922	12.594	44.231	108.352
Old-age dependency ratio	153	11.702	6.992	1.405	28.526
Developing Asia	31	8.859	3.694	4.049	20.189
Non-Developing Asia	122	12.425	7.445	1.405	28.526
Youth dependency ratio	153	50.511	21.758	21.137	102.975
GDP per capita, ln	153	7.805	1.575	4.478	10.794
Population growth	153	1.322	1.106	-1.512	4.687

Source: Authors' estimates.

## B. Results and Discussion

Tables 3a and 3b report the results of our regression analysis. All regressions controlled for both the old-age and youth dependency ratios, for GDP per capita, and for population growth, but there were some variations in specifications. For all specifications we found a robust negative and significant impact of real GDP per capita on the share of consumption implying that the income effect is at play. This result is consistent with Bloom et al. (2003) among others who found a positive link between real GDP per capita and the gross domestic savings rate. We found that estimated coefficients of population growth were significant in most specifications and were consistently negative.

**Table 3a: Regression Results**  
(dependent variable: share of consumption in gross domestic product)

	(1)	(2)	(3)	(4)	(5)
Old-age dependency ratio	0.854 (0.177)***	1.729 (0.772)**	0.732 (0.185)***	0.662 (0.189)***	0.632 (0.193)***
Youth dependency ratio	0.368 (0.119)***	0.370 (0.123)***	0.319 (0.129)**	0.296 (0.134)**	0.282 (0.131)**
GDP per capita, ln	-3.547 (1.087)***	-3.633 (1.070)***	-3.953 (1.171)***	-4.100 (1.199)***	-4.029 (1.207)***
Population growth	-2.878 (1.595)*	-2.199 (1.616)	-3.183 (1.548)**	-2.963 (1.556)*	-2.946 (1.536)*
Old-age dependency ratio, squared		-0.027 (0.022)			
Old-age dependency ratio x developing Asia dummy			-0.445 (0.248)*	-1.423 (0.637)**	-2.651 (1.338)**
Old-age dependency ratio, sq x developing Asia dummy				0.077 (0.039)*	0.138 (0.076)*
Youth dependency ratio x developing Asia dummy					0.108 (0.107)
Constant	83.846 (12.701)***	78.291 (14.494)***	92.152 (14.318)***	95.314 (14.892)***	95.755 (14.706)***
Observations	153	153	153	153	153
Adjusted R-squared	0.398	0.399	0.409	0.418	0.418

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

GDP = gross domestic product.

Note: Robust standard errors in parentheses.

Source: Authors' estimates.

Our baseline specification is reported in column 1. The result is perfectly consistent with the literature on the macroeconomic implications of population aging. The control variables explain about 40% of the variations among economies in aggregate

consumption shares. The dependency ratios are associated with greater consumption. By extension, this implies that the ratios are associated with lower savings rates, a result that is very much in line with existing studies. Again as in the existing literature, our results suggest that the effect of the old-age dependency ratio on the share of aggregate consumption is stronger than that of the youth dependency ratio.

In short, our results are consistent with those of earlier studies. We found that population aging tends to increase the aggregate share of consumption and decrease the aggregate savings rate. We also tested for possible nonlinear effects of aging on consumption by adding a squared term for the old-age dependency ratio to the basic equation. The results are in column 2; they do not support a nonlinear effect.

### 1. How Different is Asia?

Table 1 hints at a possible difference in the way aging is associated with consumption in Asia compared with the rest of the world. To formally test for this possibility, we separated out the developing Asian economies in our sample and tested for a differential effect of aging. The results are in column 3 of Table 3a and indicate that old-age dependency had a smaller impact on the region than it did on the rest of the world. This implies that the effect of population aging on the savings rate is stronger in Asia than in the rest of the world. The weaker link between aging and consumption in developing Asia may be attributed to the region's high savings rate despite rising old-age dependency ratios.

We further extended the model to examine any nonlinear effects of population aging on developing Asia by adding the interaction between the squared term of the old-age dependency ratio and a developing Asia dummy. The results in column 4 indicate that the impact of the old-age dependency ratio on consumption is negative for developing Asian economies, but after the ratio reaches a certain level, it is positive as shown in the significantly positive coefficient of the squared term. This suggests that up to a certain critical point, a rising share of elderly people in developing Asia is associated with a falling share of consumption in GDP. Based on our results, this critical point is about 5% (the ratio of the sum of the old-age dependency ratio coefficient to twice the coefficient for the squared old-age dependency ratio for developing Asia). After developing Asia passes this critical point, however, the relationship changes course, and the share of consumption increases as the old-age dependency ratio rises. The threshold at which the impact of the old-age dependency ratio on the share of consumption in developing Asia is the same as that for the rest of the world is about 9%.

In column 5, we tested for the possibility that the impact of youth dependency on consumption in developing Asia was different from that in the rest of the sample. Our result suggests that it is not significantly different. As in column 4, the interaction between the term and a developing Asia dummy was significant. Also, estimates again provide support for the nonlinear effects of the youth dependency ratio in developing Asia.

Thus, although at a certain point the aging population in developing Asia will increase aggregate consumption, it will do so to a lesser extent than in the rest of the sample. This further strengthens the case for deliberately pursuing policies that promote domestic demand and rebalancing.

## 2. Impact of Aging on Advanced Aging Economies and Checking for Robustness

In column 6 of Table 3b we examined whether the impact of the old-age dependency ratio on consumption in the 20 high-income economies of the Organisation for Economic Co-operation and Development (OECD) in the upper 80% of the old-age dependency ratio was different.<sup>2</sup> It is interesting to test for this impact to derive implications for high-income Asian economies that are reaching advanced stages of aging. Column 6 uses the same set of variables as that in column 4 but adds an interaction between the old-age dependency ratio and a dummy variable for advanced aging economies. The results indicate that the impact of aging is no different for these economies than for others.

**Table 3b: Regression Results**  
(dependent variable: share of consumption, in gross domestic product)

	(6)	(7)	(8)
Old-age dependency ratio	0.885 (0.258)***	0.691 (0.187)***	0.761 (0.193)***
Youth dependency ratio	0.318 (0.139)**	0.225 (0.114)*	0.099 (0.111)
GDP per capita, ln	-3.875 (1.239)***	-4.205 (1.097)***	-5.589 (1.156)***
Population growth	-2.572 (1.554)*	-1.779 (1.340)	-0.155 (1.351)
Old-age dependency ratio x developing Asia dummy	-1.292 (0.650)**	-1.670 (0.551)***	-1.893 (0.581)***
Old-age dependency ratio, squared x developing Asia dummy	0.067 (0.040)*	0.091 (0.036)**	0.104 (0.038)***
Old-age dependency ratio x aging advanced economy dummy	-0.180 (0.116)		
Constant	89.858 (16.170)***	96.984 (13.513)***	111.271 (13.462)***
Observations	153	145	133
Adjusted R-squared	0.419	0.422	0.432

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

GDP = gross domestic product.

Note: Robust standard errors in parentheses.

Source: Authors' estimates.

<sup>2</sup> Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Japan, Luxembourg, the Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

In columns 7 and 8, we checked the robustness of our results in column 4 by restricting our set of countries as follows. In column 7, we dropped eight economies including two in developing Asia that have consumption shares above 95%.<sup>3</sup> These economies also have consumption shares that are above 100%, i.e., that exceed their incomes. In column 8, we included only economies with populations over 1 million following Kelley and Schmidt (1996) and Bloom et al. (2003). Applying this restriction left us with a sample of 133, of which 26 were developing Asian economies.

It is interesting to note that adopting either restriction improves the fit of our regression analysis. The coefficients of the old-age dependency ratios in columns 7 and 8 are also similar to those in column 4. Furthermore, the coefficients of the interactive term between the old-age dependency ratio and the developing Asia dummy are statistically significant, and the absolute values of these coefficients are higher than those in column 4. We again see significant, nonlinear effects for the region of consumption on aging, with estimated thresholds that are slightly higher than those computed based on column 4. Therefore, our most interesting Asia-specific results—the negative impact of the old-age dependency ratio on consumption and the non-linear effect of aging—remain robust and consistent across different specifications. Most significantly, the findings from our regression analysis in columns 7 and 8 reinforced our central overall finding in column 4: the impact of aging on consumption in developing Asia is less than in the other economies in the sample.

Why is this true? Aggregate savings in the region has been relatively high, and so far it does not seem to be influenced by population aging. One possible explanation lies in the way the elderly population finances consumption in developing Asia. While the elderly elsewhere in the world tend to rely more on government transfers, the Asian elderly tend to rely mostly on their accumulated assets as sources of old-age support (Lee and Mason 2011). As a result, the need to prepare for retirement encourages Asians, including those who are still in their productive years, to save and accumulate assets.

## V. Conclusions and Policy Implications

The key to rebalancing Asian economies is stronger domestic demand, and the key to stronger domestic demand is greater consumption. Existing studies examine the impact of demographic variables on the savings rate, but it is worthwhile to examine their impact on consumption, which has a more direct effect on rebalancing. Investment can lead domestic demand and hence rebalancing in only parts of the region, but there is substantial room for growth in living standards and consumption levels throughout. A vibrant and sustainable economy ultimately requires healthy levels of consumption since consumption is the final demand for goods and services whereas investment only adds to productive capacity.

<sup>3</sup> Cape Verde, Comoros, Jordan, Moldova, Serbia, Sierra Leone, Tajikistan, and Tonga.

Our preliminary analysis indicated that while population aging is indeed a regionwide trend, there was no uniform regional pattern of consumption as a share of GDP. Our examination of the correlation between the old-age dependency ratio and consumption over time in 10 major Asian economies also failed to yield a common pattern. We then examined the impact of the old-age dependency ratio on the share of aggregate consumption in national income using data from 153 economies controlling for other variables such as per capita income.

For the complete sample, we found a positive relationship between old-age dependency and consumption, a result that was consistent with the findings of other studies, but for the 31 developing Asian countries in the sample we found evidence of a negative relationship, implying that their older populations *reduce* the share of consumption in national income. We also found a positive relationship above a certain level of the dependency ratio though it was weaker for developing Asia than for the rest of the sample.

There are a number of ways to interpret these results. One is simply that developing Asia is still relatively youthful despite rapid population aging. The old-age dependency ratio there is 8.86%, which is lower than the 12.43% in the rest of the world and the 11.70% for the world as a whole (Table 2). Another interpretation is that there could be a threshold old-age dependency ratio below which population aging does not have a perceptible effect on consumption. In fact, the ratio might be dominated by the high savings and low consumption of the working-age population as seems to be the case in developing Asia. Above the threshold, however, population aging has a positive effect on consumption. The findings of Lee and Mason (2011) from household data lend further support to this interpretation. They found that Asians tend to save for retirement instead of depending on government transfers or family support.

The most straightforward policy implication of our results is that population aging in developing Asia may not contribute significantly to robust consumption and domestic demand and hence to rebalancing, at least in economies in the early stages of the demographic transition. The obvious corollary is that governments must continue to pursue a wide range of policies that strengthen domestic demand and that promote services and other sectors geared toward domestic demand, though such policies may affect the relationship between population aging and aggregate consumption. For example, in the rebalancing debate one of the most widely touted policy options for strengthening private consumption is to increase government expenditures on health care, education, pensions, and social protection. The underlying idea is that such spending will mitigate the need for savings and thus encourage households to spend more. Providing health care and pensions to the elderly will reduce the risks and uncertainties they face, so they will be likely to consume more.

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### **About the Paper**

Gemma Estrada, Donghyun Park, and Arief Ramayandi examine the effect of old-age dependency ratio on the share of consumption in gross domestic product, and test for a possible difference of this relationship in Asian economies relative to the rest of the world. The findings suggest that the positive effect of the old-age dependency ratio on consumption share in Asia is weaker than that for the rest of the world, implying that the aging population in Asia may not be contributing as significantly to robust consumption and domestic demand as it does in the rest of the world. In order to rebalance their economies, developing Asian governments must therefore continue to pursue a wide range of policies to promote stronger domestic demand.

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