INTERNATIONAL MONETARY FUND

Demographics and Consumption in Asia Toward 2050

Sakai Ando, Kaitoh Hidano, and Jeongwon Son

WP/25/247

2025
NOV

WORKING PAPER

 WP/25/247

IMF Working Paper
Asia and Pacific Department

Demographics and Consumption in Asia Toward 2050
Prepared by Sakai Ando, Kaitoh Hidano, and Jeongwon Son*

Authorized for distribution by Andrea Pescatori
November 2025

ABSTRACT: What are the implications of demographics on total consumption and its sectoral composition in Asia toward 2050? Although the literature has studied total consumption and individual consumption categories separately, the research that studies both is scarce. Using household consumption surveys from seven Asian economies and UN population projections, we find that (1) the compositional effects of demographics on total consumption can be large when middle-aged population changes rapidly, (2) due to aging, some categories, including education and transport, may grow slower than others, like health, and (3) the implications are uncertain due to factors like economic growth, fertility, and migration.

RECOMMENDED CITATION: Ando, Sakai, Hidano Kaitoh, and Jeongwon Son (2025), "Demographics and Consumption in Asia Toward 2050," IMF Working Paper No. 25/247

JEL Classification Numbers:	E2, E20, E21, E27, J1, J10, J11
Keywords:	Demographics; Consumption; Aging
Author's E-Mail Address:	sando@imf.org, kaitoh.hidano@strath.ac.uk, json@imf.org

* The author(s) would like to thank Andrea Pescatori, Natalija Novta, and all the participants in IMF seminars for useful comments.

WORKING PAPERS

Demographics and Consumption in Asia toward 2050

Prepared by Sakai Ando, Kaitoh Hidano, and Jeongwon Son[1]

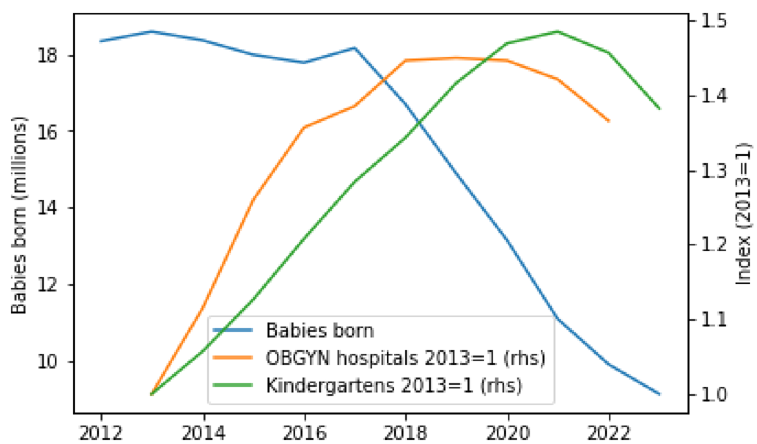
[1] The authors would like to thank Andrea Pescatori, Natalija Novta, and all the participants in IMF seminars for useful comments.

1. Introduction

Asia is the most populous region and stands at the forefront of a demographic transformation that will reshape economic and social structures across the region. Economies such as Japan and Korea are already experiencing population decline and rapid aging. Even economies with growing populations, such as India and the Philippines, will confront sharp shifts in age structure in the coming decades.

Such large demographic shifts can alter consumption patterns in a predictable manner. Figure 1 shows an example from China, where the age 0 population, or the number of babies born in a year, halved between 2017 and 2023, despite the abolition of the one-child policy in 2016. When the number of babies is half, industries that service them shrink. The number of OBGYN hospitals rose through 2018 and declined thereafter. After several years of lag, the number of kindergartens started to decrease. The delayed decline is not a surprise since babies consume hospital services first and kindergarten services later. By the same logic, when those babies become university students in the 2030s, demand for universities will likely shrink.

Figure 1. China: Declining number of babies and waning demand for related industries



Sources: UN (2024), NBSC (2024), and NHC (2024).

Figure 1 is a specific example of China's age 0 population, which gives rise to a more general question: How do demographics change future consumption in both the total and the composition across consumption categories? Different economies face different demographic pressures, including the retirement of baby boomers, the declining birth rate, or evolving migration dynamics. This paper studies the quantitative implications of demographics on all consumption categories across economies.

Understanding the implications of demographics on consumption is important from a policy perspective. For example, policies to build schools, extend roads, or train doctors in one year will have a lasting impact over the following decades. Given that population projection is one of the most reliable forward-looking data, it is important to understand its implications on consumption and integrate the insights into the government budget process. Such a projection would also be useful for structural reforms and industrial policies since economies with different demographics could have different dynamisms in sectors like education, recreation, and health services.

The literature has studied the implications of demographics on total consumption or studied individual consumption categories separately, but the research that studies both across economies is scarce. Aksoy et al. (2019), Auclert et al. (2021), Kuhn and Prettner (2018), and IMF (2025) study the impact of demographics using Overlapping Generations model with an expenditure channel but abstract from the composition of different consumption categories. For individual consumption categories, Mason and Miller (2018) study the impact of demographics on medical expenditure. Inoue et al. (2021) analyze the impact of demographics on consumption of utilities. These papers, however, abstract from total consumption and a comparison across consumption categories. Fougere et al. (2013) and Garau et al. (2013) are exceptions, studying both in a Computational General Equilibrium model, but they focus on Canada and Italy respectively, abstracting from cross-country perspective. Our paper contributes to the literature by studying both the total consumption and its composition across economies, allowing us to compare how demographics affect them in a consistent manner.

To study the implications of demographics on consumption, we combine the population projection of UN (2024) and household consumption surveys across seven economies: China, India, Japan, Korea, Philippines, Singapore, and Tuvalu. The coverage of countries is limited by the availability of age information in household consumption surveys, but they are sufficiently diverse in income levels and demographics. Harmonizing household consumption surveys across economies and aligning their units with population projection data are nontrivial. We develop a conservative estimation method and discuss measurement errors.

Methodologically, we decompose aggregate consumption into the product of demographics and per capita consumption. In the baseline, we keep the per capita consumption at each age cohort constant and change only the demographics. Since different age cohorts consume different baskets, different consumption categories may grow at a different speed than the population, depending on the demographic structure. This baseline specification has a limitation of being partial equilibrium, abstracting from price adjustments, income distribution, and supply constraints, but has the advantage of clearly isolating the impact of demographics.

The baseline results highlight the importance of middle-aged population in total consumption and reveal the consumption categories sensitive to demographics. For total consumption, we find its growth mostly follows population growth, so the compositional effects of demographics are limited. They can, however, be so large that the signs of consumption and population growth become opposite if the middle-aged cohorts that consume most decline drastically, as in Singapore. For the composition of consumption, aging is common, and thus, the growth of old-dependent consumption categories, like Health and Furnishing, tends to be faster than young-dependent ones, such as Education and Transport. These results add granular insights to the literature that studies the impact of demographics on structural change. For example, Cravino et al. (2022) show that US population aging accounted for about a fifth of the observed increase in the service share in consumption between 1982 and 2016. Our results complement them with further granularity within services and across economies, showing that the consumption share of health service may increase more than that of education service across many Asian economies.

The baseline results isolate the impact of demographics, but the per capita consumption at each age cohort can be affected by many other factors through general equilibrium effects. For example, as an economy becomes more developed, some age cohorts may become richer faster than others, demand and supply may shift to leisure, more eating out, are more home improvement. In an extension, we assume consumption patterns change as an economy becomes more developed and show that economic growth can offset demographic headwinds, especially in consumption categories that vary across income levels, such as Recreation, Restaurants & Hotels, and Furnishing. Other extensions alter the deep parameters of the UN's population projection model, such as the total fertility rate and net migration, and show that these factors can impact the projection of consumption significantly, giving a quantitative sense of uncertainty around the baseline results.

This paper is organized as follows. Section 2 describes the data. Section 3 explains the methodology. Section 4 shows the baseline results. Section 5 illustrates the extensions. Section 6 concludes.

2. Data

This section explains the data on population and consumption. Although we focus on six large economies and one small economy due to limitations of household consumption survey data, they exhibit diverse demographic patterns, from population-decreasing to population-increasing economies. Population data suggest that aging is a common pattern in both population-increasing and decreasing economies. Consumption data also show some common patterns, such as the consumption of education services concentrated in a small number of age cohorts, the consumption of health services increasing with age, and transportation decreasing with age.

2.1. Population projection

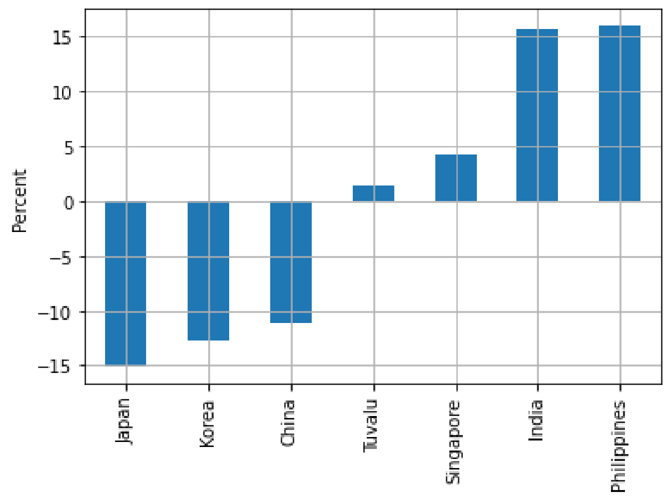
Population projections are taken from UN (2024), which uses the cohort-component method to project population by age and sex for each economy from 2024 to 2100. Intuitively, suppose $\tilde{p}_t$ denotes the vector of population for each age and sex cohort in year t. The population vector in the next period is derived by

$$\tilde{p}_{t+1} = T_t \tilde{p}_t, \tag{1}$$

where the transition matrix T_t is a function of three age-sex specific parameters, death rates, fertility rates, and net migration, which are projected probabilistically. In the baseline results, we use the median-variant projection. In the extension, we conduct scenario analyses by altering fertility and migration parameters, using Korea and Tuvalu as examples.

Asian economies have a diverse pattern of population dynamics. Figure 2 shows that, from 2024 to 2050, some economies, like India and the Philippines, are expected to expand by more than 15 percent, while others, like Japan and Korea, decline by more than 10 percent.

Figure 2. Population growth from 2024 to 2050



Aging is a common trend in both population-decreasing and population-increasing economies. Between 2024 and 2050, Japan's population will decline by roughly 15 percent, Korea's by about 13 percent, and China's by about 11 percent. Annex I shows each economy's population profile by age in 2024 and 2050. China's profile in 2024 displays a sharp drop at ages 0–4, consistent with Figure 1. (Figure 12) By 2050, the cliff will move to around 30–34. Japan and Korea show similarly compressed young-age masses. (Figure 10, Figure 11) In Japan, the youngest cohort is well under half the size of the middle-aged cohorts. In Korea, the youngest is roughly one quarter of the most populous cohort. These shapes indicate that older-age densities rise relative to younger ages throughout the horizon.

Aging is also evident in population-increasing economies. The Philippines' population is projected to grow by about 16 percent overall, yet the 0–4 cohort is markedly smaller than adjacent cohorts, implying a future decline in school-age children relative to current peaks. (Figure 16) India exhibits a similar pattern. (Figure 15) The youngest cohorts are smaller than those now in their 20s, so the mass of the population moves toward older working ages by mid-century, even though the total population increases. Singapore presents an extreme compression. (Figure 14) The population below age 10 is close to one third of that at ages 25–29, a structure that foreshadows a significant loss of middle-aged cohorts later on the horizon. Tuvalu's profile is closer to a classic pyramid, but projections are highly sensitive to outward migration, which we discuss explicitly in section 5.3. (Figure 13) The common element across these cases is an increase in the relative weight of older cohorts alongside a diminution of younger cohorts, independent of whether the total population rises or falls.

2.2. Consumption data

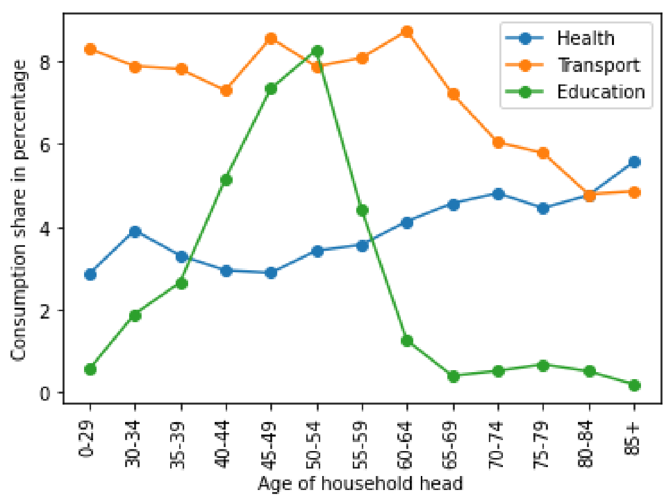
Household consumption surveys provide a second set of data for our analysis. Table 1 summarizes the sources. These surveys record expenditure at the household level by detailed category, together with demographic information. The category definitions, however, differ across economies. For cross-sectional comparability, we map items to the Classification of Individual Consumption According to Purpose (COICOP) high-level groups—Food and Beverage; Alcohol and Tobacco; Clothing; Housing; Utilities; Furnishing; Health; Transport; Information; Recreation; Education; Restaurants and Hotels; Insurance; and Other.

Table 1. Source of Household Consumption Survey

China	2020 China Family Panel Studies, Institute of Social Science Survey of Peking University, China
India	Household Consumption Expenditure Survey: 2023-24, Ministry of Statistics and Programme Implementation, India
Japan	2019 National Survey of Family Income, Consumption and Wealth, Ministry of Internal Affairs and Communications, Japan
Korea	2024 Household Income and Expenditure Survey, Statistics Korea, Korea
Philippines	2023 Family Income and Expenditure Survey, Philippine Statistical Authority, Philippines
Singapore	Household Expenditure Survey 2023, Department of Statistics, Singapore
Tuvalu	2022 Household Income and Expenditure Survey Report, Central Statistics Division, Tuvalu

We utilize information about demographics to construct age-specific consumption profiles. Annex I shows each economy's consumption profile by age. For illustration, Figure 3 shows the consumption share of Education, Transport, and Health in Japan. Consumption of Education is concentrated in households with household heads in their 40s to 60s. Health's share increases with age, while Transport's share declines with age. These regularities are consistent with life cycle needs and underpin the heterogeneous impact of demographics across different consumption categories.

Figure 3. Household consumption shares by age in Japan, 2019



One challenge is that not all household consumption surveys report ages for all household members, so the methodology to aggregate data into aggregate consumption needs to be tailored. For example, Japan's household consumption survey provides only the age of the household head. In contrast, India's household consumption survey provides the age of all household members. As detailed in section 3, depending on the granularity of available household consumption survey data, we adapt different approaches to estimate aggregate consumption of each consumption category.

3. Methodology

This section describes how demographics are incorporated in the projection of aggregate consumption for each consumption category. We illustrate the conceptual framework in an ideal environment where there is no data limitation and then explain how we conduct estimation in practice.

3.1. Conceptual framework

Let p_τ denote the population vector, where each row is the population of each age cohort a at time τ, and $c_{k\tau}$ denotes the consumption vector, where each row corresponds to the average consumption of consumption category k for each age cohort a at time τ. The category k can be total or its subcomponents, like food, recreation, etc. The aggregate consumption in category k at time τ can be written as

$$p_\tau' c_{k\tau} = \sum_a p_\tau(a) c_{k\tau}(a), \qquad \tau = 0, t. \tag{2}$$

The expression clarifies that the aggregate consumption for each category k can be decomposed into age-specific consumption. The change in aggregate consumption in category k from time 0 to t can be written as

$$p_t' c_{kt} - p_0' c_{k0} = \underbrace{(p_t - p_0)' c_{k0}}_{\substack{\text{due to demographics} \\ (\text{baseline})}} + \underbrace{p_t'(c_{kt} - c_{k0})}_{\substack{\text{rest} \\ (\text{extension})}}, \tag{3}$$

which suggests that the change in aggregate consumption can be decomposed into the part due to a change in demographics and the rest including the change in consumption patterns. The growth rate can then be obtained by dividing both sides by $p_0' c_{k0}$.

Our baseline results are based on the first term that isolates the impact of demographic change. Intuitively, the first term shows how aggregate real consumption changes when the consumption pattern of each category k remains constant over time for each age cohort $c_{kt} = c_{k0}$. This is the same partial equilibrium analysis used in the literature (Mason and Miller, 2018; Inoue et al., 2021). Unlike the literature with one consumption category, the assumption of constant real consumption $c_{kt} = c_{k0}$ applies to all categories k, implying that the consumption share of different category k is constant over time for each age cohort a.

$$\frac{c_{k0}(a)}{\sum_\kappa c_{\kappa 0}(a)} = \frac{c_{kt}(a)}{\sum_\kappa c_{\kappa t}(a)}. \tag{4}$$

The assumption of constant real consumption might be a permissible approximation for advanced economies at the frontier but could be restrictive for emerging market economies. Thus, in section 5, we consider the second term by assuming that an emerging market's consumption becomes similar to that of an advanced economy.

The interpretation of Eq. (3) can be enriched by comparing consumption growth with population growth. Let $\mathbb{I}$ denote the column vector of ones with the same length as the population vector so that $p_t' \mathbb{I}$ is the total population at time t. The difference between consumption growth and population growth is approximately per capita consumption growth.

$$\frac{p_t' c_{kt}}{p_0' c_{k0}} - \frac{p_t' \mathbb{I}}{p_0' \mathbb{I}} \approx \ln\left(\frac{p_t' c_{kt}}{p_0' c_{k0}}\right) - \ln\left(\frac{p_t' \mathbb{I}}{p_0' \mathbb{I}}\right) = \ln\left(\frac{\frac{p_t' c_{kt}}{p_t' \mathbb{I}}}{\frac{p_0' c_{k0}}{p_0' \mathbb{I}}}\right) \approx \frac{\frac{p_t' c_{kt}}{p_t' \mathbb{I}}}{\frac{p_0' c_{k0}}{p_0' \mathbb{I}}} - 1. \tag{5}$$

In the baseline with constant real consumption $c_{kt} = c_{k0}$, the difference could also be interpreted as the compositional effect of demographics.

$$\frac{p_t' c_{kt}}{p_0' c_{k0}} - \frac{p_t' \mathbb{I}}{p_0' \mathbb{I}} \approx \frac{\frac{p_t' c_{kt}}{p_t' \mathbb{I}}}{\frac{p_0' c_{k0}}{p_0' \mathbb{I}}} - 1 = \frac{p_t' c_{k0}}{\frac{p_t' \mathbb{I}}{p_0' \mathbb{I}} p_0' c_{k0}} - 1. \tag{6}$$

Note that the population vectors in the numerator p_t and the denominator $\bar{p}_0 = \frac{p_t' \mathbb{I}}{p_0' \mathbb{I}} p_0$ have the same total population and differ only in the composition, so the ratio can be interpreted as the compositional effect of demographics on consumption. To present these rich interpretations, Annex I shows the results on consumption growth together with the benchmark of population growth.

In practice, population data, p_0 and p_t, are available from UN (2024), and household consumption, denoted by m_{k0}, is available from household consumption surveys, but (1) the two databases may have different groping of age cohorts and (2) individual consumption c_{k0} is not available. To tackle the former challenge, we align the age cohorts of the two databases by aggregating the finer grouping of UN (2024) into that of each economy's household consumption survey. For the latter challenge, to estimate aggregate consumption $p_t' c_{kt}$, we need to either estimate individual consumption c_{k0} or the number of households h_t to work in the household unit. In the following sections, we describe the estimation of aggregate consumption $p_t' c_{kt}$.

3.2. When all household members' ages are available

Household consumption surveys for China, India, and Korea report all household members' ages. In this case, we estimate each age cohort's consumption c_{k0} by disaggregating household consumption m_{k0}. This approach can align the unit of consumption with that of the population vectors, p_0 and p_t, so the population projection can be used without modifications.

Formally, suppose household i has n_i members. Given the household i's consumption data $m_{ki} \in \mathbb{R}$ and the household size n_i, individual consumption for member j is estimated by

$$c_{kj} \coloneqq \frac{1}{n_i} m_{ki}, \qquad j = 1, \dots, n_i. \tag{7}$$

Let a_j denote the age of the individual j, so that $p(a) \coloneqq \sum_j 1_{\{a_j = a\}}$ denotes the population of age a in the household consumption survey. Note that the population $p(a)$ in the household consumption survey may be different from $p_t(a)$ in UN (2024). The time 0 average consumption $c_{k0}(a) \in \mathbb{R}$ is estimated by taking the average for age a.

$$c_{k0}(a) \coloneqq \frac{1}{p(a)} \sum_{j \in \{j : a_j = a\}} c_{kj} \,. \tag{8}$$

The assumption that each household member consumes equally is a natural choice when no additional information about within-household consumption is available. For some consumption categories, like education, however, the assumption that only children consume could be a reasonable alternative. In Annex II, we attribute all education expenditure to those below 18 years old in each household when the household has such members. The decline in the consumption categories of Education and Total is quantitatively larger than the baseline, but the qualitative message remains similar. The approach could still be subject to measurement errors since the expenditure for elementary school and high school could be different. China's data also has the limitation of interviewing only those over 9 years old.

3.3. When only household head's age is available

Household surveys for Japan, Philippines, Singapore, and Tuvalu report only the household head's age. In this case, we augment household data from MIAC (2020), UN (2020), MTI (2020), and CSDGT (2021), respectively. By aggregating population into the unit of households, we can circumvent the estimation of age distribution within each household.

Specifically, let h_0 denote the vector of households at $t = 0$, where each element corresponds to the number of households with each household head age. Given the data on population and household, p_0, p_t, h_0, we estimate the number of households at t, h_t, by assuming constant probability to become household heads

$$P(a) \coloneqq \frac{h_0(a)}{p_0(a)}, \qquad h_t(a) \coloneqq P(a) p_t(a), \tag{9}$$

where $P(a)$ is the probability to become a household head for each age cohort a. Note that the assumption of constant probability to become household heads implies a certain average household size

$$s_\tau \coloneqq \frac{\sum_a p_\tau(a)}{\sum_a h_\tau(a)}, \qquad \tau = 0, t. \tag{10}$$

To be compatible with the assumption of constant real consumption per capita, the household consumption at t is estimated by rescaling the household consumption at $t = 0$, m_{k0}, by the household size.

$$m_{kt}(a) \coloneqq \frac{s_t}{s_0} m_{k0}(a). \tag{11}$$

Once the number of households, h_0, h_t, and household consumption, m_{k0}, m_{kt}, are obtained, aggregate consumption can be calculated analogously in the household unit.

$$h'_\tau m_{k\tau} = p'_\tau c_{k\tau}, \qquad \tau = 0, t. \tag{12}$$

The household consumption survey and these aggregation methods lead to a total consumption of a similar magnitude to alternative sources. Annex III shows that the implied total consumption as a percentage of private consumption expenditure in IMF (2025) ranges from 60 to 100 percent of private consumption data in most cases. It is important to note this is a sanity check rather than a fair comparison since private consumption expenditure in national accounts includes not only households but also non-profit institutions serving households, often uses multiple data sources such as retail sales and business surveys, and incorporates imputed values, etc.

4. Baseline results

The baseline results illustrate quantitative implications of demographics on both total consumption and its composition. We find that the compositional effects of demographics on total consumption can be large when middle-aged cohorts change rapidly, as they tend to be the largest consumers. We also find general patterns due to aging, such as health consumption growing faster than education in many economies.

4.1. Total consumption

In general, total consumption tends to increase when the population increases, and vice versa. Annex I reports the baseline results as the growth rates from 2024 to 2050 by COICOP category for each economy. Since consumption per capita at each age cohort is assumed to be constant in the baseline $c_{kt} = c_{k0}$, the growth rate of consumption is the same as that of population if there are no compositional effects of demographics. When the two are different, the difference reflects the strength of the compositional effects of demographics.

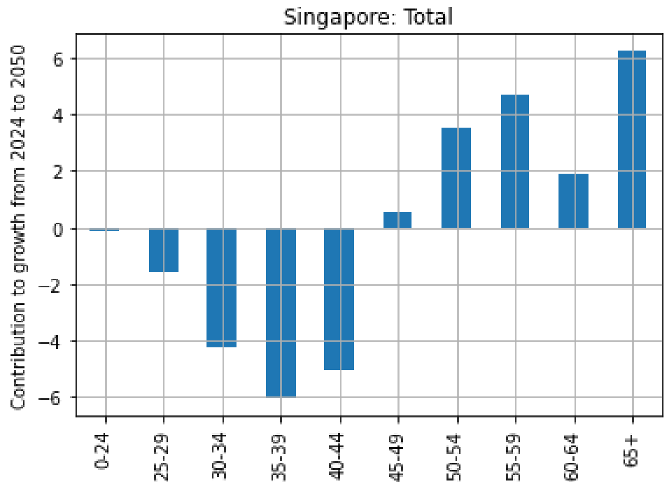
In population-decreasing economies, such as Japan (Figure 10), Korea (Figure 11), and China (Figure 12), the total consumption declines faster than the population declines. The blue bar for Total lies below the benchmark in red, implying that real consumption declines more rapidly than population growth, and therefore, the per-capita consumption growth is negative over the horizon. In addition to population decline, aging puts downward pressure on consumption as the demand from the middle-aged population decreases. As a result, consumption not only declines but also declines faster than the population.

In population-increasing economies, total consumption can grow faster than the population, but it can also grow negatively. In India (Figure 15) and the Philippines (Figure 16), the total consumption grows faster than the population, as the middle-aged population increases and they tend to consume more than other cohorts. In Singapore, however, the decline in the middle-aged population is so fast that the total consumption declines even though the population growth is positive. To see the contribution from different cohorts, define

$$contribution_k(a) := \frac{C_{kt}(a) - C_{k0}(a)}{\sum_a C_{k0}(a)}, \qquad C_{k\tau}(a) := p_\tau(a) c_{k\tau}(a), \qquad \tau = 0, t. \tag{13}$$

Figure 4 shows that the contribution from the middle-aged population is negative. As Figure 14 (1,1) panel shows, Singapore's population distribution exhibits a cliff from 15 to 25, which will shift to 40 to 45 after 25 years. The negative contributions from the 30s and early 40s offset the positive contribution from older cohorts, and thus, the total consumption is projected to decline despite positive population growth.

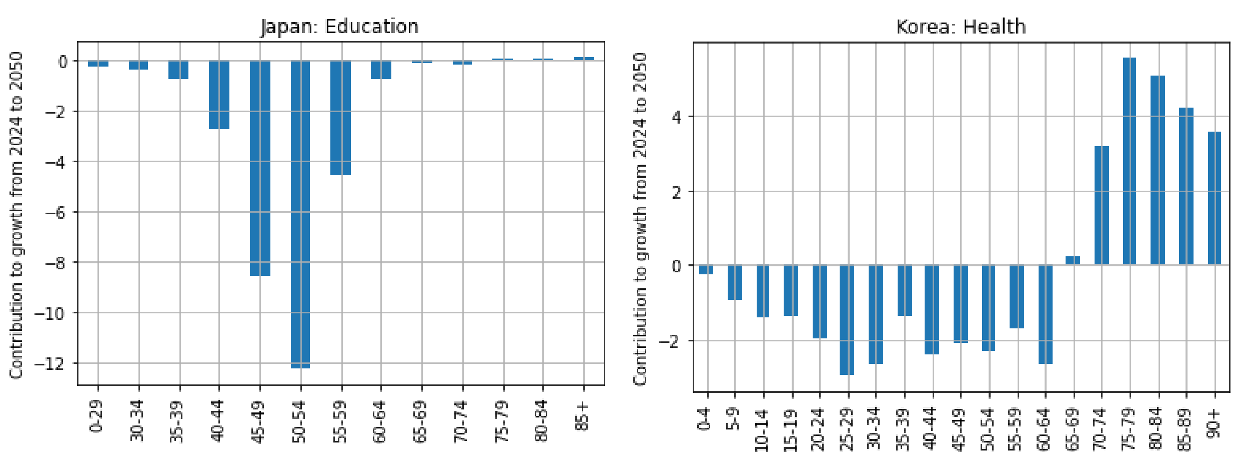
Figure 4. Singapore: Age-wise contribution to total consumption



4.2. Composition of consumption

When it comes to the composition, the consumption of the Health category tends to grow faster than that of Education in many economies. This is consistent with the concentration of Education spending in a short period of parenting ages, as can be seen in Figure 3. When the mass of population passes the parenting ages, the demand for Education that relies on those narrow cohorts disappears, as suggested by the example of Japan's decomposition in Figure 5. In contrast, the consumption of the Health category tends to decline less or grow faster than Education. Since Health consumption tends to increase with age, aging increases its demand. The example of Korea's decomposition in Figure 5 highlights that the negative contribution from young cohorts is offset by the positive contribution from old cohorts. Since aging is prevalent in both population-decreasing and population-increasing economies, Health consumption tends to grow faster than Education in many economies.

Figure 5. Age-wise contribution to growth for Education in Japan and Health in Korea



One can also see other general and economy-specific patterns. For example, the consumption of the Transport category tends to decline faster than Health but slower than Education. The category includes commuting and work-related mobility, so it tends to fall as people age, but the speed is not as fast as Education. (Figure 3) In

Korea (Figure 11), the consumption of the Food & Beverage category does not decline much as people age, so its consumption declines less than the population. Similarly, consumption of the Housing category in India (Figure 15) and Singapore (Figure 14) tends to increase with age, so its consumption tends to grow faster than other categories.

Overall, when aging is slow and the population rises broadly, most categories move with the population. When aging is rapid, and the consumption of some categories concentrates on a subset of age cohorts, the demographics can drive both the total consumption and its composition.

5. Extensions

In extensions, we relax the assumption of constant real consumption per capita and study the implications of alternative fertility and migration paths. We find that economic growth can offset demographic headwinds, and policies that affect fertility and migration paths can have profound implications on consumption through alternative dynamics of demographics.

5.1. China: Alternative consumption path

One of the assumptions behind the baseline results is the constant per capita real consumption $c_{k0} = c_{kt}$. This assumption helps isolate the impact of demographics and might be a reasonable approximation for advanced economies at the frontier, such as Japan whose real consumption per capita grew only 1.6 percent cumulatively in the last 10 years from 2014 to 2024 despite its declining population. However, the assumption could lead to downward bias for emerging market economies as the per capita consumption is likely to increase. In this section, we relax the assumption of constant per capita real consumption at each age cohort and incorporate economic growth.

To incorporate economic growth in the second term of Eq. (3), we take China and Korea for an example, assuming that the per capita consumption of China becomes similar to that of Korea. China and Korea are not only close to each other geographically and culturally but also report all family members' ages in their household consumption surveys, so they are relatively good fit for such an exercise compared to other combinations. The extension can be interpreted as an attempt to relax some of the partial-equilibrium assumptions behind the baseline results in section 4, such as price adjustments, change in income distribution, and supply constraints.

Specifically, for each COICOP category k and age cohort, China's per capita consumption at t, c_{kt}^{CN}, is set to be a weighted average of China's and Korea's consumption at 0

$$c_{kt}^{CN} = w c_{k0}^{KR} + (1 - w) c_{k0}^{CN}, \tag{14}$$

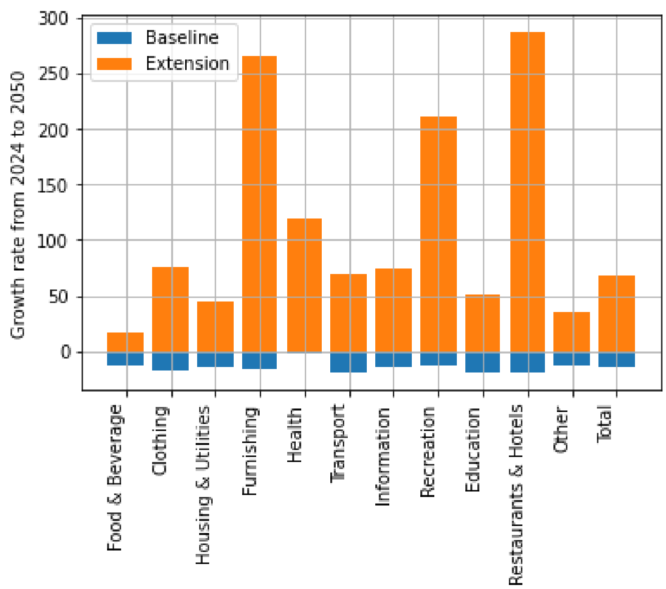
where the weight is disciplined by projected GDP per capita at PPP in 2050, y_t^{CN}, from PwC (2017), and GDP per capita in 2024 for China y_0^{CN} and Korea y_0^{KR} from World Economic Outlook of IMF (2025).

$$y_t^{CN} = w y_0^{KR} + (1 - w) y_0^{CN}. \tag{15}$$

Given that $y_t^{CN} \approx 46550$, $y_0^{KR} \approx 62648$, and $y_0^{CN} \approx 26879$, the weight is around $w \approx .55$. The rest of the exercise remains the same as the baseline. This reduced-form approach abstracts from explicitly modeling factors like price adjustments, income distributions, and supply constraints, but implicitly incorporates general equilibrium effects in actual data.

Figure 6 shows that economic growth can offset demographic headwinds. Compared to the baseline results where consumption growth was uniformly negative, all categories exhibit positive growth. In particular, the categories of Furnishing, Recreation, and Restaurants & Hotels grow more than 200 percent from 2024 to 2050, around 3 percent if annualized. To understand the arithmetic, take Recreation as an example. In 2024, Korea's consumption per capita is roughly 5 times larger than China's. Given the weight is around $w = .55$, a 200-300 percent increase is in the ballpark of a back-of-the-envelope calculation. Some categories, like Furnishing, tend to increase more with age in Korea and in China (Figure 11 and Figure 12), so the economic growth and aging demographics reinforce the demand for them. In contrast, for categories such as Food & Beverage and Education, the per capita consumption in Korea and that in China are similar in 2024, so the consumption growth is not as pronounced.

Figure 6. China: Consumption growth with economic growth

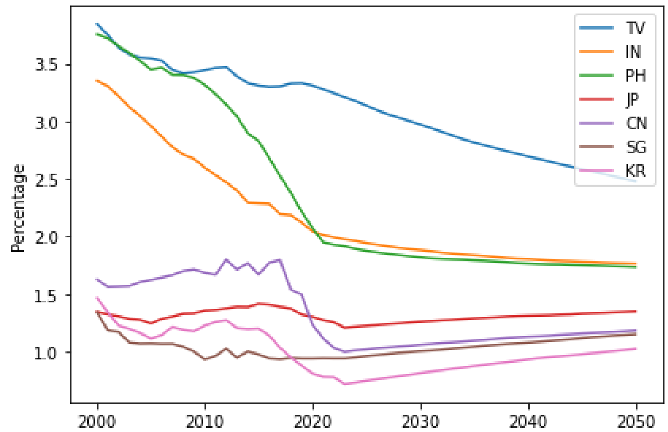


The result suggests that, as the economy grows, the consumption profile can change drastically, and the demographic impact can be offset, especially for the categories where old cohorts in advanced economies consume more than in emerging markets. Demographic change, like aging, shifts demand toward certain consumption categories, but economic growth can induce a larger shift to other sectors. The combination gives quantitative insight into their relative importance, which could serve as a useful benchmark in considering structural change and policies supporting it.

5.2. Korea: Alternative fertility path

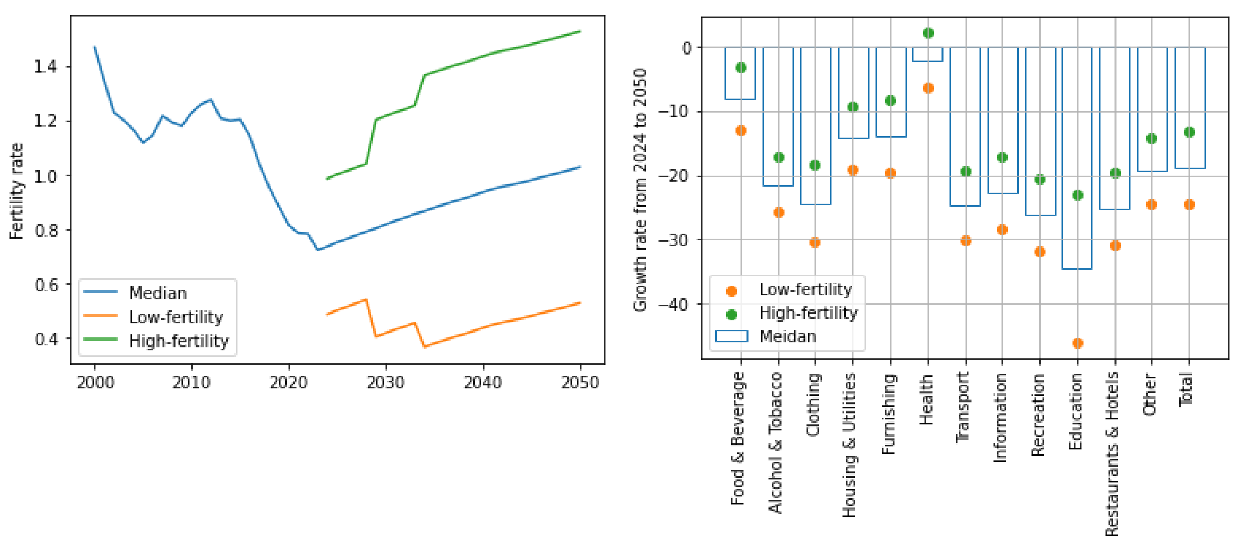
Declining total fertility rate is a common phenomenon in many economies. (Figure 7) India and the Philippines experience large declines from 2000 to 2025. In terms of the level of total fertility rate, Korea is one of the lowest in Asia as of 2025. The total fertility rate is projected to recover gradually in UN (2024), but the projection is subject to uncertainty.

Figure 7. Total fertility rate



In this exercise, we replace the median-variant of the fertility rate embedded in Korea's population projection with high and low fertility paths. Both the high and low-fertility paths are taken from UN (2024). In the low-fertility path, the total fertility rate is around half of the median path, while under the high fertility path, the total fertility rate reaches 1.5 by 2050, as can be seen in Figure 8.

Figure 8. Korea: Consumption growth with alternative fertility rate path



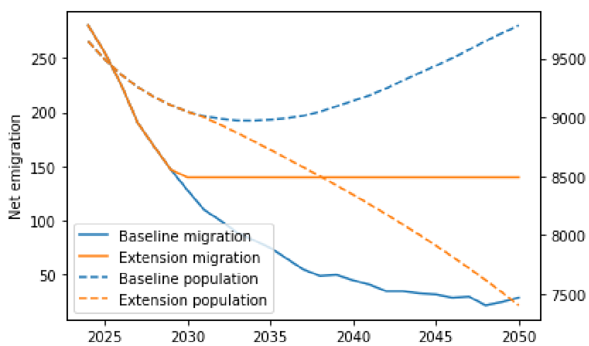
The result suggests that, in the high-fertility scenario, the decline in consumption can be mitigated significantly. Higher fertility cushions the decline in all consumption categories, and it can even turn the sign for Health to positive, even though the population declines. In the low-fertility scenario, consumption declines, especially in the category of Education by more than 40 percent. The impact across consumption categories differs since younger cohorts are affected by changes in the fertility rate, and their level of consumption varies across different categories.

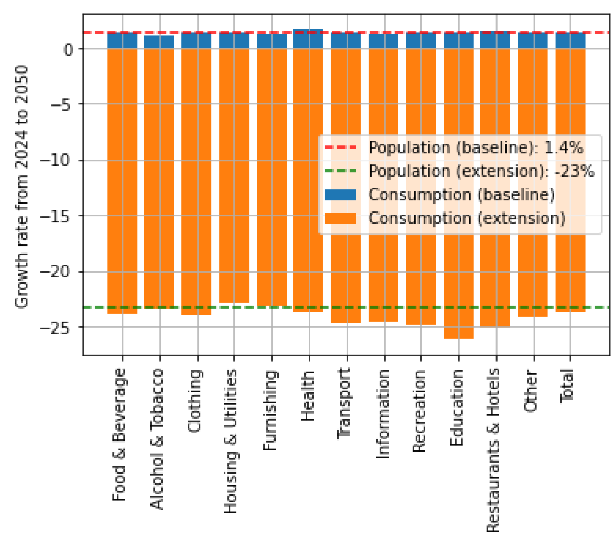
5.3. Tuvalu: Alternative migration path

In the last extension, we study the impact of migration. For economies with large populations, the impact of migration is typically limited compared to birth and death. For economies with small populations, however, migration can have a significant impact on demographics. For example, Tuvalu has faced emigration pressure due to more economic opportunities abroad. Tuvalu also faces climate risks and signed an agreement with Australia in 2023, called the Falepili Union, which allows up to 280 Tuvaluan citizens to relocate to Australia. The first visa lottery was conducted in 2025, and UN (2024) has not incorporated its impact. Whether the 280 visas will be available in all subsequent years is uncertain, but it is around 3 percent of the 10,000 population and can potentially have a large impact on the demographics.

In this exercise, we conduct a scenario analysis by altering the migration path. Under the baseline, the number of net emigrants is projected to decline gradually to less than 50, with the population recovering to the 2025 level by 2050. In extension, we assume that at least half of the 280 people with emigration visas relocate abroad through 2050. Accordingly, the population will decline by roughly 25 percent by 2050. (Figure 9) The population projection based on different migration paths is simulated using the experimental UN portal[2] since the details of the projection methods, such as the replication file, are not available. The age distribution of emigrants in the experimental simulation portal is not publicly available, but the resulting population distribution suggests that the middle-aged and young-aged population emigrate most.

Figure 9. Tuvalu: Consumption growth with alternative migration rate path





The result suggests that consumption declines at a similar speed to the population across broad categories. The consumption categories most heavily dependent on middle-aged households, like Education, Restaurants & Hotels, and Transport, exhibit the largest declines. Compared to the baseline result, the alternative assumption on migration could change both the demographics and consumption drastically, highlighting the large economic impact of emigration.

[2] As of August 2025, the experimental portal is available at http://208.85.19.53:8080/OPPP/, although the location may change.

6. Conclusion

This paper has studied the quantitative implications of demographics on consumption. For total consumption, we find the compositional effects of demographics can break the relationship if the middle-aged cohorts that support most of the consumption demand decline drastically. For the composition of consumption, we find that aging is common in many economies, and thus, the growth of old-dependent consumption categories, like Health and Furnishing, is faster than young-dependent ones, such as Education and Transport.

The baseline results isolate the impact of demographics, but consumption can be affected by many other factors. For example, an extension shows that economic growth can offset demographic headwinds, especially in the consumption categories that vary across income levels, such as Recreation, Restaurants & Hotels. Other extensions show that the deep parameters under the baseline results, such as the total fertility rate and net migration, are uncertain and could alter the projection of consumption significantly, giving a quantitative sense of uncertainty around the baseline results.

Annex I. Charts by economy

The following figures are economy-specific demographics and consumption patterns by age cohorts. The figures are presented by the order of population growth rate from low to high. The legend for the (2,1) is the same as that for (2,2) chart. Note that consumption categories may differ across economies. For example, no data on Alcohol & Tabacco is separately available for China. Utilities for Korea, Philippines, and Tuvalu are included in Housing. No data for Insurance is available for India. Insurance is included in Other for Korea. India has only Hotels, unlike other economies that report Restaurant & Hotels.

Figure 10. Japan

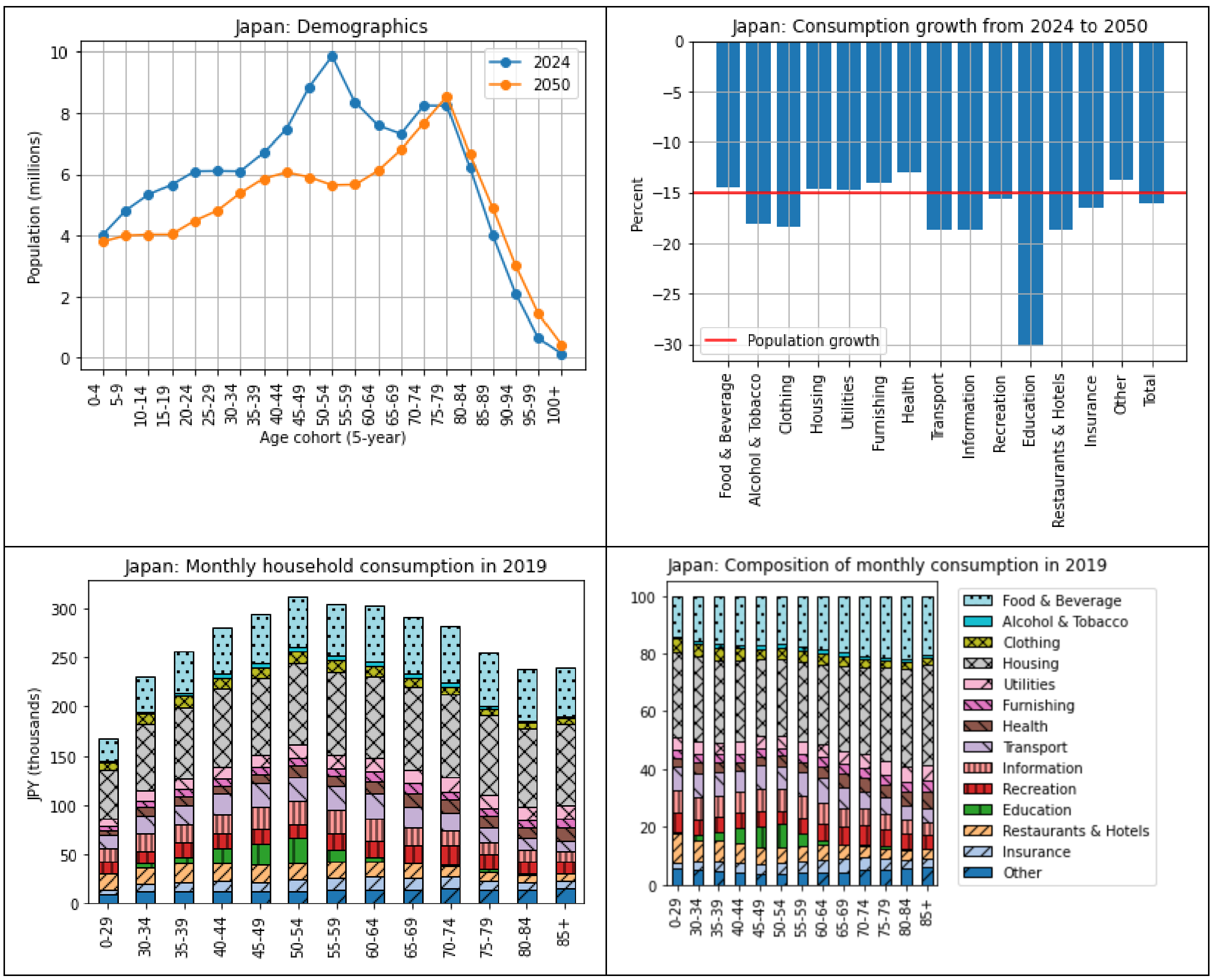


Figure 11. Korea

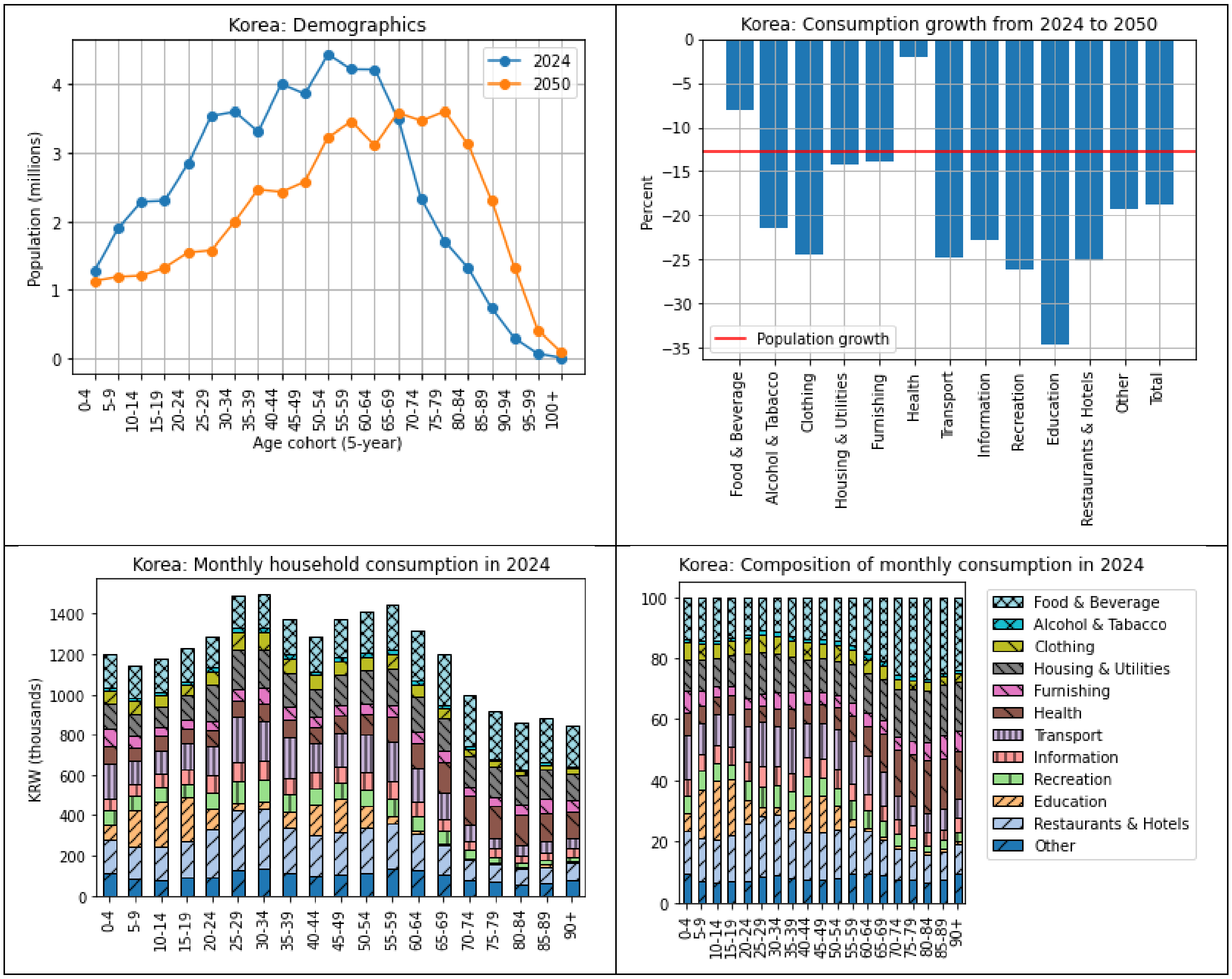


Figure 12. China

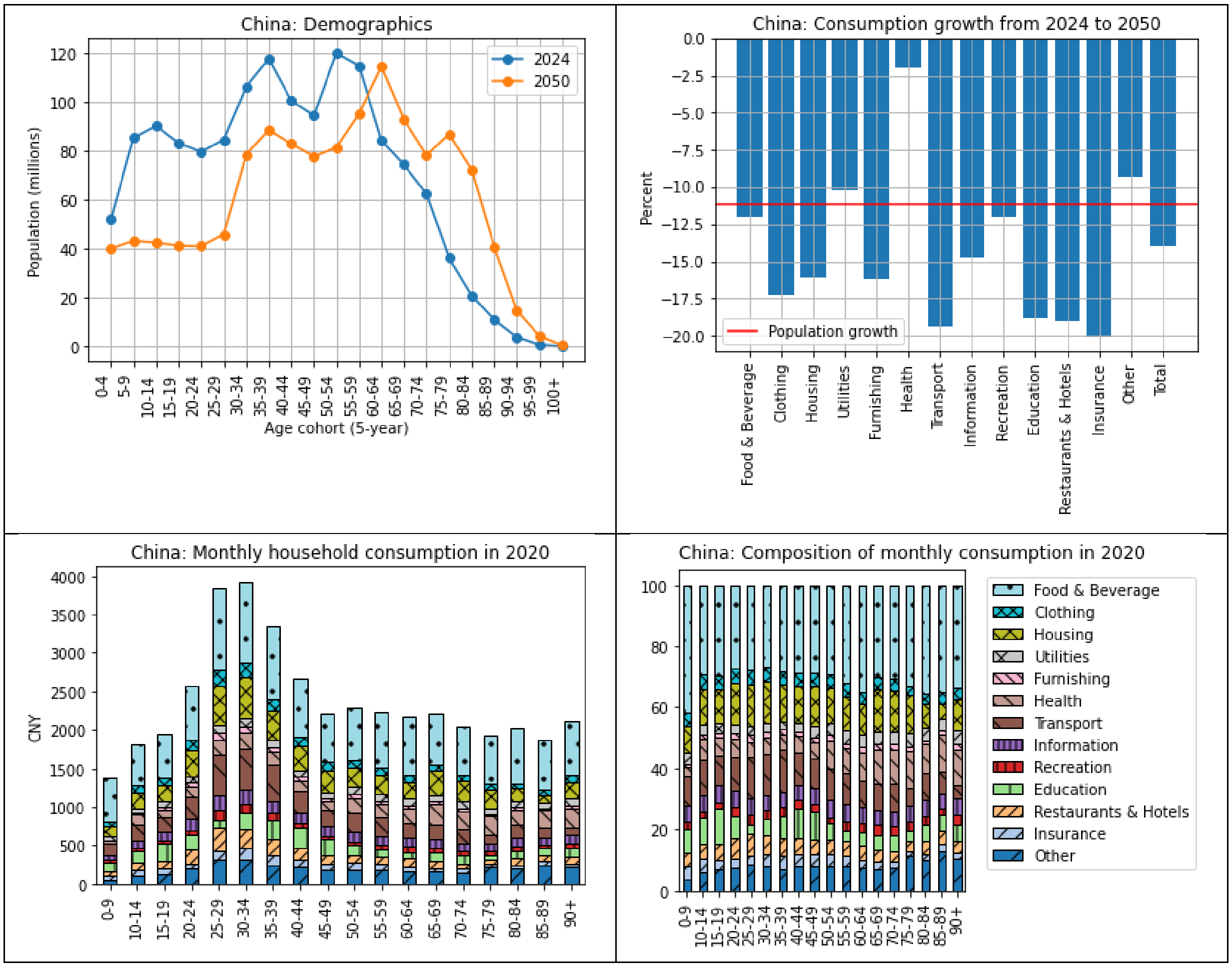


Figure 13. Tuvalu

Figure 14. Singapore

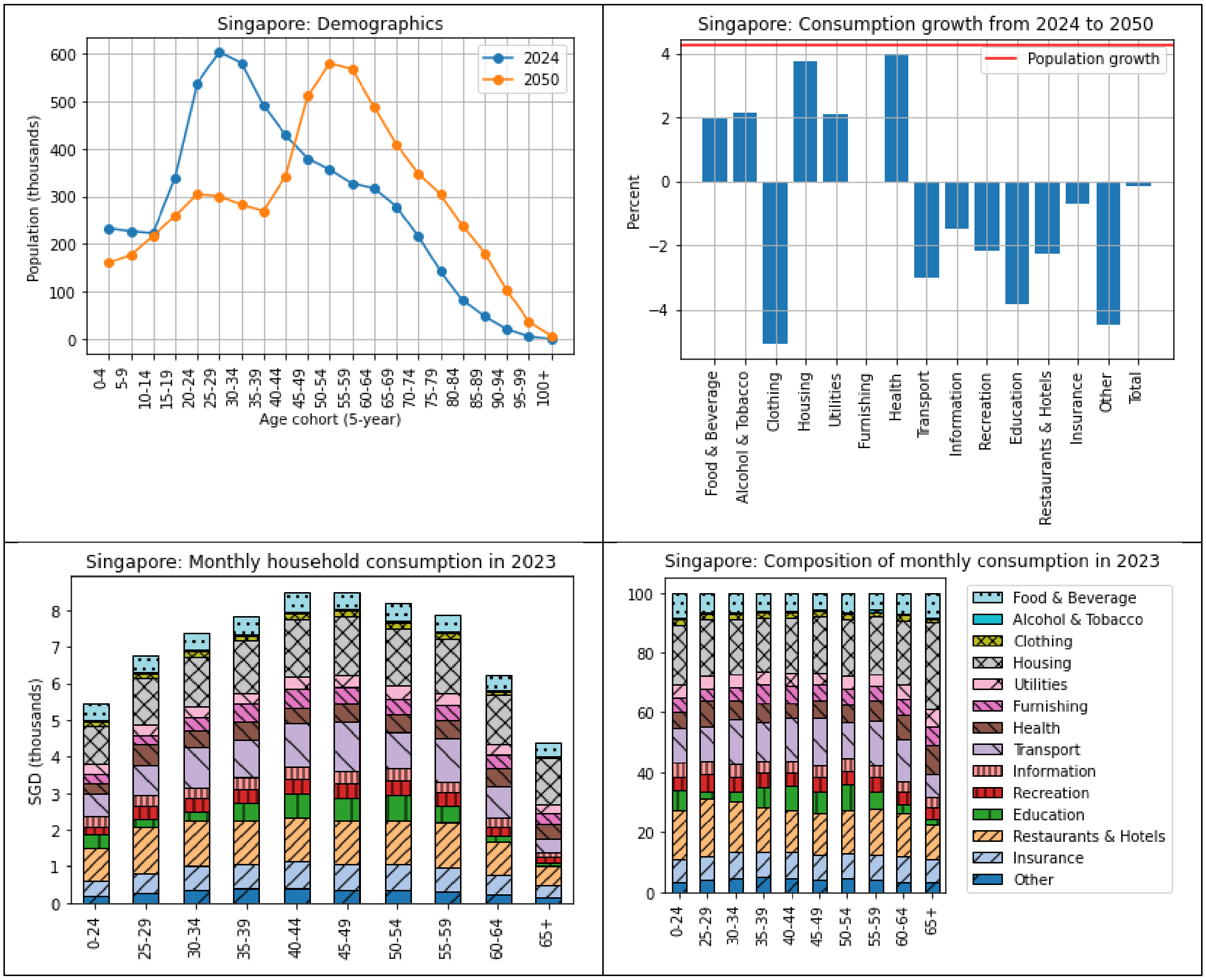


Figure 15. India

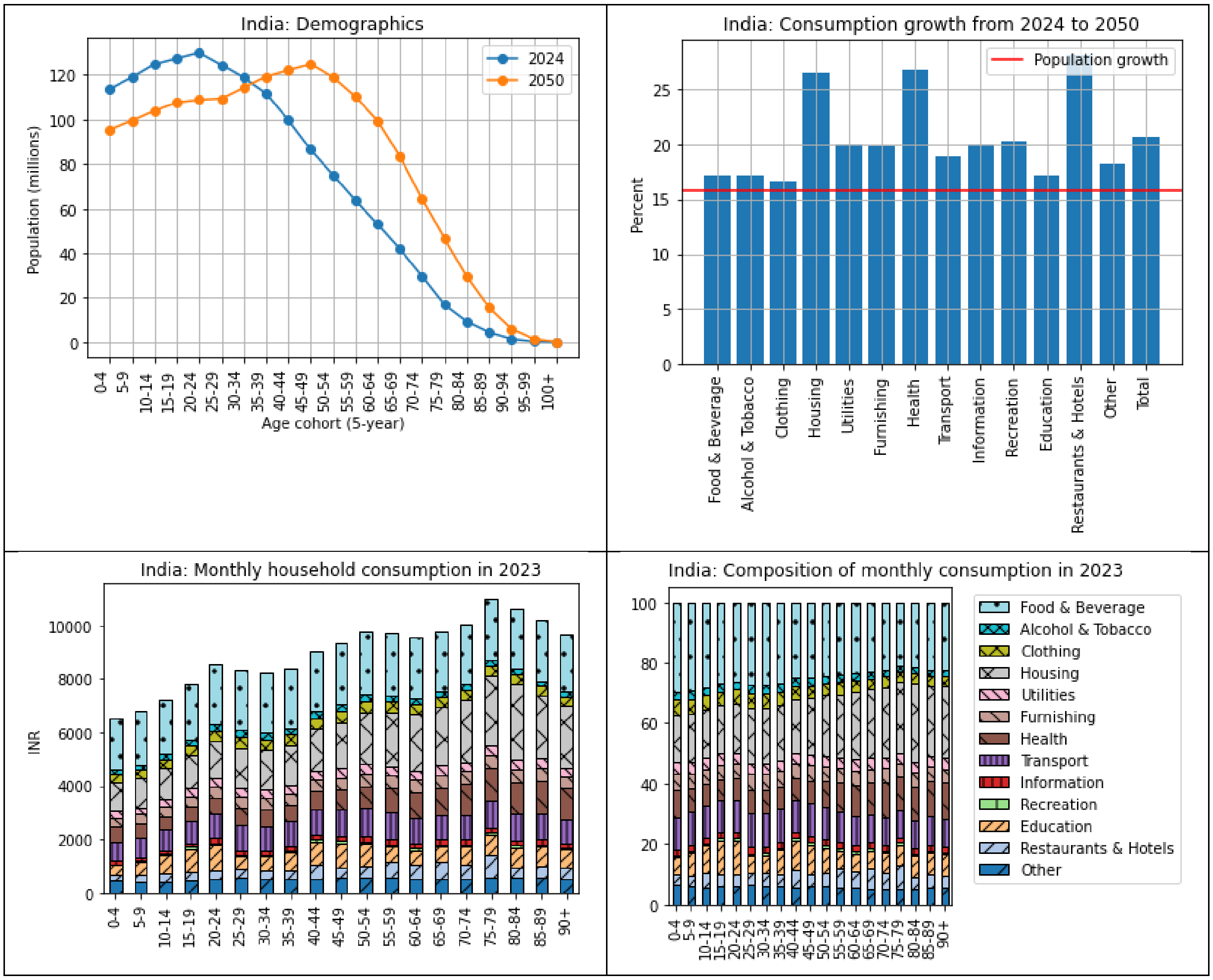
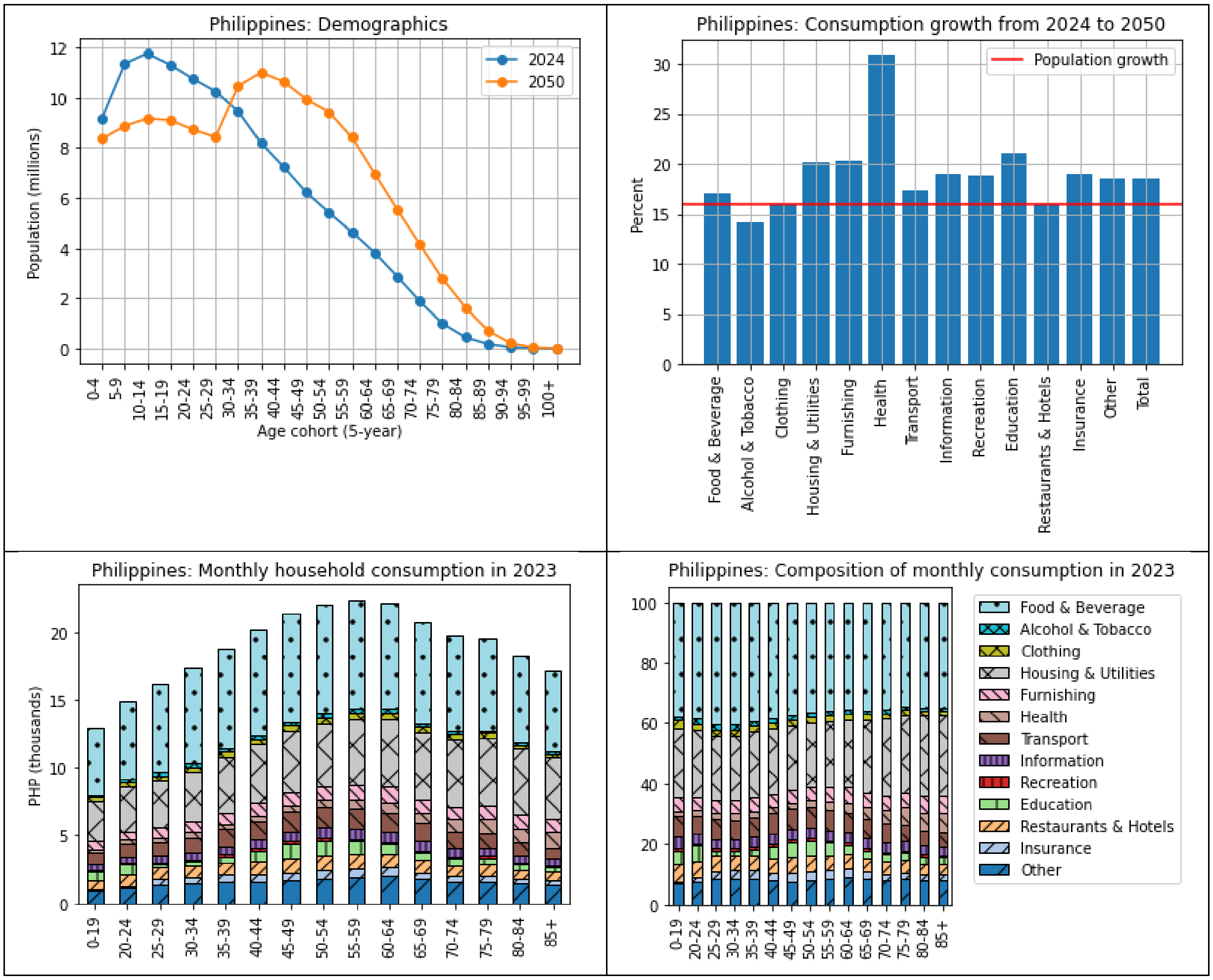


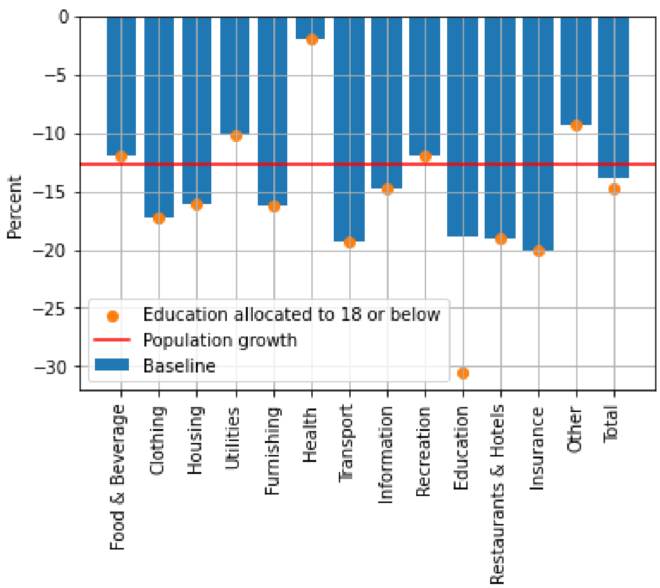
Figure 16. Philippines



Annex II. China: Alternative per capita estimation

The following figure shows that assuming education is spent only by those below 18 years old results in a larger decline in education and total consumption.

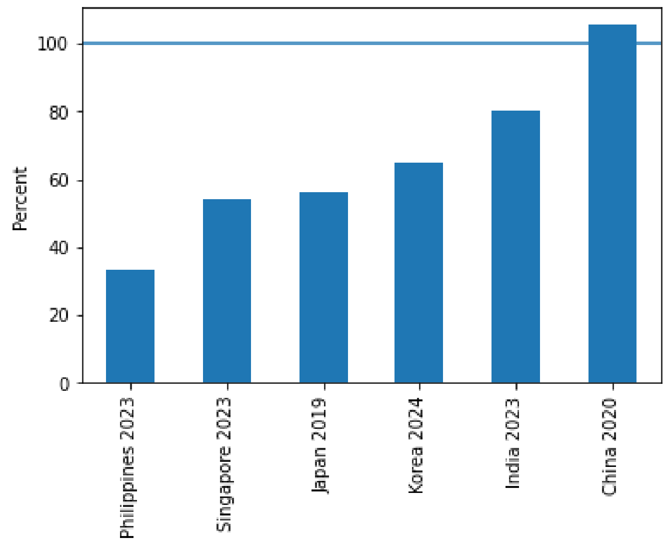
Figure 17. China: Consumption growth from 2024 to 2050 when education is consumed only by below 18



Annex III. Comparison with national accounts

The following chart shows that the total consumption is of a similar magnitude to final private consumption expenditure.

Figure 18. Total consumption as a percentage of final private consumption expenditure



References

Aksoy, Y., Basso, H., Smith, R., and Grasl T. (2019). “Demographic Structure and macroeconomic Trends.” American Economic Journal: Macroeconomies, Vol. 11(1), pp. 193-222.

Auclert, A., Malmberg, H., Martenet, F., and Rognile, M. (2021) “Demographics, Wealth, and Global Imbalances in the Twenty-First Century.” NBER Working Paper 29161.

Central Statistics Division of the Government of Tuvalu. (2021). “Population and Housing Census 2017.” https://stats.gov.tv/census/#81-85-population-and-housing-census

Central Statistics Division of the Government of Tuvalu. (2024). “Tuvalu Household Income & Expenditure Survey 2022-23." https://stats.gov.tv/news/tuvalu-household-income-expenditure-survey-hies-2022-23/

China Family Panel Studies, Institute of Social Science Survey of Peking University. (2020). “CFPS 2020.” https://www.isss.pku.edu.cn/cfps/

Cravino, J., Levchenko, A., and Rojas, M. (2022). “Population Aging and Structural Transformation.” American Economic Journal: Macroeconomics. Vol. 14, Nov. 4, pp. 479-498.

Fougere, M., Mercenier, J., and Merette, M. (2013). “A sectoral and occupational analysis of population ageing in Canada using a dynamic CGE overlapping generations model.” Economic Modelling, Vol. 24, pp. 690-711.

Garau, G., Lecca, P., and Mandras, G. (2013). “The impact of population ageing on energy use: Evidence from Italy.” Economic Modelling, Vol. 35, pp. 970-980.

International Monetary Fund (2025). “The Rise of the Silver Economy: Global Implications of Population Aging.” World Economic Outlook, Chapter 2.

Inoue, N., Matsumoto, S., and Mayumi, K. (2022). “Household energy consumption pattern changes in an aging society: the case of Japan between 1989 and 2014 in retrospect.” International Journal of Economic Policy Studies, Vol. 16(1), pp. 67-83.

Kuhn, M. and Prettner, K. (2018). “Population age structure and consumption growth: evidence from National Transfer Accounts.” Journal of Population Economies, Vol. 31, pp. 135-153.

Mason, A. and Miller, T. (2018). “International projections of age-specific healthcare consumption, 2015–2060.” Journal of the Economics of Ageing, Vol. 12, pp. 202-217.

Ministry of Statistics and Programme Implementation of India. (2023). “Household Consumption Expenditure Survey: 2023-24." Reference ID DDI-IND-MOSPI-NSS-HCES23-24. https://microdata.gov.in/NADA/index.php/catalog/237/get-microdata

Ministry of Internal Affairs and Communications of Japan. (2019). “2019 National Survey of Family Income, Consumption and Wealth.” https://www.e-stat.go.jp/en/stat-search/files?stat_infid=000032054450

Ministry of Internal Affairs and Communications of Japan. (2020). “2020 Population Census.” https://www.e-stat.go.jp/en/stat-search/files?stat_infid=000032142502

Ministry of Trade and Industry of Singapore. (2023). “Household Expenditure Survey (HES) 2023.” https://www.singstat.gov.sg/publications/households/household-expenditure-survey

Ministry of Trade and Industry of Singapore. (2020). “Singapore Census of Population 2020.” https://www.singstat.gov.sg/publications/reference/cop2020/cop2020-sr2/census20_stat_release2

National Bureau of Statistics of China. (2024). “China Statistical Yearbook 2024.”

National Health Commission of the People's Republic of China. (2024). “2023 中国卫生健康统计年鉴.”

PwC. (2017). “The Long View How will the global economic order change by 2050?” p.23. https://www.pwc.com/gx/en/world-2050/assets/pwc-the-world-in-2050-full-report-feb-2017.pdf

Statistics Korea (2024). “Household Income and Expenditure Survey.”

United Nations, Department of Economic and Social Affairs, Population Division (2024). “World Population Prospects 2024: Methodology of the United Nations population estimates and projections.” UN DESA/POP/2024/DC/NO. 10, July 2024

United Nations Statistics Division, Demographic Statistics Database. (2020) "Households by age and sex of reference person and by size of household." https://data.un.org/Data.aspx?d=POP&f=tableCode:50 (Accessed in August 2025).

PUBLICATIONS

Demographics and Consumption in Asia Toward 2050

Working Paper No. WP/2025/247