INTERNATIONAL MONETARY FUND

Graying Asia: How Aging Is Reshaping Banking

Haibo Li, Estelle Liu, Yinqiu Lu, and Anne Oeking

WP/26/150

2026
JUN

WORKING PAPER

 WP/26/150

IMF Working Paper
Asia and Pacific Department

Graying Asia: How Aging Is Reshaping Banking

Prepared by Haibo Li, Estelle Liu, Yinqiu Lu, and Anne Oeking*

Authorized for distribution by Sonali Jain-Chandra
July 2026

ABSTRACT: This paper explores how demographic shifts, particularly population aging, are reshaping banking in Asia-Pacific's bank-dominated financial systems. Using household surveys as well as bank-level and country-level panel data, we show that aging populations are associated, with shifts in bank portfolios away from traditional loans (with lower loan-to-deposit and loan-to-asset ratios), driven by changes in households' financial behavior. These changes affect banks' funding structures, profitability, and risk profiles, with implications for financial stability. We also provide new evidence on cross-border dynamics, showing that demographic divergence spurs asset reallocation toward younger economies. Our findings highlight evolving risks and supervisory challenges as demographic transitions unfold unevenly across economies.

RECOMMENDED CITATION: Li, Haibo, Estelle Liu, Yinqiu Lu, and Anne Oeking (2026): Graying Asia: How Aging Is Reshaping Banking. IMF Working Paper No. 26/150

JEL Classification Numbers:	G21, J11, G28, F21
Keywords:	Population aging; demographic change; bank balance sheets; household financial behavior; cross-border asset allocation
Author's E-Mail Address:	hli5@imf.org, eliu@imf.org, ylu@imf.org, aoeking@imf.org

* The authors would like to thank Rupa Duttagupta and Sonali Jain-Chandra for their overall guidance on this project. We are especially grateful to Tahsin Saadi Sedik for providing detailed and constructive feedback that significantly strengthened the analysis. Further, we would like to thank Evan Papageorgiou, Divya Kirti, members of APD's macrofinancial working group, and APD seminar participants for their valuable comments and suggestions. We would like to thank Cindy Xin Xu for her early contributions to the work; and thank Thi Chung Trinh for excellent research support.

Contents

Introduction

The Asia-Pacific region is undergoing a pivotal demographic transition. Rapid population aging is taking hold across a rising number of countries in the region, while the population is either growing at a decelerating pace or, in some economies, declining. The total regional population is projected to peak in 2054, according to United Nations population projections (United Nations, 2024), though underlying this are considerable differences in demographics across the region.

These twin forces—aging and population decline—will shape the region's economies and financial markets in important ways. Unlike the macroeconomic impacts of the demographic transition on public finances and pensions, interest rates, and productivity, which have been analyzed extensively, the impact of the demographic transition on financial systems, and in particular banks, has been studied less. This paper aims to contribute to filling that gap.

Why is the link between demographics and the banking sector important for the Asia-Pacific region? First, the region is undergoing rapid yet uneven demographic shifts, and aging is accelerating—meaning demographic pressures will thus only grow from here. Second, financial systems, especially in Asia-Pacific's emerging markets, remain bank-dominated, with banks still intermediating the majority of savings and credit. As populations age, household financial behavior is expected to change— shifting typically toward lower leverage and higher liquidity, including via greater deposit holdings. In the region's bank-based financial systems, these shifts will likely influence banks' funding structures, lending patterns, profitability, and business models and risk profiles. Understanding these dynamics will be critical for financial stability, regulation, and supervisory practices, as financial systems may not yet have fully matured. Third, as demographic profiles diverge across economies, global and regional banks may reallocate assets away from economies with older populations toward younger, faster-growing ones. These cross-border implications can have consequences for capital flows, financial integration and stability, including potential funding retrenchment or shifts in the product mix offered by foreign subsidiaries.

Against this background, our main research questions are as follows: How is demographic change (mainly aging and population growth) expected to affect banks' balance sheets and risk-taking in the Asia-Pacific region? And what are potential implications for financial stability?

Our main contributions to the literature are three-fold. First, we provide an integrated framework and fresh evidence—tracing the impact from households to banks and further to cross-border channels—to assess the impact of aging on the banking sector. Second, we focus on both global samples and Asia-Pacific economies in more detail which comprise a wide country sample, including many emerging market economies. Third, to the best of our knowledge, this paper is the first to explore changes to cross-border banking as a result of demographic change.

We find that aging is associated with: (i) lower loan-to-deposit and loan-to-asset ratios, and (ii) a shift in bank assets toward non-loan assets, which are not necessarily safer. We also find that (iii) changes in household behavior explain much of the funding and lending shifts, and that (iv) the expansion of banks' cross-border activities tends to be focused towards "early-dividend" (younger) markets.

The remainder of the paper is structured as follows. Section 2 presents the demographic developments in the Asia-Pacific region, focusing on aging and population growth. Section 3 reviews the existing literature on the aging-banking nexus. Section 4 describes the different data sets used. Section 5 shows stylized facts on household behavior from a range of household surveys in the region and presents a simple stylized scenario. Section 6 presents the results from both country-level panel analysis and cross-border analysis, showing how demographics impact bank balance sheets and global asset allocation. Finally, section 7 concludes.

Demographic Developments

The Asia-Pacific region is characterized by rapid yet uneven demographic transition. Some economies (e.g., Japan, Korea, China) have already moved to a post-dividend demographic state (Figure 1), while others are currently classified as late-dividend (e.g., Vietnam, Malaysia) or as early-dividend countries (e.g., Philippines, Bangladesh). Countries in the latter two categories are still benefiting from demographic dividend, albeit to different degrees.[1]

Many economies in the region will become old before becoming rich (IMF, 2017b), in contrast to what has been observed in most aging economies of Europe and North America. UN population projections show that in most Asian economies over the next two decades or so, key aging-related metrics (such as the share of the old age population and the total population growth rate) will be approaching levels of those advanced economies (Figure 2). These shifts will occur at income levels still below high-income thresholds and with less comprehensive social safety nets.

More broadly, two patterns stand out. First, the timing: Europe and Japan entered population aging earlier. Before 2010, aging was largely confined to these economies. Many others have been moving there only recently. Second, the rapid speed compared to other regions: since 2010, many Asian economies have moved through late- to post-dividend stages in a single generation, and by 2050 most are projected to reach severe aging, characterized by high old-age dependency ratios and population shrinkage (Figure 2). The contrast with Europe's gradual transition is stark: where Europe's age structure changed slowly over 1990–2010, Asia's shift is compressed in time, reducing the window for reforms to the labor market, pensions, and financial sectors.

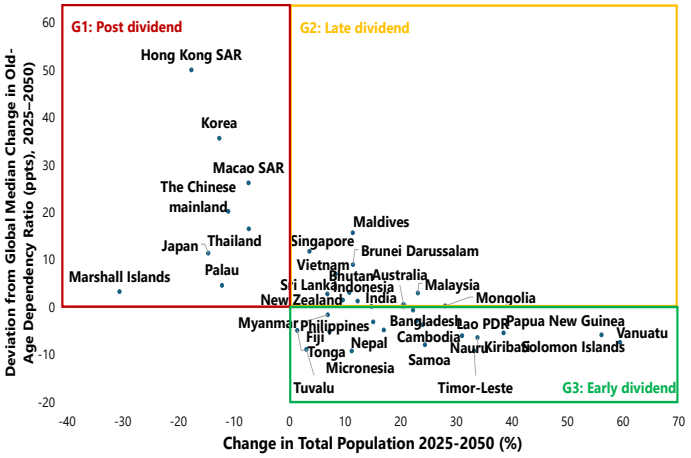
Even as the age composition of the population is rapidly changing, overall population growth remains positive in much of the region (outside the post-dividend group). Despite this, the share of older people rises even as headcounts continue to grow. The upshot is a rapid deterioration in old-age dependency ratios driven by composition effects rather than universal population decline—an adjustment path with distinct macro-fiscal and financial-intermediation implications that we examine below (Figures 3 and 4).

These structural headwinds imply that older cohorts or households will increasingly dominate the financial customer base, but with considerable differences in the capacity to smooth consumption in retirement (e.g., the availability of coverage of pension systems). The speed and unevenness of the transition—Japan or Korea as

[1] To determine these demographic groups, we rely on the two demographic indicators most relevant to our analysis—aging as measured by the old-age dependency ratio, and population growth, measured by the change in total population. We estimate these changes between 2025 and 2050, based on UN (2024) population projections. Other classifications and indicators have been used in the literature; they could also be more backward- than forward-looking. However, we find that most classifications yield broadly similar results.

economies at an advanced stage of aging, but also emerging markets like China, Thailand, and Sri Lanka that have been aging quickly—raise region-specific challenges for banks and regulators.

Figure 1: Asia-Pacific Demographic Groups Based on Aging Pace and Population Growth



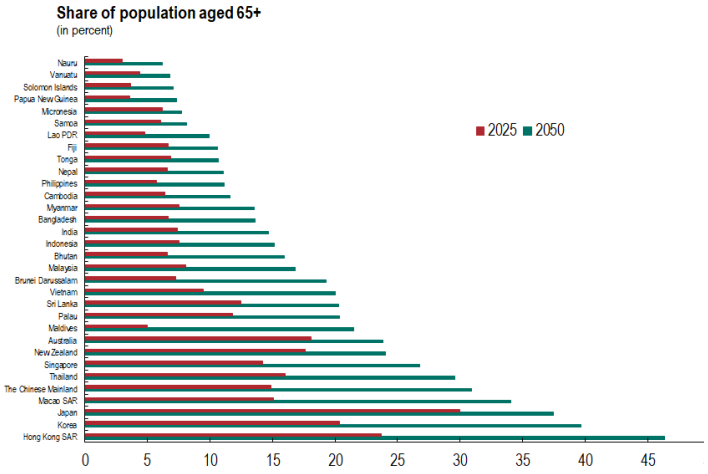
Sources: UN 2024 World Population Prospects, and IMF staff calculations.

Figure 2: Aging and Population Dynamics in the World

Economies	Old-age Share (%)						Total Population Growth Rate (%)					
	1990	2000	2010	2025	2040	2050	1990	2000	2010	2025	2040	2050
North America	10			16		22	1.3			0.6		0.2
South America	5			15		30	1.9			0.6		0.1
Europe												
European Union	14			23		31	0.4			-0.2		-0.3
Other Europe	11			18		25	0.5			0.0		-0.3
Asia												
Japan	12			30		38	0.4			-0.5		-0.8
Hong Kong SAR	9			24		46	0.4			-0.3		-1.4
Australia	11			18		24	1.5			1.0		0.6
New Zealand	11			18		24	1.9			0.7		0.2
Korea	5			20		40	1.3			-0.1		-1.0
Macao SAR	7			15		34	3.5			0.2		-0.5
The Chinese Mainland	5			15		31	1.7			-0.2		-0.8
Thailand	4			16		30	1.7			-0.1		-0.6
Singapore	6			14		27	3.4			0.7		-0.3
Sri Lanka	6			13		20	0.6			0.5		0.0
Vietnam	6			10		20	2.1			0.6		0.0
Mongolia	4			5		13	1.9			1.2		0.8
Indonesia	4			8		15	1.8			0.8		0.2
Philippines	3			6		11	2.6			0.8		0.2
India	4			7		15	2.2			0.9		0.2
Other Asia	4			6		10	2.3			1.3		0.9
MENA	3			6		12	2.7			1.6		0.9
Sub-Saharan Africa	3			3		5	2.8			2.5		1.6

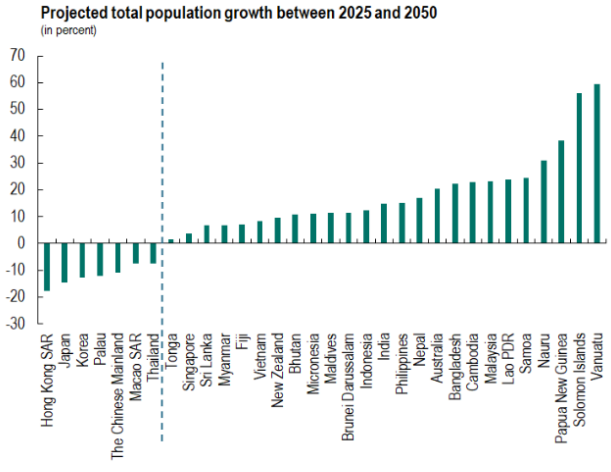
Sources: UN 2024 World Population Prospects, and IMF staff calculations.

Figure 3: Share of population aged 65+



Sources: UN 2024 World Population Prospects, and IMF staff calculations.

Figure 4: Projected total population growth between 2025 and 2050



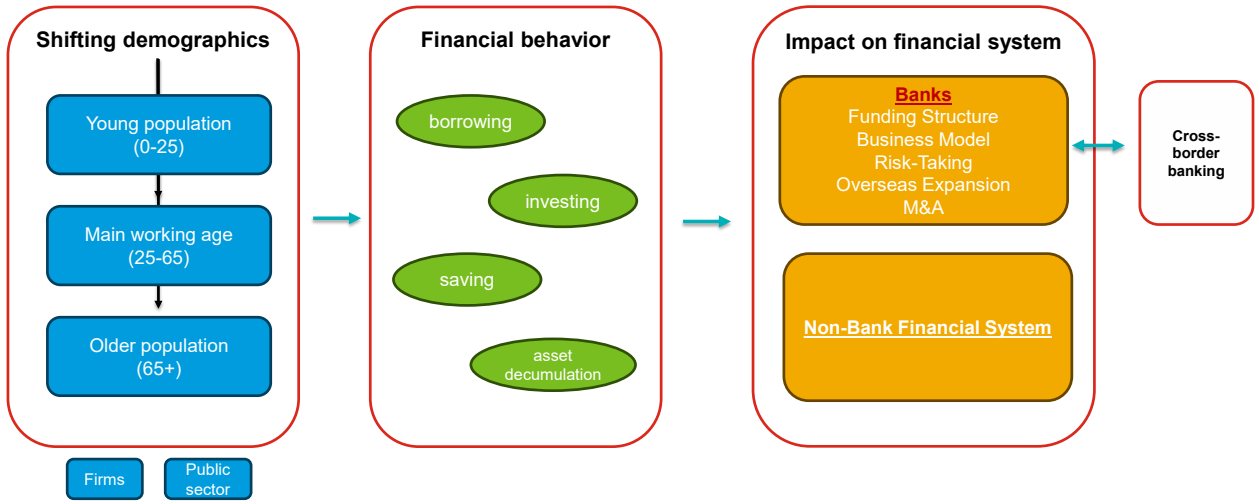
Sources: UN 2024 World Population Prospects, and IMF staff calculations.

Linking Demographics to the Financial System

How does demographic change translate into impacts on the financial system? The most direct link between demographics and banking lies in shifts in household financial behavior—how people save, borrow, and invest

as they age (Figure 5). These changes will also impact corporates and the public sector, which, in turn, could also affect the banking sector. For example, aging might result in lower corporate loan demand or shifts in sectoral borrowing, with corresponding implications on banks' loan portfolios. Here, we focus first on understanding changes in the financial behavior of households and turn then to examining the implications for financial system, especially banks' balance sheets, and finally consider implications for cross-border lending and borrowing by banks.

Figure 5: Aging and Banking: A Conceptual Diagram



Source: IMF staff.

Literature on Demographics and Banking

The foundational theories linking age and household behavior were developed in the 1950s. Modigliani and Brumberg (1954) proposed the life-cycle hypothesis, which postulates that households' saving behavior will change over their lifetime. With these changes, households can maintain a relatively stable level of consumption over their lifetime, by saving when income is high—during prime earning years—and borrowing or dissaving when their income is low (early and late in life). It implies that wealth accumulation will be hump-shaped, peaking in middle age. The permanent income hypothesis (Friedman, 1957) states that individuals' consumption decisions are based on their lifetime income, not their current income. These hypotheses suggest that age structure, longevity, and other demographic shifts will affect the financial behavior of households.

Analyzing how aging affects the financial system began in the late 1980s and 1990s, driven initially by the desire to understand the implications for changes in the relative roles of public and private pension systems and the differences in their funding structures in OECD countries (OECD 1998; Gruber & Wise, 1999).[2] Gradually, the literature expanded to cover a wide range of topics: the effects of aging on asset prices such as housing and equities (Poterba, 2004; Davis & Li, 2003), on saving behavior and asset accumulation (Börsch-

[2] Earlier debates include the Geneva Association's *Four Pillars Programme* launched in 1987, which emphasized long-term financing of pensions and insurance.

Supan 2003), and on the overall structure of the financial system, including interest rates and capital flows (Carvalho, Ferrero & Nechio 2016; Davis 2006).

More targeted research on the impact of aging on banking systems emerged over the last decade, including case studies on Japan (e.g., Imam, 2013, and IMF, 2017a). At the household level, studies have shown that aging is associated with declining risk appetite, higher deposit shares, and lower leverage after retirement (e.g., Imam, 2013; Li et al., 2024). At the bank level, aging tends to lower credit demand and compress margins (Ramlall, 2023; Berlemann et al., 2014). Recent work points to possible risk-taking incentives in aging economies as banks seek yield (Doerr et al., 2024; Imam & Schmieder, 2025). Davis and Karim (2025) provide a broader survey of the literature in this field.

Empirical evidence for the Asia-Pacific region, especially for emerging market economies, is still limited, especially with respect to cross-border lending and borrowing by banks. And yet, recent work by policy-making institutions underscores rising supervisory interest in this topic (e.g., RBNZ, 2025). Our paper contributes to the growing literature on aging and banking by jointly analyzing (i) household behavior; (ii) bank balance-sheet composition; and (iii) cross-border asset and liability allocations using a coherent empirical framework and a global bank panel database, with and a special focus on Asia.

Data Description

We draw on three datasets to explore the implications of aging on the banking system.

Household Surveys

We rely on household surveys from Australia, China, Indonesia, Japan, New Zealand, and the Philippines to explore age-group profiles of financial assets, including bank deposits; liabilities; and debt participation. Household surveys from Korea, Malaysia, Nepal, and Thailand complement our findings with partial coverage. Whenever possible, we rely on published aggregated data. Further information is available in Annex I.

This data provides an insight into household financial behavior by age but comes with some challenges and shortcomings:

- First, the data can be sensitive to the aggregation method and age grouping. Since these are individual household surveys across a range of countries, available age groupings do not always match across countries.
- Second, reported average figures usually refer to the mean, thus do not take into account income or wealth distributions and can be skewed towards the wealthiest households. For some countries, we are able to control for these distributions as a robustness check.
- Third, important differences in the financial systems across countries make direct comparisons challenging for some indicators, for example, whether retirement funds are mostly private or public and thus counted towards household balance sheets or not. Usually, social security wealth or wealth in defined pension funds would not be included in these household surveys but could play an important role in household's financial behavior in old age.
- Fourth, the results by age groups could also be driven by differences across cohorts. This is particularly important when we talk about countries that have undergone rapid development over the

last decades, for example, an 80-year-old person today was brought up in very different circumstances than a future 80-year-old person growing up right now. To understand how our findings differ across time, we add samples from different time periods whenever available—by and large, the results do not seem to change much with time.

- Fifth, higher income can be associated with longevity, and this effect could be even more pronounced in lower income economies with weaker health systems (e.g., Neumayer and Plümper, 2016, or Payne et al., 2025). Thus, our findings for older cohorts could be skewed towards wealthier households.
- Sixth, as we rely on aggregated data in most instances, we cannot make full use of the underlying micro data, e.g., to control for other factors or age-cohort-time effects. In addition, none of the surveys are longitudinal studies, we thus cannot control for changes over time.

Despite the caveats, these sources offer rare cross-country insight into how demographic change maps into bank-relevant behaviors in Asia.

From Bank-level to Country-level Panels

To examine banks' response to demographic transition, we construct a panel data set based on banks' financial statements, harmonized across accounting regimes, and aggregate them to the country–year level for key ratios: the loan-to-deposit ratio, the loan-to-asset ratio, and the deposit-to-funding ratio. The data are sourced from the Fitch Connect Database, which provides global bank data spanning 1981–2023, though observations before 1989 are very limited. Our data cleaning procedures for the Fitch Connect data are broadly consistent with Raddatz et al. (2024), except that we use unconsolidated rather than consolidated financial statements. This avoids double-counting across countries in our bank-level analysis, which examines the association between population aging and the asset allocations across subsidiaries within bank groups.[3] The cleaning procedures are documented in Annex I.

As shown in Table 1, the dataset is composed of a global bank-level panel of 4,256 banks covering the period 1989–2023. We then aggregate this bank-level dataset to a country-level panel by taking the averages of the key banking ratios. The country-level panel covers 56 economies, spanning all geographic regions and representing different demographic status. We take the unbalanced panel as the main database for our analysis but also construct a balanced panel spanning from 2000 to 2023 for robustness checks. In our main analysis, we exclude all low-income countries from our sample to avoid structural differences in the banking sector, while our findings still broadly hold after including these countries.

We merge macroeconomic controls and demographic variables in the country-level panel. For macroeconomic controls, we use the GDP growth rate, GDP per capita, CPI inflation rate, trade openness (defined as the ratio of total exports and imports to GDP) and policy interest rate from the IMF World Economic Outlook Database, and we take the credit-to-GDP ratio from the World Bank Global Financial Development Database to control for the country-specific credit situation. Demographic variables are constructed from UN World Population Prospects, including the old-age share (population aged 65 and above as a share of the total population), total population growth, life expectancy, and active-age share (population aged 15-49 as a share of the total population).

[3] For the country-level analysis, a robustness check shows that the findings still hold when using consolidated data.

Table 1: Distribution of Bank- and Country-level Panels

Region	Number of Economies	Number of Banks	Demographic Status		
			Early Dividend	Late Dividend	Post Dividend
Asia-Pacific	16	1,732	4	6	6
Europe	13	1,412	2	3	8
Western Hemisphere	11	912	3	7	1
Middle East and Central Asia	8	99	5	3	0
Sub-Saharan Africa	8	101	5	2	1

Note: The panel listed here is unbalanced with a maximum time coverage spanning 1989–2023.

Cross-border Allocation Dataset

Using the same bank-level panel data, we further construct a cross-border banking allocation dataset to study how banks adjust their behavior in the context of aging. We use the Ultimate Ownership Dataset from Fitch Connect to identify the ultimate owners, i.e., the banking group or parent bank, of each observation and summarize country-specific total assets of each banking group as well as each group's global total assets. Among all the 4,256 banks in the bank-level panel, 3,751 banks have been matched to 3,129 ultimate parents. Consistent with the bank-level panel data, we use unconsolidated financial statements to avoid double-counting of banking groups' balance sheets across subsidiaries which is essential for the analysis of this section, as we focus on cross-border allocation within each group. We thus exclude banking groups that operate only in one country to remove institutions without cross-border activity. After excluding these, our final sample includes 166 banking groups headquartered in 46 economies across all regions during 1989–2023, yielding a total of 2,504 bank–country–year observations.[4]

Household Level Findings

Stylized Facts

The household surveys present the following stylized facts:

- **Wealth accumulation**: Both household financial assets and total assets (the latter including real estate) peak around the time of or before retirement. Household liabilities peak slightly earlier, in mid-life. Taken together, household net worth or net financial assets peak around the time of retirement. These findings are broadly in line with the hump-shaped wealth accumulation predicted by the original life-cycle hypothesis and suggest some asset decumulation in older age (Figure 6).

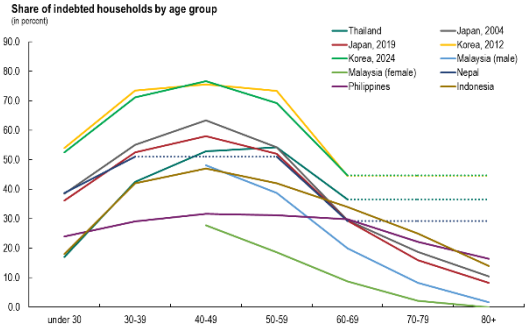
[4] See Table A2 in Appendix I for the distribution of ultimate groups.

Figure 6: Wealth Accumulation

Sources: National household surveys and IMF staff calculations.
Notes: Green indicates higher values, red lower values.

- **Debt participation**: The share of indebted households increases in mid-life and declines steadily as the household ages (Figure 7). A non-negligible share of elderly households still carry debt, but the data suggests this is due to continued income sources, multi-generational households, or a crude breakdown of the elderly age group in our data.

Figure 7: Debt Participation

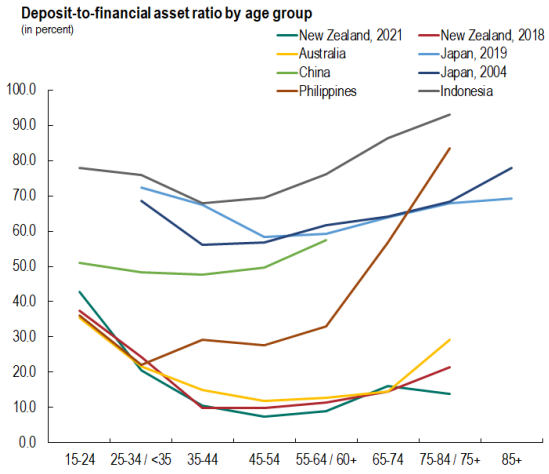


Sources: National household surveys and IMF staff calculations.
Note: Dotted lines indicate less detailed breakdown of age groups.

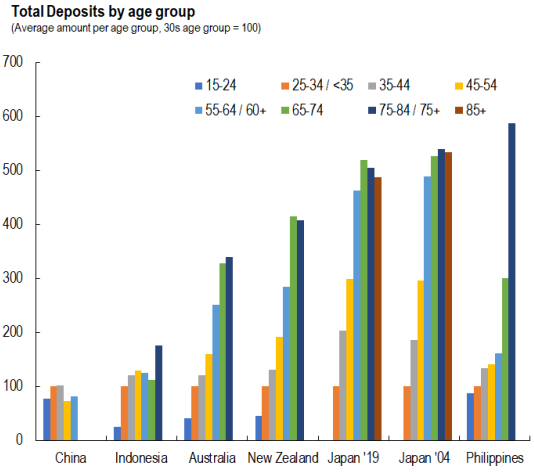
- **Portfolio composition**: The data suggests a shift toward safer assets with age (Figure 8). The ratio of deposits to total financial assets follows a U-shaped pattern across age groups, falling in mid-life and increasing again for elderly households, thus tilting the composition towards safer assets, here captured by bank deposits. The level of bank deposits remains relatively stable across elderly groups, broadly suggesting that any asset decumulation happens across other asset classes.[5]

[5] However, comparing data from 2004 and 2019 for Japan, a post-demographic-dividend society, we observe that bank deposit decumulation among post-retirement age groups was more pronounced in 2019 than in 2004. As these are only two points in time, we cannot test whether the tendency for older people to hold on to their deposits is a persistent pattern over time. But it raises the question of whether marginal behavioral shifts have occurred as Japan's society continues to age.

Figure 8: Portfolio composition



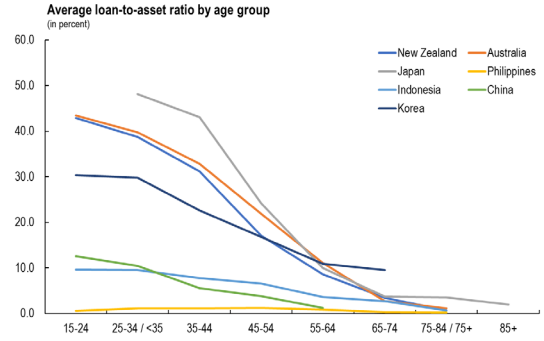
Sources: National household surveys and IMF staff calculations.



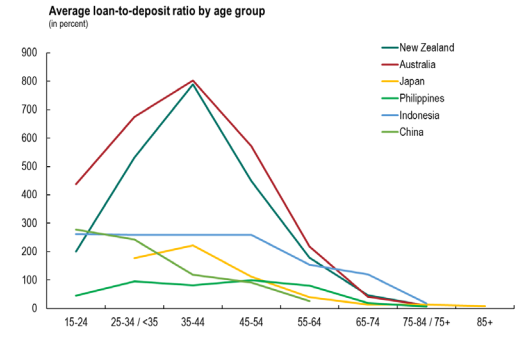
Sources: National household surveys and IMF staff calculations.

- **Financial leverage**: Taken together, financial leverage and risk exposure are lower for older age groups. Both the average loan-to-asset ratio and the average loan-to-deposit ratio by age group show a clear downward trend with age (Figure 9).

Figure 9: Financial leverage



Sources: National household surveys and IMF staff calculations.



Sources: National household surveys and IMF staff calculations.

These findings are broadly in line with the life-cycle hypothesis and are intuitive. As people age, they no longer expect rising labor income, have lower spending needs, and, therefore, less need for mortgages or consumer loans. In addition, credit supply to older borrowers may tighten, as lenders face higher repayment risk because of shorter remaining lifespans and longevity risk. The latter, and the related risks of higher medical costs incentivizes households to hold more of their assets in safe and liquid assets, especially bank deposits.

A Simple Scenario

To translate these household level observations into aggregate or bank-level changes, we create a stylized scenario, for illustrative purposes. We explore how aggregates of financial variables would change by 2050 if behavior within age groups remained constant, but the population size and composition changed in line with population projections:

$$x_t = \sum w_{i,t} x_{i,t} \quad (1)$$

With $x = financial\ variable$ (either total deposits, total loans, or total assets), $t = year$, $i = \text{age group}$, and $w_{i,t} = population_{i,t}$. Assuming $x_{i,t} = x_i$:

$$x_{t+n} = \sum w_{i,t+n} x_i \quad \text{with } n = 1,2,..\ 20, \ldots years.$$

For $r = financial\ ratio$ (either average loan-to-asset ratio or average loan-to-deposit ratio), with the financial variables $l = total\ loans$, and $y = total\ assets$ or $total\ deposits$, and same assumptions above, we calculate:

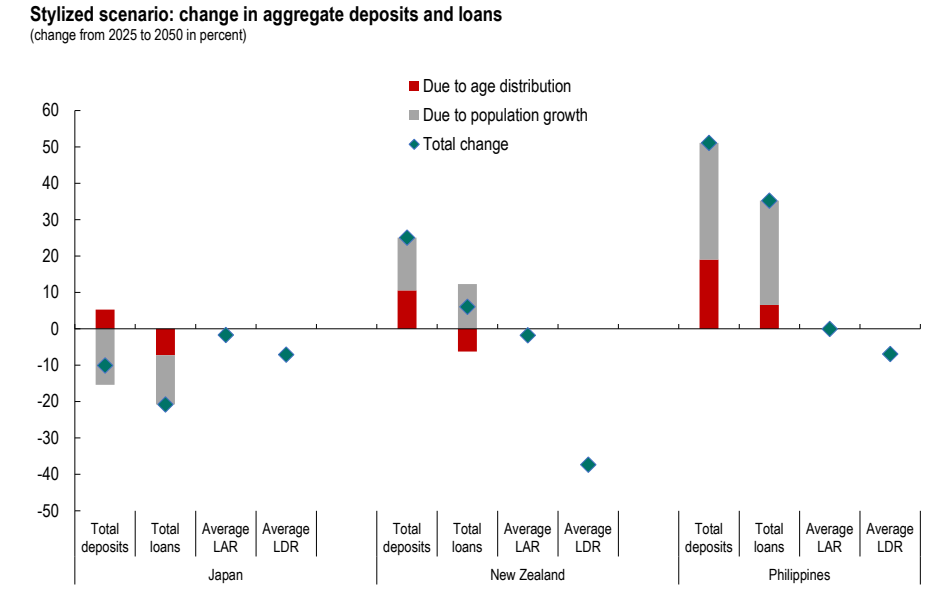
$$r_{t+n} = \frac{\sum w_{i,t+n} l_i}{\sum w_{i,t+n} y_i} \quad (2)$$

This exercise abstracts from any price and interest rate changes, income and wealth effects, birth cohort differences, and fiscal policy changes, etc. For countries with household-level data only, it assumes individuals behave in line with household-level findings. This is a rough approximation as household age groups are determined by the household head, and average household compositions change over time. Despite these extreme simplifications, we use the scenario to illustrate how—ceteris paribus—population growth and population age composition could impact bank balance sheets.

Holding within-age cohort behavior fixed and letting only population size and age composition evolve to 2050, we illustrate sizable shifts in banking aggregates. Figure 10 presents result for Japan, New Zealand, and the Philippines, representing the three demographic groups (see Figure 1). We find that the shifting age distribution (i.e., a larger share of the elderly, shown as red bars in Figure 10) would increase total deposits and decrease total loans, except in the relatively younger Philippines. But if we add the size of the population (grey bars in Figure 10), a shrinking population such as in Japan would imply both fewer deposits and fewer loans, i.e., taken together, both aggregates would fall. With a projected increasing population as in New Zealand and the Philippines, both aggregates would increase. Yet, demographic shifts still reduce leverage ratios in this illustrative scenario: as assets and liabilities change at different ages and at different speeds, both the average loan-to-asset ratio and the average loan-to-deposit ratio would fall in our three country examples.

As long as populations keep growing—and they do in most economies in the Asia-Pacific region—any aggregate impact for the total level of deposits and loans in our scenario might still be positive. However, taken together, relevant leverage ratios would fall. Thus, aging plus positive population growth would raise levels while lowering ratios.

Figure 10: A Simple Illustrative Scenario



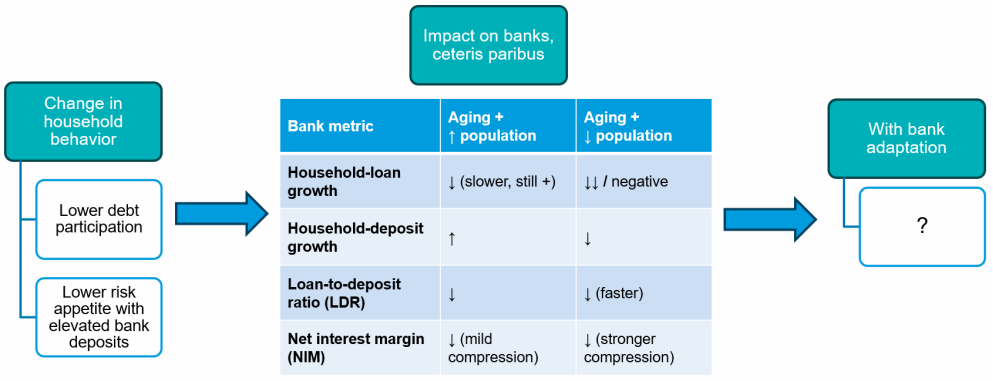
Sources: National household surveys and IMF staff calculations.
Notes: LAR = loan-to-asset ratio. LDR = loan-to-deposit ratio.

From Household Level Behavior to Bank Impact

To summarize, our stylized facts suggest that aging households have lower debt participation and hold fewer risky assets, thus shifting portfolios to more liquid assets even as overall wealth might be drawn down. These age-related changes in households' financial behavior will likely lower credit exposures, but also lower banks profits . *Ceteris paribus*, household-loan growth and household-deposit growth would slow in aging and shrinking economies (Figure 11). With relatively higher demand for deposits, banks' loan-to-deposit ratios will thus likely fall, even in countries still experiencing positive population growth, and banks may need to hold more lower-yielding liquid assets.

Banks are unlikely to passively accommodate these changes and will adjust their business models, potentially toward non-loan assets and fee-based activities, and adjustment in asset allocation. To understand these changes, the next section focuses on the demographic impact on banks' funding and credit demand.

Figure 11: From Household Behavior to Bank Impact: A Conceptual Diagram



Source: IMF staff.

Country-Level Analysis and Findings

Country-Level Panel: Aging and Bank Balance Sheets

To understand the impact of demographic change on banks' funding structure and credit activity, we conduct country-level panel regressions in the form:

$$Y_{it} = \beta A_{it} + \alpha X_{it} + \mu_i + \mu_t + \varepsilon_{it} \quad (3)$$

where the dependent variable Y_{it} represents one of the aggregated banking indicators of interest in country i and year t, including the loan-to-deposit ratio, the deposit-to-funding ratio and the loan-to-asset ratio. The key independent variable A_{it} represents demographic developments. In our baseline regression, we take the old-age share as the core metric of aging, whereas in a further robustness check we also include three other demographic variables—the population growth rate, life expectancy, and the active-age share (15-49). In X_{it}, we include the real GDP growth rate, log of real GDP per capita, CPI inflation, policy interest rate, trade openness (defined as the ratio of total exports and imports to GDP) to control for the general macroeconomic context of an economy, and we include the total bank credit to GDP ratio to control for the credit situation. We include country fixed effects to control for time-invariant factors and year fixed effects to control for common shocks and trends.

Baseline Results

Our baseline regressions show that aging—measured by the old-age share—is associated with material changes in bank balance sheet structure. Table 2 reports the results of the baseline country-level regressions:

- **Loan-to-deposit ratio**: Column (1) shows that a 1-percentage point increase in the old-age share is significantly associated with a 5.2-percentage point decline in the loan-to-deposit ratio, aligning with deleveraging over the aging process discussed above.[6] This association is economically sizable, in particular when combined with the rapid population aging in Asia-Pacific.

[6] This can be due to both lower credit demand and supply.

- **Loan-to-asset ratio**: Column (2) indicates that the loan-to-asset ratio is also lower by about 1.4 percentage point per 1-percentage point increase in the old-age share, suggesting a portfolio reallocation away from loans.

- **Deposit-to-funding ratio**: As shown in column (3), the deposit-to-funding ratio rises with aging, by about 1.3 percentage point per 1-percentage point increase in the old-age share. This is consistent with the expectation that older households tilt toward safer, more liquid assets such as deposits, thereby boosting core deposit funding for banks.

Table 2: Results of the Baseline Country-level Regression

	(1) Loan/Deposit	(2) Loan/Asset	(3) Deposit/Funding
Old-age Share (65+/Total)	-5.162***	-1.414***	1.296***
	(0.764)	*(0.243)*	*(0.305)*
Real GDP Growth Rate	-0.283	-0.004	0.089
	(0.195)	*(0.067)*	*(0.056)*
Ln Real GDP per Capita	36.669***	3.227	-12.596***
	(5.440)	*(2.041)*	*(2.014)*
Short-term Interest Rate	-0.295**	-0.163***	-0.025
	(0.142)	*(0.047)*	*(0.068)*
Credit-to-GDP Ratio	54.515***	21.759***	-15.921***
	(7.205)	*(2.565)*	*(2.397)*
CPI Inflation	0.088	0.003	0.007
	(0.127)	*(0.048)*	*(0.062)*
Trade-to-GDP Ratio	-4.233	1.427	-1.083
	(6.402)	*(1.806)*	*(2.365)*
Country Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Observations (country-year)	1,038	1,038	1,038
R2	0.579	0.696	0.615

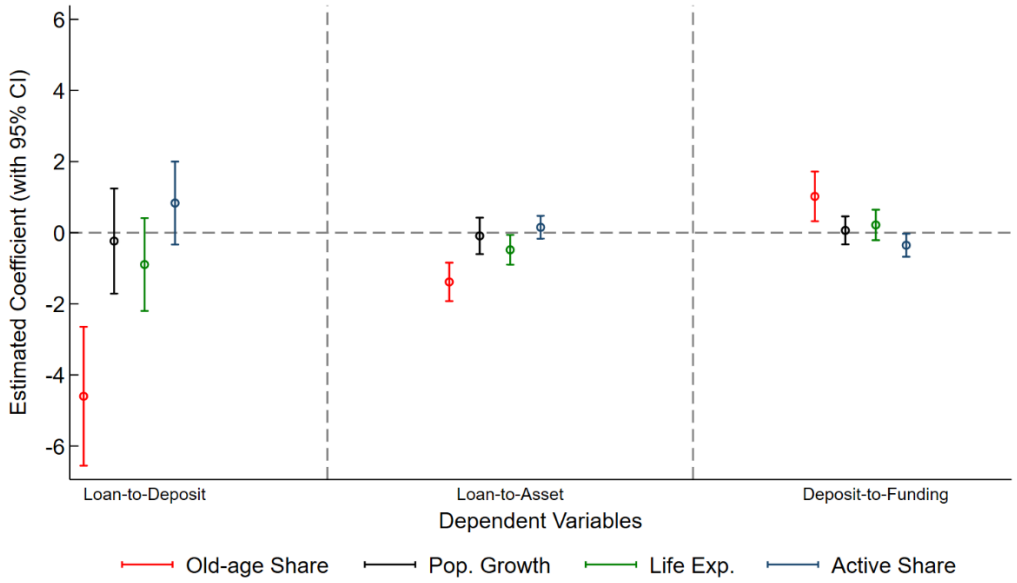
Notes: Standard errors clustered by countries are shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Robustness Check

As a robustness check, we include three other demographic variables—population growth, life expectancy, and active-age share in our regression. Figure 12 presents the results. As shown in the red lines in the figure, the relationships between aging measured as old-age share and the core banking indicators are still consistent with the baseline regression. Population growth often offsets aging—boosting credit and moderating deposit dominance—consistent with the scenario analysis based on the household survey data.[7] Further robustness checks are explored in Annex II and present similar findings.

[7] As additional robustness checks, we also exclude low-income countries and use a smaller, balanced panel. These findings all support the robustness of the relationship between aging and the shown banking variables.

Figure 12: Robustness Check for Country-level Regression



Sources: UN 2024 World Population Prospects, Fitch Connect Database, and IMF staff calculations.
Notes: Dots represent the estimates of coefficients. Lines indicate their 95% confidence interval.

Forward-looking Application

Based on our estimation results, we illustrate banking sector dynamics to show where bank balance sheets may face the largest demographic headwinds. To do so, we apply the regression elasticities estimated above to UN demographic projections and derive key banking indicators across the world. This assumes the marginal associations between the old-age share and bank balance sheet indicators as estimated in our regression continue to hold forward.[8]

As shown in Figure 13, Asia would experience a more significant decline in loan-to-deposit ratios and loan-to-asset ratios than other regions due to its rapid population aging. Within Asia, a divergent picture emerges: Mainly due to a high initial base, economies like Australia or New Zealand would retain high loan-to deposit and loan-to-asset ratios in the future. However, other Asian economies, starting from a lower loan-to-deposit ratio or a lower loan-to-asset ratio and undergoing faster aging, such as China, Korea, and Thailand, could potentially experience diversification of banking asset allocation indicated by a decreased loan-to-asset ratio. Overall, the illustration points to regionally uneven balance-sheet implications ahead.[9]

[8] It is a linear interpretation of the regression results and future research could explore non-linearities in the data.

[9] The findings differ qualitatively from the scenario in section 5.2, though directionally are the same. Since both exercises—particularly the one based on household data—make simplifying assumptions, we focus on the direction and speed of the changes rather than the overall size.

Figure 13: Illustration of Future Banking Sector Indicators in the World

	Loan-to-Deposit Ratio (%)					Loan-to-Asset Ratio (%)				
	2000	2010	2023	2040E	2050E	2000	2010	2023	2040E	2050E
North America	94		90		68	62		59		52
South America	95		103		71	46		50		40
Europe										
European Union	100		92		61	47		50		39
Other Europe	99		83		54	55		48		38
Asia-Pacific										
Australia	158		114		92	72		65		58
New Zealand	158		127		102	78		80		71
Korea	91		96		23	61		70		46
Malaysia	92		91		59	64		59		49
Thailand	76		94		44	63		67		50
The Chinese Mainland	73		83		26	55		57		39
Singapore	76		77		31	51		54		39
Japan	74		64		37	68		52		43
Hong Kong SAR	58		65		-19	45		43		15
Indonesia	35		85		57	25		61		52
Philippines	73		68		48	52		53		47
India	51		81		55	40		62		53
Macao SAR	47		84		15	41		50		27
Sri Lanka	90		67		38	58		54		45
MENA	75		83		61	54		56		49
Sub-Saharan Africa	106		89		83	67		61		59

Sources: UN 2024 World Population Prospects, Fitch Connect Database and IMF staff calculations.
Notes: This figure illustrates the impacts of changes in the old-age share on the banking sector. The unit impact of aging is based on the regression coefficients and is assumed to be same for all countries.

Cross-Border Channels: Aging and Global Asset Allocation

The regionally uneven balance sheet implications of the demographic transition should provide incentives for cross-border lending and borrowing across the Asia-Pacific region. In this section, we will examine whether we can establish an association between banks' cross-border assets and demographics. To this end, we use a cross-border bank-country level panel regression in the form below:

$$\frac{Y_{b,i,t}}{G_{b,t}} = \beta_1 A_{i,t} + \beta_2 X_{i,t} + \mu_{b,i} + \gamma_{h,t} + \varepsilon_{b,i,t} \quad (4)$$

where the dependent variable $\frac{Y_{b,i,t}}{G_{b,t}}$ represents the ratio of banking group b's assets in a host country i to its global total assets $G_{b,t}$, reflecting the banking group's resource allocation share to a specific country. The key independent variable $A_{i,t}$ represents aging developments in the host country, which we proxy using the old-age share, consistent with our previous analysis. Its coefficient β_1 captures the association between aging developments in the host country and the resources share of the banking group in the host country, implying the relationship between aging and banks' behavior. In this regression, we also include the same macro controls $X_{i,t}$ as in the country-level regression. We control for bank-country fixed effects $\mu_{b,i}$ to absorb time-invariant heterogeneity across bank-country pairs. We also include home-country-year $\gamma_{h,t}$ fixed effects to control for all factors in the banking groups' home country over years and common shocks across years. To

eliminate the potential heterogeneity arising from the banking group's home-country exposure, we exclude observations located in the banking group's home country, i.e., where the dependent variable corresponds to group b's assets share in its home country. This ensures that the estimated coefficients reflect only cross-border allocations.

Results

We find that asset allocation of banks are affected by population aging. The estimates (Table 3) imply that, on average, a one-percentage-point increase in the old-age share in the host country is associated with an approximately 0.85-percentage-point decrease in the share of subsidiary banks' assets relative to the total assets of their ultimate parent groups, suggesting that banks allocate relatively less balance-sheet capacity to aging markets where credit demand and growth prospects are weaker. Based on linear projections, this result suggests that the projected changes in old-age shares between 2023 and 2050 would be associated with decreases ranging from 8 to 32 percentage points in the share of subsidiary banks' assets relative to their ultimate groups' total assets.

Meanwhile, the results show that the share of banks' assets in a host country increases with the country's real GDP growth rate and declines with its log real GDP per capita, implying that banks tend to allocate more to emerging market economies with potentially lower per capita income and higher GDP growth. The asset share also rises with the country's credit-to-GDP ratio, suggesting that a more developed financial market attracts capital.

Table 3: Results of the Cross-Border Allocation Regression

	Banking group's assets in a foreign country/Banking group's global total asset (in percent)
Old-age Share (65+/Total)	-0.851**
	(0.418)
Real GDP Growth Rate	0.170***
	(0.059)
Ln Real GDP per Capita	-9.526***
	(3.034)
Short-term Interest Rate	-0.025
	(0.039)
Credit-to-GDP Ratio	11.623***
	(3.081)
CPI Inflation	0.018
	(0.044)
Trade-to-GDP Ratio	2.159
	(2.715)
Country-bank Pair Fixed Effects	Y
Year Fixed Effects	Y
Home Country*Year Fixed Effects	Y
Observations (bank-country-year)	2,504
R2	0.827

Notes: Standard errors clustered by bank-country pairs are shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Conclusion and Discussion

In this paper, we focus on the impact of demographics on banks in the Asia-Pacific region and find that aging is associated with significant changes in the structure of bank balance sheets, and consequently banking behavior. We build upon the earlier, still limited, literature by using a broader global bank panel dataset and refined demographic metrics, with a special focus on Asia-Pacific. We also innovate with a cross-border analytical framework, an area previously not widely explored. Our main findings can be summarized as follows:

- **Demographics reshape bank behavior through household channels**. Household-level evidence shows aging is associated with more holdings of safer financial assets and reduced leverage—reflected in increased bank deposits and reduced loan participation.

- **Aging shifts bank portfolios.** Panel regressions show that a rising old-age share is associated with lower loan-to-deposit and loan-to-asset ratios, indicating shrinking credit demand or supply and asset reallocation away from loans, not necessarily lower leverage.

- **Demographics shape cross-border banking decisions**. Our novel cross-border regression framework shows banks allocate fewer assets to aging host economies—or more assets to younger host economies—suggesting demographic dynamics influence global expansion strategies.

The demographic transition in Asia-Pacific is already altering the plumbing of banking. The changing household financial behavior, especially lower leverage and a stronger preference for deposits, translates into a lower share of loans in bank balance sheets. As populations age and in some cases, shrink banks are likely to diversify away from loans toward other activities, which may introduce new risks that may be captured by standard regulatory and supervisory leverage metrics, rather showing up in an adjusted balance sheet composition. Weaker loan demand and thinner lending margins in aging economies could push banks toward non-loan assets and fee-generating businesses that better match a stable deposit base. Importantly, this shift does not necessarily lower risks: expansions into trading books and wealth or retirement services raise exposure to market, duration, and fee-income volatility. Thus, aging can reduce the concentration of loans in bank portfolios while reshaping, rather than eliminating, risk. While more liquidity in the banking system would benefit regulatory buffers, risks could re-emerge in new, less regulated activities, or in non-bank financial institutions, making regulatory agility critical to keep pace with financial innovation in aging economies.[10]

Moreover, banks systematically allocate less balance-sheet capacity to demographically advanced host markets and more to demographically younger host markets, adding a cross-border dimension to the on-going demographic transitions in the region. The cross-border dimension can present an opportunity for host economies, such as younger and lower-income economies that need to tap foreign savings for domestic investment. These implications might differ across country groups: in more advanced aging economies with deeper capital markets, such reallocation may primarily reflect portfolio diversification away from subdued domestic credit demand, whereas in emerging market economies, which are often aging with weaker social safety nets and more bank-dependent financial systems, it underscores the importance of investing in

[10] The strength and channels of these relationships are likely to depend on institutional features such as the degree of competition from other financial institutions, the development of pension systems, and whether economies function as financial centers; while country fixed effects control for persistent cross-country differences, we do not explore these sources of heterogeneity in depth.

deepening alternative sources of financing, including domestic capital markets, along with effective supervision and macro-prudential frameworks.

Annex I. Data

Annex I.1 Household Surveys

We rely on the following household surveys:

Table A1: Household Surveys Used in the Analysis

Country	Survey	Source
Australia	Household Income and Wealth, 2019-20 [2015-16]	Australian Bureau of Statistics
China	China Household Finance Survey, 2019	China Family Finance Survey and Research Center
Indonesia	Indonesian Family Life Survey, 2014 [Indonesia Longitudinal Aging Survey, 2023]	RAND National authorities, ADB
Japan	National Survey of Family Income, Consumption and Wealth, 2019 [2004]	Official Statistics of Japan, National Statistics Center
Korea	Survey of Household Finances and Living Conditions, 2024 [2012] Survey of Household Assets, 2024	Statistics Korea
Malaysia	Ageing and Retirement Survey, Wave 2, 2021–22	Universiti Malaya, ADB
Nepal	Baseline Survey on Financial Literacy in Nepal, 2022	Nepal Rastra Bank
New Zealand	Household net worth statistics, 2021 [2018]	Stats NZ
Philippines	Consumer Finance Survey, 2021	Bangko Sentral ng Pilipinas
Thailand	Financial Access Survey of Thai Household, 2020	Bank of Thailand

Annex I.2 Bank-level Dataset Construction

The following cleaning procedures for the Fitch Connect bank data are broadly consistent with those introduced by Raddatz et al. (2024). Their procedures involve multiple databases, where we reference only those related to the Fitch Connect database.

- Step 1. As our research interest lies in the commercial banking sector that most directly relates to demographics, we select institutions in the Fitch Connect Database based on their market sector description and their specialization. We keep institutions with the following market sector description: bank holding companies, banks, credit union, development banks, private banks, retail & consumer banks, trade finance banks, trust & processing banks, universal commercial banks, wholesale

commercial banks. We keep all institutions with the "commercial bank" specialization code. We also keep institutions with a market sector description of "government sponsored enterprises" when their specialization code is consumer loans / credit cards, co-operative banks, multi-lateral governmental banks, state / government bank, or savings bank. We drop all other institutions.

- Step 2. We drop observations with missing data for total assets to ensure sample quality.
- Step 3. We keep only annual statements to eliminate duplicates.
- Step 4. We keep only one statement quality type with the following order of priority: restated, original, preliminary, partial.
- Step 5. We keep only one statement in cases where there are multiple audited/qualified categories available with the following order of priority: audited-unqualified, audited-qualified, and audited-unqualified (emphasis of matter) statements.
- Step 6. We keep only one statement in case multiple statements are available with different accounting standards, with the following order of priority: international financial reporting standards (IFRS), international accounting standards, local generally accepted accounting principles (GAAP), U.S. GAAP, regulatory.
- Step 7. We keep unconsolidated financial statements only.
- Step 8. We drop bank-years that have very high annual loan growth in absolute terms (>=200 percent) to capture M&A or other related structural changes.

Table A2: Distribution of Ultimate Banking Groups Involving Cross-border Business

Region	Number of Economies	Number of Ultimate Banking Groups	Demographic Status		
			Early Dividend	Late Dividend	Post Dividend
Asia-Pacific	14	57	4	6	4
Europe	11	41	1	2	8
Western Hemisphere	9	36	2	6	1
Middle East and Central Asia	5	17	3	2	0
Sub-Saharan Africa	7	15	4	2	1

Note: The panel listed here is unbalanced with a maximum time coverage spanning 1989–2023.

Annex II. Supplementary Analysis for Country-Level Analysis

Annex II.1 Supplementary Robustness Check

Including Lagged Variables

Building on equation (3), we add two-period lagged variables of all the independent variables and dependent variables to control for dynamic effects. As shown in Table A3, the results remain consistent with the main analysis, although the statistical significance of the coefficients declines slightly. Meanwhile, as we add the lagged independent variables, the R2 increases significantly.

Table A3: Country-Level Analysis Including Lagged Variables

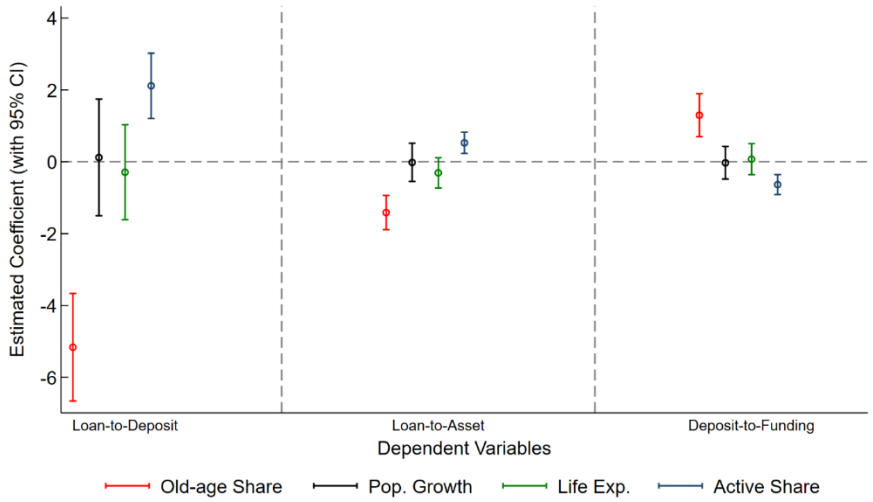
Dependent Variables	(1) Loan/Deposit	(2) Loan/Asset	(3) Deposit/Funding
Total Effects of Old-age Share (Contemporaneous + first lag + second lag)	-2.54** (0.73)	-0.30 (0.19)	0.45** (0.21)
First Lag of Dependent Variable	0.33*** (0.07)	0.70*** (0.04)	0.49*** (0.06)
Second Lag of Dependent Variable	0.16*** (0.06)	0.03 (0.04)	0.16*** (0.05)
Macro Controls & Two-period Lagged Controls	Y	Y	Y
Country Fixed Effects & Year Fixed Effects	Y	Y	Y
Observations	892	892	892
R2	0.74	0.88	0.80

Notes: Standard errors clustered by countries are shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01. The total effects of the old-age share are calculated as the sum of the coefficients on the contemporaneous, first-lag, and second-lag terms of the old-age share, with the standard error and confidence interval obtained using joint t-tests.

Including Demographic Variables Separately

Figure A1 shows the supplementary robustness check results corresponding to Figure 12. In contrast to the results in Figure 12, which are obtained by jointly including all demographic variables in a single regression, Figure A1 reports the estimated coefficients from regressions that include each demographic variable separately. As shown below, the results in Figure A1 are consistent with those in Figure 12.

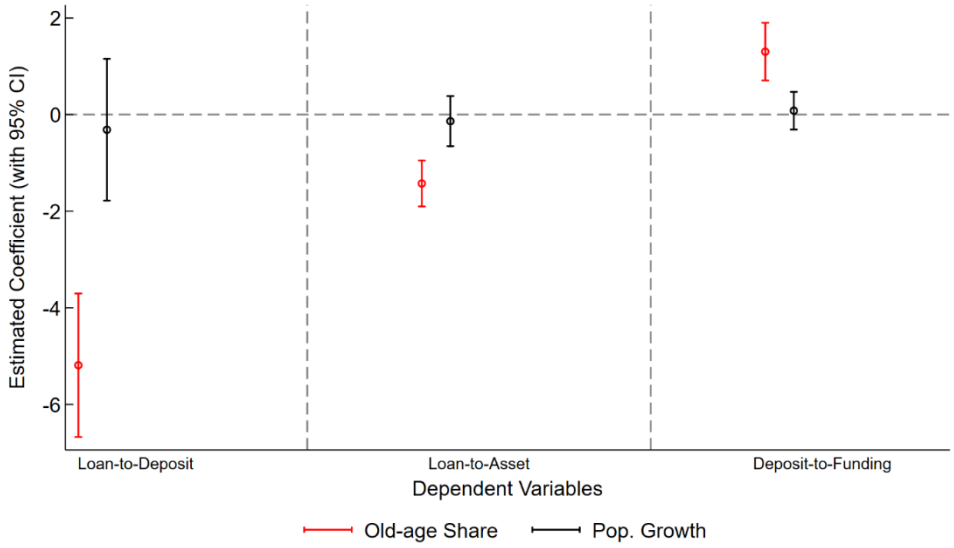
Figure A1: Robustness Check for Country-Level Regression, Including Demographic Variables Separately



Sources: UN 2024 World Population Prospects, Fitch Connect Database and IMF staff calculations.
Notes: Dots represent the estimates of coefficients. Lines indicate their 95% confidence interval. The coefficients are estimated by regressing the dependent variables on each demographic variable separately.

Figure A2 shows the estimated results obtained from similar regressions, including both old-age share and population growth rate jointly as independent variables. The estimated coefficients are consistent with those in Figure 12.

Figure A2: Robustness Check for Country-level Regression, Controlling for Population Growth



Sources: UN 2024 World Population Prospects, Fitch Connect Database and IMF staff calculations.
Notes: Dots represent the estimates of coefficients. Lines indicate their 95% confidence interval. The coefficients are estimated by regressing the dependent variables on old-age share and population growth jointly.

Annex II.2 Bank-Based Economies versus Market-Based Economies

The distinction between bank-based and market-based financial systems represents a key structural feature of financial architecture, exerting profound influences on funding, lending and financial intermediation (Levine, 2002; Demirgüç-Kunt and Maksimovic, 2002). The relationship between population aging and the banking sector may therefore exhibit heterogeneity across bank-based and market-based economies. To examine this heterogeneity, we augment the baseline regression by including an interaction term between the bank-based indicator and the aging variable:

$$Y_{it} = \beta_1 A_{it} + \beta_2 A_{it} * bankbased_i + \alpha X_{it} + \gamma bankbased_i + \mu_i + \mu_t + \varepsilon_{it} \quad (A.1)$$

where $bankbased_i$ is a dummy variable equal to one if an economy is bank-based and zero otherwise. The coefficient β_2 indicates the heterogenous relationships between aging and banking sector in these two kinds of economies.

Although the core idea is to measure the relative importance of banks in the financial system, there is no standard measure of whether an economy is bank-based or market-based. Considering the sample coverage, we reference the method proposed by Gambacorta et al. (2014), which relies solely on data from the World Bank Financial Development Database, which we have already used for retrieving our control variables, avoiding loss of observations. Following Gambacorta et al. (2014), the importance of the banking sector in a financial system is measured as the ratio of bank credit to the sum of bank credit, equity capitalization and bond capitalization. All variables are available up to 2020 in the World Bank Financial Development Database. We classify economies with this ratio below the 25th percentile as market-based, and those above as bank-based economies.[11]

As shown in Table A4, the impact of aging differs slightly across financial structures. Relative to market-based economies, bank-based economies exhibit a sharper decline in the loan-to-deposit ratio as aging rises. This pattern is consistent with the results in column (3), which show that the deposit share increases with aging in bank-based economies but does not change significantly in market-based economies. At the same time, the loan-to-asset ratio declines more moderately with aging in bank-based economies than in market-based economies, likely indicating that bank balance sheets in market-based systems shift away from loans more strongly.

[11] A few economies in our sample have missing values for at least one of these variables. For these cases, we classify them as bank-based economies.

Table A4: Heterogeneity between Bank- and Market-Based Economies in the Relationship between Aging and Banking Sector

Dependent Variables	(1) Loan/Deposit	(2) Loan/Asset	(3) Deposit/Funding
Old-age Share* Bank-based	-5.21***	-1.38***	1.38***
	(0.79)	(0.25)	(0.32)
Old-age Share* Market-based	-4.68***	-1.77***	0.42
	(1.56)	(0.53)	(0.47)
Macro Controls	Y	Y	Y
Country Fixed Effects & Year Fixed Effects	Y	Y	Y
Observations	1,038	1,038	1,038
R2	0.32	0.58	0.65

Notes: Standard errors clustered by countries are shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

References

Berlemann, Michael, Marco Oestmann and Marcel Thum (2014): Demographic change and bank profitability: empirical evidence from German savings banks. *Applied Economics*, Vol. 46, No. 1, 79–94.

Börsch-Supan, A. (2003). Life-Cycle Savings and Public Policy. CESifo Economic Studies, 49(1), 7–26.

Carvalho, C., Ferrero, A. & Nechio, F. (2016). Demographics and Real Interest Rates: Inspecting the Mechanism. European Economic Review, 88, 208–226.

Davis, E. P. & Li, C. (2003). Demographics and Financial Asset Prices in the Major Industrial Economies. Brunel Discussion Paper 03-07.

Davis, E. P. (2006). Ageing and Financial Stability. Financial Market Trends, OECD.

Davis, E. P. And D. Karim (2025): Ageing and Financial Markets – A Literature Survey. NIESR Discussion Paper No. 568.

Demirgüç-Kunt, A., & Maksimovic, V. (2002). Funding growth in bank-based and market-based financial systems: evidence from firm-level data. Journal of financial Economics, 65(3), 337-363.

Doerr, Sebastian, Gazi Kabaş and Steven Ongena (2024): Population Aging and Bank Risk-Taking. Journal of Financial and Quantitative Analysis, 59(7), pp. 3037–61.

Friedman, Milton (1957): The Permanent Income Hypothesis, in: "A Theory of the Consumption Function." Princeton University Press, pp. 20-37.

Gruber, J. & Wise, D. (eds.) (1999). "Social Security and Retirement around the World." University of Chicago Press.

Imam, Patrick (2013): Demographic Shift and the Financial Sector Stability: The Case of Japan. Journal of Population Ageing.

Imam, Patrick A. and Christian Schmieder (2025): Aging gracefully: steering the banking sector through demographic shifts. Applied Economics.

International Monetary Fund (2017a): "Technical Note-Long-term Challenges for Financial Intermediation", Japan FSAP, IMF Country Report No. 17/283.

International Monetary Fund (2017b): "Asia: At Risk of Growing Old before Becoming Rich?" Chapter 2 in: IMF, October 2017 Regional Economic Outlook for Asia and Pacific.

Levine, R. (2002). Bank-based or market-based financial systems: which is better?. Journal of financial intermediation, 11(4), 398-428.

Li, Zeguang, Yuanbiao Huang, and Keqiang Hou (2024): Impacts of population aging on bank loan portfolios: Evidence from China. International Review of Economics & Finance, 95.

Modigliani, Franco, and Richard H. Brumberg (1954): "Utility analysis and the consumption function: an interpretation of cross-section data," in Kenneth K. Kurihara, ed., *Post-Keynesian Economics*, New Brunswick, NJ. Rutgers University Press, pp. 388–436.

Neumayer, Eric and Thomas Plümper (2016): Inequalities of Income and Inequalities of Longevity: A Cross-Country Study. American Journal of Public Health 106, 160-165.

OECD (1998). “Maintaining Prosperity in an Ageing Society.” OECD Publishing.

Payne, Collin F, Kim Qinzi Xu, Jessica Yi-Han Aw (2025): Healthy longevity in the Asia–Pacific: a cross-national population-based modeling study, American Journal of Epidemiology.

Poterba, J. (2004). The Impact of Population Aging on Financial Markets in Developed Countries. NBER Working Paper 10851.

Raddatz, C., Seneviratne, D., Vandenbussche, M. J., Xie, P., & Xu, Y. (2024). The Riskiness of Credit Origins and Downside Risks to Economic Activity (No. 2024/072). International Monetary Fund.

Ramlall, Indranarain (2023): Digitization, Ageing Population and Bank Profitability: Evidence in Light of Two Global Crises. Journal of International Commerce, Economics and Policy Vol. 14, No. 2.

Reserve Bank of New Zealand (2025): The Grey Wave: Exploring the impact of an ageing population on the financial system. Financial Stability Report, Special topic June 2025.

United Nations, Department of Economic and Social Affairs, Population Division (2024). World Population Prospects 2024: Data Sources.

PUBLICATIONS

Graying Asia: How Aging Is Reshaping Banking
Working Paper No. WP/2026/150