

Global Demographics and Pensions: Investment Implications (Asia Focus)

Amlan Roy, PhD

Senior Managing Director, Global Chief Retirement Strategist
amlan_roy@ssga.com

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For details of team members, please see contacts page at the back.

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Demographics: A Different Perspective

WHAT IT CONNECTS TO & INFLUENCES

D: Discount rates, **Debt**

E: **Economic Growth**, Efficiency, Structure

M: **Mortality**

O: Organisation Behaviour, Structure

G: Geography, Geopolitics, **Governance**

R: Robotics, **Real Estate**

A: Asset Prices, **Asset Allocation**

P: **People**, **Pensions**, Politics

H: **Heterogeneity**, **Households**

I: **Inflation**, **Inequality**, Institutions

C: **Consumers**, Culture, Cities

S: **Sustainability**

WHO DOES IT PERTAIN TO?

All the “People” in the world and their characteristics as “consumers and workers” in the world.

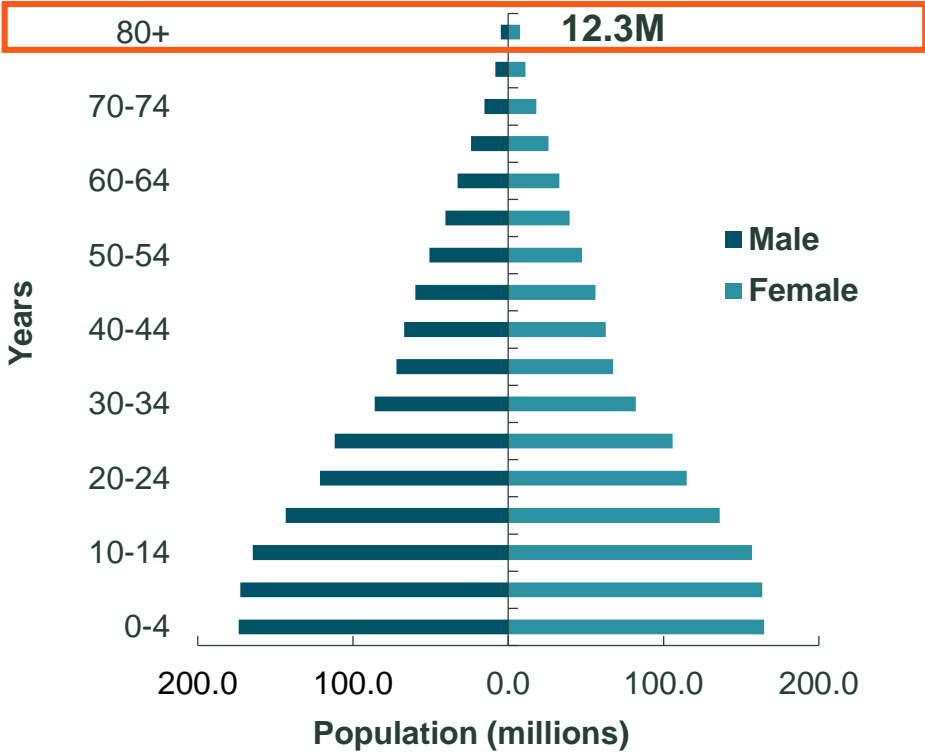
It affects all Income Statements & Balance sheets in the world for

- Individuals
- Households
- Corporates
- Nations

Unless otherwise stated, all data and all data sourced to “UN” is the most current data attributable to the United Nations Population Division. Data shown beyond 2015 is a UN projection. Red outline of boxed indicate content covered in this presentation.

The Asia's Super-old (80+) Age Group Fastest Growing

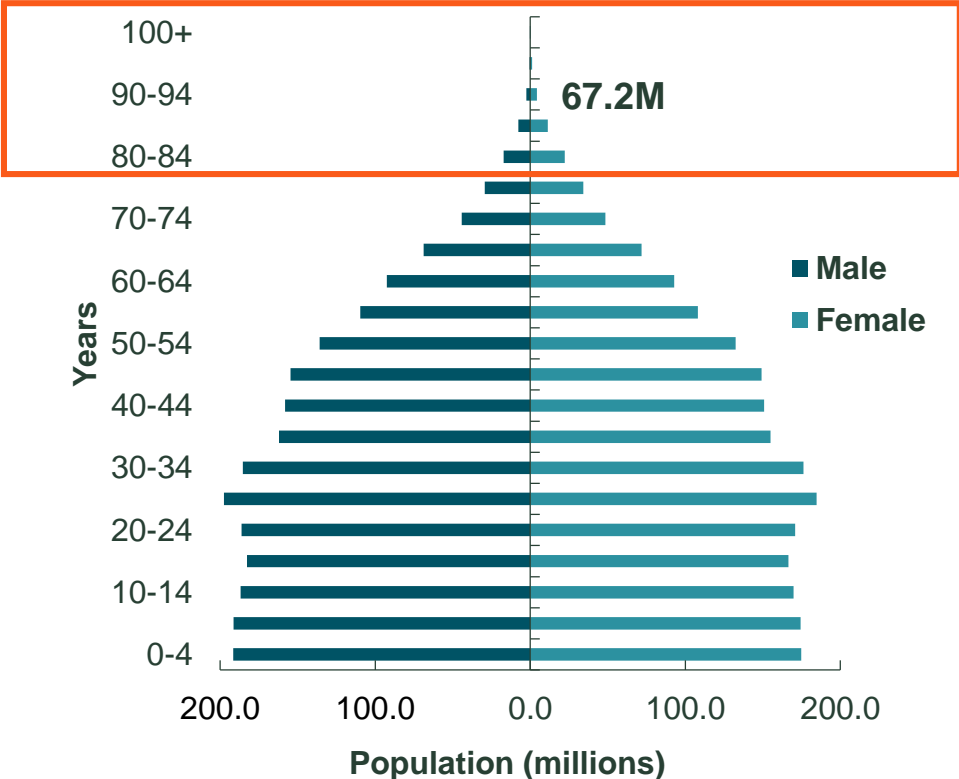
1980



Total: 2,642M

+ 448 %

2017



Total: 4,504M

+ 71%

Source: UN, SSGA Demographics

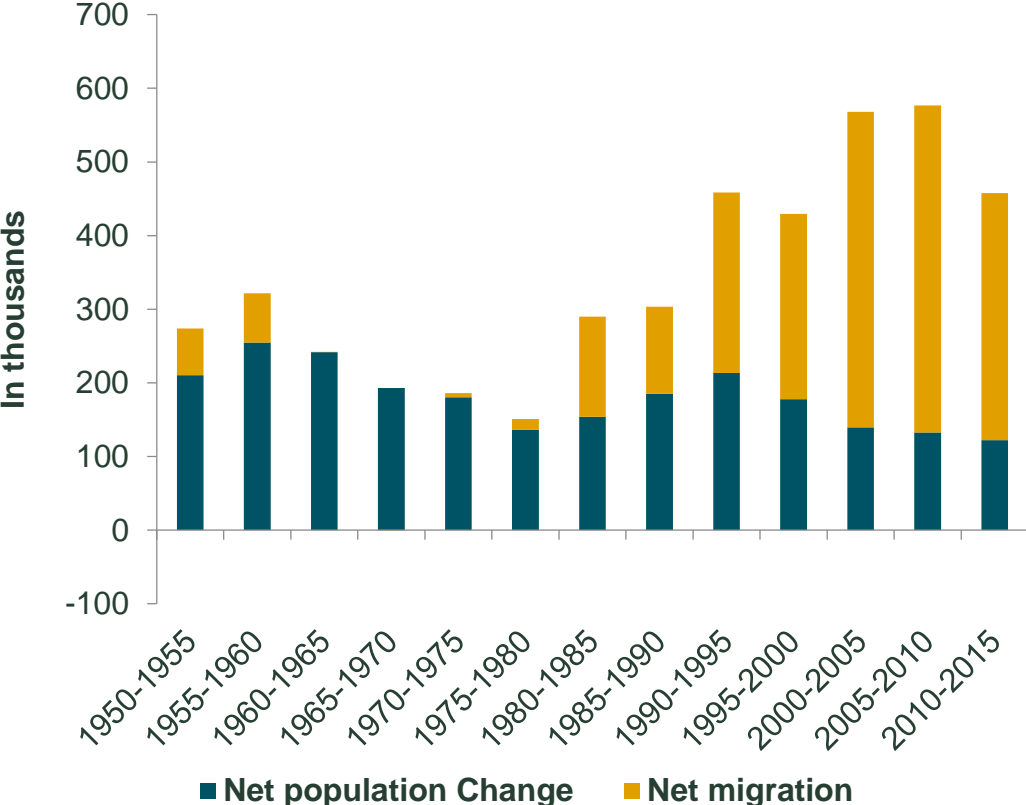
Total Population, Share of 80+ and 60+ Age groups

	Total Population (Millions)	% of Global Population	Population Growth 1980–2017	Share of 80+ Group (%)		Share of 60+ Group (%)	
	2017	2017	(% p.a.)	1980	2017	1980	2017
World	7,550		1.4	0.8	1.8	8.6	12.7
Asia	4,504	59.7	1.5	0.5	1.5	6.8	12.2
China	1,410	18.7	0.9	0.4	1.8	7.5	16.2
Japan	127	1.7	0.2	1.3	8.1	12.7	33.4
Hong Kong	7	0.1	1.1	0.8	4.7	10.0	23.5
Singapore	6	0.1	2.4	0.5	2.6	7.2	19.5
S. Korea	51	0.7	0.8	0.5	3.0	6.4	20.1
Thailand	69	0.9	1.0	0.6	2.4	5.6	16.9

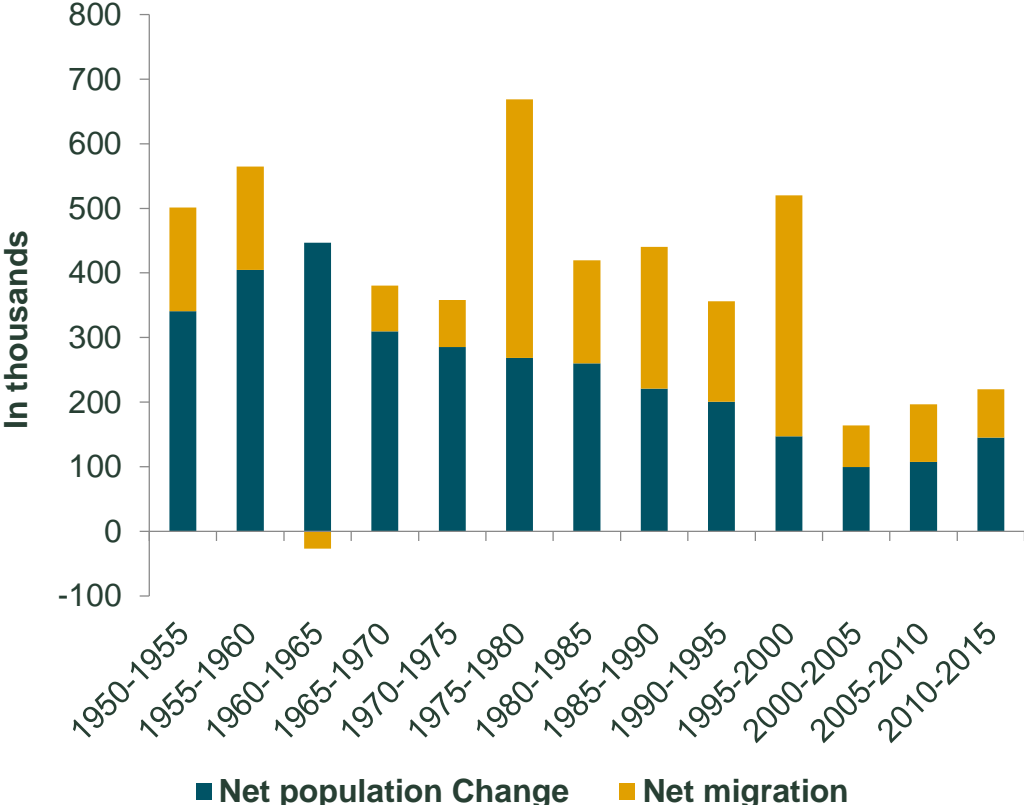
Source: UN, SSGA Demographics

Population Change Decomposition

Singapore



Hong Kong



Source: UN, SSGA Demographics

The Demographic Manifesto (2000)

Radical Policy Actions to mitigate the Ageing Time Bomb

- **Abolish Mandatory retirement ages.** Adopt Flexible retirement.
- **Close** gender gaps to better utilise female work potential
- **Rethink & implement** immigration policies
- **Outsource and off-shore** non-core jobs based on costs and benefits

Retirement Ages: Effective & Official (2016)

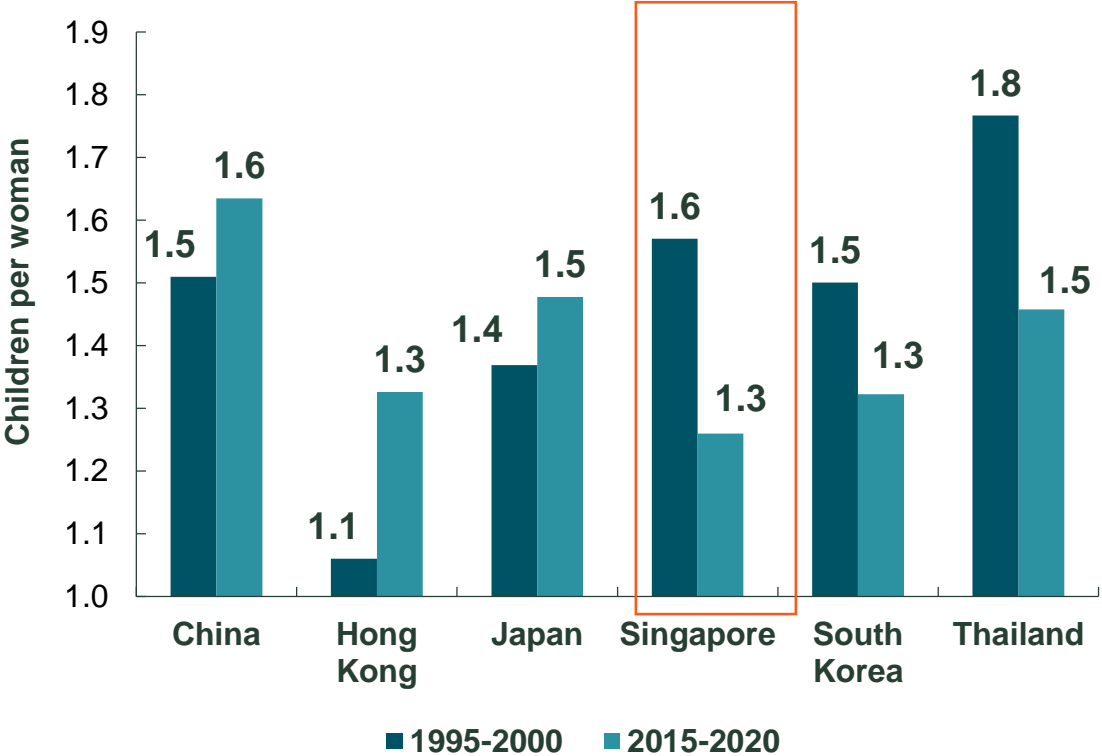
Retirement Age (Years)	Men		Women	
	Effective	Official	Effective	Official
Korea	72.0	61.0	72.2	61.0
Mexico	71.6	65.0	67.5	65.0
Turkey	66.1	60.0	66.3	58.0
Japan	70.2	65.0	68.8	65.0
New Zealand	68.4	65.0	66.4	65.0
Switzerland	66.0	65.0	64.3	64.0
United States	66.8	66.0	65.4	66.0
United Kingdom	64.6	65.0	63.2	63.0
Italy	62.1	66.6	61.3	65.6
Netherlands	63.5	65.5	62.3	65.5
France	60.0	61.6	60.3	61.6
Germany	63.3	65.0	63.2	65.0

* Red Cells: Effective retirement age > Official retirement age

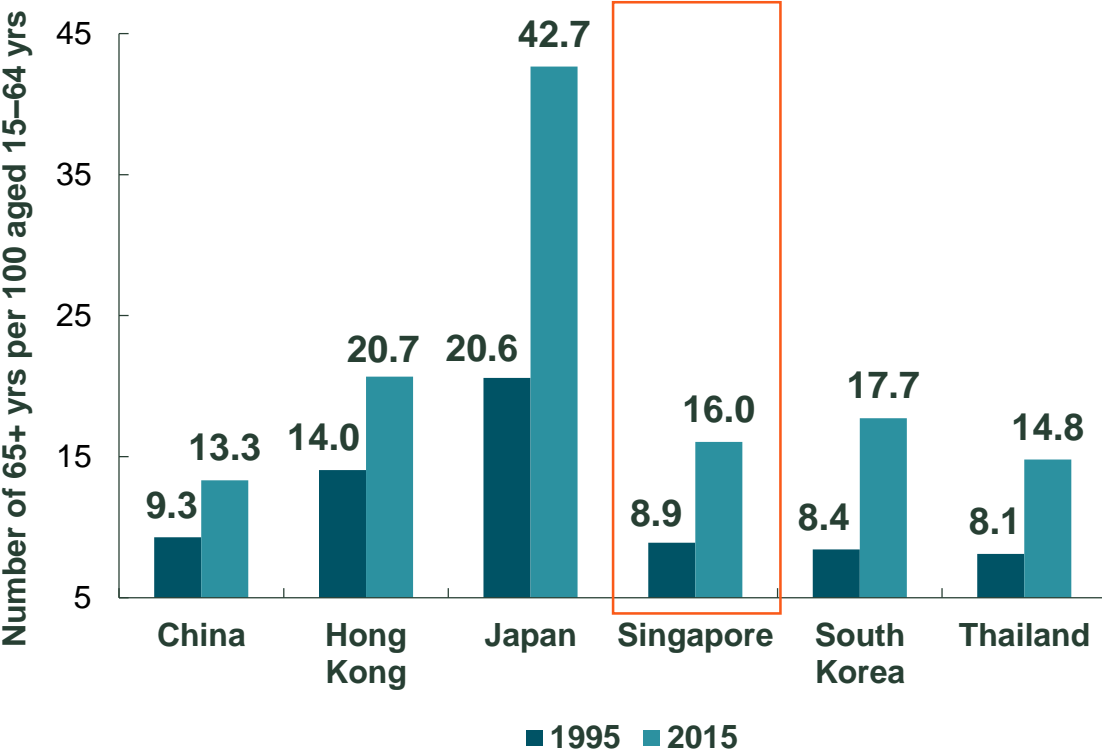
Source: OECD, SSGA Demographics

Core Demographics

Total Fertility Rate



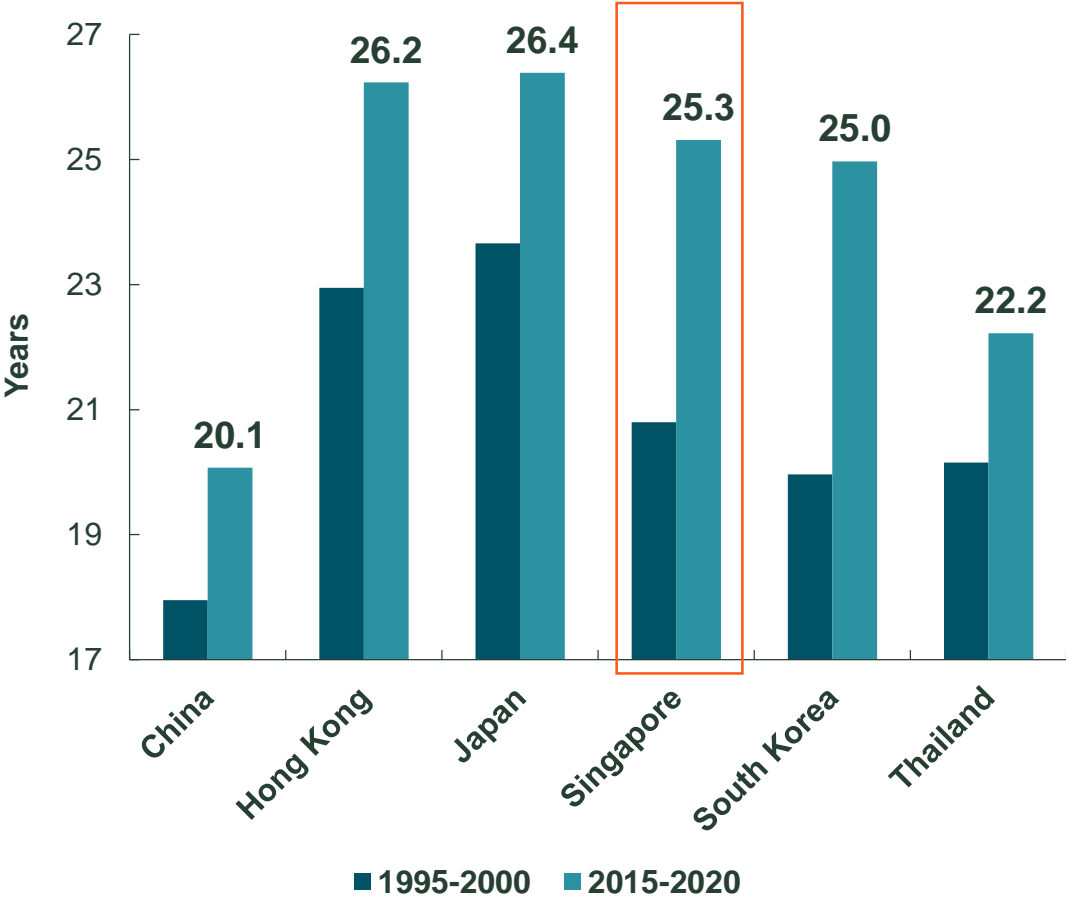
Old Age Dependency Ratio



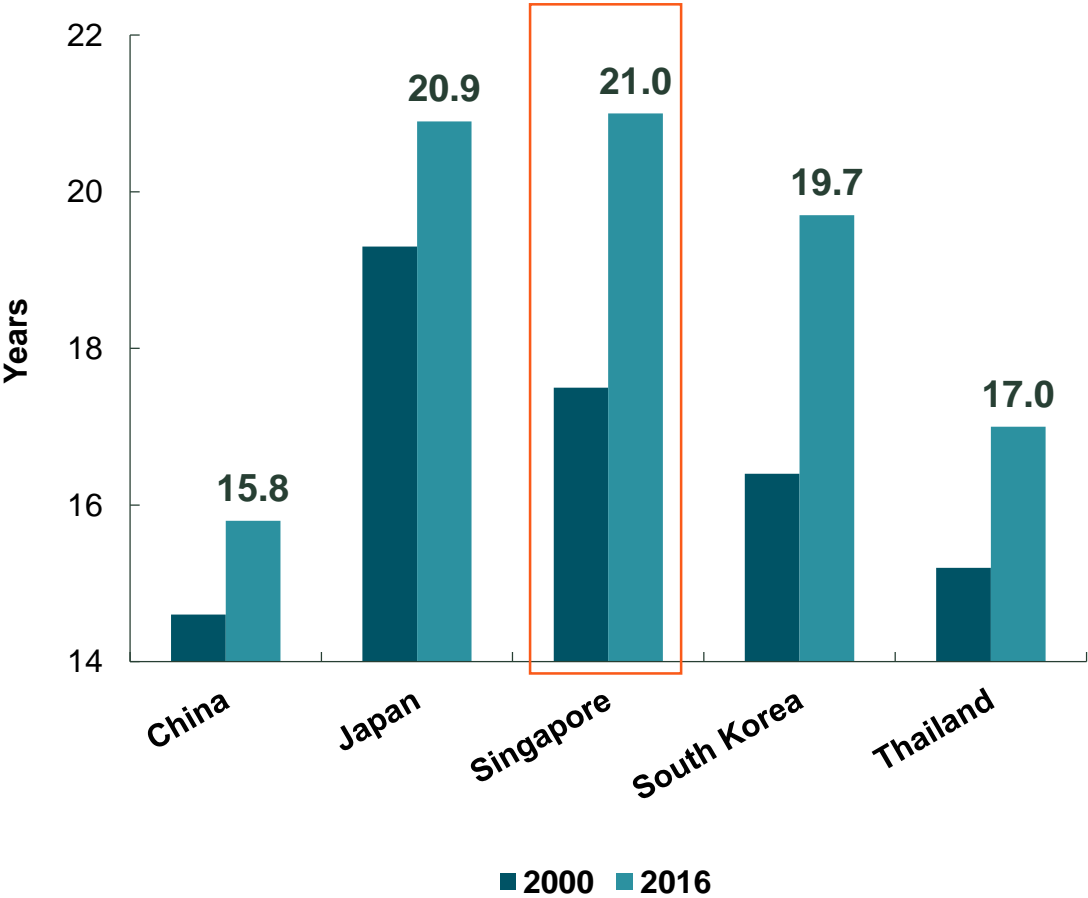
Source: UN, SSGA Demographics

Conditional Life Expectancy & Healthy Life Expectancy

Life Expectancy at Age 60



Healthy Life Expectancy at Age 60



Source: UN, SSGA Demographics

How Increasing Longevity Affects Us All?

Individuals & Families

- Challenge existing asset & time allocation frameworks & intergenerational dynamics

Governments & Societies

- Policy changes in labour, education, health, pensions & social benefits necessary

Asset managers, pension funds, insurance cos., banks, SWFs etc.

- Re-assess frameworks & assumptions. Develop new solutions for clients & new approaches to understanding longevity.

Significant change in thinking and mind-set needed

Uncertain Future of Longevity — Experts Extreme & Wrong?

J. Oeppen & J. Vaupel:

- Rise in life expectancy over last 160 years at a steady pace of 3 months per year. Number of centenarians doubling every decade since 1950.
- Myth of a looming limit to life expectancy due to decline in post 80- mortality rate. Life expectancy in Europe expected to exceed 90 years by 2050.

J. Olshansky:

- Oeppen & Vaupel prediction US life expectancy in US will reach 100 years by 2060 lacks supporting scientific evidence. Life expectancy may level off or decline.
- Straight-line forecasts using composite of world records is statistically flawed
- Advances in Biomedical technology acceleration requires new technologies to reduce deaths from heart disease, stroke and cancer. Ignore biology of ageing.

Source: Watson Wyatt/Cass Public Lectures on Longevity (2005)

Factors Influencing Longevity

Robert Fogel (2005): Physiology of aging over life cycles of 3 cohorts:

- **Civil War cohort (1838–1845):** Short lives with common disabilities at young ages, prone to malnutrition and exposed to severe diseases
- **World War II cohort (1920 and 1930):** Fewer died as infants, most lived past age 60 without severe chronic diseases
- **Cohort born between 1980 and 1990:** 50–50 chance of living to age 100

Heterogeneity of longevity depends on:

- Social economic status (education, occupation, income level)
- Gender, marital status, nutrition
- Living environment (climate, pollution, sanitation, population density)
- Physiological factors
- Life style, diet

Source: R. Fogel (2005), 'Changes in the Physiology of Aging During the Twentieth Century', NBER Working paper 11233

Mortality Forecasting Methods

The Major methodologies of forecasting mortality are:

- Expert Based
- Structural Modelling (Explanatory or econometric)
- Decomposition
- Trend Modelling (Extrapolation)

Using a combination of above methods helps enhance forecast accuracy.

There is a need for history consistent parsimonious models, easy to implement using analytical methods or fast algorithms. Models should apply to full age range and allow parameter uncertainty.

Implications for annuities, annuity options, capital reserving etc.

Good Longevity Risk Management

What is Needed? Better understanding of

- Causal factors of Longevity
- Ageing Process Analysis
- Quantification through indices, stochastic mortality forecasting models (sample paths, forecasts, uncertainty measures)
- How to combine many forecasting approaches to improve robustness of forecasts

New horizons in LRM will rely on

- Mortality improvement modelling. Jumps and regime switches.
- Joint modelling of populations across countries, regions and groups
- Panel data, cointegration, bootstrapping
- Joint modelling of causes of death & macroeconomic factors

Source: S. Haberman (2016)

Annuity Products Overview (1)

Level/ (de)escalating annuities: Most basic type of annuity, with fixed payments being guaranteed beginning immediately or deferred to some point in the future. Payments can also be scheduled to increase (escalate) or decrease (de-escalate) over time by a defined amount.

Advanced Life Deferred Annuities: Also known as longevity insurance, are deferred annuities which tend to be bought around retirement age with payments deferred to begin at a more advanced age, usually over age 75.

Enhanced Annuities: Pay out a higher income level to individuals deemed to have a shorter life expectancy. The largest market for enhanced annuities is in the UK.

Inflation Indexed Annuities: Payments change depending on the rate of inflation each period. Compared to fixed level annuities, these annuities offer a much lower initial level income.

Participating Life Annuities: Offer a minimum guaranteed level of income to the annuitant while offering additional bonus payments depending on an actual return of profit measure. These annuities allow for some risk-sharing between annuity provider and annuitants.

Annuity Products Overview (2)

Variable Annuities: Deferred retirement savings products with an annuity option. Underlying assets are managed in individual accounts, usually with a variety of investment options, allowing for the realization of market returns rather than locking in a fixed rate.

- A minimum rate at which the accumulated funds can be converted into annuity is guaranteed at issue
- Optional guarantees are provided by the insurers which offer additional levels of protection from investment, mortality and/or longevity risk

Fixed Indexed Annuities: offer returns which are indexed to the market along with downside protection through the same types of optional investment guarantees offered with variable annuities. The upside return is usually capped at around 4%–5% for the customer.

The main risks for annuity providers:

- Longevity Risk
- Investment related risk
- Inflation risk for products whose payments are indexed to the cost of living
- Behavioural risk for products offering increased flexibility for the customer

Demographic Dividend & Transition:

The **Demographic Dividend**: Decreases in fertility rate and youth dependency ratios lead to higher savings & productivity thanks to a higher labour force and capital deepening leads to **higher GDP per capita growth**.

Stages of Demographic Transition

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
High & fluctuating death rates	Falling death rates	Falling death rates	Low death rates	Very low birth rates
High & fluctuating birth rates	High birth rates	Falling birth rates	Low birth rates	Death rates higher than birth rates
Stationary population numbers	Large increase in population	Stable population growth	Stable population	Declining population/Ageing
	India, Indonesia, Malaysia, Vietnam, Venezuela, Mexico	Brazil, China, Thailand, US, UK, France, Chile	Italy, Russia, South Korea	Japan, Germany

Source: Bloom and Canning (2000, 2013), John Caldwell (2006), SSGA Demographics

Demographic Components of GDP Growth

Working-age Population Growth

working-age population = population aged 15–64

Labour Productivity Growth

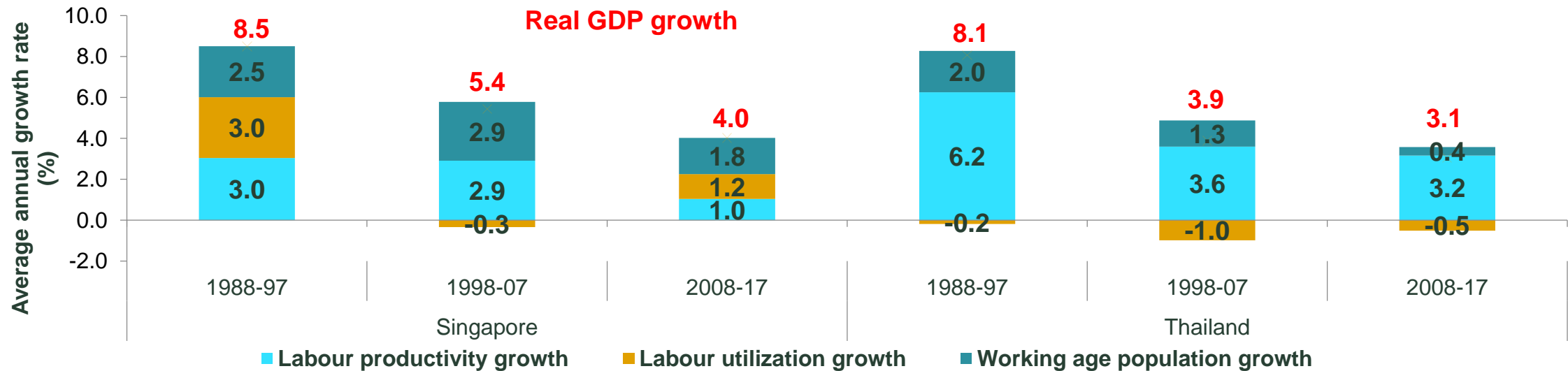
labour productivity = real GDP / hours worked

Labour Utilisation Growth

labour utilisation = hours worked / working-age population

- G6 GDP growth rate has fallen dramatically
 - Main cause is declining labour productivity growth. Similar across the developed & developing world.

Real GDP Growth Contributions



Source: GGDC, UN, SSGA Demographics.

Structure of GDP Matters Too

National Income Identity (expenditures method): $C + G + I + (X - M) \equiv GDP$

C = Consumption, I = Investment, G = Government, X = Exports, M = Imports

GDP Breakdown (% of GDP)

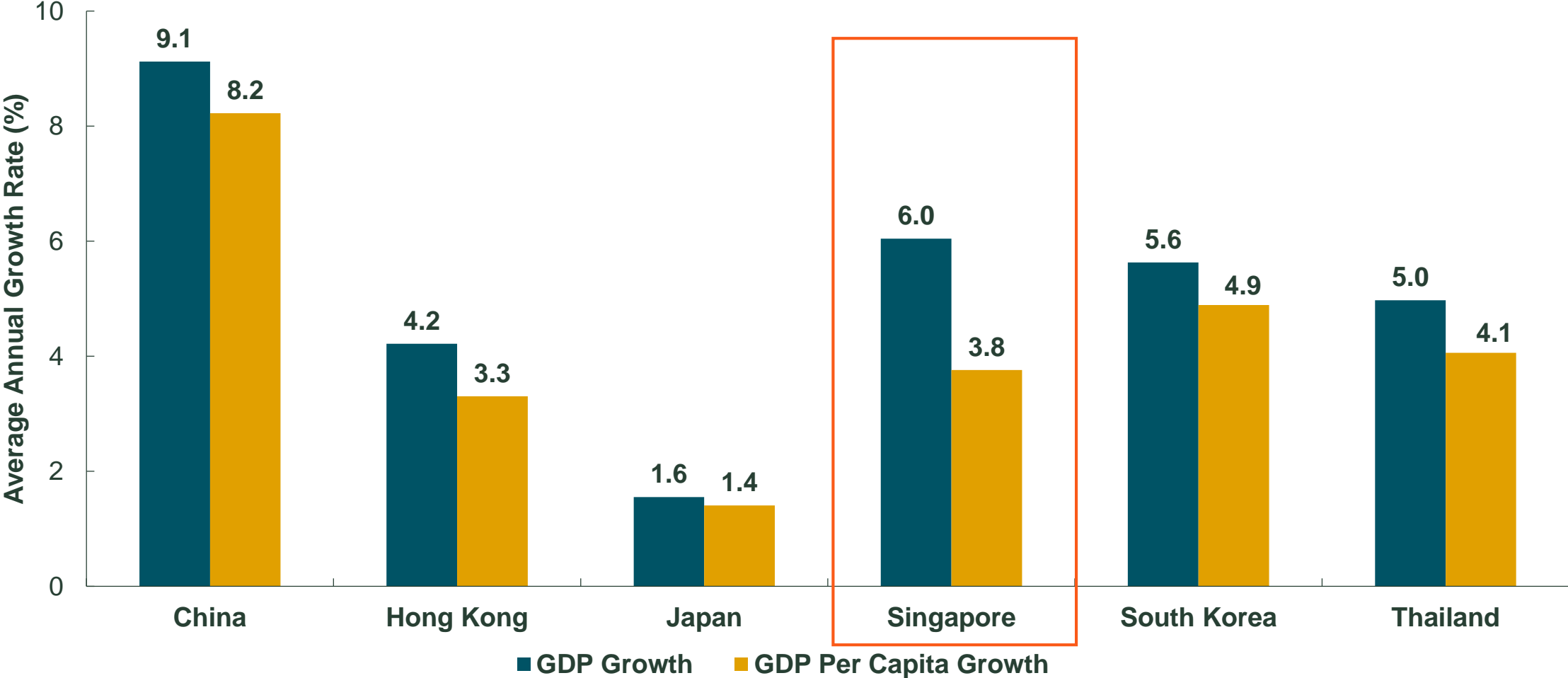
	China		Hong Kong		Japan	
	1985	2015	1985	2015	1985	2015
Final Consumption	63.9	51.1	68.5	76	67.1	76.5
Household	49.7	37.1	61.5	66.4	52.9	56.6
Government	14.2	14	7	9.6	14.2	19.9
Gross Capital Formation	39.9	45.4	21.5	21.5	29.7	23.9
Exports	8.6	22	103.9	195.9	14.1	17.6
Imports	12.4	18.5	93.9	193.5	10.9	18
	Singapore		South Korea		Thailand	
	1985	2015	1985	2015	1985	2015
Final Consumption	58.6	47.3	66	64.1	74.5	66.2
Household	45.2	36.7	55.2	49.1	61	48.9
Government	13.4	10.6	10.8	15	13.5	17.3
Gross Capital Formation	41.1	26.8	32.6	28.9	28.2	22.2
Exports	152.4	177.9	27.3	45.3	23.2	69.1
Imports	152.1	152	25.9	38.4	25.9	57.5

Openness of an economy is measured by the sum of exports + imports as a ratio of GDP:

41% (China), 389% (Hong Kong), 36% (Japan), 330% (Singapore), 84% (South Korea), 127% (Thailand)

Source: World Bank, SSGA Demographics

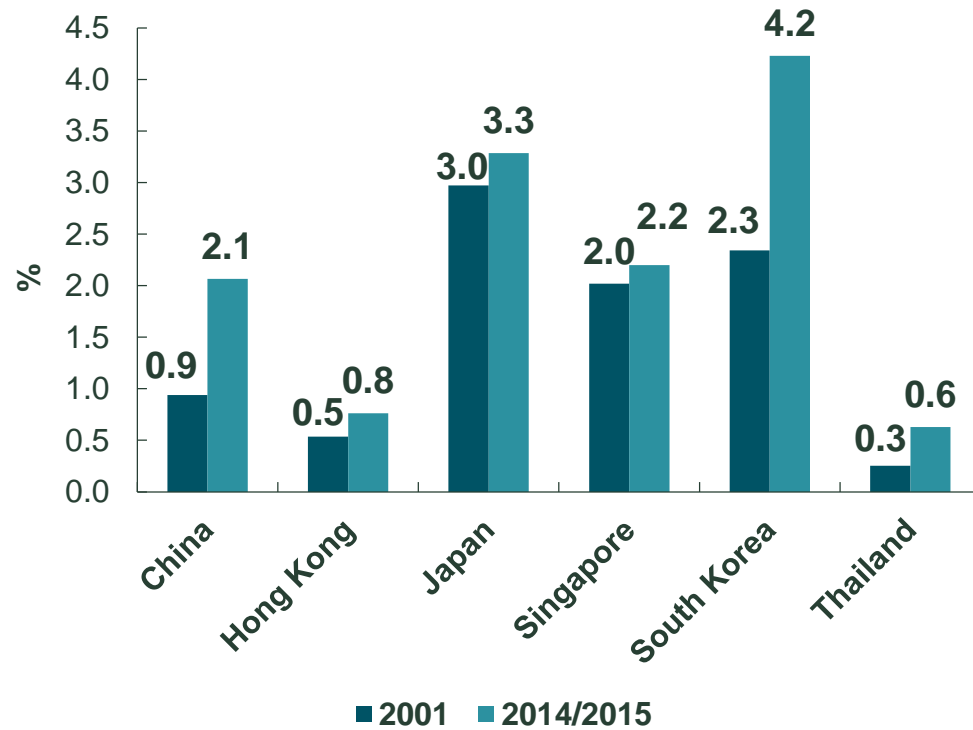
GDP Growth & Per Capita GDP Growth: 1985-2017



Source: IMF, SSGA Demographics

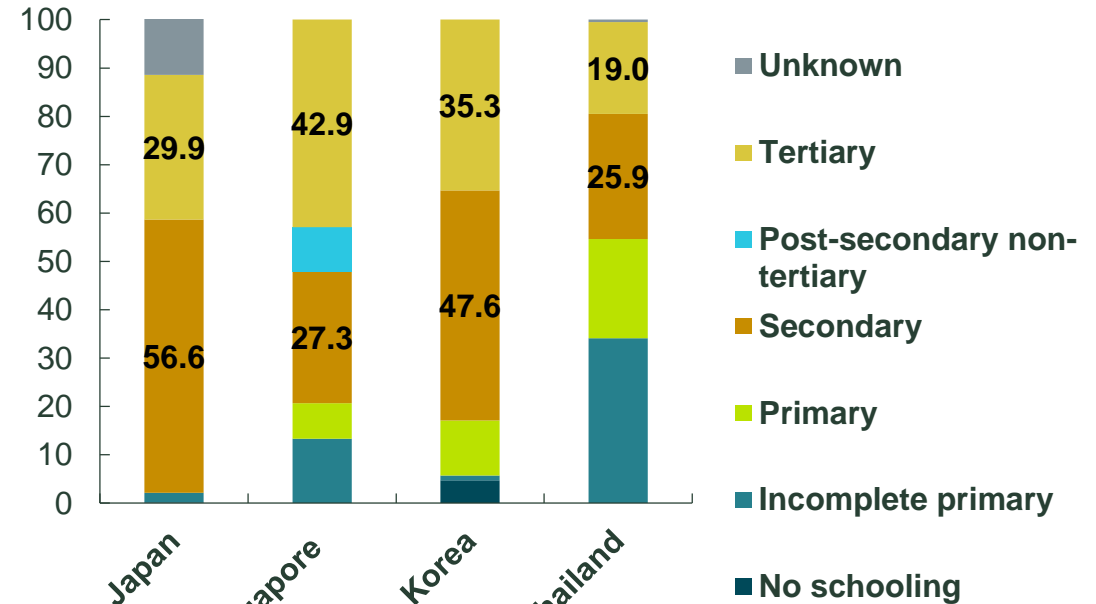
Technology & Education

R&D Expenditure (% of GDP)



2014/2015: Singapore refers to 2014. Others refer to 2015.

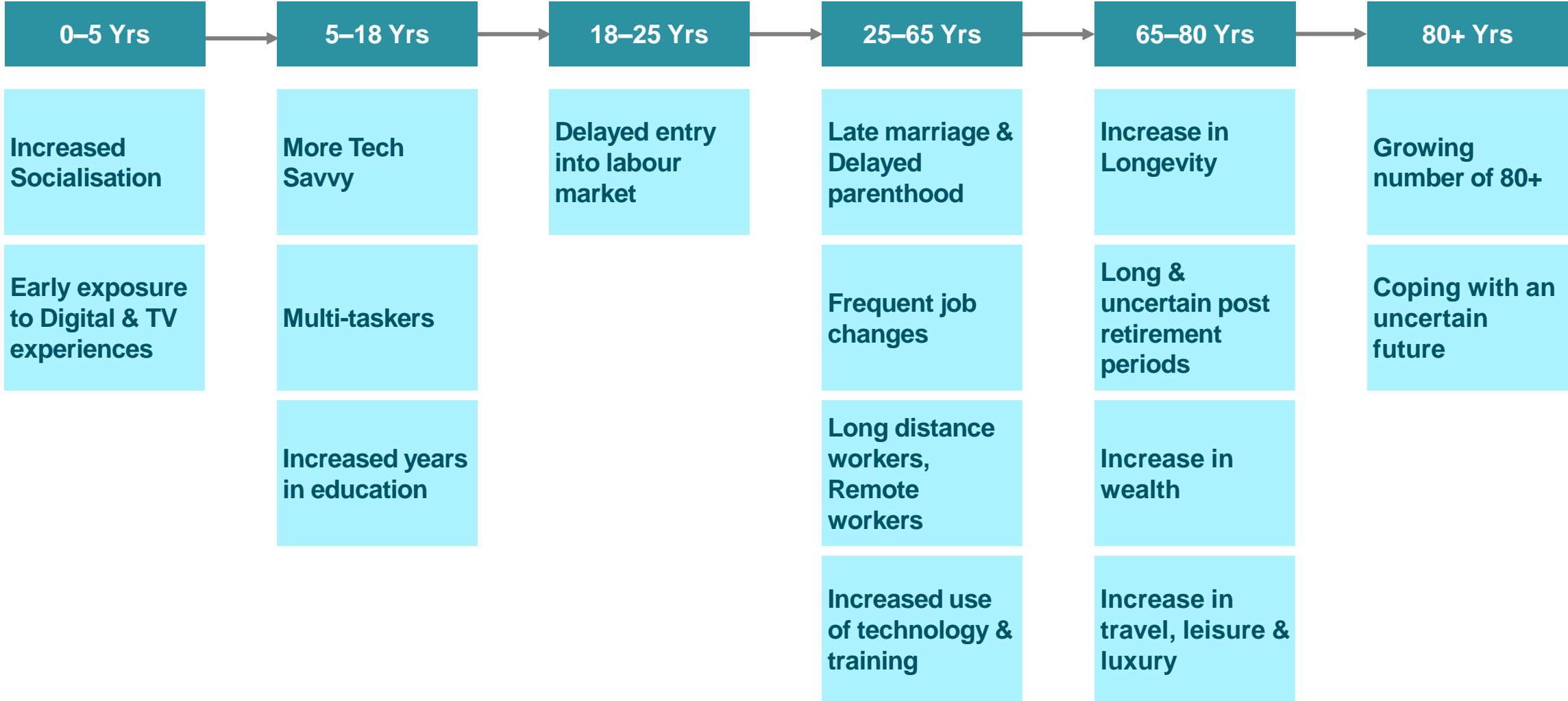
Educational Attainment of the population aged 25+



Singapore and Thailand refer to 2016. Japan and South Korea refer to 2010.

Source: World Bank, UNESCO, SSGA Demographics

Consumers & Life Cycles: Multiple Generations, Millennials

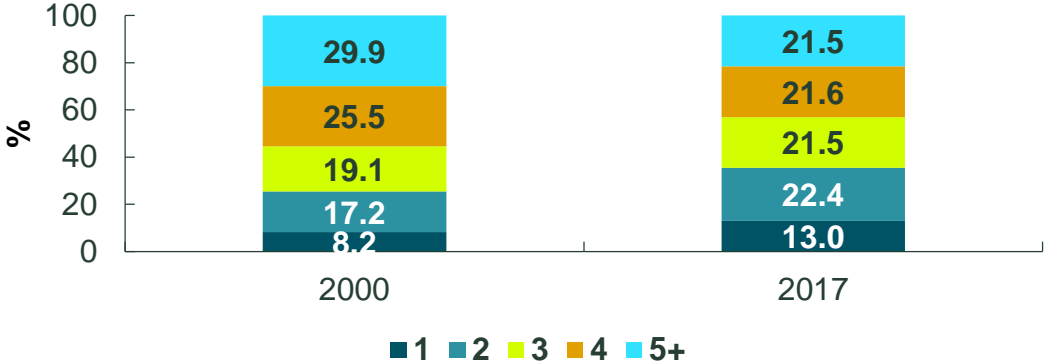


Source: Longer Lives, Changing Life Cycles: Exploring Consumer & Worker Implications, Credit Suisse (2011), SSGA Demographics

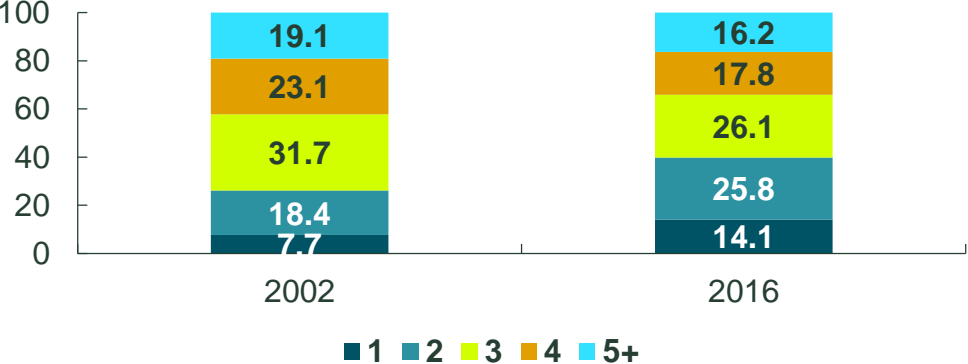
Share of Household

Share of Household by Household Size (% of total households)

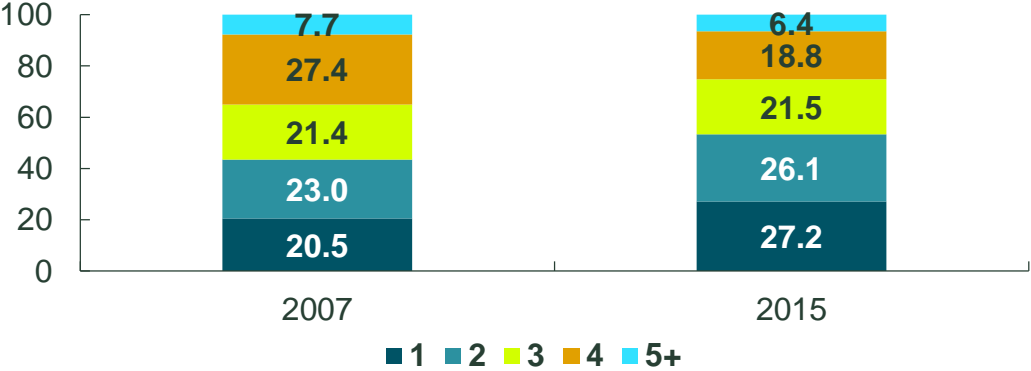
Singapore



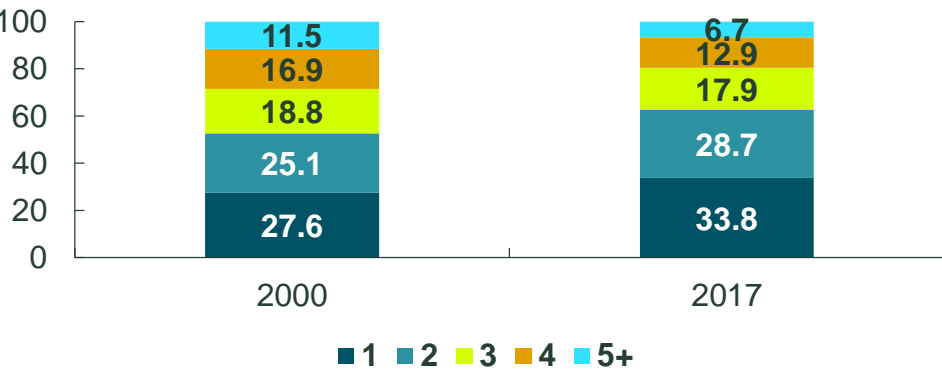
China



South Korea



Japan



Source: China NBS, Euromonitor, Bernstein analysis, Singapore Department of Statistics, Statistics Korea, SSGA Demographics

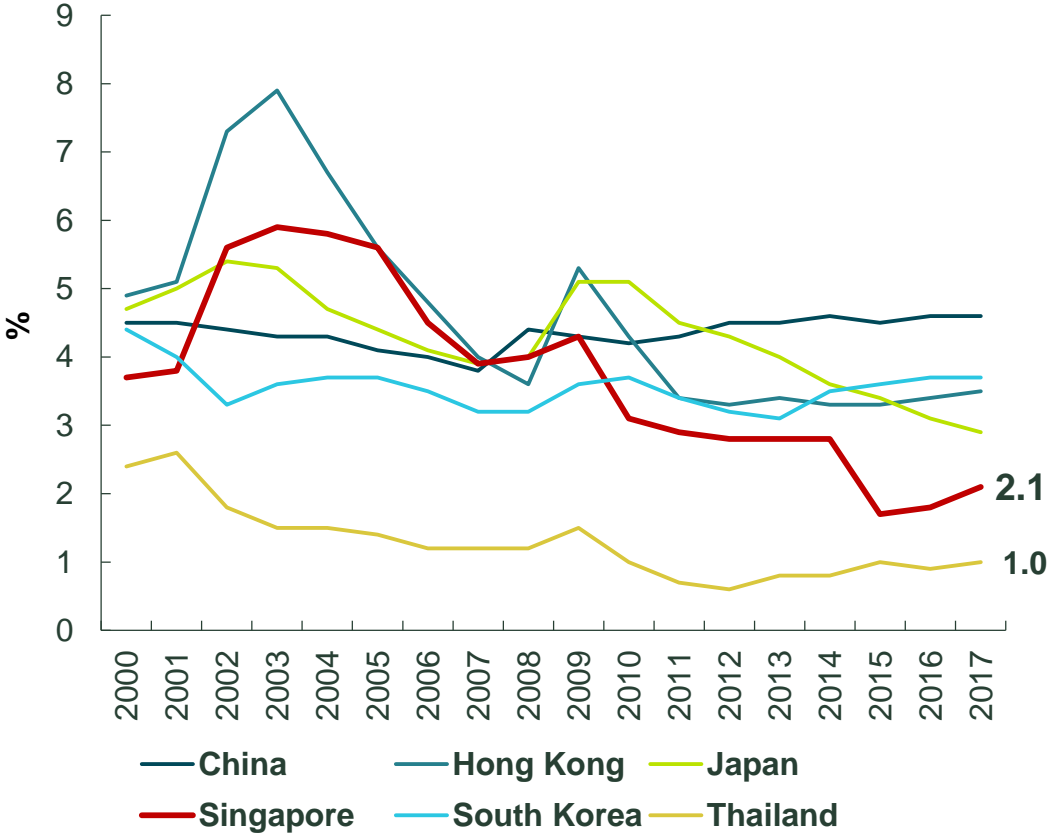
Consumer Expenditure by Age of Household Head

	China		Singapore		Thailand	
	2005	2017	2005	2017	2005	2017
< 20	36	145	69	118	33	60
20–29	96	392	109	208	88	157
30–39	108	445	110	208	106	190
40–49	100	411	100	184	100	179
50–59	94	389	106	177	90	162
60+	74	307	59	116	74	133
Total	96	383	96	164	91	159

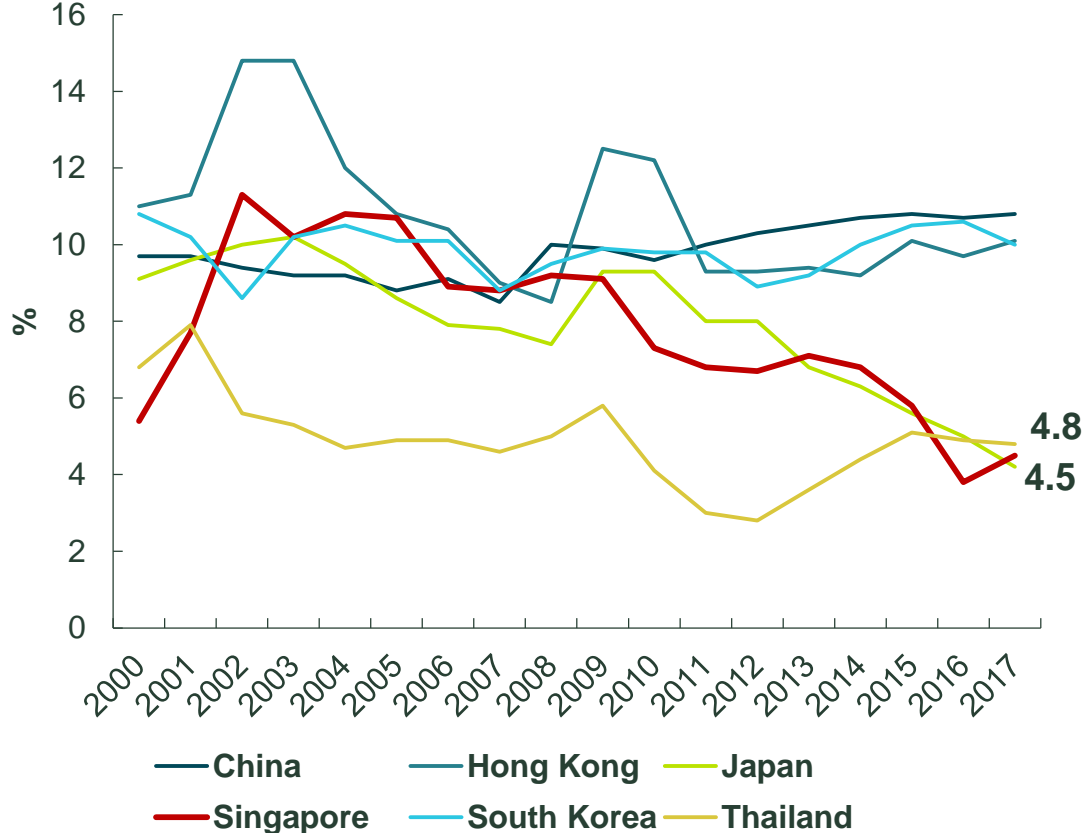
Source: Euromonitor, SSGA Demographics

General Unemployment & Youth Unemployment

Total Unemployment (% of total labor force)



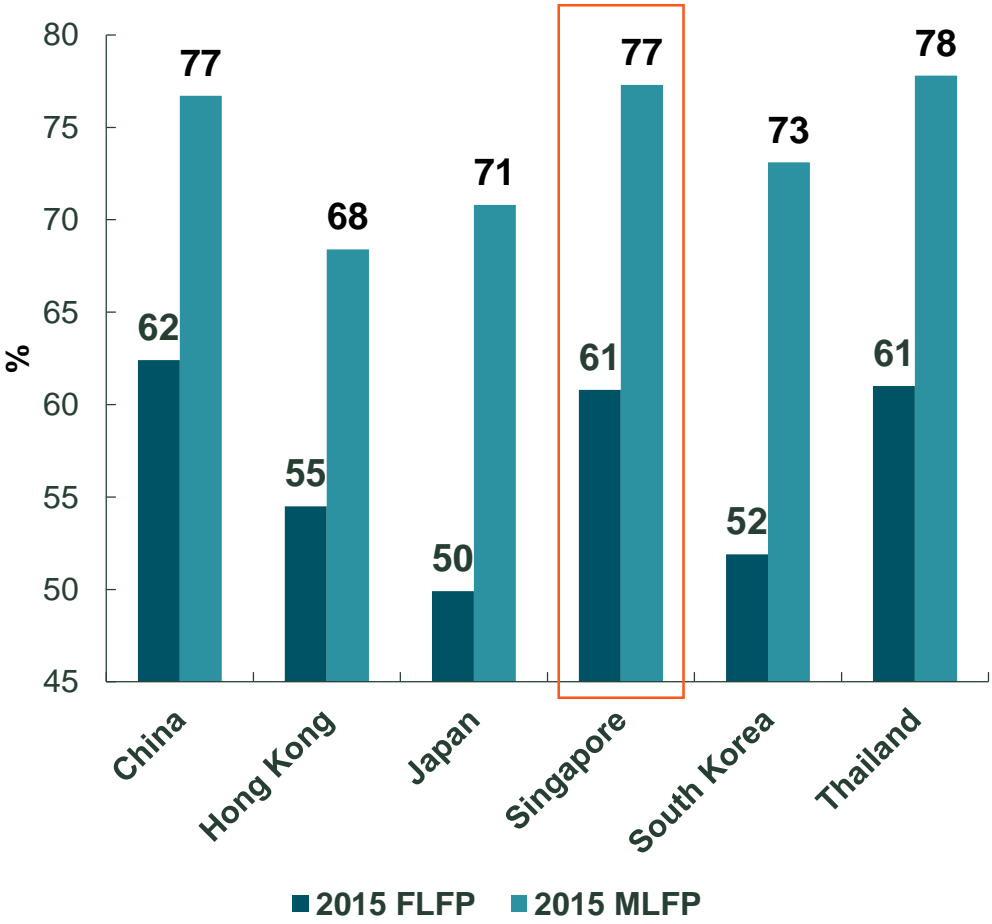
Youth Unemployment (% of total labor force ages 15–24)



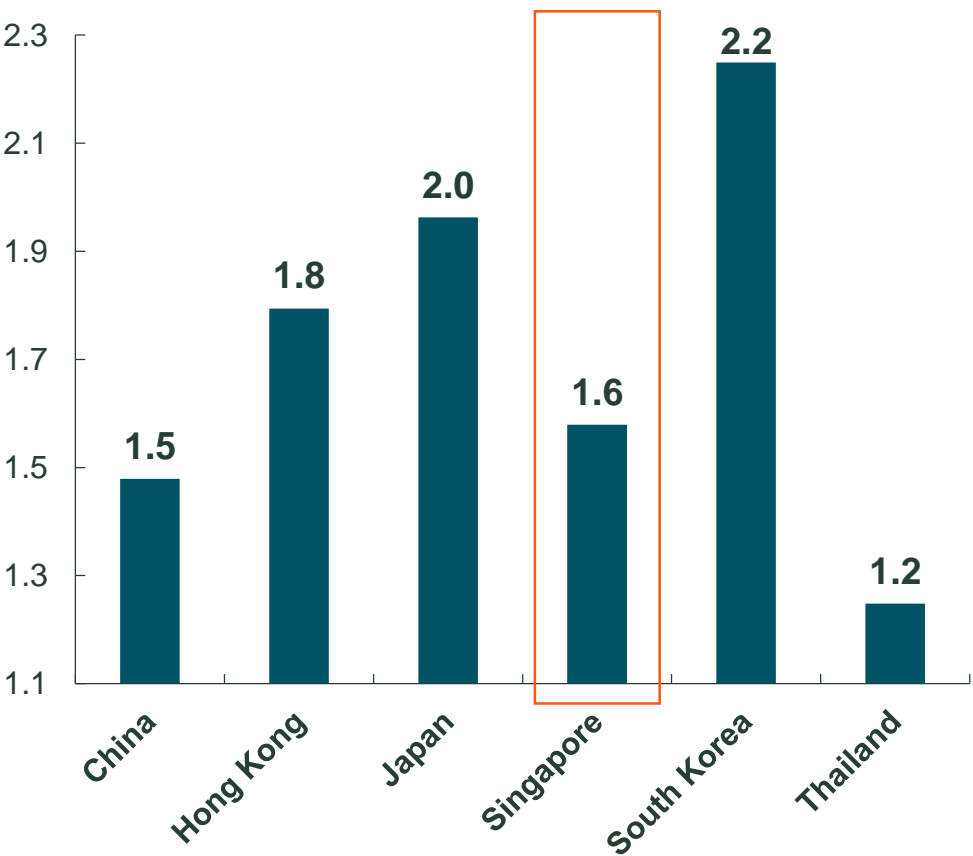
Source: World Bank, SSGA Demographics

Gender Differences

Gender Labour Participation Differences



Ratio of Male GNI per capita to female GNI per capita 2015 in 2011 PPP



Source: ILO, UN, SSGA Demographics

Demographics & Monetary Policy

My view since 2005

Effects of Interest Rates:

The **young**: Long on human capital & short on assets.
The **old**: Long on assets & short on human capital.

Monetary policy impact is different based on **relative fractions of young & old**

Credit Restrictions

The more people in the latter parts of their working lives and in retirement and the fewer the young workers — the less important are credit constraints

Patrick Imam (IMF WP 2013), Shock from Graying: Is the Demographic Shift Weakening Monetary Policy Effectiveness:

- Moderate monetary policy effectiveness in graying societies
- Weakening of monetary policy effectiveness over time with regards to unemployment and inflation in US, Canada, Japan, UK, and Germany due to demographic changes

Source: IMF, St Louis Fed, SSGA Demographics

Demographics, Monetary Policy & Interest Rates

Philip Turner (BIS, 2013) — Benign neglect of the long-term interest rate:

- Maturity risk reduction makes financial system more shock resilient. Extended period of low long rates and high public debt creates financial stability risks.
- Policy frameworks should be reconsidered, with a view to clarifying **the importance of the long-term interest rate for monetary policy, financial stability and government debt management**

Stanley Fischer (Federal Reserve Board, 2016) on ‘The Low Level of Global Real Interest Rates’:

- Aging population lowers equilibrium interest rate beyond effect on labor force and trend growth
- Higher saving by near-retirement households could be pushing down longer-run equilibrium federal funds rate relative to its level in the 1980s by 75 bps

Demographics & Inflation

Jong-Won Yoon, Jinill Kim, and Jungjin Lee (IMF WP, 2014) — Impact of Demographic Changes on Inflation and the Macroeconomy:

- Population growth affects real economic variables on the negative side. Influence of population dynamics on fiscal policy variables is rather mixed.
- Ongoing demographic changes could have a sizable deflationary impact in the coming years. These demographic dynamics would change the framework of macroeconomic policies.

Mikael Juselius and Előd Takáts (BIS WP 2018) — The enduring link between demography and inflation:

- Systematic relationship between the age structure and inflation. Slow but large-scale demographic shifts have the potential to materially affect trend inflation.
- Accounting for age structure leads to substantially lower estimates of endogenous inflation persistence. Role of endogenous drivers like inflation expectations, may have been overstated.

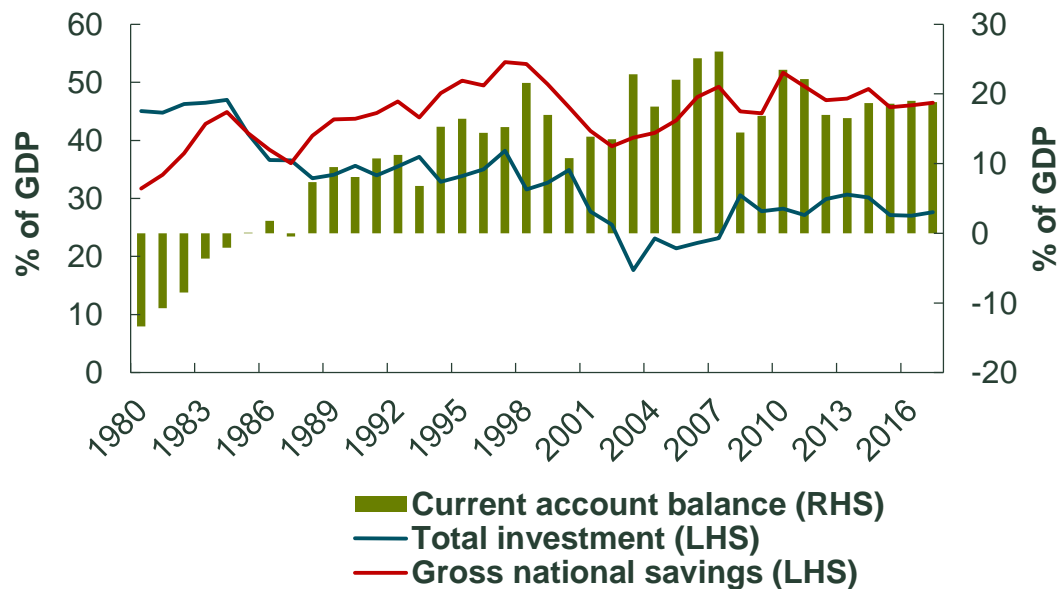
Demographics, Savings & Current Account

From National Income Identity: $S = I + CA + (G - T)$

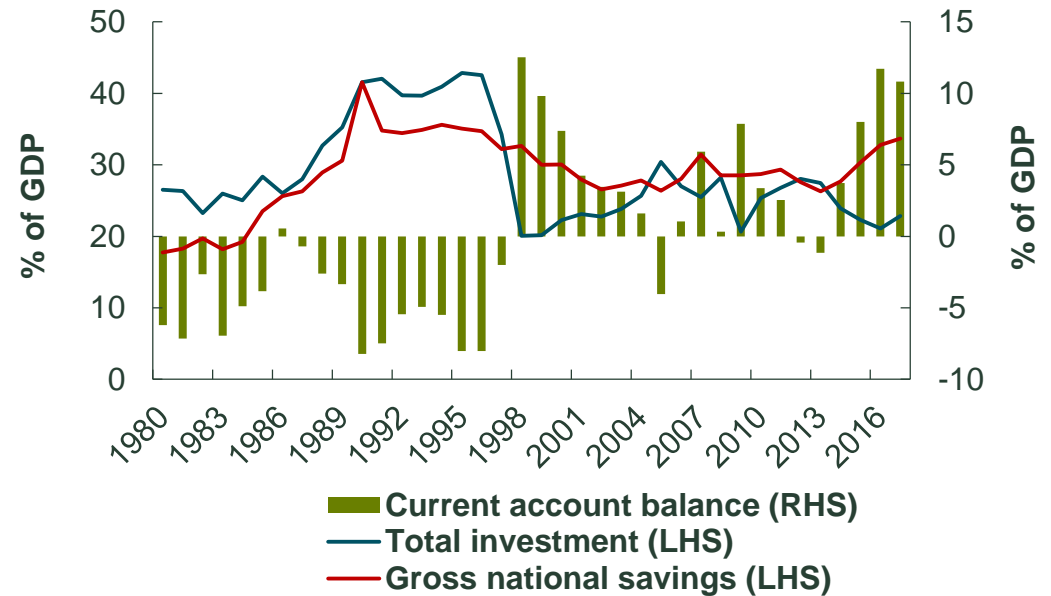
where S = Private Saving, I = Investment, G = Government Expenditure, CA = X - M = Net Exports, T= Taxes

We find statistically strong links between demographic variables & aggregate saving, investment & current account balance

Singapore



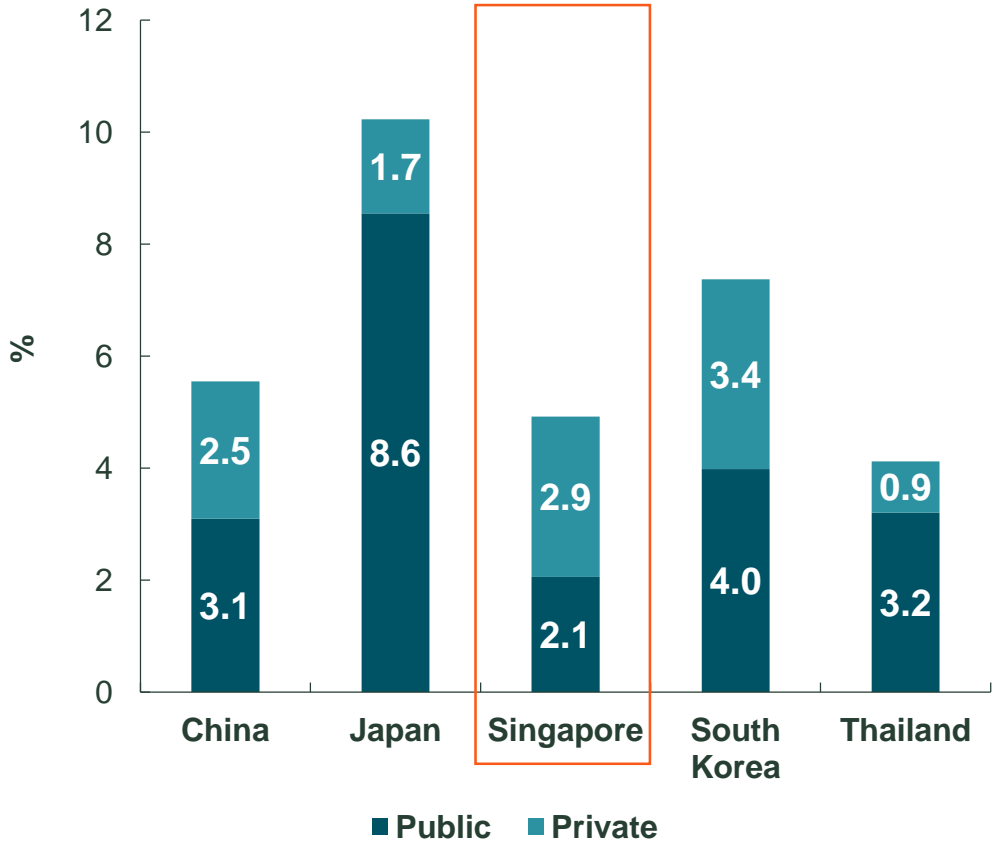
Thailand



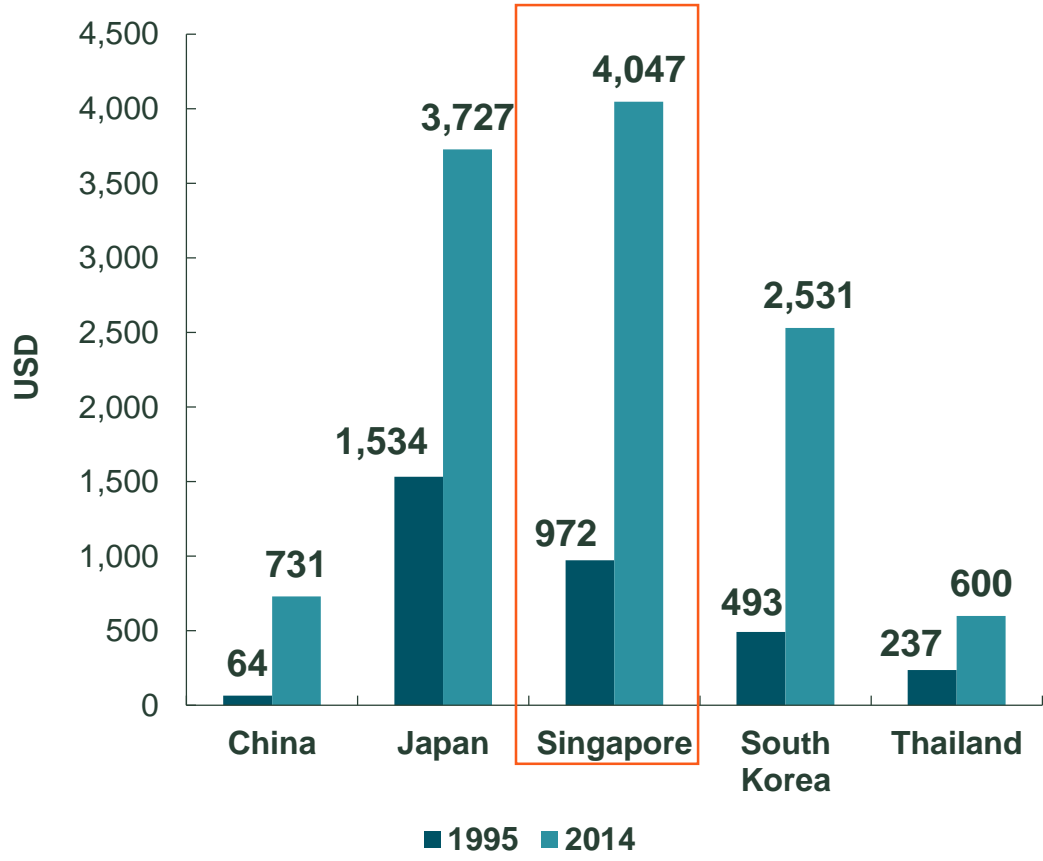
Source: CS, IMF, SSGA Demographics

Health Expenditure

Health Expenditure as % of GDP, 2014



Health expenditure per capita, PPP (constant 2011 international USD)



Source: World Bank, SSGA Demographics

Sectors Demographically Advantaged

Changing consumers and workers in a global and technologically advancing world. Not just people numbers, but groups and behaviours impact these sectors.

INFRASTRUCTURE

NATURAL RESOURCES

LEISURE & LUXURY

EMERGING MARKETS

PHARMA & *BIOTECH*

FINANCIAL SERVICES

Pension Fund Asset Allocation Trends: 2017 versus 2001

	2001				2017			
	Equities (%)	Bonds (%)	Cash (%)	Other (%)	Equities (%)	Bonds (%)	Cash (%)	Other (%)
Australia	62	19	5	14	49	14	15	22
Canada	62	26	2	10	45	31	2	22
Japan	52	46	0	2	30	56	4	10
Netherlands	44	44	11	1	33	50	0	17
Switzerland	36	35	20	9	33	34	4	28
UK	67	18	5	10	47	35	2	16
US	65	28	2	5	50	21	2	28

DB — DC Asset Split (2017 versus 2001)*

	2001		2017	
	DC (%)	DB (%)	DC (%)	DB (%)
Australia	83	17	87	13
Canada	3	97	5	95
Japan	0	100	4	96
Netherlands	2	98	6	94
UK	8	92	19	81
US	52	48	60	40

Asset size

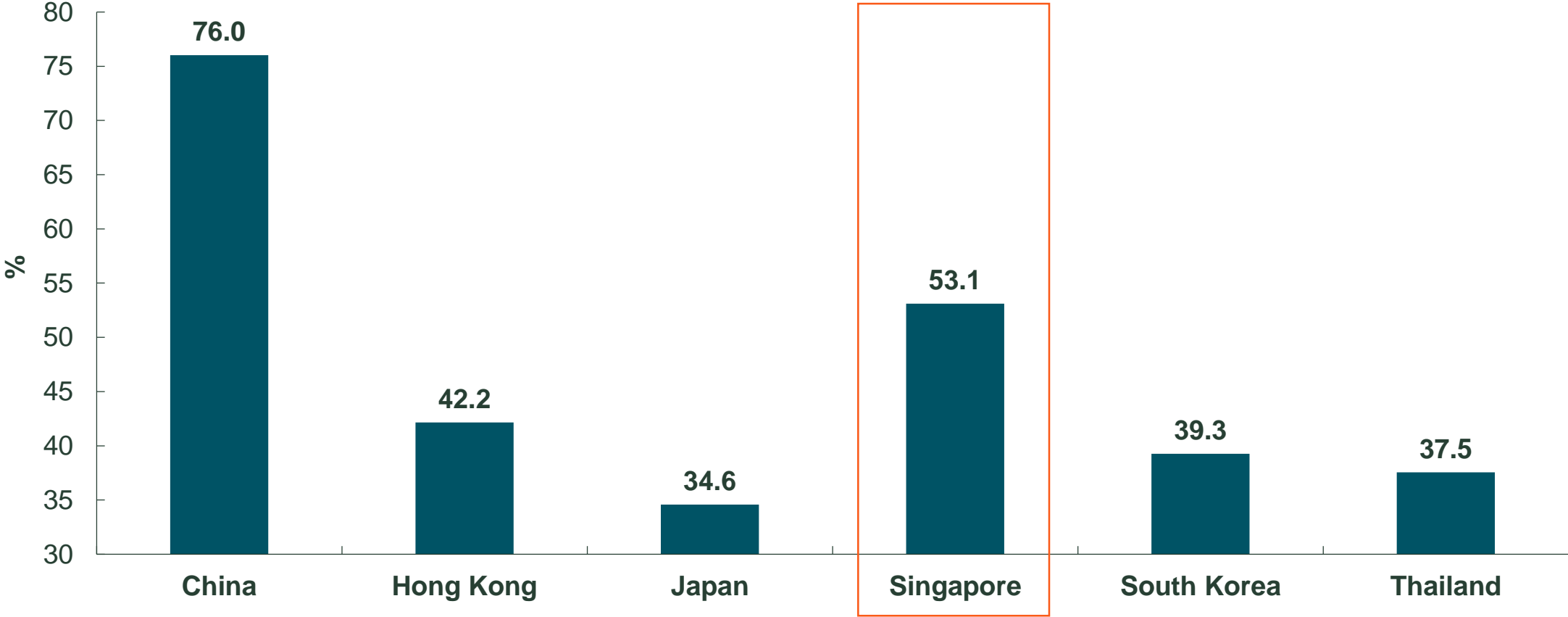
	Total Assets (USD Billion)	Assets/GDP Ratio (%)
Australia	1,924	138.4
Canada	1,769	107.8
Japan	3,054	62.5
Netherlands	1,598	193.8
Switzerland	906	133.1
UK	3,111	121.3
US	25,411	131.2

Source: Willis Towers Watson (2018)

* DC assets in Switzerland are cash balance plans and are excluded from the analysis.

Pension Indicators

Gross pension Replacement Rates, Average Male Earners



Source: OECD 2018, SSGA Demographics

Pensions, Valuation and Corporate Balance Sheets

Does market value of firms sponsoring pension plans reflect information about pension liabilities?

Franzoni & Marin (2006) find:

- Market significantly overvalues firms with under-funded pension plans
- Low returns are not explained by risk, momentum or accruals
- Firms with underfunded pensions have poor operating performance & low returns

Do firm's equity returns reflect its pension plan risks? **Li Jin, Robert Merton & Zvi Bodie** (2006) find:

- Equity risk does reflect the risk of the firm's pension plan despite arcane accounting rules. Capital markets are informationally efficient.
- **BUT** using de-leveraged equity return betas to figure out cost of capital for operating assets is flawed as it does not adjust for pension risks

Pensions Solutions for the 21st Century

Zvi Bodie in “Worry-Free Investing (2003)” challenges that a diversified portfolio of stocks is not risky in the long-run:

- Stocks don’t always produce the highest return, diversification doesn’t always protect you against loss & risk of owning stocks doesn’t always decline the longer you hold them
- Employees should invest at least some of their retirement money in Inflation Bonds and TIPS. Employers should make them available.

Modigliani & Muralidhar’s “Rethinking Pension Reform” (2005) highlight:

- A combination of DB & DC plans is preferable to standalone DB or DC
- Hybrid Pension Plans is good both for employers and employees

Development, Governance, Corruption & Gender Balance Indicators

Countries	Human Development Index Score (%)	Human Development Index Rank	Gender Gap Index Score (%)	Gender Gap Index Rank	Corruption Perception Index Score	Corruption Perception Index Rank	Sustainability	Percentile Rank
Norway	94.9	1	83	2	85	6	1.17	91.4
Switzerland	93.9	2	75.5	21	86	5	1.32	95.7
Germany	92.6	4	77.8	12	81	10	0.76	71
US	92	10	71.8	49	74	18	0.35	58.6
Singapore	92	10	70.2	65	84	7	1.53	99.5
UK	91	16	77	15	81	10	0.38	59
Japan	90.3	17	65.7	114	72	20	1.01	86.2
South Korea	90.1	18	65	118	53	52	0.17	51.9
France	89.7	21	77.8	11	69	23	-0.06	44.3
Italy	88.7	26	69.2	82	47	60	0.35	58.1
Malaysia	78.9	59	67	104	49	55	0.1	50
Turkey	76.7	71	62.5	131	41	75	-2	5.7
Mexico	76.2	77	69.2	81	30	123	-0.77	20
Brazil	75.4	79	68.4	90	40	79	-0.45	30
Thailand	74	87	69.4	75	35	101	-0.93	15.7
China	73.8	90	67.4	100	40	79	-0.52	27.1
India	62.4	131	66.9	108	40	79	-0.95	14.3
Taiwan	n/a	n/a	n/a	n/a	61	31	0.93	79
Hong Kong	n/a	n/a	n/a	n/a	77	15	0.84	74.3

Source: World Bank, WEF, UN, TI, SSGA Demographics.

Conclusions

- Better understanding **changing behaviour of consumers and workers** alongside market and economic factors will be very important
- **Macro fundamentals** (growth, inflation, public debt) are affected by underlying demographics. Demographics affects **asset prices** too with implications for asset allocation.
- **Strategic ALM & SAA** must holistically take into account drivers of inflation risk, interest rate risk, longevity risk and market risk. **Governance** will be crucial.
- In a low growth world, both **risk taking and risk management** become very important and critical for higher returns. Multi-asset strategies with downside protection needed.
- Middle-Income trap and rapid ageing is creating need for a **proactive holistic coordinated structural reform programs** to combine with modern fiscal and monetary policy

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Amlan Roy (amlan_roy@ssga.com) Amy Le (amy_le@ssga.com)

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Singapore: State Street Global Advisors Singapore Limited, 168, Robinson Road, #33-01 Capital Tower, Singapore 068912 (Company Reg. No: 200002719D, regulated by the Monetary Authority of Singapore). T: +65 6826-7555. F: +65 6826-7501.

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SSGA Contacts

For additional information or any questions on the information covered in today's presentation, please contact

Global Demographics/Retirement Research

Amlan Roy, PhD

Senior Managing Director

Global Chief Retirement Strategist

+44 203 395 6719

amlan_roy@ssga.com

Amy Le

Investment Strategist

+ 44 203 395 6590

amy_le@ssga.com