Fiscal Implications of Population Ageing
Asian Countries

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1. Demographic Changes

- What is happening?
  - Demographic Changes
  - Structure/Distribution as well as Size of Population

Sources: UN (Median Projection)
1. Demographic Changes

Similar in most developing countries including China

Sources: UN (Median Projection)
1. Demographic Changes

Main Drivers of Demographic Changes:

\[ \Delta \text{Population} = \text{Birth} + \text{Immigration} - \text{Death} - \text{Emigration} \]

Now, people live longer with less kids \( \Rightarrow \) behavioral changes:
In labor supply, consumption, intergenerational relationship, etc.

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**Total Fertility Rate**
(Births per woman over the lifetime)

- SG: 1.4, 2.0, 1.6, 1.5, 1.7, 1.9, 1.5, 1.7, 2.0, 2.4
- JP: 5.1, 6.2, 6.4, 6.1, 6.0, 5.6, 7.0
- KR: 1.4, 1.6, 1.5, 1.7, 1.9, 1.5, 1.7, 2.0, 2.4
- CN: 5.1, 6.2, 6.4, 6.1, 6.0, 5.6, 7.0
- VN: 1.4, 1.6, 1.5, 1.7, 1.9, 1.5, 1.7, 2.0, 2.4
- TH: 5.1, 6.2, 6.4, 6.1, 6.0, 5.6, 7.0
- MY: 1.4, 1.6, 1.5, 1.7, 1.9, 1.5, 1.7, 2.0, 2.4
- ID: 5.1, 6.2, 6.4, 6.1, 6.0, 5.6, 7.0
- PH: 1.4, 1.6, 1.5, 1.7, 1.9, 1.5, 1.7, 2.0, 2.4

**Life Expectancy at Birth**
(Years)

- SG: 66.4, 69.0, 54.3, 44.1, 50.2, 58.6, 72.5, 71.4
- JP: 87.0, 86.9, 86.3, 80.6, 78.6, 78.5, 78.5, 78.5
- KR: 87.0, 86.9, 86.3, 80.6, 78.6, 78.5, 78.5, 78.5
- CN: 66.4, 69.0, 54.3, 44.1, 50.2, 58.6, 72.5, 71.4
- VN: 87.0, 86.9, 86.3, 80.6, 78.6, 78.5, 78.5, 78.5
- TH: 66.4, 69.0, 54.3, 44.1, 50.2, 58.6, 72.5, 71.4
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- PH: 87.0, 86.9, 86.3, 80.6, 78.6, 78.5, 78.5, 78.5

Note: Total Fertility Rate is defined as the average number of live births a woman would have by age 50 if she were subject, throughout her life, to the age-specific fertility rates observed in a given year. Its calculation assumes that there is no mortality.
1. Demographic Changes

Demographic Changes (especially aging):
- Often measured/captured by old age dependency ratio (ODR) and proportion of working age population.

Note: In the right panel, all the figures in parentheses denote the years when the share of working age population reaches the (projected) peak. In the right panel, the arrows indicate the transitions across the years 1995, 2000, and 2008~12 (depending on the data availability). Sources: UN, ILO & AMRO Staff Estimates.
1. Demographic Changes

- Population Aging in More Dramatic Ways:
  - How fast is it?
  - How many workers are to “support” one retiree? – Fiscal Implications

### Speed of Aging
(Years for Old Age Dependency Ratio Change)

<table>
<thead>
<tr>
<th>Country</th>
<th>7%→14%</th>
<th>14%→20%</th>
<th>7%→14%</th>
<th>14%→20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>65</td>
<td>14</td>
<td>41</td>
<td>9</td>
</tr>
<tr>
<td>France</td>
<td>114</td>
<td>40</td>
<td>37</td>
<td>12</td>
</tr>
<tr>
<td>Germany</td>
<td>40</td>
<td>36</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>Japan</td>
<td>25</td>
<td>11</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>US</td>
<td>72</td>
<td>17</td>
<td>23</td>
<td>8</td>
</tr>
</tbody>
</table>

### Support Ratio
(Number of 15-64 per One 65+)

<table>
<thead>
<tr>
<th>Year</th>
<th>CN</th>
<th>JP</th>
<th>KR</th>
<th>ID</th>
<th>MY</th>
<th>PH</th>
<th>TH</th>
<th>LA</th>
<th>MM</th>
<th>SG</th>
<th>VN</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>10.3</td>
<td>4.0</td>
<td>9.8</td>
<td>13.7</td>
<td>16.4</td>
<td>18.0</td>
<td>10.6</td>
<td>14.9</td>
<td>13.3</td>
<td>9.7</td>
<td>9.6</td>
</tr>
<tr>
<td>2050</td>
<td>2.1</td>
<td>1.4</td>
<td>1.5</td>
<td>4.7</td>
<td>3.9</td>
<td>6.9</td>
<td>1.9</td>
<td>7.2</td>
<td>5.1</td>
<td>1.6</td>
<td>2.9</td>
</tr>
<tr>
<td>2080</td>
<td>1.6</td>
<td>1.5</td>
<td>1.4</td>
<td>3.3</td>
<td>2.3</td>
<td>4.1</td>
<td>1.5</td>
<td>2.8</td>
<td>3.3</td>
<td>1.3</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Sources: UN & AMRO Staff Estimates
2. Economic Implications

Why Do We Care?

- Implications on economic growth potentials from labor input

Changes in Working Age Population vs Long-run Growth Potential

Contribution to Growth to Annual Average Trend Real GDP Growth 2011-2060

Note: In the left panel, the arrows indicate the transitions across the years 1995, 2000, and 2008~12 (depending on the data availability).

Sources: UN, ILO, OECD & AMRO Staff Estimates
2. Economic Implications

Impact on Growth?

- Many factors including more structural & behavioral components

GDP Growth:

\[
\frac{\Delta \text{GDP}}{\text{GDP}} = \frac{\Delta \text{TFP}}{\text{TFP}} + \alpha \times \frac{\Delta \text{HC}}{\text{HC}} + (1 - \alpha) \times \frac{\Delta \text{Capital}}{\text{Capital}} + \alpha \times \frac{\Delta \text{Worker}}{\text{Worker}}
\]

where TFP (Total Factor Productivity), HC (Human Capital), \( \alpha \) (Labor Share of Income)

‘Worker’ as a Labor Input

\[
\text{Worker} = \text{Pop} \times (1 - \text{DR}) \times \text{LPR} \times \text{ER}
\]

where Demographic Factors: Pop (Total Population), DR (Dependency Ratio, both infant and old age); Behavioral Factors: LPR (Labor Force Participation Rate), ER (Employment Rate)

Also GDP per Capita:

\[
\frac{\text{GDP}}{\text{Pop}} = \frac{\text{GDP}}{\text{Worker}} \times (1 - \text{DR}) \times \text{LPR} \times \text{ER}
\]
3. AEs vs. DEs

Are Developing Economies Different?

- Aging started at different levels but with similar drivers
  - Growing older before getting rich enough??
  - Concept of “Old” and “Support”
  - Role of the State – Social Security System
    * Expectation vs. reality: reinforcing each other
    * Growth strategy amid rising expectation
  - Similar Drivers: demographic changes, economic/fiscal outlook

- Faster changes with the 2nd order effect implications

<table>
<thead>
<tr>
<th>Demographic/Labor Characteristics</th>
<th>Economic Characteristics</th>
<th>Institutional Characteristics</th>
<th>Political/Social Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Underemployment</td>
<td>• Industry structure</td>
<td>• Less developed Social Security System</td>
<td></td>
</tr>
<tr>
<td>• Education</td>
<td>• Capital intensity</td>
<td>• Fast expansion</td>
<td>• Political instability</td>
</tr>
<tr>
<td>• Urbanization</td>
<td>• GDP per capita</td>
<td>• Need for further growth</td>
<td>• More populistic nature</td>
</tr>
<tr>
<td>• Behavioral changes</td>
<td>• Industry structure</td>
<td>• Informal sector</td>
<td>• Inter-generational gap</td>
</tr>
<tr>
<td>• Growing inequality</td>
<td>• Capital intensity</td>
<td></td>
<td>in social norms</td>
</tr>
<tr>
<td>• Retirement Age</td>
<td>• GDP per capita</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Need for further growth</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Informal sector</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Need for More Public Resource
3. AEs vs. DEs

More on Growth

- Growth components may have different dynamics between AEs and DEs

GDP Growth:

\[
\frac{\Delta GDP}{GDP} = \frac{\Delta TFP}{TFP} + \alpha \times \frac{\Delta HC}{HC} + (1 - \alpha) \times \frac{\Delta Capital}{Capital} + \alpha \times \frac{\Delta Worker}{Worker}
\]

‘Worker’ as a Labor Input

\[\text{Worker} = \text{Pop} \times (1 - DR) \times LPR \times ER\]

<table>
<thead>
<tr>
<th>Major Factors</th>
<th>TFP</th>
<th>HC</th>
<th>(\alpha)</th>
<th>Capital</th>
<th>Pop</th>
<th>DR</th>
<th>LPR</th>
<th>ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity, Economic</td>
<td>+</td>
<td>~</td>
<td>~</td>
<td>+</td>
<td>~</td>
<td>-</td>
<td>~</td>
<td>~</td>
</tr>
<tr>
<td>Structure</td>
<td>Education,</td>
<td>Work Ethics</td>
<td>Labor Share</td>
<td>Economic</td>
<td>Birth,</td>
<td>Aging</td>
<td>Culture,</td>
<td>Labor Mkt</td>
</tr>
<tr>
<td></td>
<td>of Income</td>
<td></td>
<td>Structure</td>
<td>Death,</td>
<td>Immigration</td>
<td></td>
<td>Economic</td>
<td>Behavior</td>
</tr>
<tr>
<td>AEs</td>
<td>+</td>
<td>+</td>
<td>+/-</td>
<td>+</td>
<td>~</td>
<td>-</td>
<td>~</td>
<td>~</td>
</tr>
<tr>
<td>DEs</td>
<td>+</td>
<td>+</td>
<td>+/−</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td></td>
<td>Under Employment</td>
</tr>
</tbody>
</table>
4. Fiscal Implications

Why do we care?
- Implications on fiscal sustainability through both revenue and expenditure

Tax Revenue Changes over Aging Labor Force (Korea)

Spending on Social Benefits vs. Population Aging (OECD Countries, 2013)

Sources: Korea NTS, KOSIS, OECD & AMRO Staff Estimates
4. Fiscal Implications

More on Fiscal Side

- Population dynamics will have a disproportionate effects on fiscal aggregates structurally

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Revenue Structure (2012)

Expenditure Structure (2013)

Source: OECD, *Government at a Glance 2015*
4. Fiscal Implications

- Population Dynamics towards Structural Imbalance
  - Without recalibrating revenue and expenditure structures, population aging will slowly undermine long-term fiscal sustainability

- Note: In the right figure, debt per capita changes are from 2009 to 2013, in USD PPP adjusted.
- Sources: OECD & AMRO Staff Estimates
5. More on Revenue

More on Revenue Side

- Revenue structure of member countries seems to be exposed to the same structural vulnerability with some additional issues.

Note: Pre-crisis period and post-crisis period cover 2000~2005 and 2010~2015 respectively. Income-based tax includes personal income tax & corporate income tax and consumption based tax include sale tax, excise (consumption) tax, VAT, and GST. For Japan, charts only refer to the General Account of the Central Government. Further for Japan, post-crisis period average is only up to FY2014.
5. More on Revenue

Revenue Structure Needs to Consider
- Structural changes affecting both revenue stream and financing needs
- What will be the acceptable level of ‘tax burden’?

(Tax+SSC)/GDP vs. Old Age Dependency Ratio (1970~2010)

How Revenue will Change?

<table>
<thead>
<tr>
<th></th>
<th>Demographic</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income Based (PIT, CIT)</td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>Consumption Based (VAT, GST, Excise)</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Tariff &amp; Duties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: OECD
5. More on Revenue

Need to Consider Tax Base Change

- Tax liabilities vs. Demographic Structure – Income tax, Consumption tax
- Some Key Parameters in Tax Design – Progressivity, Exemptions, Coverage
- In DEs, Economic Structure and Institutional Development Also Matter

Personal Income Tax: Payroll, Interest Income, etc. By Age Group (Korea, 2012)

Changes in Personal Income Tax by Age Group (Ratio of 2012 to 2007: Korea)

Source: Korea National Tax Service & AMRO Staff Calculation
6. More on Expenditure

Rising Demand with Changing Priorities
- Spending for Economic Growth vs. Spending by Economic Growth
- Establishing social security system – reference point?
  - Inequality and poverty issues: Social Safety Nets
  - Pension & Health/Long-term Care design vs. Demographic change
- Non-economic factors make policy design more complicated

Safety Net Spending Tends to Increase with Growth

Increasing Public Spending on Old Age Cohorts

Note: Safety-net benefits are the total amount of benefits that individuals receive without contribution. In the right panel, bubble size indicate total public expenditure on old-age benefits in % of GDP. (as of 2011)
Sources: OECD, EU & AMRO Staff Estimation
6. More on Expenditure

- Health and Long-Term Care – Harder to Contain
  - Direct effect from population aging
  - Plus, institutional changes & behavioral changes

Main Determinants of Public Health Expenditure

- Demographic Factors
  - Age Structure
  - Health by Age
- Institutional Factors
  - Policy Design
  - Technology
- Economic Factors
- Other Factors
  - Behavior

Public Spending on Health & Long-term Care
(proportion by age group)

Sources: OECD & EU
6. More on Expenditure

- More Generous System at the Cost of ... whom?
  - Political responses to rising demand

**Wider Pension Coverage (2000 → 2010)**


Note: In the left panel, bubble size is the GDP ratio of non-health public social protection expenditure on pensions and other benefits for older persons (2010/2011). In the right panel, total social protection expenditure includes public spending on public health care, old age pension, and other social securities such as unemployment benefits, labor market programs, maternity benefit, etc.

Sources: UN, WHO, ILO & AMRO Staff Calculation
6. More on Expenditure

- Good to Have a Generous Government
  - Public Expectation is Already/Still High -> Political Pressure
  - Doomsday scenario? Not in ‘sight’ yet (myopic nature)

High Expectation (2014 Survey) Q: Who should support the retirees?

Sources: Global Aging Institute
7. Further Thoughts

How to Respond?

- Multidimensional and time varying nature
  - Comprehensive Policy Response: behavioral change + sustainable system
- Long-term Perspective:
  - Fiscal sustainability to support public confidence
  - Institutional changes in accordance with behavioral changes
- Main Constraints: maintaining growth & stability, political feasibility

Economic Growth Potentials

Demographic Change

Fiscal Prudence & Sustainable Fiscal Institutions

Behavioral Changes & Institutional Changes

Policy Responses to address key challenges
Thank you for your attention