Uniquely Asia: How Asian nations can tackle their inflation, worker & retiree concerns

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1. Based on a recent working paper by Joe Cherian (CAMRI, NUS), Chua Wee Kang (CAMRI, NUS), and Zvi Bodie (Boston University)
Challenges facing Asian nations

• Mounting headline and on-the-ground inflation pressures
  ➢ eroding savings & purchasing power
  ➢ potential for social ramifications

• Changing demographics
  ➢ rapidly aging populations with many incumbent retirees
  ➢ dwindling support networks
  ➢ less reliance on traditional support by children in old age

• Retirees & workers’ financial ignorance and miseducation
  ➢ confusing risk with return
  ➢ high risk investments with poor performance
Objectives

• To propose investment strategies and products that assist small, trade-based sovereigns (such as Singapore, Taiwan, HK) to offer a riskless real rate of return for retirement

• The return should be commensurate with that of local inflation, as measured by the local Consumer Price Index

• To potentially construct a basket of instruments whose returns track the CPI of a particular country as closely as possible

• The final retirement product(s) should be inflation-indexed, guaranteed for life, and rational from the perspective of investment science & engineering
The Retirement Problem

- The average investor is concerned about 3 fundamental issues during retirement:
  - Receiving a reasonable, level payout every month
  - It should last for as long as the investor lives
  - It should be indexed to his or her cost of living
What is needed?

Retirement products which have the following characteristics:

- Returns at least that of local inflation – CPI Plus
- Negligible risk, guaranteed by government
- Easily understandable & investible

Solution:

- Government-backed, inflation-indexed bonds
- Private and public life annuities for retirees (i.e., guaranteed real level returns for life)

Unfortunately, most Asian nations currently do not offer these
The Retirement Solution

• The most commonly-cited product that provides a level real payout for life is an inflation-linked retirement life annuity

• Such a product converts accumulated investment capital to lifetime real cash flows for retirement consumption, expenses, and spending

• Ageing populations and changing demographic landscapes in Asian countries will increase the demand for such retirement annuity products

• An alternative: Financially manufacture a laddered portfolio of inflation-indexed bonds from the respective sovereign. But such bonds need to exist first!
How small sovereigns can offer inflation-indexed returns to their citizens

Option 1: The government directly issues inflation-indexed bonds through competitively-priced auctions

Option 2: Invest a portion of their reserves or sovereign wealth portfolios in a suitably-weighted basket of larger (G3/G7) sovereigns’ inflation-indexed bonds, taking care to hedge out currency & other exposures

Option 3: Use derivatives, such as inflation swaps. It can be at the direct sovereign/central bank level, or through financial intermediaries & institutions
Option 1: U.S. Treasury Inflation-Protected Securities (TIPS) Example

- TIPS’ Principal (or Face Value) is adjusted by changes in the CPI. With inflation, the principal increases. With deflation, the principal decreases.
- 5, 10, and 30 year issues are available online in increments of US$100 via TreasuryDirect.
- Interest rate (or coupon) is determined in a competitive auction.
- Both the sum paid when a TIPS matures and the amount of interest paid every six months is affected by adjustments in the Principal due to changes in the CPI.

Option 2: Sovereign “carve outs”

Government Provident Funds and Long-term Investment Funds

AuM = US$WXYZ billion

TRADE-WEIGHTED INVESTMENTS

INFLATION-INDEXED RETURNS (F/X HEDGED)

INFLATION-INDEXED RETURNS & PRODUCTS

Consumers / Retirees

TIPS

Index-linked Gilts

JGBi’s

ACIB’s

US$W billion

£X billion

¥Y trillion

ASZ billion

ASIA’S GLOBAL BUSINESS SCHOOL
Option 3: Inflation-linked Sovereign Swaps

• Bilateral or multilateral inflation-indexed sovereign swaps
• Notional amount = US $100 billion
• Trade-weight notional principal across Parties B, C, D, and E
• Tenor: Quarterly (3-MO LIBOR) or Semi-annual (6-MO LIBOR)

Party A
(Government Provident Fund or Long-term Investment Fund)

6-MO LIBOR

INFLATION-INDEXED CASH FLOWS (HEDGED)

Party B
(U.S.)

Party C
(U.K.)

Party D
(Japan)

Party E
(Australia)

• Set-up should be similar to US-dollar currency swap lines established between the Fed and certain CBs during the global financial crisis (to meet excess demand for USD)
• Sovereign credit risk is mitigated by collateralization
• Currency exposures are swapped out
Aside: Inflation-linked Sovereign Swaps’ Pricing

1. **• Assuming semi-annual resets and a 5-year life, the I/L swap rate (or spread) at initiation is such that:**
   - Value of 5 year Floating Rate Bond on 6-MO LIBOR = Value of 5 year TIPS with a real coupon

2. **• Similarly, the I/L swap rate (or spread) at initiation is such that:**
   - (Notional) Value of Government Portfolio = Value of 5 year TIPS with a real coupon
## Pros & cons of the 3 methods compared

<table>
<thead>
<tr>
<th>Method</th>
<th>Advantages</th>
<th>Risks</th>
<th>Mitigants</th>
</tr>
</thead>
</table>
| 1) Direct issuance of sovereign inflation-indexed bonds | • Simple, direct, exact.  
• Government tax revenues & receipts rise naturally with inflation. | • Sovereign bears full brunt of inflation risk.  
• Taxable income and GDP may be adversely affected by inflation. Receipts may not rise sufficiently quickly. | • Caps and floors on inflation payouts.  
• Government has control over inflation via fiscal and monetary policies, and price controls. |
| 2) Entering into inflation swaps | • Unfunded, requires minimal upfront capital.  
• Sovereign bears minimal inflation risk. | • Financial institution counterparty risk. | • Direct sovereign or central-bank level swap arrangements. |
| 3) Replication using basket of correlated G3/G7 inflation-indexed bonds | • Sovereign bears low to moderate residual inflation risk.  
• Practical & feasible.  
• Currency, interest rate and default risks can be hedged. | • Basket can sometimes underperform the local inflation index.  
• Requires carving out of a portion of the sovereign investment portfolio.  
• Hedging may be costly and/or impractical for the required time horizons. | • Purchase portfolio insurance/hedging policies from large global institutional players  
• Sovereign reserve and wealth portfolios usually already contain some foreign (especially G3/G7) bonds.  
• Currency hedging via swaps can be directly arranged at the sovereign or central bank level. |
Case Study: What is investible via CPF (Singapore’s mandatory retirement savings scheme)

<table>
<thead>
<tr>
<th>Products</th>
<th>Transaction costs / fees</th>
<th>Negligible risk</th>
<th>Principal protected</th>
<th>Guaranteed level of returns</th>
<th>Inflation-linked returns</th>
<th>Suitable for retirement savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPF savings accounts</td>
<td>✓, zero</td>
<td>✓</td>
<td>✓</td>
<td>✓, but variable</td>
<td>X</td>
<td>Default option</td>
</tr>
<tr>
<td>Fixed Deposits</td>
<td>✓, zero</td>
<td>✓</td>
<td>✓</td>
<td>✓, but very low</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SG government bonds</td>
<td>✓, low</td>
<td>✓</td>
<td>✓</td>
<td>✓, but low</td>
<td>X</td>
<td>Possible alternative</td>
</tr>
<tr>
<td>Corporate bonds</td>
<td>X, illiquid</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Investment linked insurance</td>
<td>X, sales charge</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Unit trusts</td>
<td>X, annual fees</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>ETFs</td>
<td>✓, low</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>REITs</td>
<td>X, mgmt fees</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>no correlation</td>
<td>X</td>
</tr>
<tr>
<td>Gold</td>
<td>✓, low</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>no correlation</td>
<td>X</td>
</tr>
<tr>
<td>CPF Life</td>
<td>✓, zero, premium</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>X</td>
<td>Possible alternative</td>
</tr>
</tbody>
</table>

Source: CPF website (ask-us.cpf.gov.sg)
Option 2: Detailed example for Singapore

- Benchmark = Singapore CPI return over each rolling 10-year period
- Attempt to best replicate / outperform with: weighted combination of US & UK CPIs
Option 2: Actual Inflation (SG) and Proxies, 1-year and 2-year Rolling

1-year

Actual inflation

Equal-weighted estimate

Import-weighted estimate

Trade-weighted estimate

2-year

Actual inflation

Equal-weighted estimate

Import-weighted estimate

Trade-weighted estimate

Year

Percent
Option 2: Equal-weighted Proxy vs Actual Inflation (SG), 1-year and 2-year Rolling

1-year

\[ y = 0.6954x + 0.0285 \]
\[ R^2 = 0.4222 \]

Equal-weighted estimate

Linear (Equal-weighted estimate)

2-year rolling

\[ y = 1.0274x + 0.0444 \]
\[ R^2 = 0.7066 \]

Equal-weighted estimate

Linear (Equal-weighted estimate)
Option 2: Import-weighted Proxy vs Actual Inflation (SG), 1-year and 2-year Rolling

\[ y = 0.4256x + 0.0162 \]
\[ R^2 = 0.6026 \]

\[ y = 0.459x + 0.0294 \]
\[ R^2 = 0.7163 \]
Option 2: Trade-weighted Proxy vs Actual Inflation (SG), 1-year and 2-year Rolling

- **1-year**
  - Trade-weighted estimate
  - Linear (Trade-weighted estimate)
  - \[ y = 0.4916x + 0.0173 \]
  - \[ R^2 = 0.6142 \]

- **2-year rolling**
  - Trade-weighted estimate
  - Linear (Trade-weighted estimate)
  - \[ y = 0.5252x + 0.0314 \]
  - \[ R^2 = 0.6833 \]
Option 2: Observations

- In general, inflation proxies are positively correlated with actual inflation, $R^2$ from 0.6 to 0.7.

- On a 2-year rolling basis, the equal-weighted inflation proxy has $R^2=0.7$, with a slope of 1!

- Both import and trade-weighted coefficients are more robust over the stated window periods.

- Estimates tend to be too large when Singapore’s inflation is low; while under-estimating when local inflation is high.
Option 2: Performance of Laddered Portfolio of Currency-hedged Inflation-indexed bonds

![Graph showing performance metrics for different UK CPI weights.](image-url)
Data - Background Info

• Consumer Price Index and trade data obtained from Thomson Reuters DataStream

• Singapore’s major trading partners are: US, UK, Germany, France, Australia, Japan, Korea, Taiwan, Hong Kong, Indonesia, Malaysia, Thailand, China, India & Saudi Arabia

• Time period examined is from 1980 to 2009
Implementation into Products: Inflation-Indexed Participating Life Annuities

Future Realized Investment Value

Payoff $S_{T_i}$ million SGD in real dollars at future time $T_i$, $i = 1, 2, 3, \ldots, N$

$= S_{T_i}$ million SGD at $T_i$ (in real dollars)

Short zero-cost inflation-indexed “participating forward”:

$$\text{Payoff} = \begin{cases} 
K - S_{T_i} & \text{if } S_{T_i} < K \\
0 & \text{if } K \leq S_{T_i} \leq F \\
-\frac{1}{2}(S_{T_i} - F) & \text{if } S_{T_i} > F 
\end{cases}$$

$\Leftrightarrow$ Long Put struck at $K$ + Write $\frac{1}{2}$ a Call struck at $F$

No hedging

Retirement Receipts at $T_i$ + Participating Forward

Some participation in upside

Plain forward contract

Future Risky Investment Value $S_{T_i}$ (SGD)

Strictly limited downside (indexed to inflation)

Investment depreciates

Forward Price ($F$)

Investment appreciates

Future

Realized

Investment

Value
Taking the Lead: The Global Institutional Opportunity

- Asian financial centres such as Singapore, Shanghai, and Hong Kong are ideally-suited from the technology, know-how, and financial stability points of view to serve as the catalyst ("agent of change") in dealing with retirement issues, and help improve the functioning of the "guaranteed" indexed life annuity market in the context of smaller sovereigns & pension funds.

- It can provide technical and f/x expertise, as well as capital, for setting up a warehousing facility for inter-government and inter-pension fund inflation-linked swaps; in providing central clearing, netting & settlement arrangements; handling transactions in various currencies; etc.

- Most smaller sovereigns & provident funds, by definition, are too small to do this by themselves. Collectively, however, they can offer scale and create liquidity, and hence offer I/L products more competitively.
Final Thoughts

• Investment risk **should not** be born by retirees but by producers, who typically have far greater knowledge and skill in handling it.

• In the absence of appropriate risk transfer programs, a reliance on consumer “financial education” may be counterproductive - it also takes businesses and governments off the hook.

• The citizenry should, at a minimum, be supplied with pension & retirement products that **guarantee** an inflation-indexed standard of living.

• Not enough to have guaranteed products if the issuer of such products can itself default! Need **strong partnership** between governments, financial and corporate sectors.

• These products, such as inflation-indexed life annuities, should be rational from the perspective of investment science & engineering.