INNOVATIONS IN FUND MANAGEMENT
SOME ACADEMIC THOUGHTS

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Contents for today's discussion

1. Dynamic asset allocation: facts and fallacies
2. Retirement finance: The Full Monty
3. Innovation: Inflation-Indexed Participating Annuities for Life
4. Other (future) innovations in fund management for retirement
5. The role of alternative investments such as hedge funds
6. What factors and drivers explain hedge fund returns: Asia versus US
7. Conclusion & discussion
Asset allocation and risk management – The issues

• Liquidity, Transparency, and Downside Risk Control & Management have become paramount concerns of asset owners.

• Diversification helps but that does not mean a well-diversified basket of stocks are as safe in the long run. If they were safe in the long-run:
  ➢ they wouldn’t command a risk premium
  ➢ longer-term put options (a.k.a. insurance) on stocks with a floor rising at the riskless rate would be cheaper than their shorter-term counterparts

• Absolute return strategies deserve a closer look in the modern capital allocation program.
A well-diversified, all equities portfolio ain’t less risky in the long run

- Volatility of average compound rate of return on stocks declines with the length of time horizon.
- Probability of a shortfall declines with the length of time horizon.
- However, the severity of the shortfall (the “penalty of being wrong” function) increases with the length of time horizon.
Emerging equity market returns are highly non-normal and cannot be measured with standard approaches

Based on Historical Returns from Jan 2002 to Aug 2011

Source: Bloomberg
Emerging equity market returns exhibit contemporaneous shifts in volatility regimes and increase in correlations.

Again, emerging markets cannot be entirely characterized by their first two moments.
Risk management for retirement: Hope for the best, prepare for the worst

- Ageing population and changing demographics in Japan, Hong Kong, Singapore and other parts of Asia. Declining “support ratios”

- As a consequence, expect compressed equity risk premiums and disappointing long-only equity returns

- An attendant issue: the development of cutting-edge financial innovations & solutions to meet investment and retirement planning needs

- Hedge funds, alternative investments, principal-protected and/or inflation-linked investment products, equity-indexed guaranteed life annuities (a.k.a. ratchet or click funds), etc.
## Debunking some myths with facts

<table>
<thead>
<tr>
<th>Popular literature (Myths)</th>
<th>Financial Economics (Facts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving is for the short run, investing is for the long run</td>
<td>Saving means income minus consumption; investing means selecting your portfolio of assets, including cash</td>
</tr>
<tr>
<td>The only way to reduce risk is to diversify</td>
<td>The simplest ways to reduce risk are to hedge, insure, or hold safe assets. A safe way to achieve a future spending target is with CPI-linked (inflation-indexed) bonds</td>
</tr>
<tr>
<td>Stocks become safe in the long run due to “time diversification”</td>
<td>Stocks do not become safe even in the long run. If they did, they would not have a risk premium</td>
</tr>
</tbody>
</table>

Source: My favorite coauthor, Prof. Zvi Bodie
A word about unit trusts (mutual funds)

- High fees – up to 5% sales load, and anywhere between 1.5% - 2% p.a. in management and trustee fees for actively-managed retail funds

- Nevertheless, well-diversified risky assets such as equity ETFs and mutual funds do have an important role to play in our investment portfolios, although

  - They may not exactly match the purpose or objectives of our future spending profile and consumption needs, which may be sensitive to inflation

  - For a matching strategy, the basic building blocks must be denominated in units that match the purpose or objective, and have known maturities (a.k.a. asset-liability management)
A goal-oriented lifestyle

- Identify financial goals – building up a nest egg, buying a house, having sufficient funds for medical emergencies, retiring comfortably, taking care of aged parents, etc.

- Design a financial and asset-liability management program that gets you there via diversification, hedging, and insurance

- Implement the plan

- Monitor and review regularly – it’s all about risk management!
Matching (or “hedging”) portfolio:
- Fixed income, laddered bond portfolios (including active management, high yield, EM debt)
- Interest rate and inflation total return swaps

Return-seeking (well-diversified) portfolio:
- Equities, hedge funds, portable alpha, commodities, real estate, private equity

Downside Protection = Insurance

PERFORMANCE + RISK REDUCTION = DIVERSIFICATION, ASSET-LIABILITY MANAGEMENT AND RISK MANAGEMENT VIA FINANCIAL ENGINEERING
It’s getting harder all the time: The retirement problem

• We think 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
Safe investing in risky times

- Conventional investment advice today is based on a mistaken principle of “time diversification,” which inadvertently has led to portfolios that are riskier than investors realize... until it is too late!

- Starting point of any retirement portfolio should be 100% inflation-proof, guaranteed annuities (our “safety-net” portfolio)

- Always hope for the best, but prepare for the worst

- Principal-protected, inflation-linked investment products

- Participating equity-indexed and inflation-indexed annuities
Getting better all the time: What about Inflation-Indexed Participating Annuities?

Future Realized Investment Value

Receive \( S_T \) million SGD at future time \( T \) upon retirement
\[ = S_T \text{ million SGD at } T \text{ (inflation-indexed)} \]

Short zero-cost inflation-indexed “participating forward”:
\[
\text{Payoff} = \begin{cases} 
K - S_T & \text{if } S_T < K \\
0 & \text{if } K \leq S_T \leq F \\
-\frac{1}{2} (S_T - F) & \text{if } S_T > F
\end{cases}
\]

\( \iff \) Long Put struck at \( K \) + Write \( \frac{1}{2} \) a Call struck at \( F \)

Investment appreciates
\( F = $35K \)

Investment depreciates

K = $32.5K

Strictly limited downside (indexed to inflation)

Forward Price (F)

K

K = $32.5K

F = $35K

Future Risky Investment Value \( S_T \) (SGD)

No hedging

Retirement Receipts at \( T \) + Participating Forward

Some participation in upside

Plain forward contract

X diversification
✓ hedging (some form)
✓ insurance

Diversification
Accumulated Investment Capital reaches $780K at retirement (hopefully!)

Invest in a diversified portfolio of equities, mutual funds/ETFs, hedge funds, commodities, real estate, etc., based on your individual risk tolerance profile

“Upside Participation Portfolio, $S_T$”

- diversification
- hedging
- insurance
The retirement solution

- The most commonly-cited product that provides a level real payout (i.e., inflation-indexed) for life is an inflation-linked retirement annuity.

- Such a product would convert accumulated investment capital (say, from your Provident Fund) 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, assuming such bonds exist.
Life-cycle investment products around the world today

- Target-maturity retirement accounts – very popular in the U.S.
- Target-maturity college tuition accounts – newer vehicles, popular as well
- Health saving accounts
- Common characteristics
  - Specific purpose
  - Specific maturity date
  - Tax advantaged
- Most of the money in these accounts is invested in risky equity and bond mutual funds, which have no guarantees against downside risk or inflation!
- In Singapore:

  “The top two performing CPF-approved funds in 2Q2009 were United Growth Path 2010 and United Growth Path Today — these are "target maturity" funds, which means they have a limited lifespan. Such funds typically start off by investing in riskier, higher-yielding equities before gradually shifting to bonds and other safer assets as the maturity date approaches.”

  The Edge (Singapore), August 2009
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.

Let’s say you need $35,000 in real cash flows per annum in retirement and have $780,000 in accumulated Provident Fund capital at the point of retirement (today).1

It will cost you $780K today to buy a laddered portfolio comprising of a series of 30 inflation-indexed government bonds with maturities of 1 to 30 years.

Assuming the government-linker is correctly tracking your cost of living during retirement, you should be able to meet your target consumption needs annually while maintaining purchasing power.

1. Assume the real interest rate is 2% p.a. and the inflation rate is 3% p.a. (both flat) over the next 30 years.
How do we get to $780K? Option 1

“Saving / Accumulation Period”
Invest in equities, mutual funds, commodities, balanced funds, etc., during Saving / Accumulation Period

Hope For
The Best

“Take a Chance On Me” (ABBA)
Accumulated Investment Capital reaches $780K at retirement (hopefully!)

“Inflation-linked retirement annuity stream”
Real Cash Flows
Nominal Cash Flows

Note: Assume the real interest rate is 2% p.a. and the inflation rate is 3% p.a. (both flat) over the next 60 years
How to get there prudently? Option 2

Start buying today (say, at age 26) $19,300 worth of 30-year, government-guaranteed inflation-linked bonds annually for the next 30 of your working years, and hence remove ALL uncertainty about future cash flows

<table>
<thead>
<tr>
<th>Age</th>
<th>30 YR</th>
<th>I-Bond Cost</th>
<th>Real Cash Flow</th>
<th>Pays At Age</th>
<th>Nominal Cash Flow</th>
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</thead>
<tbody>
<tr>
<td>26</td>
<td>$19.3</td>
<td>$35</td>
<td>$36.1</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>$19.3</td>
<td>$35</td>
<td>$37.1</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>$19.3</td>
<td>$35</td>
<td>$38.2</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>$19.3</td>
<td>$35</td>
<td>$39.4</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>$19.3</td>
<td>$35</td>
<td>$77.7</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>$19.3</td>
<td>$35</td>
<td>$80.1</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>$19.3</td>
<td>$35</td>
<td>$82.5</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>$19.3</td>
<td>$35</td>
<td>$85.0</td>
<td>85</td>
<td></td>
</tr>
</tbody>
</table>

(All cash flows in '000)

Note: Assume the real interest rate is 2% p.a. and the inflation rate is 3% p.a. (both flat) over the next 60 years.
Future Innovations in Retirement Finance

- Integration to include other retirement-dedicated assets including those from previous employment, after-tax dedicated personal savings, and house [pre-paid consumption and retirement-funding asset]
- Bequest and asset-use efficiency: reverse mortgage
- Longevity bonds, swaps and other cohort-based tradable longevity hedging instruments
- Product efficiency: long-term care and life annuity
- Age, means, and interest-rate-dependent employer contribution rates to reduce participant duration-mismatch risk
- Standard of living risk: consumption-linked income units
- Tail-insurance on longevity: >85 life annuities

Above as suggested by Nobel Laureate Professor Robert C. Merton©


- To get even more educated on personal financial investing and investments science, please visit Professor Zvi Bodie’s website: http://zvibodie.com
- Or visit the CAMRI Life-cycle Saving and Investing in Asia Research Series (NUS Business School, Singapore)
APPENDIX: An Aside on Hedge Funds
Increased use of absolute return strategies and alternatives investments

Efficient use of the risk budget

- An increased focus on risk budgeting, risk parity and risk control
  - Specification of an ex-ante risk budgets
  - Optimal diversification across risk premia (risk parity investing)
  - Reduction of relative portfolio beta risk exposure with orthogonal alpha strategies

- A new framework for optimal asset allocation
  - Constrain equity market beta to client’s utility function
  - Introduce the full spectrum of alternative investment solutions and uncorrelated sources of alpha such as hedge funds
  - Introduce assets with built-in inflation hedges – TIPS, IL-GILTS, Commodities
  - Conduct a dual optimization exercise: joint beta and alpha optimization process
The evidence: Hedge fund correlations and skew

LOW CORRELATIONS TO TRADITIONAL ASSET CLASSES & POSITIVE SKEW RESULTED IN HIGH INCREMENTAL RETURNS FOR LOW MARGINAL RISKS
On a historical basis, an allocation to hedge funds would have yielded significantly higher returns from:

- Jan 2002 until now (multiple market cycles)
- Aug 2008 until now (Global Financial Crisis)

Optimal allocation to hedge funds:

- The less dependent or correlated the assets, the more the potential gains from diversification
- Addition of uncorrelated assets with high information ratios results in significant expected return enhancement, thus enhancing portfolio risk-adjusted returns
- Introduction of alternative strategies improves the portfolio’s potential return per unit of risk even at low overall portfolio risk levels (Sharpe ratio)

Source: Bloomberg
Optimal allocation to active risks: Devising optimal alternative strategies weights

Alternative methods to mean-variance optimization techniques

Alternative Methods To Define Optimal Allocations To Alternative Strategies

- Client-specific customized solutions are designed by minimizing the total (joint) risk of the investor’s current portfolio by selecting and allocating across suitable Alternative Strategies according to risk allocations
  - Use risk parity
  - Hedge the investor’s strategic asset allocation portfolio's principal components
  - Devise flexible customized portfolios of Alternative Strategies, with minimal interdependences with the investor’s core portfolio and all of its components
  - Set constraints to provide consistent positive alpha with low downside risks
Asian versus American hedge funds – some summary stats (Jan 2000 to Sep 2012 = 153 months)

<table>
<thead>
<tr>
<th>Eurekahedge North American Hedge Fund Indices</th>
<th>HF Index</th>
<th>Arbitrage</th>
<th>Fixed Income</th>
<th>Long-Short Equities</th>
<th>Macro</th>
<th>Multi Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of months of negative returns</td>
<td>44</td>
<td>22</td>
<td>26</td>
<td>53</td>
<td>54</td>
<td>42</td>
</tr>
<tr>
<td>% of negative returns</td>
<td>28.6</td>
<td>14.3</td>
<td>16.9</td>
<td>34.4</td>
<td>35.1</td>
<td>27.3</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>1.34</td>
<td>1.61</td>
<td>1.90</td>
<td>0.82</td>
<td>1.19</td>
<td>1.28</td>
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<tr>
<td>No. of 3 month consecutive negative return periods</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>11</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>No. of 6 month consecutive negative return periods</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of funds</td>
<td>689</td>
<td>41</td>
<td>43</td>
<td>297</td>
<td>9</td>
<td>33</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Eurekahedge Asian Hedge Fund Indices</th>
<th>HF Index</th>
<th>Arbitrage</th>
<th>Fixed Income</th>
<th>Long-Short Equities</th>
<th>Macro</th>
<th>Multi Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of months of negative returns</td>
<td>54</td>
<td>46</td>
<td>49</td>
<td>58</td>
<td>59</td>
<td>57</td>
</tr>
<tr>
<td>% of negative returns</td>
<td>35.5</td>
<td>30.3</td>
<td>32.2</td>
<td>38.2</td>
<td>39.3</td>
<td>37.5</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>0.73</td>
<td>0.98</td>
<td>0.62</td>
<td>0.61</td>
<td>0.37</td>
<td>0.75</td>
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<tr>
<td>No. of 3 month consecutive negative return periods</td>
<td>8</td>
<td>13</td>
<td>9</td>
<td>11</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>No. of 6 month consecutive negative return periods</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Number of funds</td>
<td>378</td>
<td>6</td>
<td>20</td>
<td>265</td>
<td>4</td>
<td>43</td>
</tr>
</tbody>
</table>

Source: Eurekahedge
Factor analysis: Hedge fund risk exposures have decreased post-GFC

Based on Historical Returns From Jan ‘00 to Sep ‘08 (Pre-GFC) and Oct ‘08 to Sep ’12 (Post-GFC)

Source: Eurekahedge
Rolling $\beta$’s (S&P500) indicate strategies may not be entirely “market neutral”...
Asian hedge funds AUM below pre-GFC levels

Number of Asian hedge funds deaths per month and total AUM of Asian hedge funds (Jan ’02 – Sep ‘12)

- Global financial crisis
- European debt crisis

Number of fund deaths

Source: Eurekahedge
Almost 1 in 2 Asian hedge funds pass away...

Survival rate of Asian hedge funds by strategy
(Jan 2000 to Sep 2012)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Survival Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>94.3%</td>
</tr>
<tr>
<td>Relative Value</td>
<td>57.1%</td>
</tr>
<tr>
<td>Others</td>
<td>42.9%</td>
</tr>
<tr>
<td>Multi-Strategy</td>
<td>57.1%</td>
</tr>
<tr>
<td>Macro</td>
<td>52.6%</td>
</tr>
<tr>
<td>Long Short Equities</td>
<td>50.7%</td>
</tr>
<tr>
<td>Fixed income</td>
<td>69.1%</td>
</tr>
<tr>
<td>Event driven</td>
<td>50.6%</td>
</tr>
<tr>
<td>Dual approach</td>
<td>61.6%</td>
</tr>
<tr>
<td>Distressed debt</td>
<td>47.1%</td>
</tr>
<tr>
<td>CTA/Managed Futures</td>
<td>60.2%</td>
</tr>
<tr>
<td>Bottom-up</td>
<td>77.9%</td>
</tr>
<tr>
<td>Arbitrage</td>
<td>57.1%</td>
</tr>
</tbody>
</table>

Average survival rate across strategies: 56.5%

Source: Eurekahedge
Flows have shifted out of Asian long-short equities into alternatives strategies

**Strategic mandates to Asian hedge fund strategies by percentage of AUM**

- Large drop in long-short equity funds
  - Reflects maturation of Asian hedge fund industry?
  - Availability of more instruments on Asian exchanges enabling alternative strategies?
- Investors allocating to newer and less crowded strategies
- Strong performance of CTA/Managed Futures and Macro Funds during GFC bolstered flows into these strategies

Source: Eurekahedge
Performance of Asian hedge funds by strategy

- Top performing strategy in 2011 was CTA/Managed Futures
- Event driven also performed well in 2011
  - High volume of Asian corporate activities, particularly IPOs in North Asia
  - Large volumes of M&A within Asia

Source: Eurekahedge
Investors should seek hedge fund managers who have:

- Deep experience in portfolio management and a culture of continuous innovative research

- Robust security selection models tested under live performance, historical backtests, and Monte Carlo simulations, covering multiple economic environments

- Systematic and consistent, yet unconstrained, investment process that applies experience and model analytics to all relevant markets, asset classes, and opportunities

- Disciplined portfolio construction and downside risk management

- Flexible modeling capable of meeting specific client needs