EDHEC Alternative Investment Days 2007

Bringing Academic Insights to Alternative Investment

16:00-17:30
Stream 3G: Asset-Liability Management with Alternative Investments

Chairman:
Lionel Martellini, Professor of Finance and Scientific Director, EDHEC Risk and Asset Management Research Centre

Speakers:
Tom Steenkamp, CIO of Allocation & Research and Member of the Board, ABP Investments
Roy Hoevenaars, Senior Portfolio Manager GTAA, ABP Investments

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(Best) Practices of Liability Driven Investment (LDI)

The case for alternative investments?

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Agenda

- LDI in practice

- LDI at ABP
  – LHP and ROP portfolio
  – Why this framework?
  – Innovative ways to cover liabilities

- “LDI or Hedge” characteristics of alternatives
  – Optimal portfolios and LDI
  – Academic research-paper “Strategic Asset Allocation with Liabilities: Beyond Stocks and Bonds”

LDI in practice

- “Fifty ways” to define LDI
- LDI paradigm in practice:
  - Goal of pension fund is to fund liabilities
  - Assets should behave in line with liabilities
  - Liabilities are the discounted value of cash flows on the basis of current pension rights
  - Liabilities behave like bonds
  - Assets should be primarily bonds
- Is the LDI paradigm in accordance with pension fund goals?

- Is the LDI paradigm in accordance with pension fund goals?

  (1)Low level of absolute return ➔ increases expected costs of running a pension plan.

  (2) Focus on nominal interest rate as the primary risk source is dubious at best.

  (3) Liabilities defined as if the fund is liquidating.

- Change in asset allocation not in line with pension fund goals:
  - No affordable pensions
  - Linkage to wage inflation needs real assets to invest
  - Inflation is primary source of risk
  - Also look at “going concern”

Choices we can make

Choice	Contribution rate (mean)	Pension-result (mean)	Risk (deviation mean)
High investment risk (65% eq, 35% bonds)	22%	70%	High
Low investment risk	36%	52%	Low/Medium
Nominal guarantee	13.5%	44%	Zero
ABP-portfolio (incl. alternatives)	20%	68.5%	Medium

- No direct connection between DB pension promise and interest rate:
  - Pension promise = f(wages, years of service)

- Liability definition and “Accounting bias”:
  - inflation ↑ ➔ LT interest rate ↑ ➔ ΔMarket value Liabilities=Δ Market value Assets
  - Are we OK??

- Real life:
  - Inflation ↑ ➔ Assets down, promises up
  - Are we still OK??

Terminating Driven Investing

- Liability definition based on current pension rights
- Given risk profile 80/120=67% in bonds

- Liability definition based on going concern
- If future contribution rates are relatively certain➔ bond-like
- Given risk profile 180/220=82% in bonds

	Liquidating balance sheet		
Equities	*40*	**Liabilities (ABO)**	*100*
Bonds	*80*	**Surplus**	*20*
	120		*120*
	Going concern balance sheet		
Future contributions	*100*	**Future Pension rights**	*100*
	220		220

LDI and ABP

- **New Investment Framework: asset and liability allocation via two portfolios**

- **(1) Liability Hedging Portfolio**: portfolio with a low (minimal) risk vis-a-vis the liabilities (mismatch risk).
  - Approximate as close as possible the non-existent risk-free asset for the pension fund (ILB+ real wage growth).
  - Aim of the portfolio is control of risk.

- **(2) Return Optimizing Portfolio**: as high as possible risk-adjusted return, viewed from a long-term perspective and taking advantage of ABP's scale.
  - Goal portfolio is return
  - Portfolio of strategies, construction remains important !

LDI and ABP: why the new investment framework?

- Links to academic literature
  - LHP/ROP is also known as the “two fund separation theorem” and the natural LDI investment framework (see e.g. Martellini, Paris, EDHEC Days november 2006, and our research paper).

- More focus on the **pension fund** investor:
  - Greater flexibility in the investment process.
  - Greater focus on absolute return in the long run.
  - Less dependence on traditional benchmarks
  - Separation matching and return

- Structure which in a simple way accommodates possible future changes in requested investment policies by the participants, or other possible developments in the pension contract.

LDI and ABP: age dependent investing

A weighted combination of LHP and ROP can accomodate different risk preferences.

ROP

LHP

It´s like mixing cold and hot water. By regulating the mixer tap a wide range of temperatures is possible!.

- In 5-10 years, 65-70% of the liability-value will be possessed by the non-actives
- Pressure on the pension fund to invest more and more risk averse
- Seniors benefit from stable returns (versus the liabilities) in the short run
- However, young persons desire high real returns in the long run (otherwise, pensions plans will be very expensive or rather nominal)
- A uniform mix is therefore far from optimal for all participants
  (solution: two portfolios with age dependent weights*)*

More innovative ways to cover Liabilities: What is LHP?

- Nature of the liabilities: index benefits to wage growth
- Nature LHP: minimize mismatch risk vis-à-vis the real liabilities
- LHP is according to us not mere hedging with interest rate and/or inflation swaps!
- LHP is a index-linked bond plus mandate where ABP should be the dealmaker
- Real assets providing stable, inflation-linked cash-flows can be useful additions to the LHP

More innovative ways to cover liabilities:
LHP including alternatives decreases MMR!

	LHP portfolios		
	Current ABP portfolio (Low vol assets)	More ILB + Fixed Income	Incl. alternatives
ILB	17.50%	50%	50%
Credits	57.50%	25%	
Treasuries	25%	25%	25%
Alternatives	0%	0%	25%
Nom MMR (5 yr)	4%	3%	4%
Real MMR (5 yr)	5%	4%	2.80%

More innovative ways to cover liabilities: What is LHP?

- Possible strategies/assets for the LHP portfolio:
  - real estate portfolios with inflation linked returns (e.g UK shopping malls)
  - infrastructure
  - high dividend portfolio
  - ultra long inflation swaps
  - inflation linked credits (utilities, building societies)
  - Low volatility absolute return strategies

Your investment for life

Investments

“LDI or Hedge” characteristics of alternatives

(“Strategic Asset Allocation with Liabilities: Beyond Stocks and Bonds” by Hoevenaars, Molenaar, Schotman, Steenkamp 2007)

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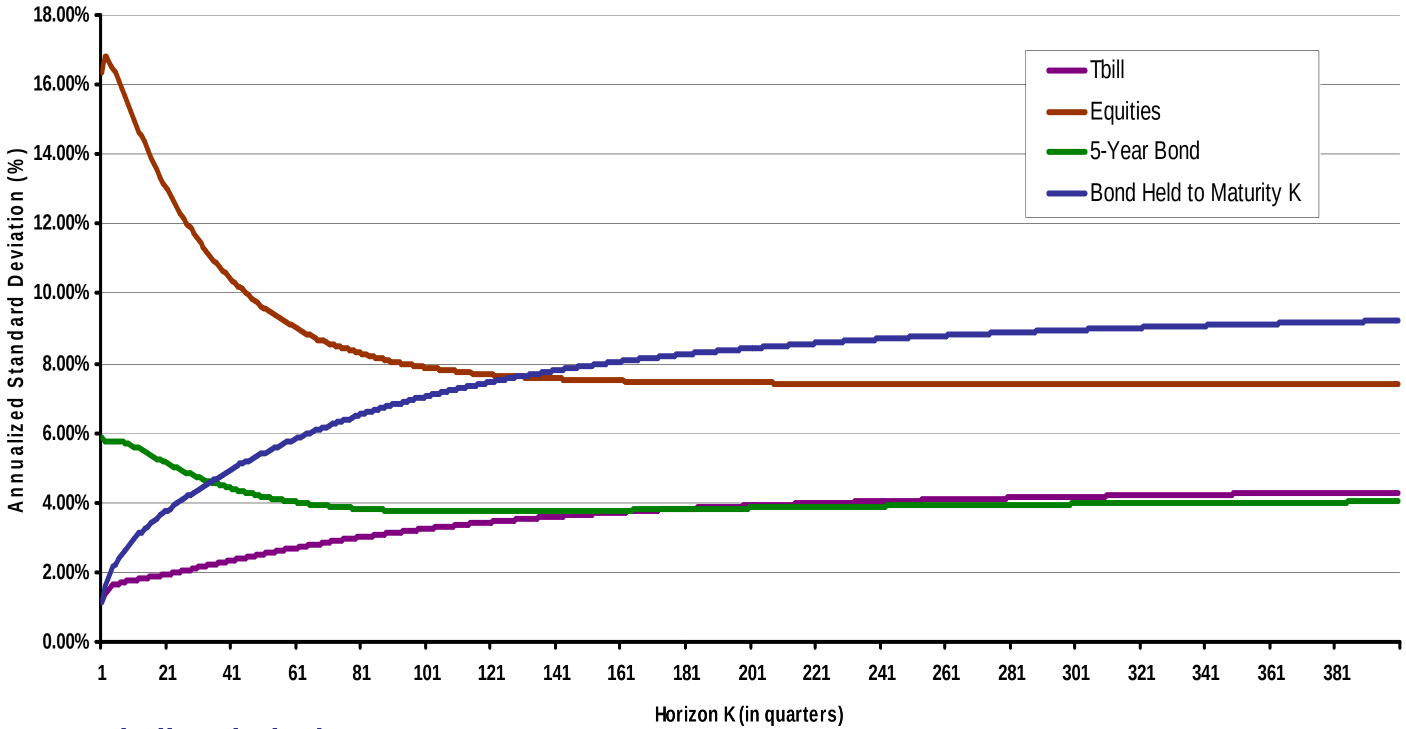
- How do we evaluate attractiveness of alternatives, equities, bonds etc for LHP?
- How do we balance between short vs long term and interest rate and inflation risks?
- How do we derive LHP-ROP two fund separation?
- How do we account for horizon effects in risk?

Figure 1. Annualized Percent Standard Deviations of Real Returns Implied by Quarterly VAR(1) Estimates (1952.Q-2002.Q4)



Source: Campbell and Viceira 2005

Predictability of returns on stocks and bonds has revived interest in strategic asset allocation.

Implications of time-variation in expected asset returns

- Return predictability
  - Tactical asset allocation (market timing)
  - There is however considerable uncertainty which makes it hard to identify the optimal timing strategy

- Risk
  - (conditional variances and correlations of asset returns) may be significantly different across investment horizons
  - *Term structure of the risk return tradeoff*: optimal portfolios are different for short term oriented versus long term oriented investors

SAA with liabilities: beyond stocks and bonds

1. Time series properties of covariance between (alternative) assets and liabilities?

2. Do alternative asset classes add value in a long-term asset-liability study?
   - Time and risk diversification benefits?
   - Inflation and real interest rate risk?

3. Portfolio choice for asset-only vs. asset-liability:
   - LDI for pension funds: liability hedging vs (real) return?

Remainder of presentation

1. Model
2. Time diversification
3. Risk diversification
4. Inflation hedging qualities
5. Interest rate hedging qualities
6. Optimal portfolios and LDI

Model: VAR(1)

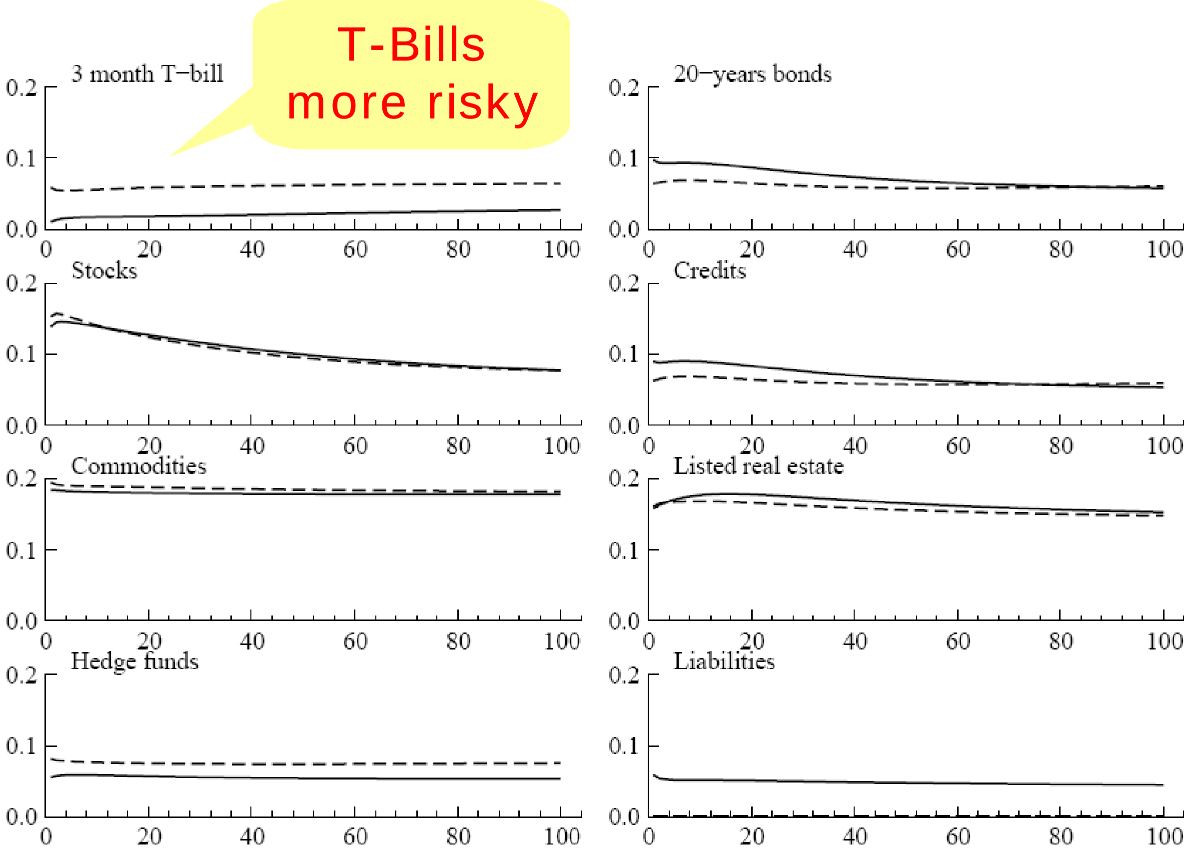
- Methodology as in Campbell and Viceira (2005)

$$z_{t+1} = \Phi_0 + \Phi_1 z_t + u_{t+1}$$

- Different types of variables in z:
  - Real short-term interest rate r.
  - Excess returns on assets (and liabilities) x.
  - Predictor variables s:
    - Credit spread, nominal interest rate, dividend yield, term spread (Fama and French 1989)
    - All persistent

Time diversification

Annualized volatilities (y-axis) across different investment horizons (in quarters on x-axis). Solid lines represent real asset returns. Dashed lines represent real asset returns relative to the liabilities.



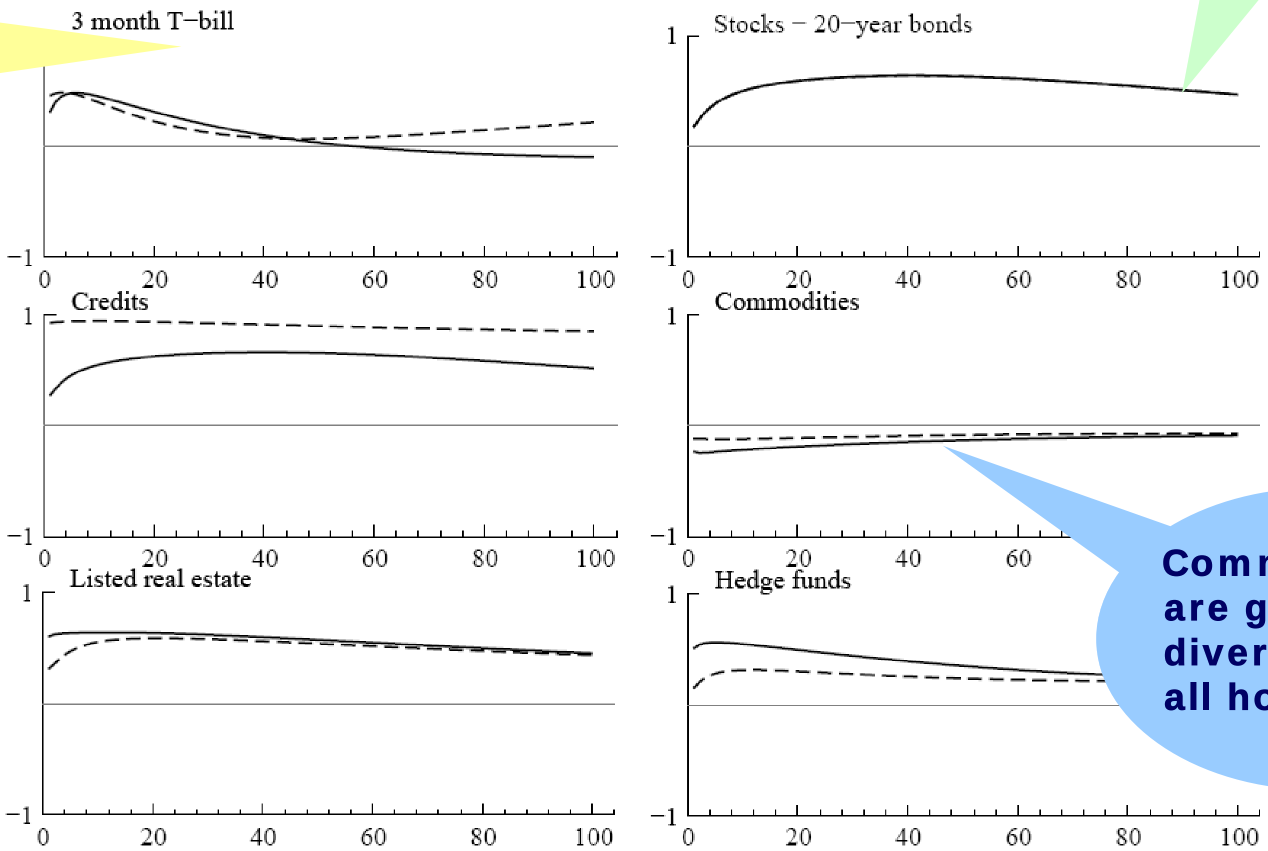
Risk diversification

Figure 2.2: Correlations with stocks and bonds

Correlations of real stock returns (solid lines) and real bond returns (dashed lines) with other real asset returns (y-axis) across different investment horizons (in quarters on x-axis)

T-bills are a good risk diversifier in long run

Stocks and bonds different risk diversification properties



Commodities are good risk diversifiers at all horizons

Strategic Asset Allocation:

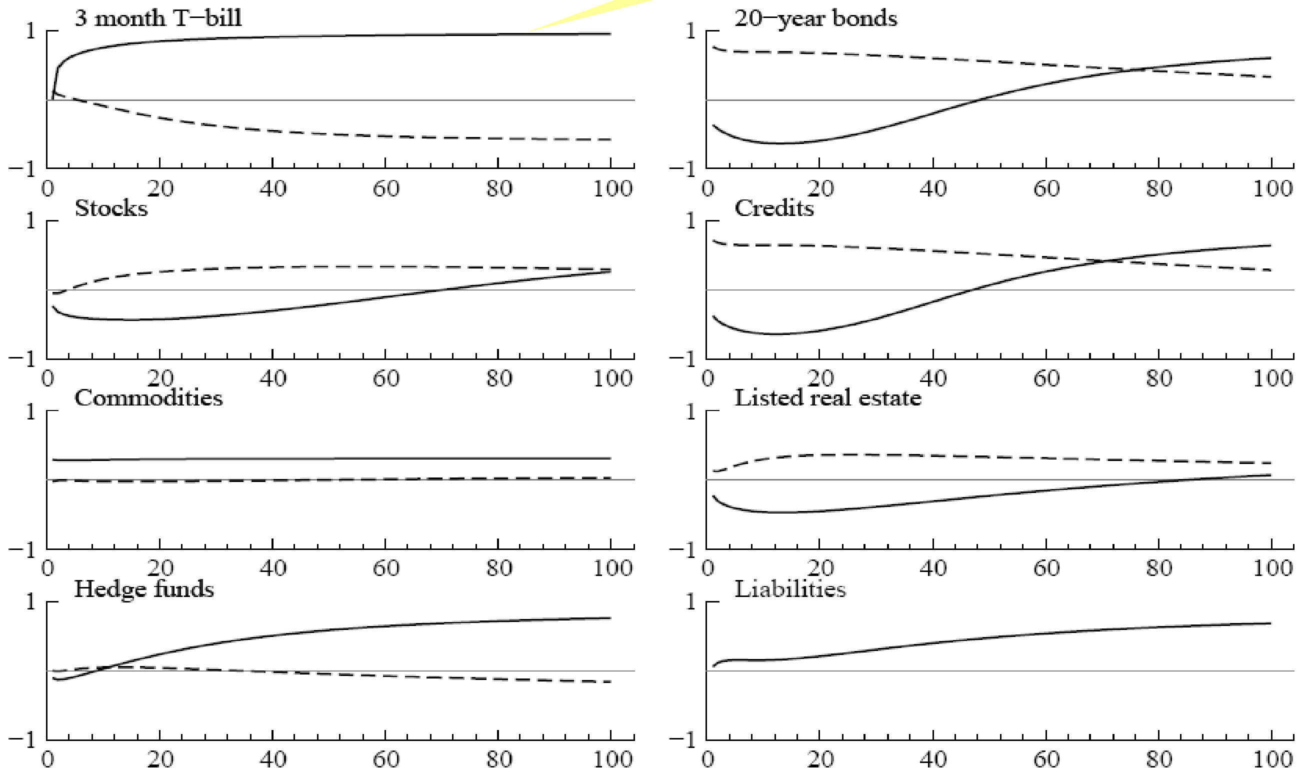
- Distinguish risk properties in long-term from short-term
- This distinguishes long-term from short-term investor
- Mean reversion in returns implies time diversification (e.g. stocks less risky in LT).
- LT-investor could benefit from both
  time diversification within an asset class, and
  risk diversification between asset classes.

Inflation and real liability hedge

T-bills have negative correlation with liab, but positive with inflation

Figure 2.3: Inflation hedge and real interest rate hedge prop

Solid lines represent correlations between inflation and nominal ...ns. Dashe lines represent correlations between real returns on liabi... real asset returns. Correlations are on the y-axis across different investm... ...izons (in quarters on x-axis).



Asset Liability Management:

- If inflation is completely hedged, liabilities still move by changes in real interest rate

- Hedge both inflation risk and real interest risk

  → Indexed linked bond (TIPS)

- Horizon effects in inflation and real rate hedge properties

- Distinguishes long-term from short-term asset-liability investor

Optimal Portfolios

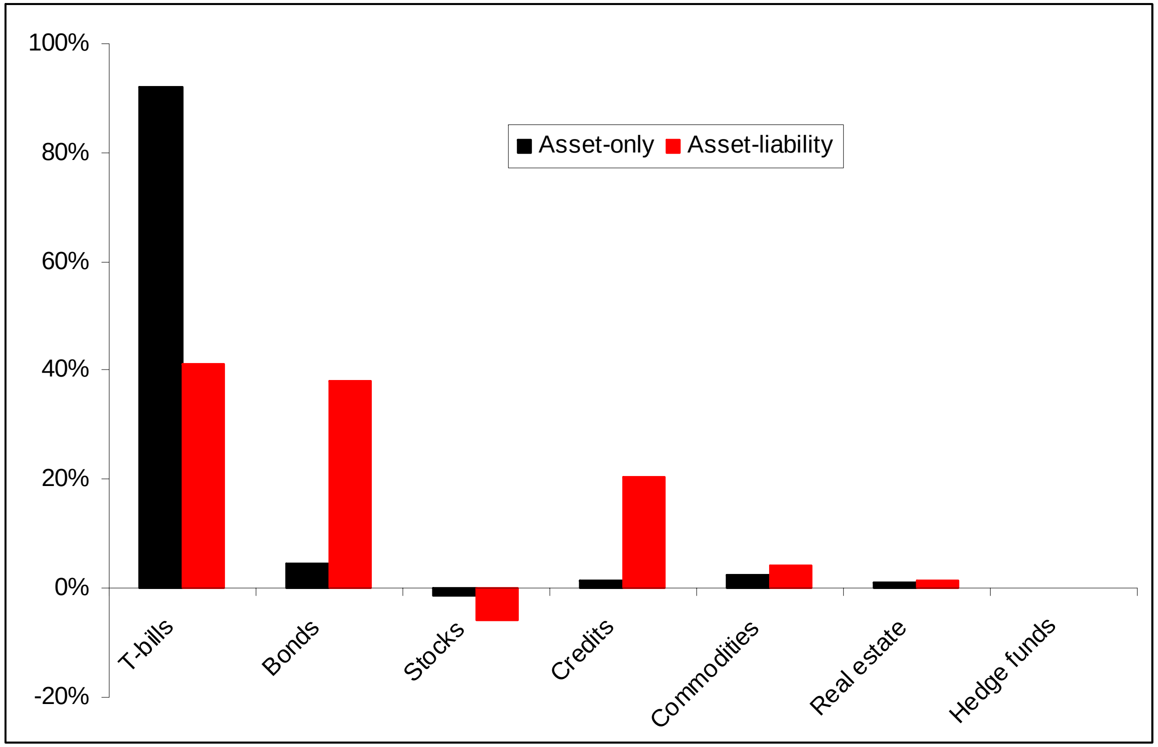
Return vs liability hedge

- We assume a mean variance investor with calendar rebalancing
- Strategic asset allocation can be decomposed in a return component and liability hedge component
- Optimal portfolio choice (asset-liability investor):

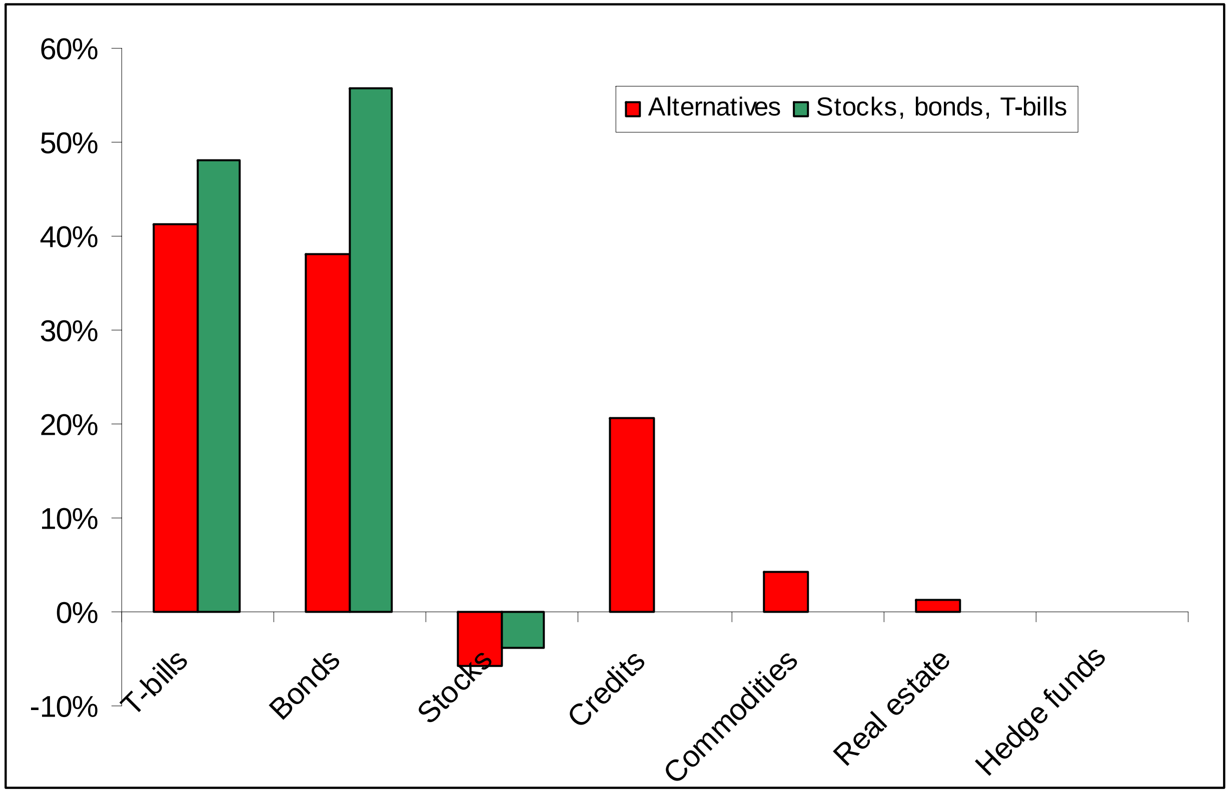
$$\alpha_t^{(\tau)} = \frac{1}{\gamma}\left((1-\frac{1}{\gamma})\Sigma_{AA}^{(\tau)} + \frac{1}{\gamma}\Sigma_{AA}\right)^{-1}\left(\underbrace{\mu_t^{(\tau)} + \tfrac{1}{2}\sigma_A^2}_{\text{Return component}} - \underbrace{(1-\gamma)\sigma_{AL}^{(\tau)}}_{\text{Liab. Hedge Component}}\right)$$

Liability hedge portfolio
10 year horizon (τ = 10), γ -> ∞

- For asset-only (GMV) mostly cash
- For ALM also nominal bonds
- Explanation from long-term covariances of assets with inflation and real interest rate risk



Alternatives in Liability Hedge Portfolio



Alternatives (26%) drive out T-bills and long-dated bonds in favor of commodities and credits (10 year horizon, $\gamma \to \infty$)

Finally….

- LDI in practice:
  - LHP - ROP framework
  - Account for horizon effects

    (In risk, correlation, inflation and real rate hedge)
  - Innovative ways to cover pension liabilities

- Is there more than stocks and bonds for ALM and LDI?
  - Commodities good risk diversifier also at long horizons
  - Stocks inflation hedge in long run
  - Hedge funds interesting for return enhancement
  - Listed real estate doesn’t add much

…but practical issues with alternatives…..

- Heterogeneity
- Manager selection skills
- Fees
- Illiquidity
- Limited excess
- Different return distributions: fat tails, skewness…
- Data availability
- Biases in data: stale pricing, selection biases…
- Benchmarks
- Alternative betas
- Non market risks: operational, transparancy

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