Long Term Finance and Investment

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Vilnius May 2014

Frameworks

- ***Conventional*** *- When and where markets fail, there is a need for more regulation and state engagement; where state organisations malfunction, then privatisation and more liberal markets are required.*
- *This economic and political consensus emerged progressively towards the end of the 20th century and is now widely accepted. However, it has serious defects.*
- ***Unconventional*** *- Equally misconceived is the alternative, unconventional paradigm that advocates a private sector approach to the problem – 'corporate social responsibility', Social entrepreneurship', and 'stakeholder values'.*
- *Where they fail is in establishing credible criteria by which these objectives can be delivered and in ensuring an alignment of the interests of socially conscious people with the priorities of their wider communities.*
- There are also newer frameworks in development

The most appropriate definition of long-term financing

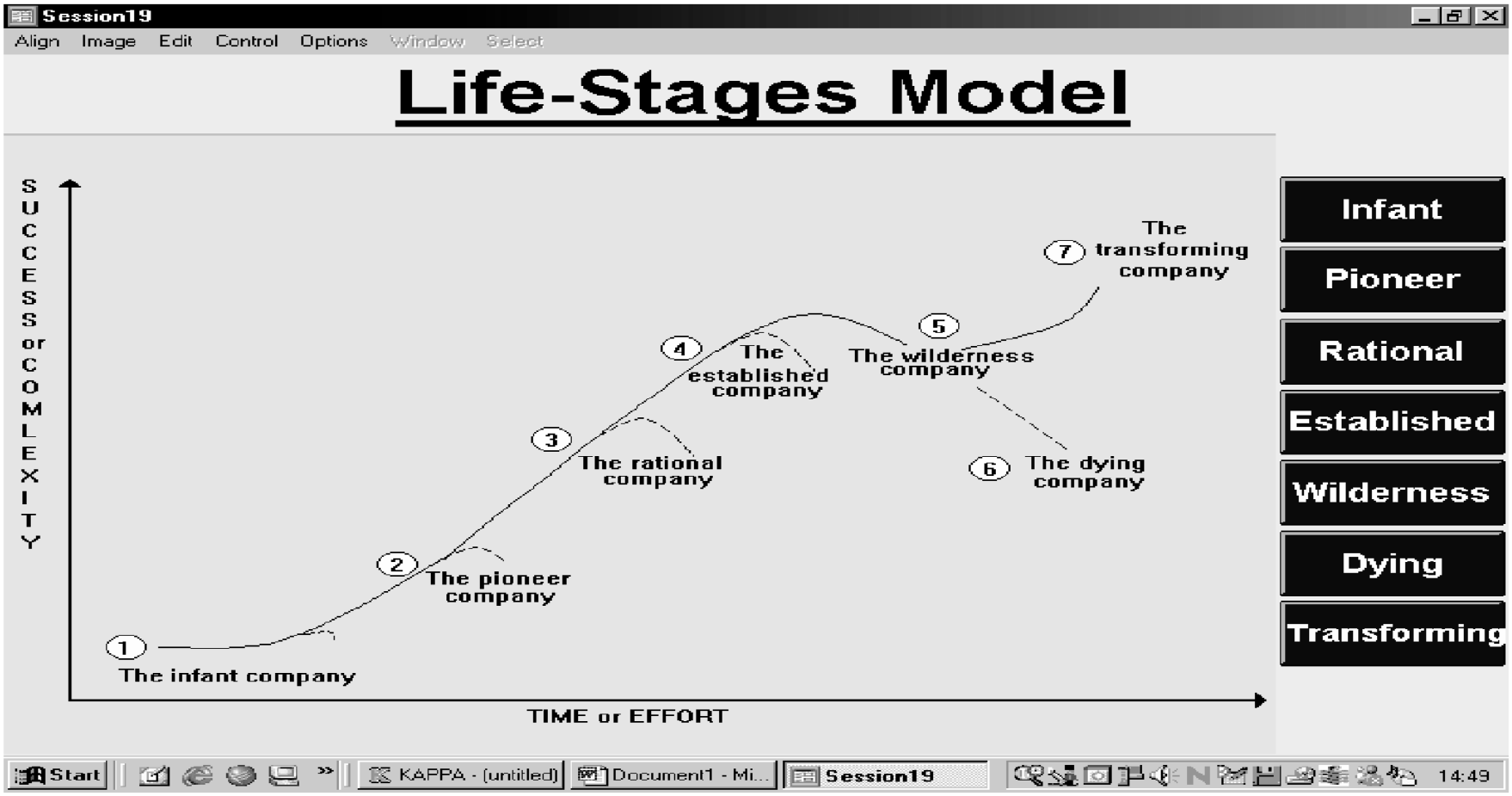
- OECD – Patient, Productive, Engaged
  - Productive – Supply Side Economics
    - Mortgages and the demand side?
  - Engaged versus Committed
- Liquidity Source – market versus contract counterparty
- Business Cycles
  - Kuznets 20 - 25 years Infrastructure Cycle
  - Kondratiev 40 - 60 years Long Technological Cycle
- How does the long term differ from the short-term
- To Keynes the long term was just the aggregation of a series of short terms
- But when we are talking of horizons things differ

What is the long-term ?

- OECD
  - Patient,
  - Productive ,
  - Engaged Capital
- Instrumentally – Questions of temporal priority in security
- Order of payment in insolvency & Cascades in Structured Credit
- Collateral security - Insurers writing annuity business
- Equity – Long dated debt – short dated debt
- This introduces also the time dimension of risk
- Note that long-dated debt can be riskier than equity in the sense of having greater sensitivity to interest rate changes

The Long and Short Term

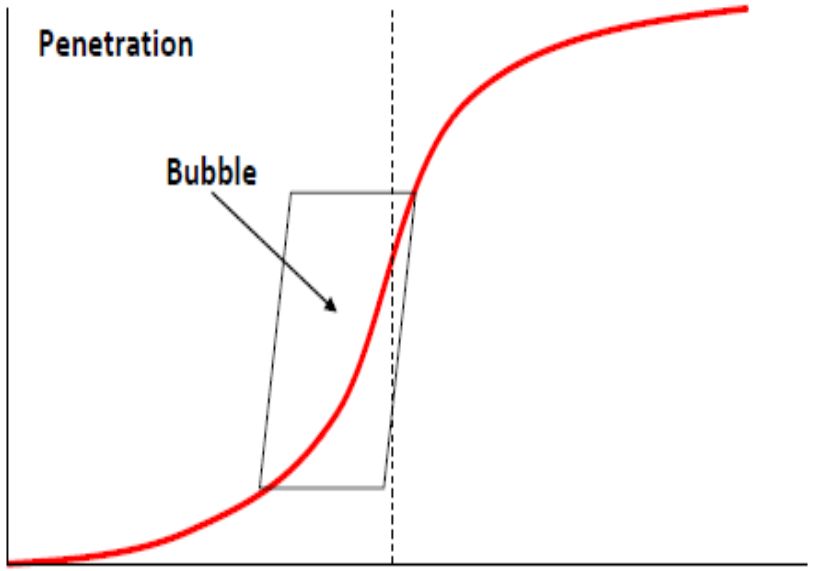
- Companies experience life cycles
- With much uncertainty over possible decline



- Infrastructure also has a defined life
- Depreciation and Amortisation are forms of investment

Bubbles and Disruptive Technologies

- Much disruptive technology is based upon state fund IP
- Apple – Google – Mazzucato: The entrepreneurial state
- Others rely on network effects – Facebook, Linked-in, Microsoft
- This depends upon the degree of adoption of the technology
- Booms and bubbles, associated with disruptive technologies, tend to occur early in the life cycle of a technology
- Further developments can be expected – Big Data
- But taxation is an issue
- As a dividend for State developed IP
- As a competition issue with networks
- New technology may be Capex lite
- Facebook – 5000 engineer years to build
- Market cap $170 billlion
- Did those engineers really add $34 million?
- Wealth creation without savings



Rights of ownership

Right	Me over my umbrella	Shareholder of company	Shareholder over shares	Company directors over company
Possession	Yes	No	No	Yes
Use	Yes	No	Some	No
Management	Yes	Some	Some	Yes
Income	Yes	Some	Yes	No
Capital	Yes	Some	Yes	No
Security	Yes	Some	No	Some
Transmission	Yes	No	No	Yes
No limit of term	Yes	Yes	Yes	No
Duty not to do harm	Yes	No	Some	Yes
Judgment liability	Yes	No	Some	No
Residual control	Yes	Yes	Some	Yes

Can we really think of governance as a simple principal agent problem?

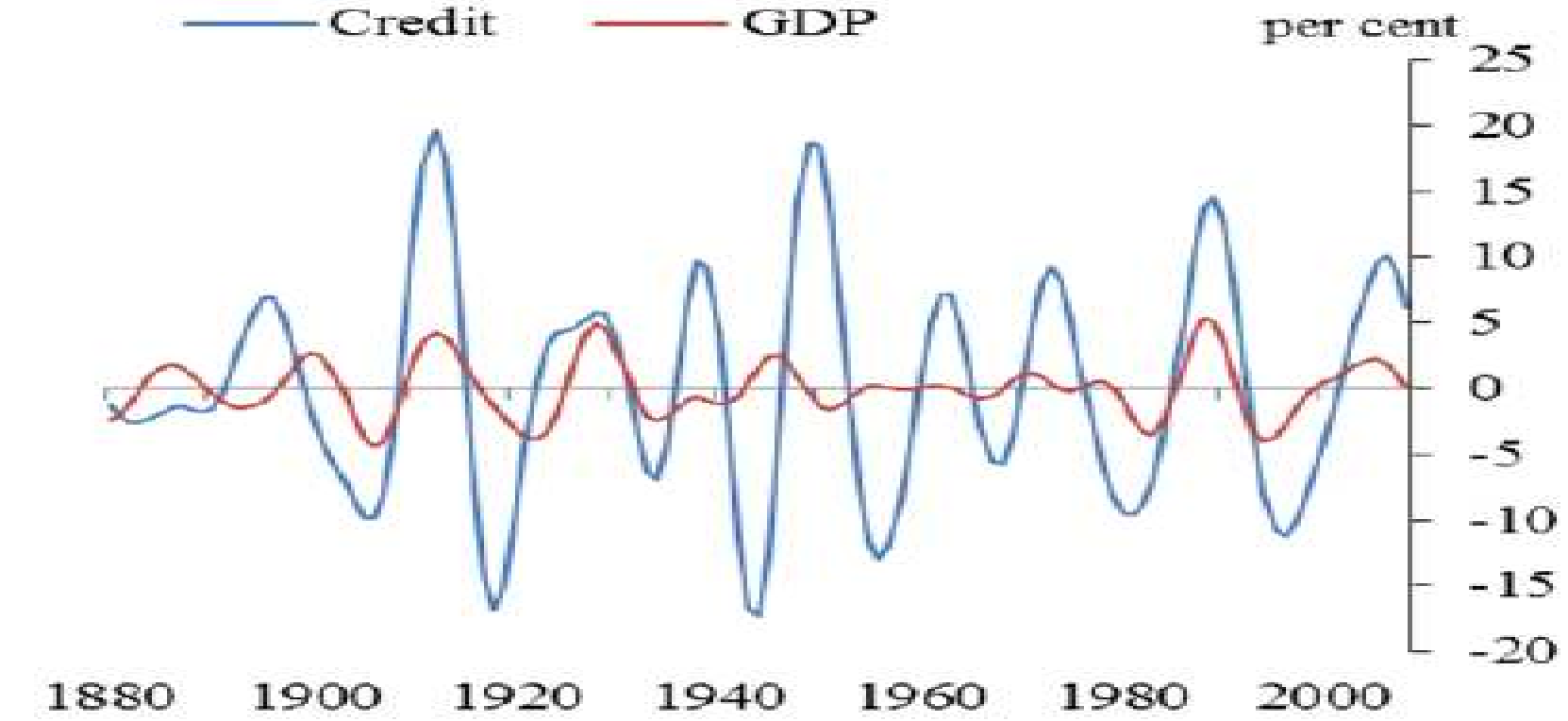
Is it not investor commitment that engages management?

By what mechanism does good governance improve returns?

We should not forget that the original rationale was protection of minority shareholders and then reduction of the principal agent problem.

Business and Financial Cycles

- the Kitchin inventory cycle of 3–5 years
- The Juglar fixed investment cycle of 7–11 years
- the Kuznets infrastructural investment cycle of 15–25 years
- the Kondratiev wave or long technological cycle of 45–60 years



Source: Bank calculations

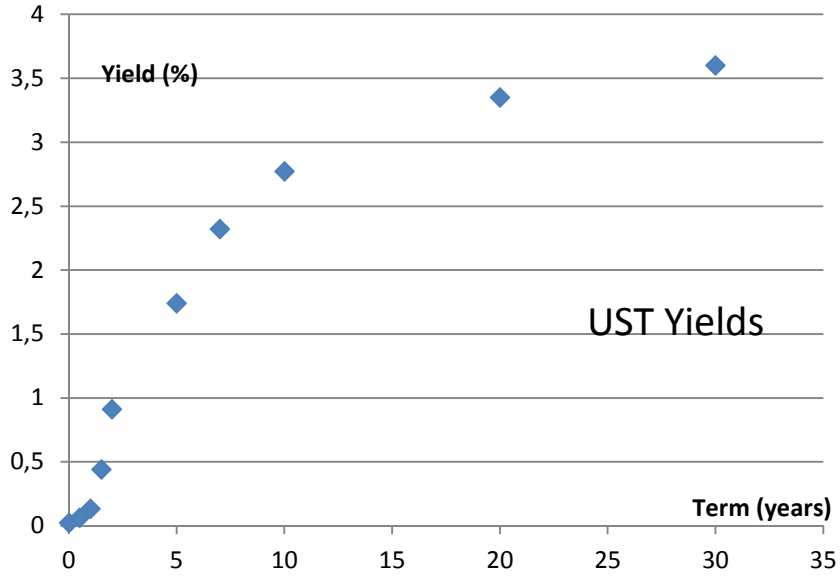
- Note the lack of synchronicity

Liquidity

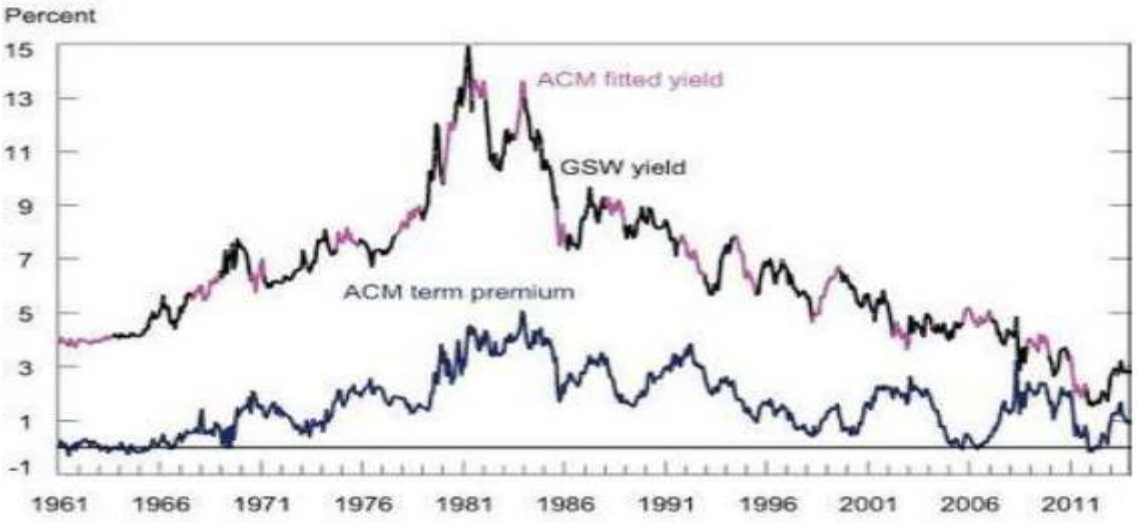
- We can also distinguish the short from the long-term by the source of liquidity.
- If the source is the market, this is short-term – speculation
- If the source is the security obligor, this is long term
- Note that liquidity has a cost – if it did not all assets would be liquid
- This means that we expect higher returns from illiquid investments
- The current yield from a liquid investment is lower than from an illiquid
- Ceteris paribus, as holding periods increase the cost of liquidity is lower – an amortisation process.
- Liquidity cost is time variant
- Buying a bill or bond for its term is investment. Buying a bond in expectation of selling it in a market is speculation.
- As coupons and dividends are received over time so investment comes to dominate.
- Diversification in the long term is about the number of independent sources of liquidity
- Diversification in the short term is about disparity in market price performance

- Normally positively sloped
- Liquidity preference
- But how to interpret downward sloping or humped or U shaped?
- A long term premium
- But could this merely be compensation for the higher volatility?
- And informational uncertainty
- Could it be expectations of the future direction of interest rates?

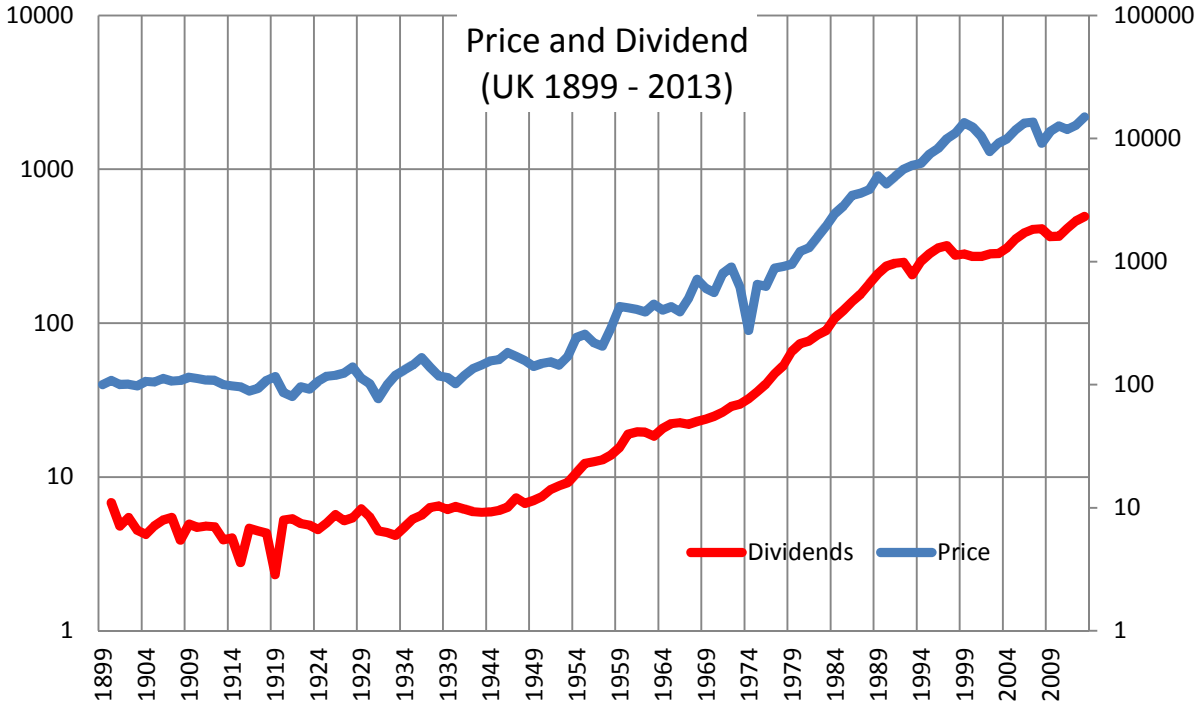
Term Structure



Ten-Year Treasury Term Premium and Yield Fit



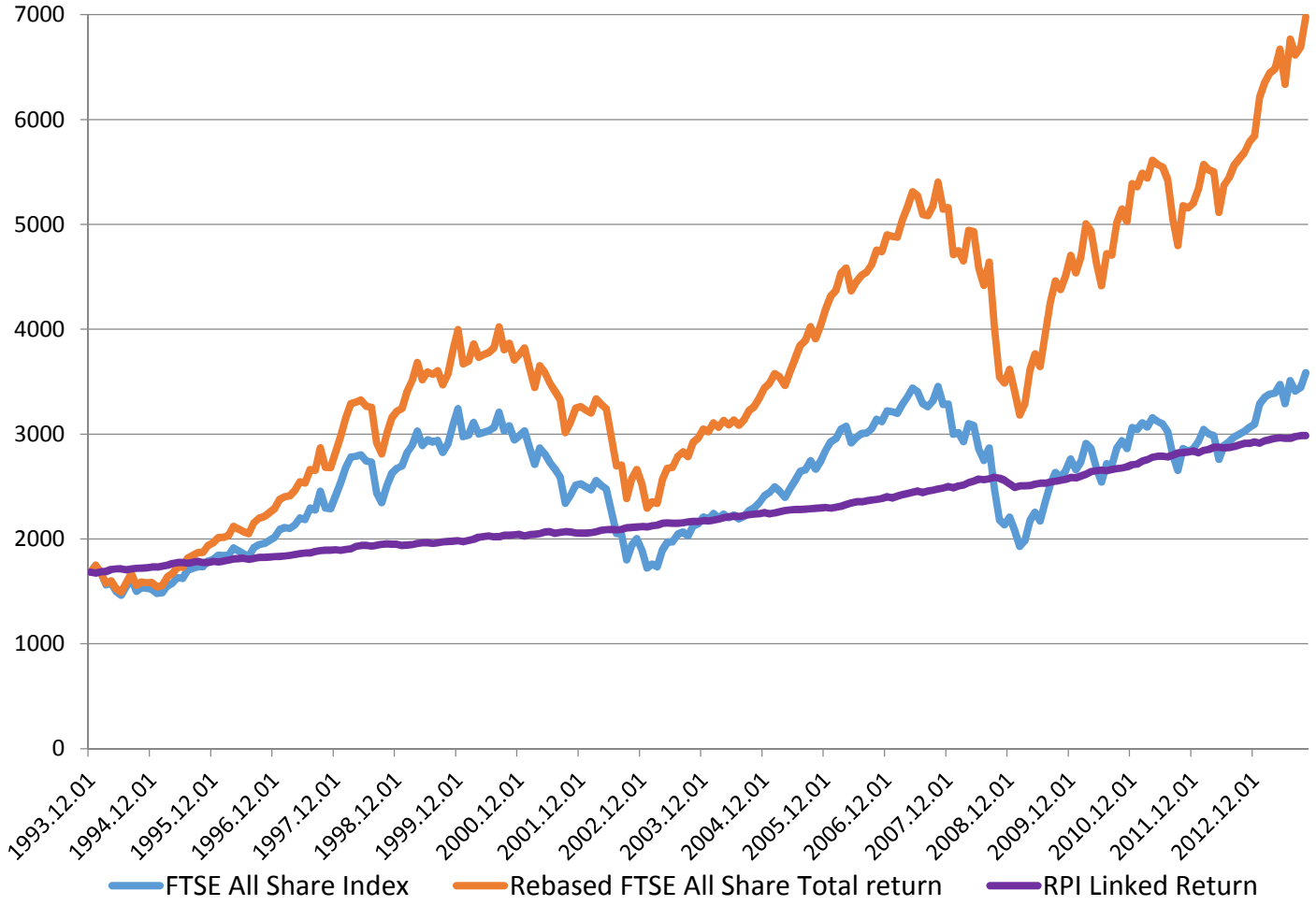
Sources: Authors' calculations; Federal Reserve Board.
Notes: GSW refers to yield data described by Gurkaynak, Sack, and Wright (2007). ACM fitted yield and ACM term premium are obtained from the model described in Adrian, Crump, and Moench (2013).



Dividends and Prices

- Market prices are driven by fear and greed - Anomalies abound
- Volatility is extremely high.
- Prices drive portfolio returns – Beebower, Brinson.
- Market returns are negatively correlated with GDP growth out to about five years
- Some good reasons for this – eg capital investment demand
- Prices changes are uncorrelated with dividend changes
- The short term is extremely volatile

The significance of income and real returns



Returns from markets and the real economy

- Market returns and Private Sector profitability are unrelated in the short term

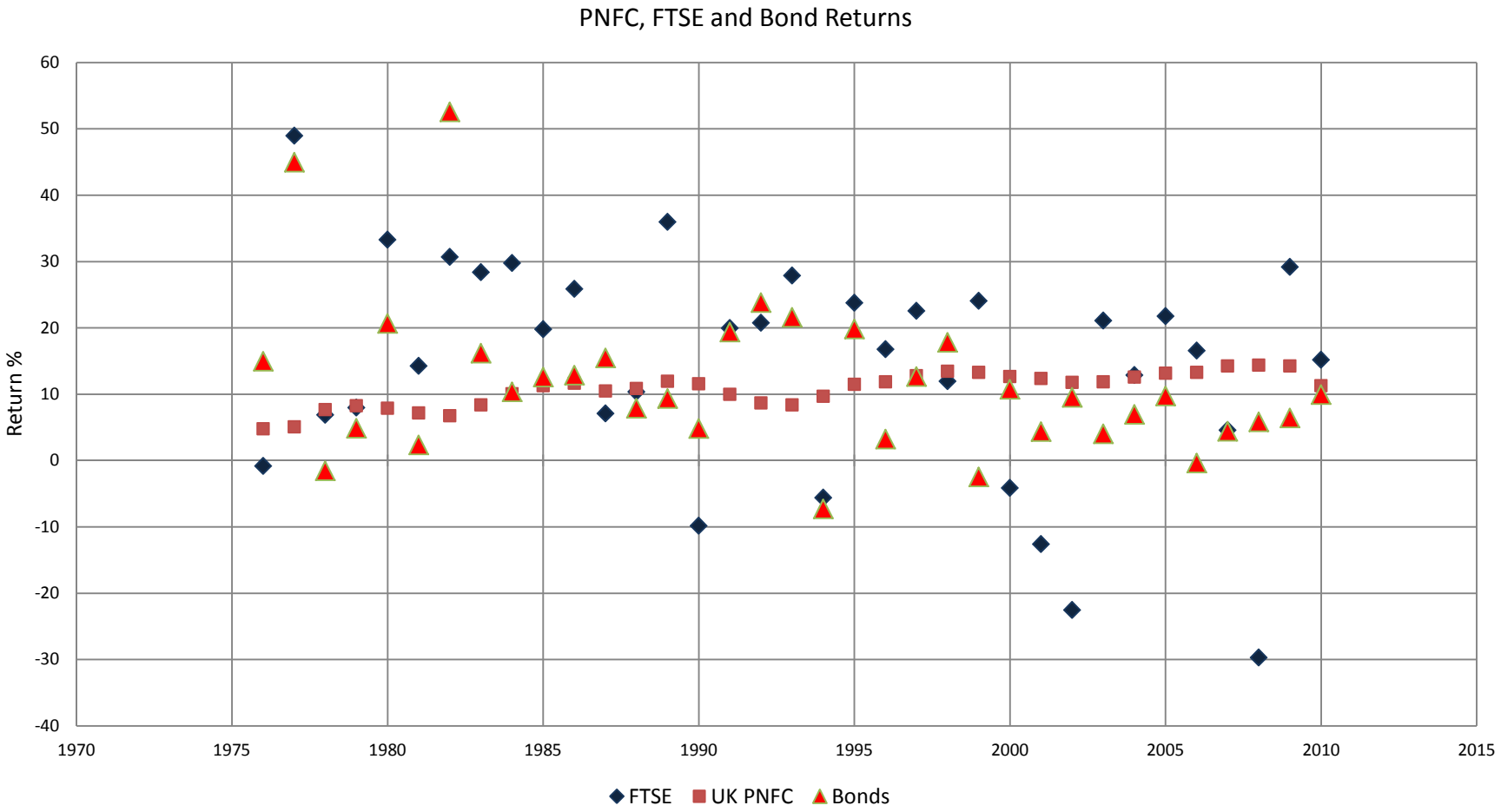
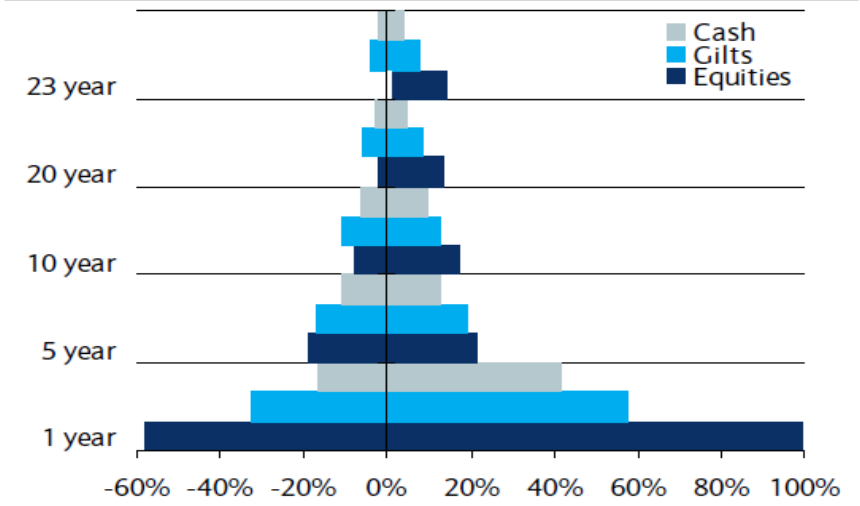
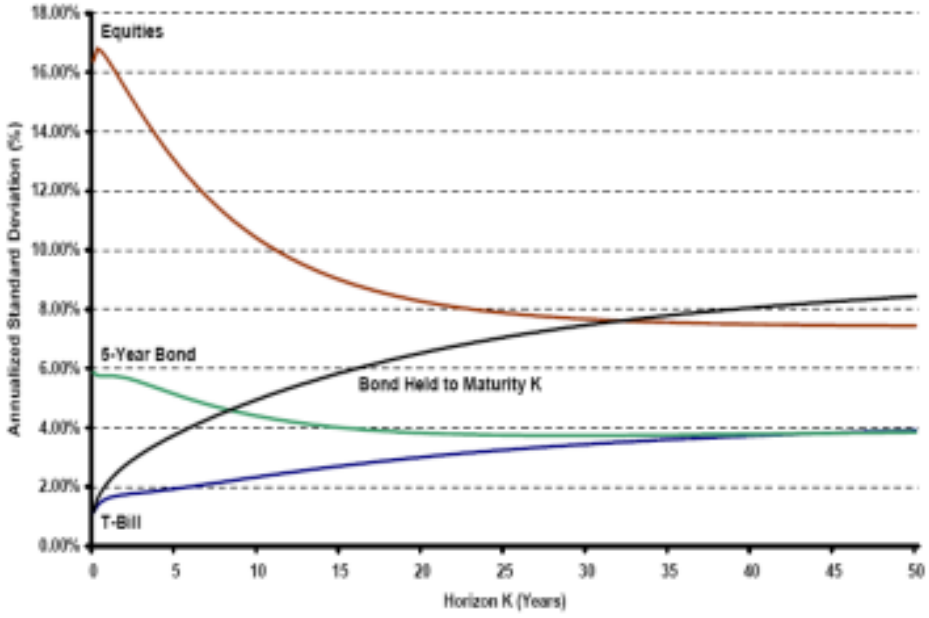


Figure 7: Maximum and minimum real returns over different periods



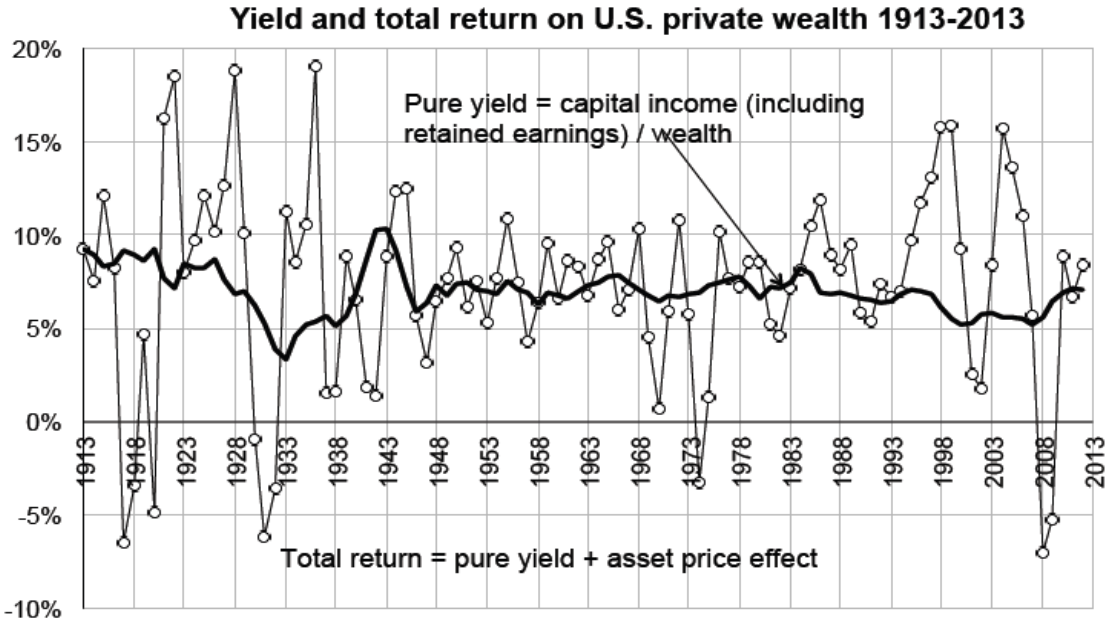
Source: Barclays Capital:

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

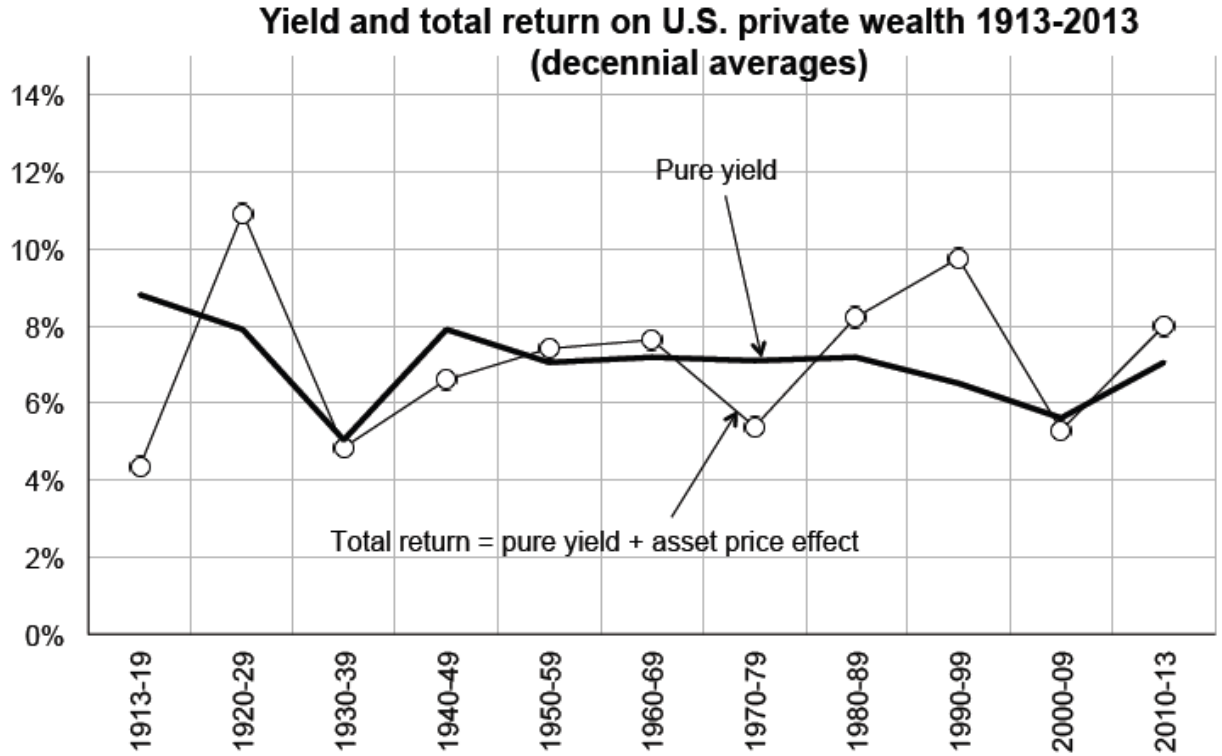


Long-Term

- But as we move to long holding periods for listed securities, income dominates and volatility declines.
- UK Real returns from 1900 5.6%
  - Income 4.8%
  - Increase income 0.6%
  - Price gain 0.2%
- Long term returns are positively correlated with GDP growth
- In other words, short term market price moves converge to the long-term fundamentals and allocative efficiency
- This is not mean reversion
- **But not** if we use them as indicators for short-term management actions



Short to Long Differences are evident widely



Long Horizons

- Committed capital has long horizons
- Its returns will be higher if not paying the market liquidity premium
  - Liquidity has a cost – if it did not all assets would be liquid
- Its returns will converge to the productive output of the economy
- As will risk

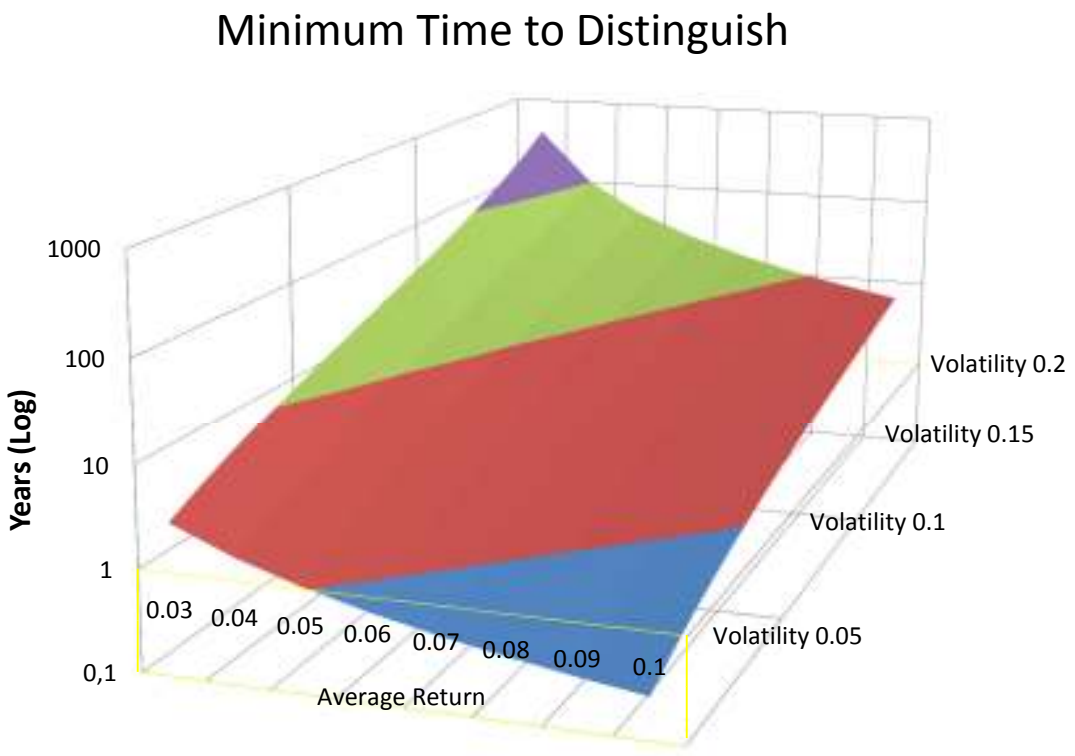
Source: Bank of England

30 Year GDP Growth

Diversification is about independent sources of liquidity

Information Dominance: Time

- The minimum length of time to distinguish signal from noise
- If we assume normality in return, we can estimate these:



- Only with high return, low volatility strategies are market prices informative. Everywhere else, we are working with noise.

Horizons
Expectational Time

- With long horizons more projects get done
- Those with intermediate path dependencies don't get scrapped
- And the economic growth rate is higher
- Both in the construction and operational phases
- Cost Benefit Analyses on Government Projects
  - Scrappage is economic loss
  - Like government deficits, cost excesses = private profits
  - But there are effects in distribution – Taxpayer v Shareholder
  - Shareholder gain results in higher current investment
  - The question reduces to the growth implications of the consumption/investment preferences of tax-payers versus rentiers.
  - Externality gains and higher growth are the real benefits to tax-payers

LT Investment

- Differs from short-term
- In short-term price movements dominate returns
- In the long-term income dominates returns
- In the short term we must be concerned with the game against others that sets prices and risk
- In the long-term we are concerned with fundamentals
- In the short-term we can use ensemble statistics and ergodic models
- In the long-term we need time serial statistics and non-ergodic models.
- The endogenous risk of the short term declines or converges to the lower fundamental risk of the long-term economic performance
- Diversification in the short term is about relative price performance but in the long term the degree of independence of the sources of income.

other public policy tools and frameworks that can support the financing of LTI ?

- R & D – Investigation of the options and flexibilities
- While investment is the exercise of those options unveiled by R&D
- R&D does not itself deliver future pledgeable cash flows
- In Europe R&D usually just means process enhancement
- Blue sky and disruptive technologies are needed
- The state is critical in this
- Most investment is undertaken by corporate sector
- Six times state.
- The post crisis period has seen European investment €300billion lower than pre-crisis trend when the corporate sector has never had so much cash.

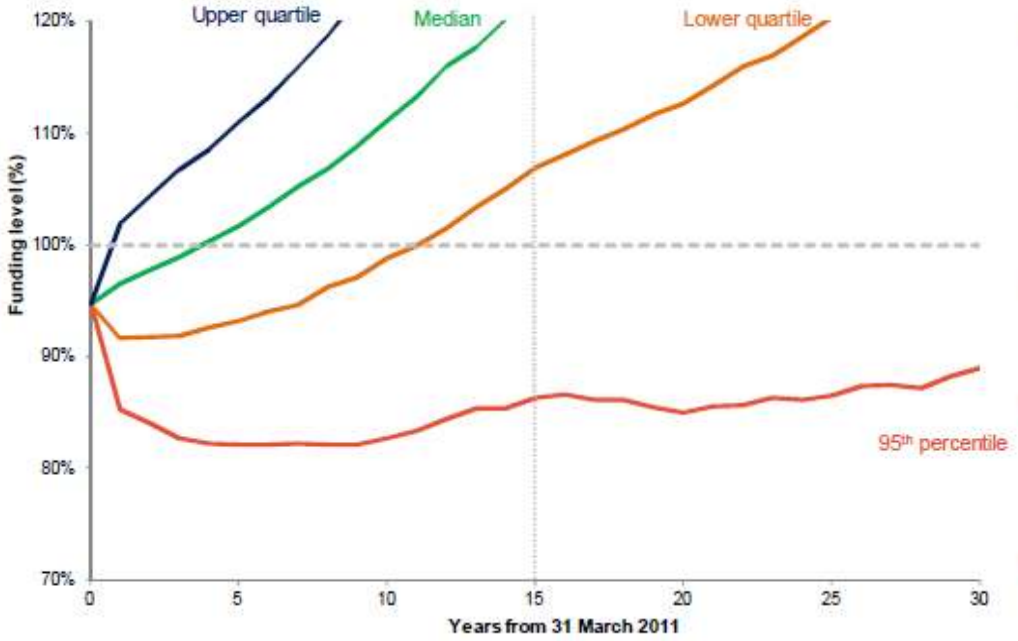
SMEs

- Most SMEs do not require or use external finance
- It is 9% or less of SMEs that deliver the much talked about growth
- In the UK, SMEs currently benefit from £7.9 billion of government subsidy
- Most of the finance needed by SMEs is short-term in nature
- Let's not forget that the current cash generation of large companies is unusual – normally they are consumers of finance for investment
- National "Business" Banks are offering "additional" credit to SMEs
- This is credit that has been declined by the banking sector...
- Perhaps the clarion call should be: Give the man an order, not a loan
- And given the predominant role of SMEs as producers of intermediate goods which are inputs to large companies, should we stimulate large companies.
- They will invest when they see adequate demand.

Modern Portfolio Theory

Long term funding level projections
Current asset allocation and contributions

Technical Provisions basis funding level over the next 30 years.



- The Fund's initial funding level on a Technical Provisions basis is 95%.
- The Fund is expected to reach 100% funding on a Technical Provisions basis by year 4. However, experience since the valuation date has been less favourable than anticipated so this is an over-estimate
- There is a 1 in 20 chance that the funding level is lower than 86% in 15 years' time.
- The 95th percentile results show no improvement in long term funding level above ~ 86%, this due to the cashflow strain of the Fund's liabilities.
- These figures are only indicative, since at your request, we have only used approximate techniques to carry out our long-term projections rather than full asset-liability modelling

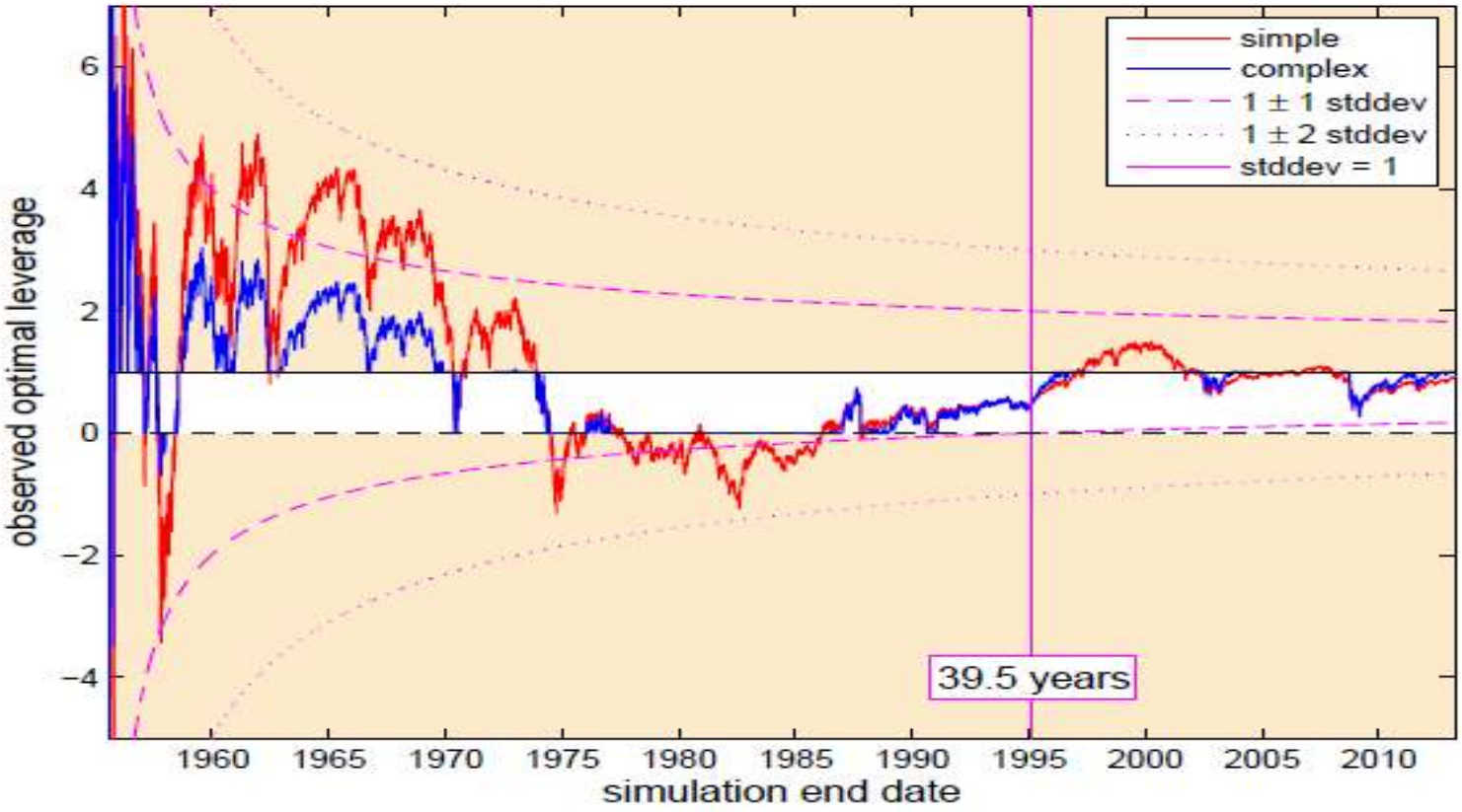
This is an ergodic, ensemble projection Time is reversible

This is the realm of the capital asset pricing model fraught with problems

The correct method is to use time serial statistics

Time serial Optimal Leverage

Using S&P data from 1955-2013, we ask the question what would the optimal leverage have been to maximise risk adjusted returns



We see short periods where it made sense to use leverage , we even see periods where it makes sense to short equities and buy bonds, but in the long run, the optimal leverage is zero – investing just our own funds.

Savings – Investment Synchronicity

- Savings purpose usually has a term associated with it
- Pension saving, school fees, precautionary provision.
- Pension Funds, Insurance companies and many institutional forms exist to smooth and extend the term of the savings pool
- Demand for funds also have a term –the long term of infrastructure or new equity – the short term of working capital and commercial paper –the indefinite of R&D
- The most important function of banking is its transformational role in accommodating mismatches between the savings desires of depositors and the investment needs of the state and private sector.
- Markets also function as maturity transformation mechanisms
- Note that banks also accommodate consumption smoothing by households – mortgages etc

Prudential Regulation

- Pension and Long-Term Insurance Accounting is misleading and provides incentives for short-term behaviour.
- Having the balance sheet /solvency view drive all else is misconceived – particularly prudential regulation
- Valuing financial assets at market where they are serving a role as intermediate goods is folly.
- Having risk regulation based upon the balance sheet and current provisions is misconceived
- One of the few things we know about risk is that it means that more things can happen than will.
- Overprovision becomes easy and costly –and may not be effective
- We need provision which can be drawn upon when the adverse future event occurs – and that is insurance
- Markets can handle idiosyncratic risks but not systemic.

Risk Management

- Developed into a monoculture – Solvency and Capital Adequacy Regimes.
- These are appropriate for “pile it high, sell it cheap, and maximise return on capital” business strategies, for banks where liabilities can run.
- But there are many ways to manage risk – notably: Prevention versus Precaution
- Prevention – we may act on the likelihood of the risk occurring or we may act on the magnitude of the risk should it occur, or both. This is the land of insurance, and is immediate acting. It assumes we know the probabilities.
- This is fundamentally static, though it may be long-term (LDI, SII)
- Precaution is a temporary action when the risk is imperfectly known
- It is strongly related to the arrival of new information over time – it is dynamic
- This is the land of prudence and management action. It is the land of the super-secure business strategy, where cost is a second order concern.
- 1992 Rio Declaration Principle 15
  - *In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.*

Regulatory Mechanisms

$$P_{ruin} \leq \frac{1}{\beta^2}, \qquad \text{where } \beta = \frac{C + \lambda N}{\sigma\sqrt{N}}.$$

- Value at Risk is simply an application of insurance ruin theory
- It dates from 1963 and William Baumol rather than the 1990s
- If we wish to regulate the probability of ruin, there are variables other than capital (C) we may utilise.
- The loading factor (λ) but this is product regulation
- The number of risks (N) but this has competition implications
- The variability of individual risks (σ), again product regulation
- The regulator favours institutional over product regulation.
- We may also simply adopt the precautionary rather than preventive approach – it is more appropriate for the long-term

Short-termism

- Short-termism carries a host of problems - John Kay: “Kay review of equity markets and long-term decision making”
- Share buybacks rather than special dividends
- Institutional Corruption - *Safra Centre for Ethics – Harvard*
- *Lessig – Salter – Youngdahl*
- *Institutional corruption refers to institutionally supported behaviour that, while not necessarily unlawful, erodes public trust and undermines a company’s legitimate processes, core values, and capacity to achieve espoused goals.*
- *Institutional corruption in business typically entails gaming society’s laws and regulations, tolerating conflicts of interest, and persistently violating accepted norms of fairness, among other things. ...*
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Trust

- Trust is a recurrent theme in markets and more broadly
- For Trust to be necessary, there must be a risk of loss
- We cannot rebuild Trust
- We can only increase our own trustworthiness
    - **Competence**
    - **Reliability**
    - **Honesty**
- We place our trust is those we perceive to be trustworthy
- Guarantees are substitutes for Trust – they do not enhance it
- Collateral security is the same
- Trust lowers transaction costs – inter alia, legal expense
- Trust is commitment
- Commitment encourages engagement, and better governance.

Asset Allocation

- The complexities of correct time serial analysis reduce to some simple heuristics for asset management
- Buy long-term income
  - Rents
  - Indexed Bonds
  - Dividend Growth Stocks
- Illiquid Assets
  - Infrastructure
  - Direct Private Equity
  - Direct Private Debt
- Diversification is now about independent sources of cash flow
- No Hedge Funds, No Insurance Linked Securities or Derivatives
- The concerns are not about returns and market prices but about income
- We actually prefer lower prices and higher income in the long-term
- Solvency ratios and the like are incidental to that

Some final thoughts

- Will we ever get capital markets which reflect investor preferred habitats when debt payments are tax deductible to the corporate sector?
- Excessive debt destabilises the financial system and the economy.

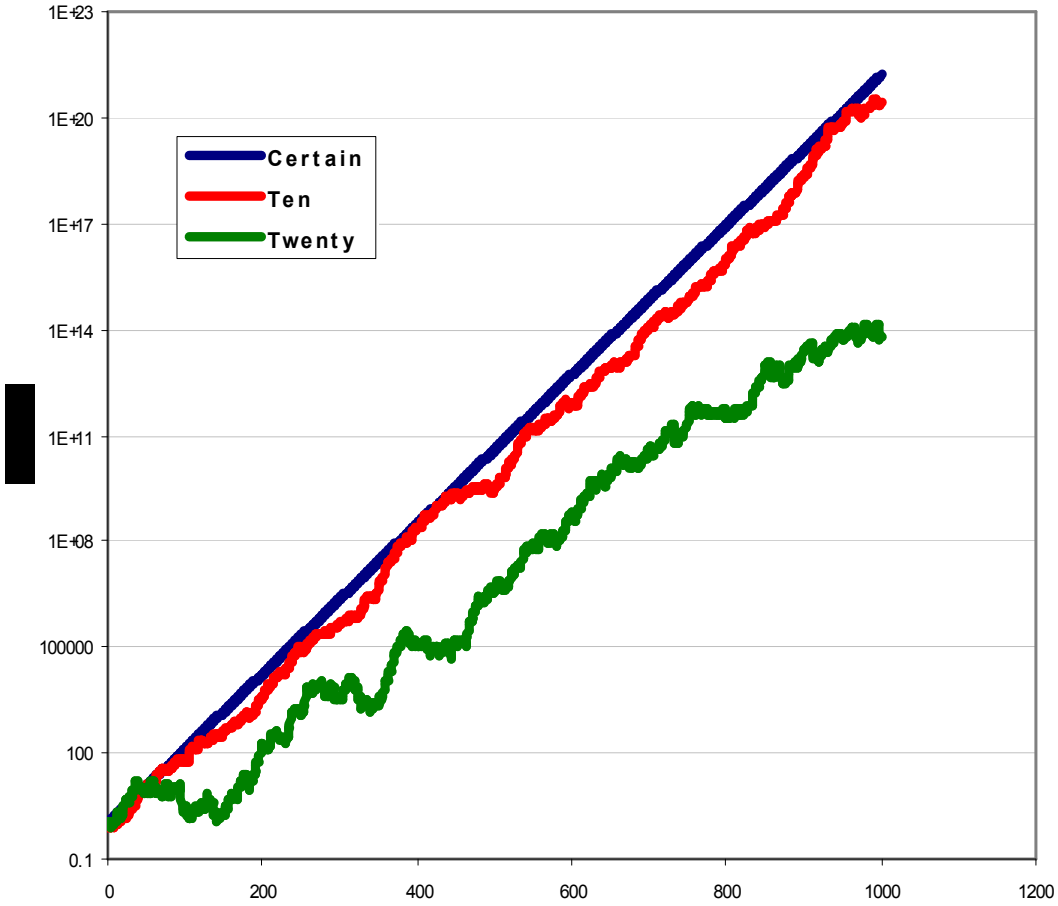
- *"The failure of the conventional and unconventional paradigms is in providing a compelling description of the corporation."*

  Colin Mayer

- *Similarly, we need a compelling model of investment – one which reflects the differences arising in time transitions.*

- *Questions ??*

Why do we care about variability?



Geometric Mean =
Arithmetic Mean – 0.5*Variance

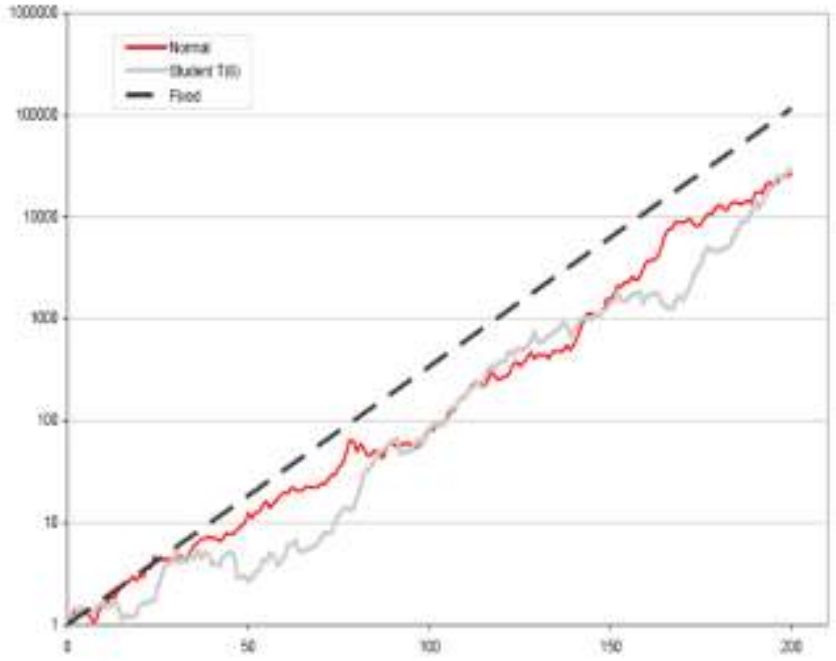
$$r_g \cong r_a - \frac{1}{2}\sigma^2 + \ldots.$$

10% volatility = 0.5%
20% volatility = 2.0%

Volatility / Risk has a cost

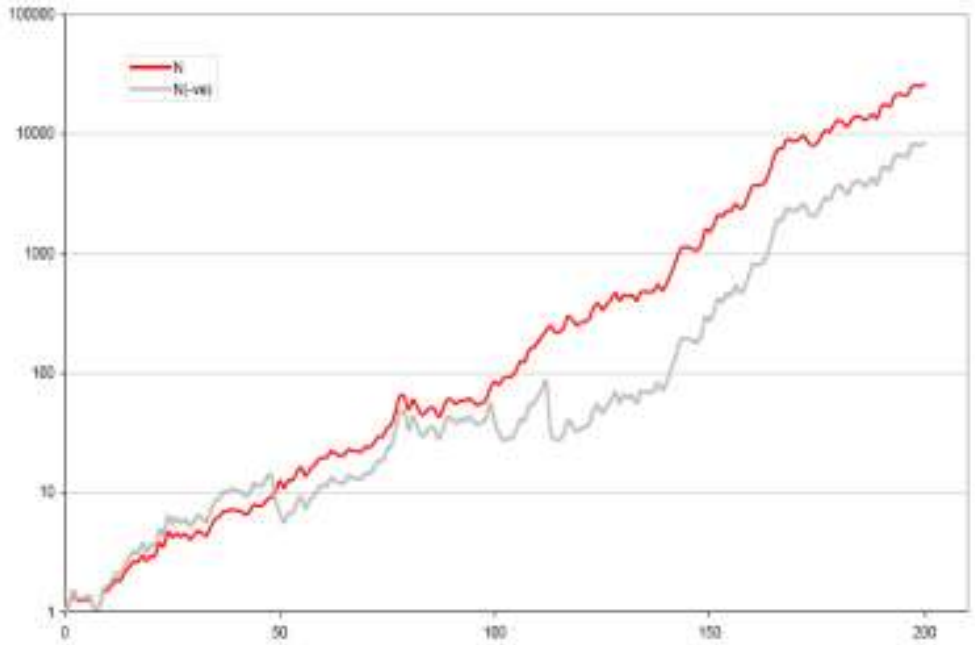
Property of repeated games

Fat Tails and Asymmetry



Fat Tails – Often but not always lowe
– reverts reasonably

This is not an assumption of mean reversion in the price generating process.

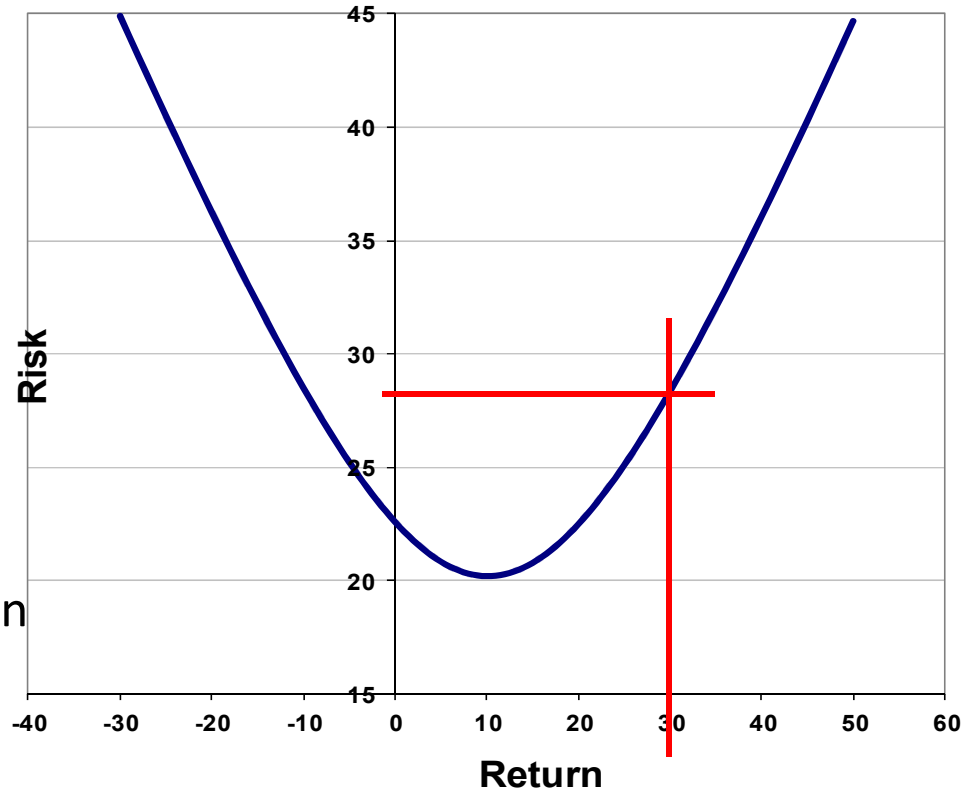


(-ve) Asymmetry – strictly lower very slow to revert

The downside asymmetric limit is, of course, that we lose it all – never to recover

Functions

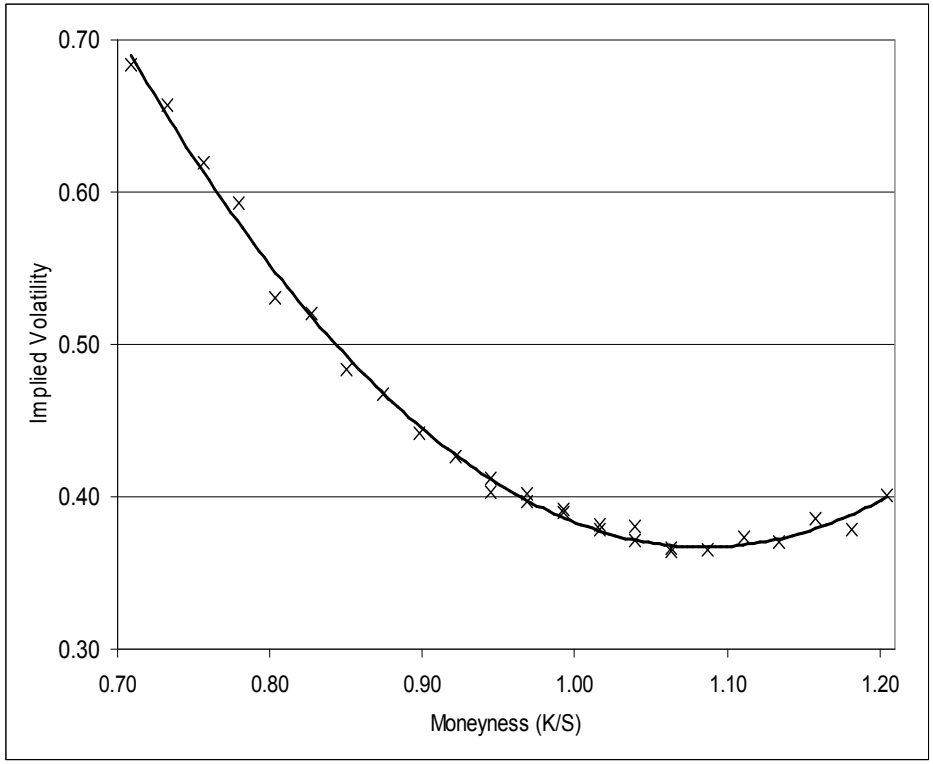
- The CAPM is based upon expected returns and expected risks – that is averages.
- What happens when we consider particular gains and losses, that we believe will prove outcomes? – our judgement skill is applied.
- Risk changes value
- The mean statistic is a global rather than local value.



If we forecast a 30% return, we also face volatility of 28.3%

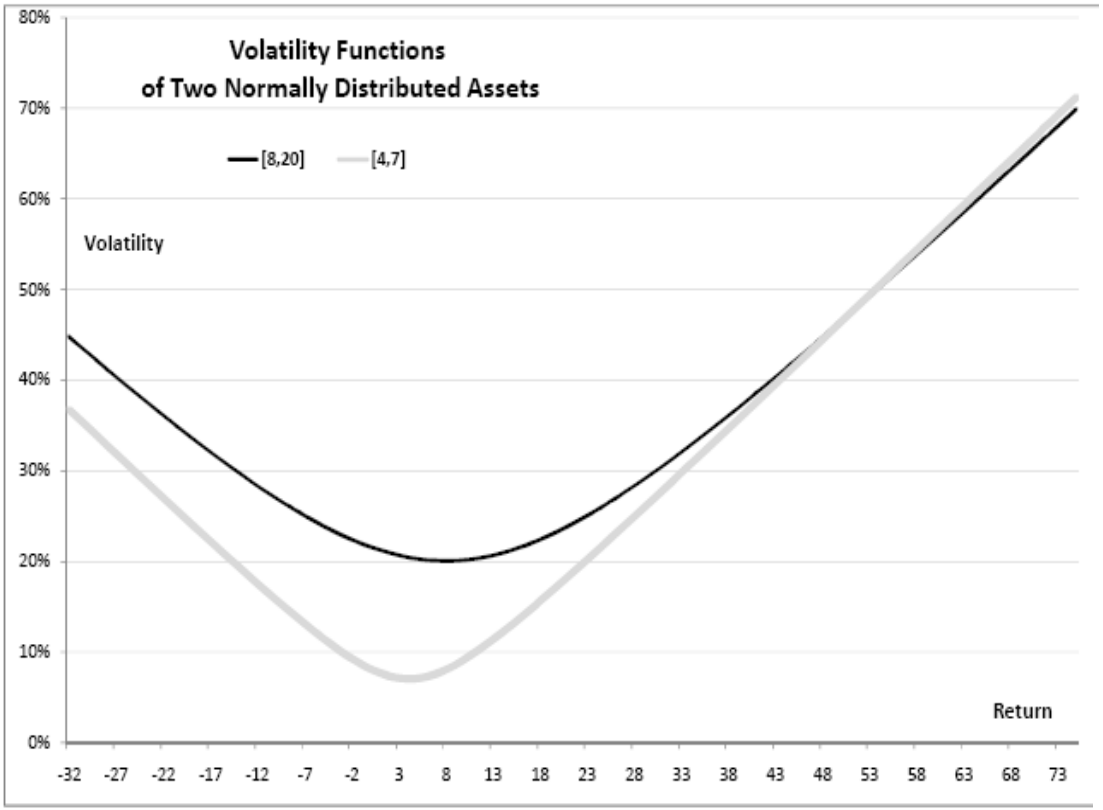
This is an extreme forecast, it is likely in approximately 15.9% of cases

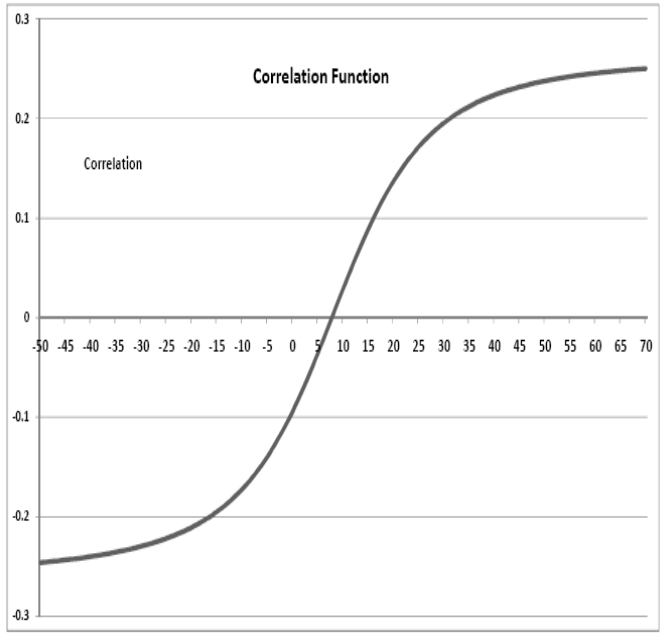
Option Smiles and Smirks

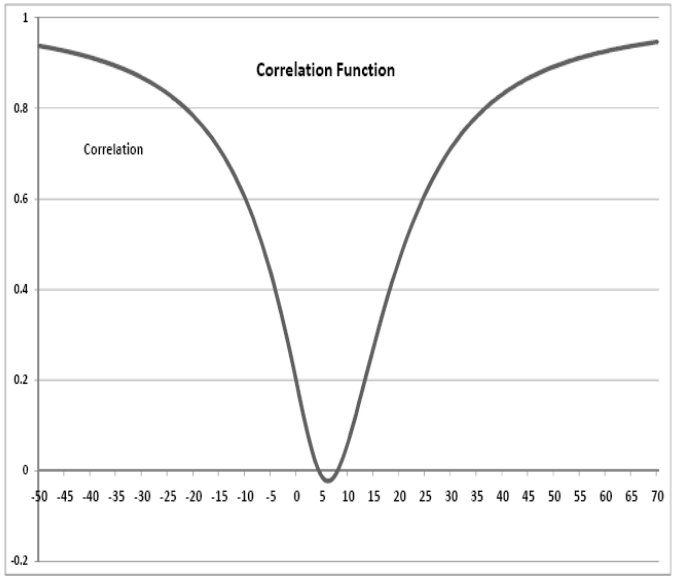


The option smile is related to this local versus global implied volatility issue.

Functions



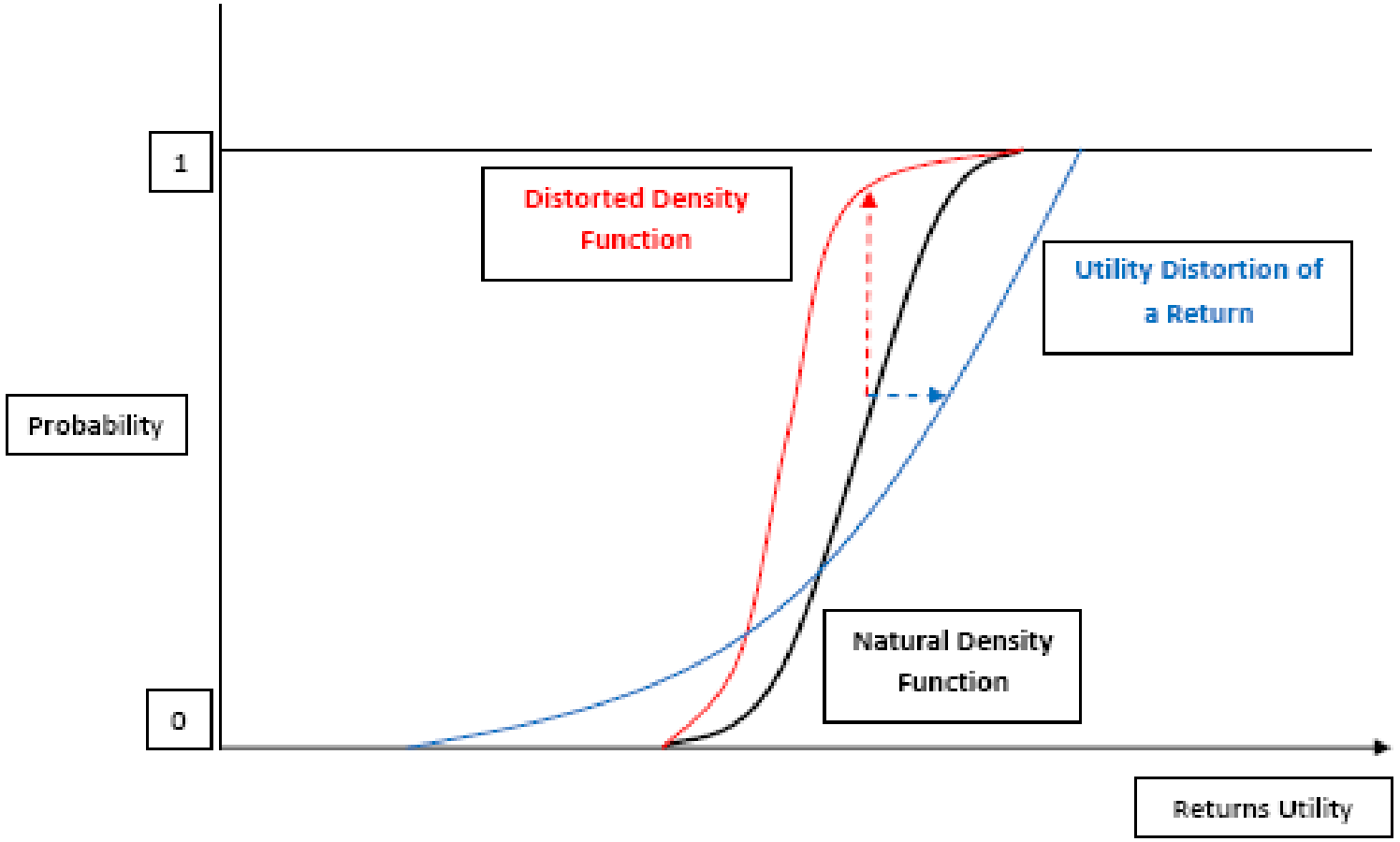




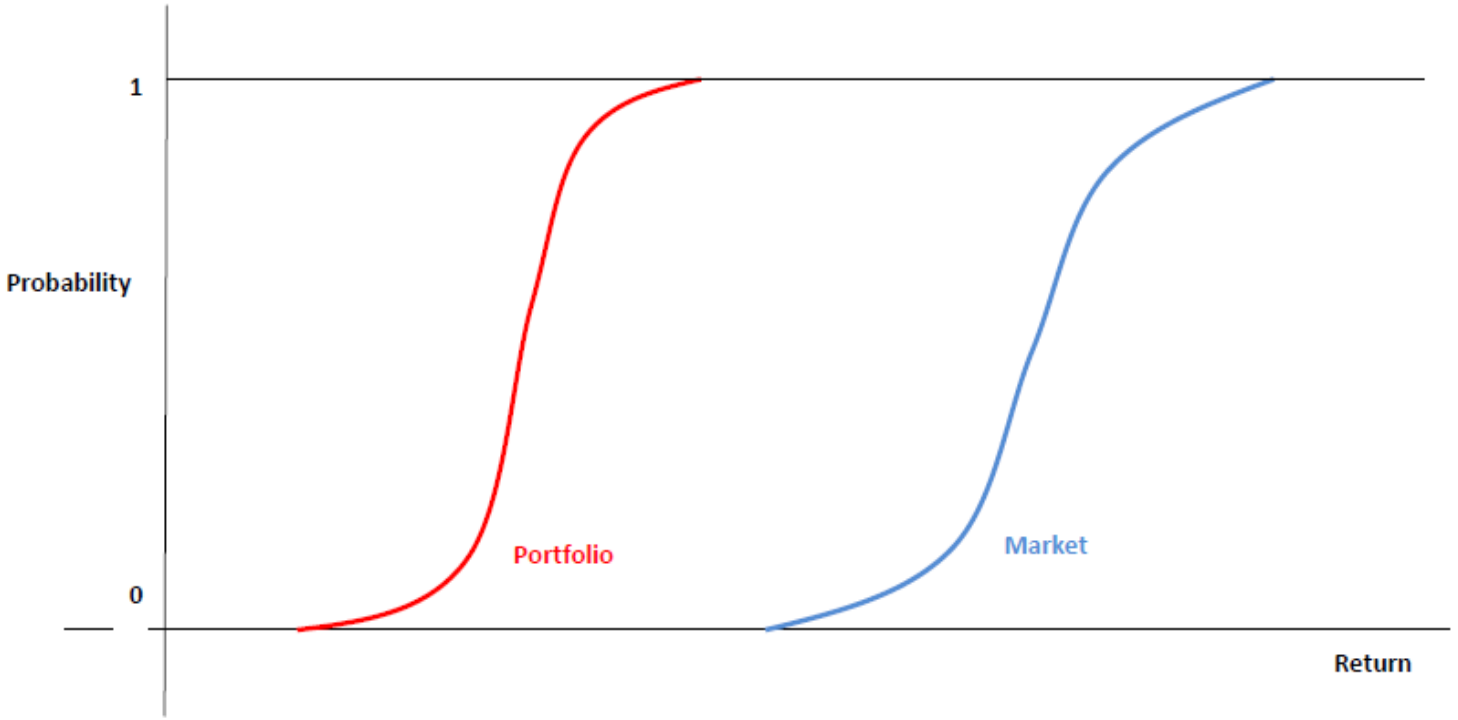
So what do the correlation **functions** look like ?
Note that they are non-commutative

Forecasts are ensembles and volatility and correlation are dependent on returns.
This presents real challenges for dynamic asset allocation strategies

Change of Measure
Equivalent Martingale and Utility Transforms



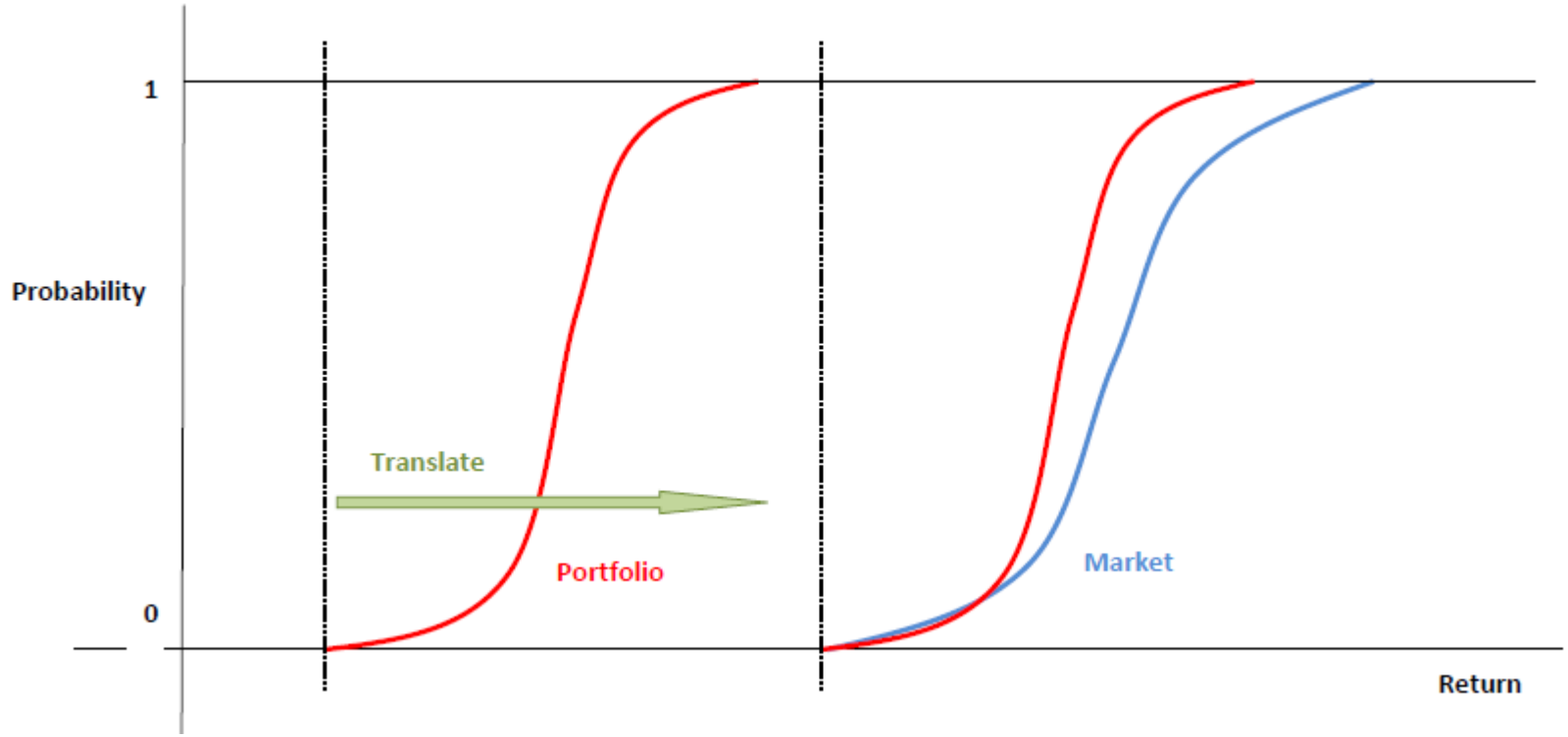
Distribution Comparison



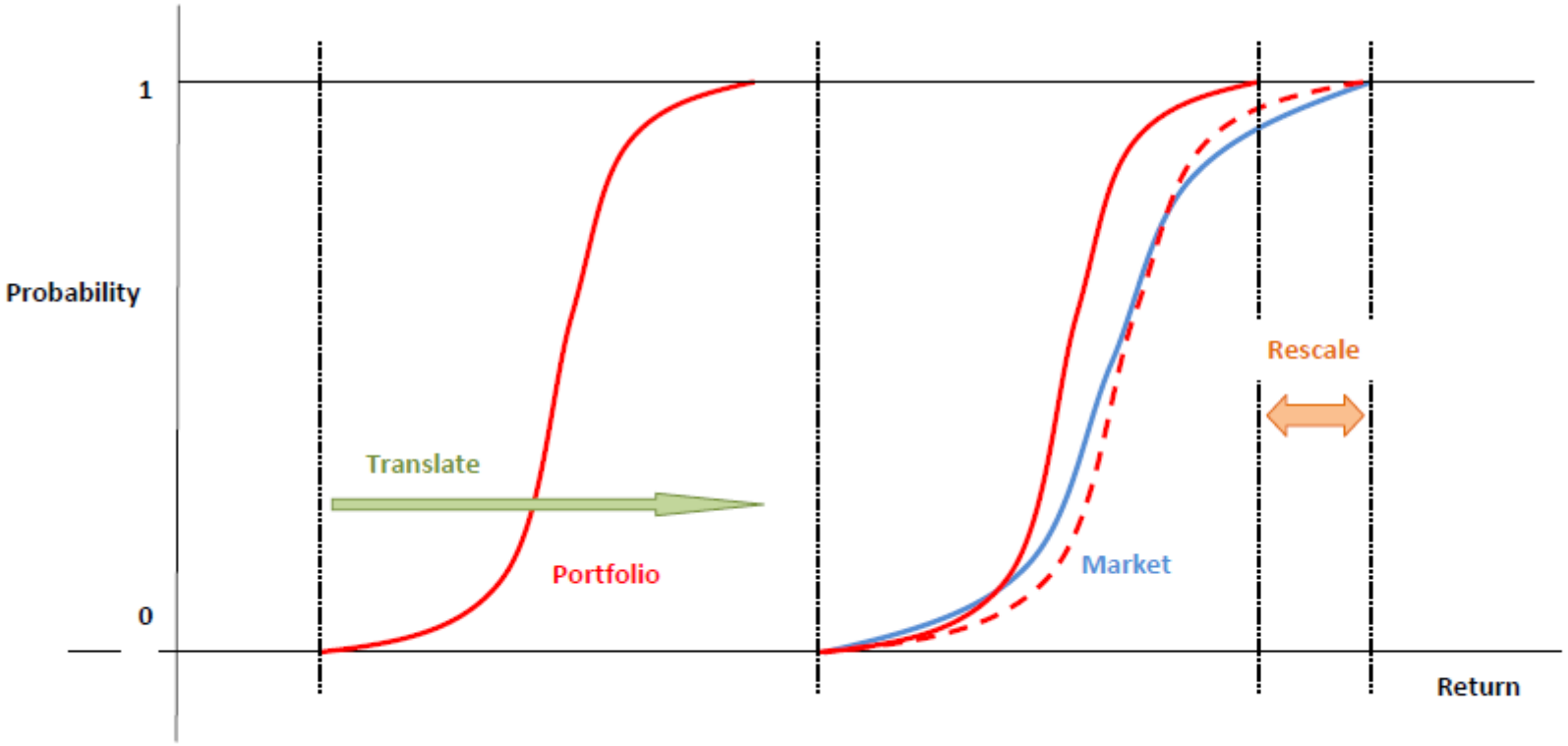
In this illustration the market is clearly much more attractive than the portfolio, but by how much?

This can be derived by affine translation - A + B (R)

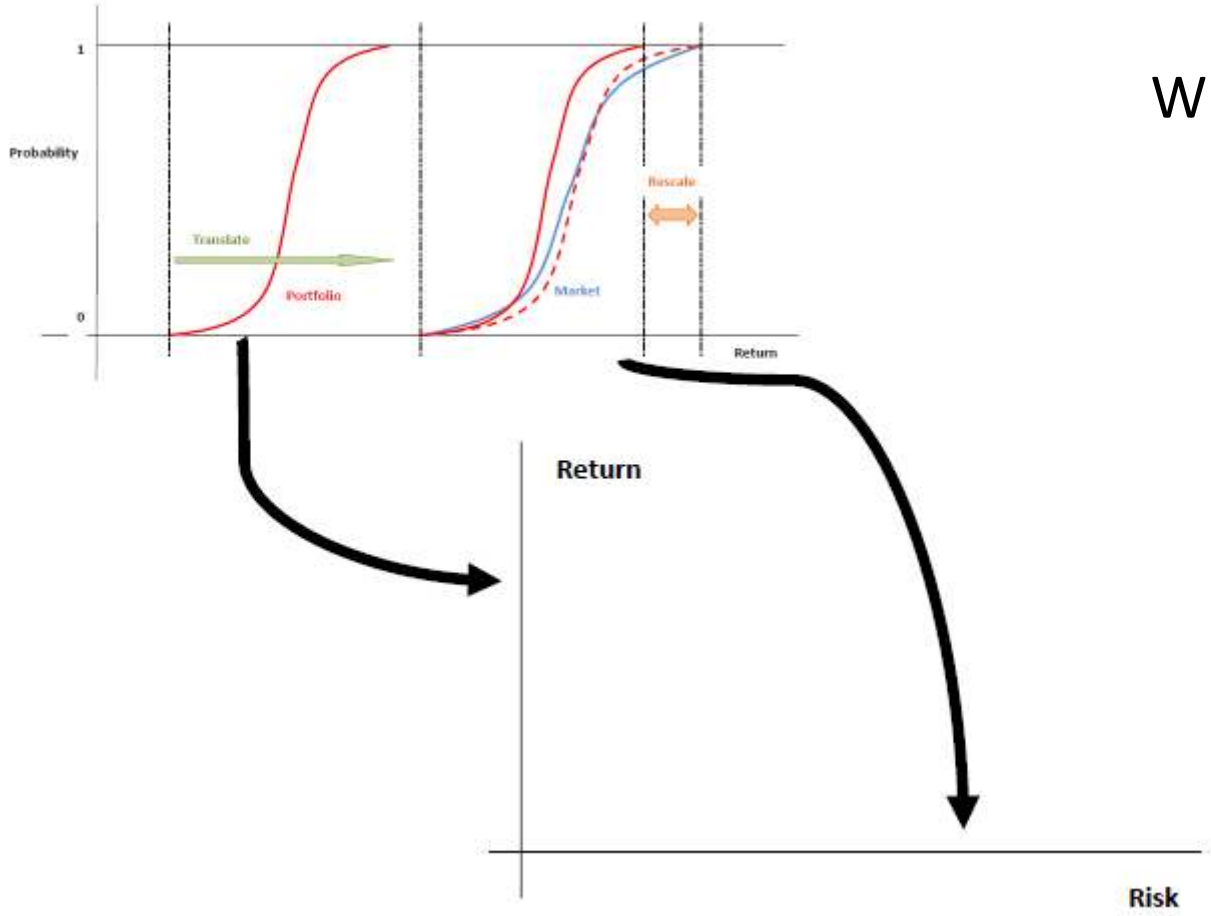
Translate and Rescale



Translate and **Rescale**



Over this common support, we can integrate out the differences between portfolio and market.



Why is this relevant?

This shows that the CAPM is just a distribution comparison

And the economics around that are entirely redundant