Lecture 4: The process of portfolio management and portfolio manager behaviour

In this lecture we will probe the way in which asset managers acting on behalf of institutional investors come to select the assets they hold. We start from the basic aim of investment to achieve the optimal trade-off of risk and return, and then assess the constraints on that choice for different kinds of institutional investor. We continue by focusing on the characteristics of equity as a key component of institutional portfolios.

Asset management objectives and constraints 1

The risk return tradeoff – review

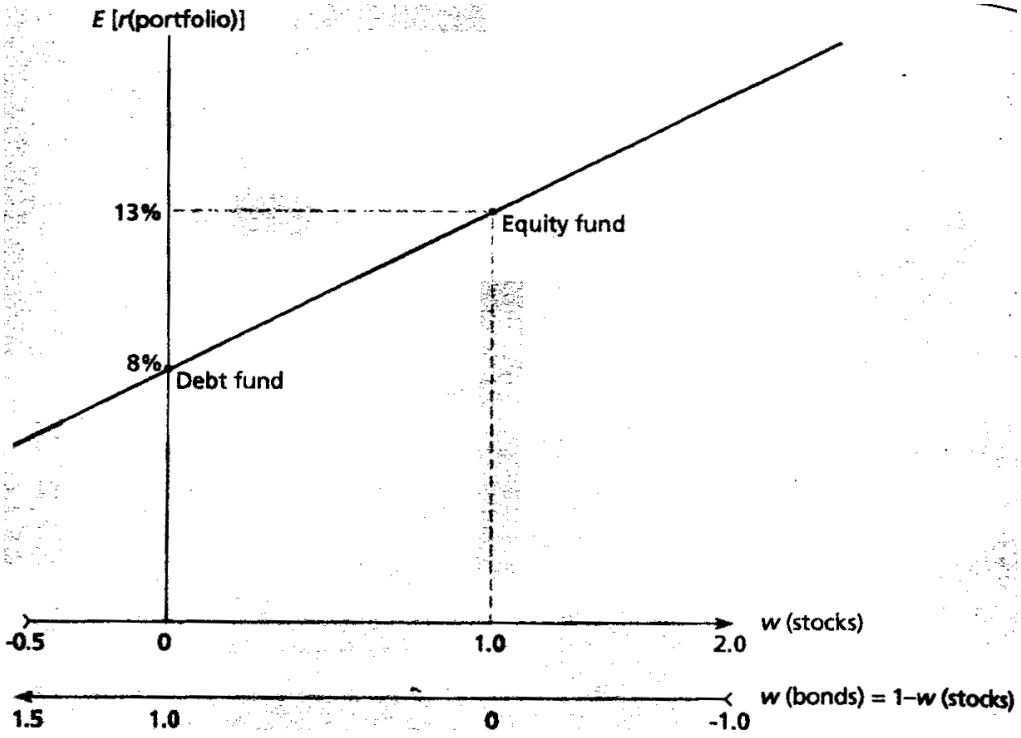
Expected return on a portfolio is weighted sum of returns

$$E(r_p) = w_D E(r_D) + w_E E(r_E)$$

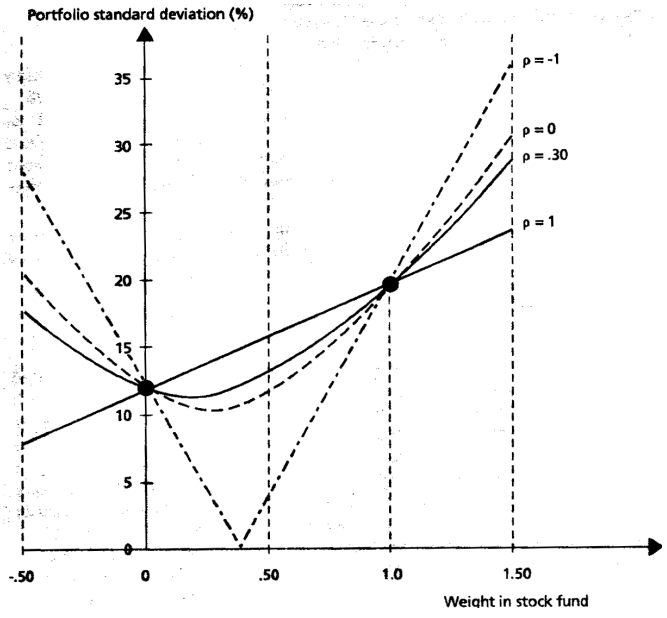
Variance is weighted variance plus 2*weighted covariance

$$\sigma_p^2 = w_D^2\sigma_D^2 + w_E^2\sigma_E^2 + 2w_D w_E \mathrm{Cov}(r_D, r_E)$$

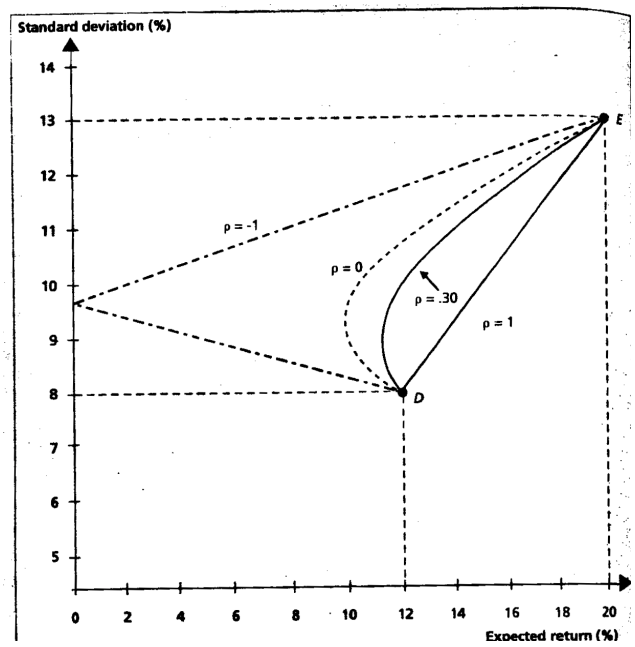
Portfolio returns as function of investment, i.e. asset allocation



Portfolio risks as function of investment



Opportunity set



Share of assets in optimal risky portfolio – combinations where no higher return possible without increased risk. Idiosyncratic risk eliminated.

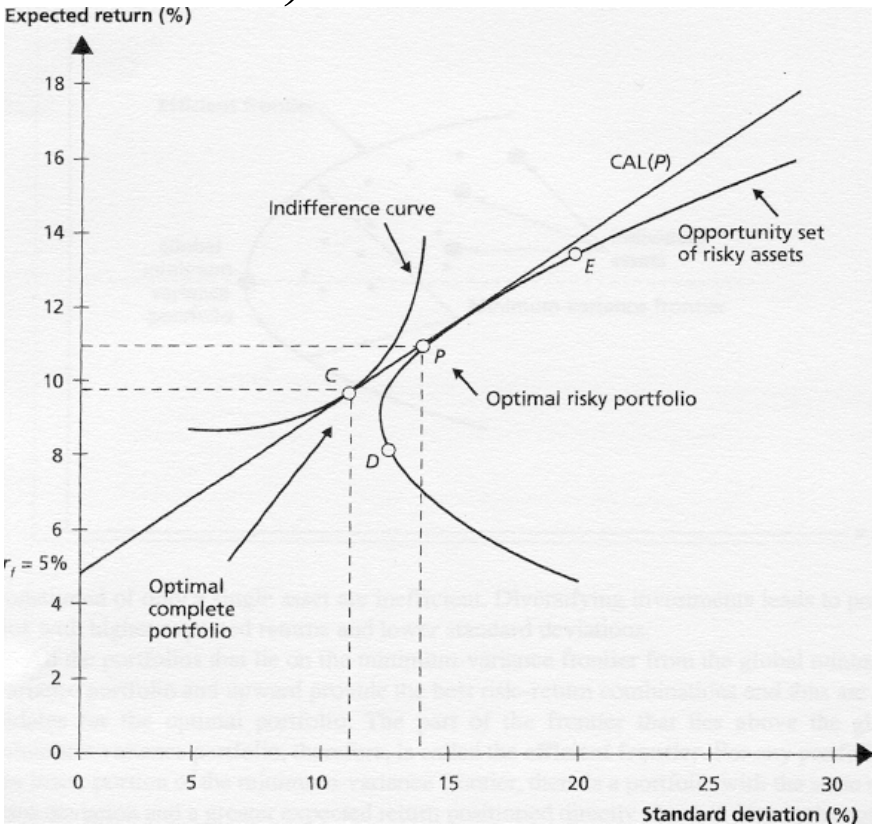
Return on assets (CAPM formula)

$(ER_i - r) = \beta_i (ER^m - r)$ or

$ER_i = r + \beta_i (ER^m - r)$ where

$\beta_i = \mathrm{cov}(R_i, R^m) / \mathrm{var}(R^m)$

With risk free asset and investor welfare maximization ("mutual fund separation theorem")



Suppose can invest in Treasury bills, optimal decision is tangency of capital allocation line CAL with optimal risky portfolio opportunity set, where slope of CAL is

$s_p=[E(r_p)-r_f]/\sigma_p$

Maximising this subject to $\Sigma w_i=1$ gives an optimal risky portfolio in the presence of a risk free asset:

$$w_d=\frac{[E(r_d)-r_f]\,\sigma^2_e-[E(r_e)-r_f]\,cov(r_d,r_e)}{[E(r_d-r_f)]\,\sigma^2_e+[E(r_e-r_f)]\,\sigma^2_d-[E(r_d)-r_f+E(r_e)-r_f)]\,cov(r_d,r_e)}$$ and

$w_e=1-w_d$

To find best split cash/risky, assess individual's risk aversion, where $U=E(r)-0.005A\,\sigma^2$ is mean variance consistent, A risk aversion coefficient

Expected return and variance of CAL

$E(r_c)=r_f+y[E(r_p)-r_f]$ and $\sigma^2_c=y^2\,\sigma^2_p$

where y=weight on risky portfolio

To get best allocation to risky asset:

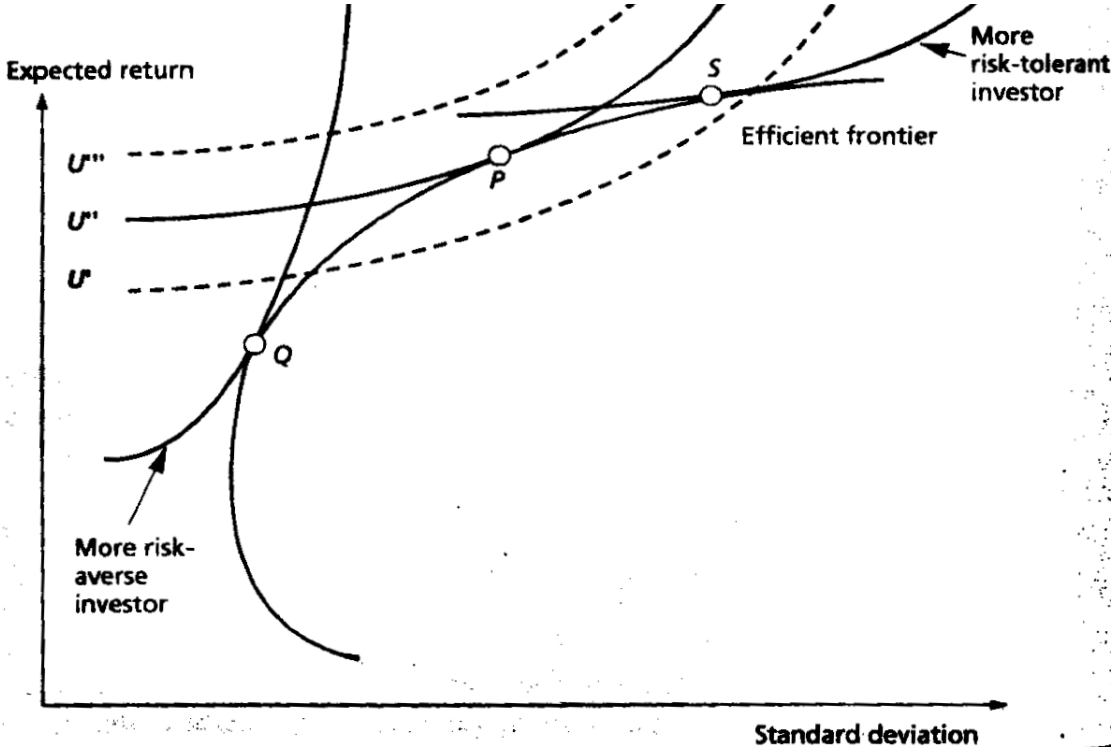
$\text{Max}_y U=E(r_c)-0.005A\sigma^2_c$

$=y[E(r_p)-r_f]-0.005Ay^2\,\sigma^2_p$

Giving: $y=\frac{E(r_p)-r_f}{0.01A\sigma^2_p}$

Optimal proportion held in risky asset is inversely related to risk aversion and level of risk and directly related to the risk premium between risky and risk free assets

Without risk free asset



- no unique optimal portfolio, choose according to risk aversion and constraints on investor
- note that with inflation bonds or cash are not risk free in real terms (but possible risk free asset is index linked bonds)
- institutional investment is an operationalisation of the process set out above

Steps in institutional investment

Institutional investment is a service on behalf of a client, requiring communication and incentives/control mechanisms

Need to discover objectives of client – link to returns need and risk tolerance (parameter “A”)

Assess constraints on investment choice:

- Liquidity needs
- Investment horizon
- Inflation sensitivity
- Portfolio regulations
- Tax
- Accounting rules, market and book values

Asset management objectives and constraints 2

Steps in devising investment strategies

Choice of asset categories
Derivation of efficient frontier
Benchmark asset allocation in light of frontier and constraints (strategic asset allocation)
Choice of degree of variation from benchmark (tactical asset allocation)
Choice of approach to security selection (active or passive)

Approach common to all institutional investors but weights differ (index fund less account of market conditions than actively managed)

Asset management objectives and constraints 3

The role of liabilities

What is a liability? – "cash outlay made at a specific time to meet the contractual terms of the obligation issued by the institution"

Types of liability – see table. Vary in terms of certainty, timing and also guarantee elements (e.g. defined benefit pension, life insurance)

TYPES OF LIABILITY

	Certainty	
Timing	Known	Unknown
Known	Bank deposit	Floating rate debt
Unknown	Term life insurance	Pensions, mutual fund, variable life insurance

Current key issue pension fund deficits, affected by bear market but also low bond yields, rising longevity, inflation protection regulations

Portfolio regulations

- prudent person rules “to act as a prudent person would in conduct of his/her own affairs” – and diversify (choose point on frontier)
- portfolio regulations “direct quantitative limits on asset allocation”

Rationale of the different approaches

Impact on portfolios

PORTFOLIO REGULATIONS P=Prudent person rule

	Pension Funds			**Life Insurers**		
Percent	**Equities**	**Bonds and Loans**	**Foreign Assets**	**Equities**	**Bonds and Loans**	**Foreign Assets**
UK	P	P	P	—	—	Max. 20%
US	P	P	P	Max. 15%	—	Max. 10%
Germany	Max. 30%	—	Max. 20%	Max. 30%	—	Max. 20%
Japan	Max. 30%	Min. 50%	Max. 30%	Max. 30%	—	Max. 30%
Canada	—	—	Max. 20%	Max. 25%	—	Max. 20%
France	—	Min. 50%	—	Max. 65%	—	Max. 20%
Italy	P	P	P	Max. 20%	—	Max. 20%

Comparing pension fund and life insurance real returns with benchmarks

50-50 is 50% domestic bonds and 50% domestic equities

Global is 50-50 in foreign securities

Real earnings are a measure of labour income

See impact of restricting ability to choose optimal portfolio

Real return on	Life insurance less:			Pension funds less:		
	50-50	Global	Real earnings	50-50	Global	Real earnings
Canada	0.3	-3.7	6.6	0.9	-3.2	7.2
Germany	-2.6	-1.5	6.4	-3.7	-2.6	5.3
Japan	-4.1	-3.4	4.1	-2.7	-2.0	5.5
Netherlands	-4.3	-2.8	7.0	-5.0	-3.5	6.2
Sweden	-4.2	-4.3	5.8	-5.4	-5.6	4.6
United Kingdom	-0.5	-1.5	5.7	0.6	-0.4	6.9
United States	-2.0	-3.3	7.5	-0.3	-1.6	9.2
Average	**-2.2**	**-2.9**	**6.5**	**-2.2**	**-2.7**	**6.4**
Prudent person	**-2.2**	**-2.5**	**6.7**	**-1.8**	**-1.9**	**6.9**
Prudent person excluding Japan	**na**	**na**	**na**	**-1.6**	**-1.8**	**7.4**
Restrictions	**-2.7**	**-3.3**	**5.7**	**-4.6**	**-4.1**	**4.9**

Alternative paradigms of asset management

Mean-variance model (sole focus on return and volatility) as above
Immunisation (stabilise value of investment)
Shortfall risk (avoid downward moves)
Asset-Liability Management (ensure long term balance of assets and liabilities)

Implies cannot always assess optimization by mean and variance alone

The role of conventions
Passive investment (hold the market on the assumption it is efficient)
Active investment (seek out and purchase misvalued securities)

The dichotomy of asset allocation and security selection - introduction

Asset allocation – choice of instrument (e.g. bond vs equity) – Lectures 4 and 5
Security selection – choice of security in instrument category (individual equities or bonds): Lectures 6 and 7 (and 1)
Strategic and tactical asset allocation

Types of passive asset allocation
    Market versus GDP weights for international investment

Active security selection – basis in financial economic analysis
– Continuation and contrarian
– Growth and value strategies

Passive security selection - introduction
Style analysis

Asset management for the differing institutional sectors

Life insurance

- Investment approach dependent on nature of liabilities – nominal (more bonds) and variable
- Shortfall risk as guarantee

Pension funds

- Overall considerations – real liabilities (more equities), maturity
- Defined contribution (no guarantee) – mean-variance
- Defined benefit (guarantee) – elements of shortfall risk

Mutual funds

- Security selection only (usually equities)
- Risk tolerance predefined
- The issue of style management
  The role of individuals

Type of Investor	Return Requirement	Risk Tolerance
Individual and personal trusts	Life cycle (education, children, retirement)	Life cycle (younger are more risk tolerant)
Mutual funds	Variable	Variable
Pension funds	Assumed actuarial rate	Depends on proximity of payouts
Endowment funds	Determined by current income needs and need for asset growth to maintain real value	Generally conservative
Life insurance companies	Should exceed new money rate by sufficient margin to meet expenses and profit objectives; also actuarial rates important	Conservative
Nonlife insurance companies	No minimum	Conservative
Banks	Interest spread	Variable

Type of Investor	Liquidity	Horizon	Regulations	Taxes
Individuals and personal trusts	Variable	Life cycle	None	Variable
Mutual funds	High	Variable	Few	None
Pension funds	Young, low; mature, high	Long	ERISA	None
Endowment funds	Low	Long	Few	None
Life insurance companies	Low	Long	Complex	Yes
Non–life insurance companies	High	Short	Few	Yes
Banks	High	Short	Changing	Yes

Equity investment

Market valuation by Gordon formula

$V_o = (D_0(1+g) + P_{t+1})/(1+(rr_{t+1}+pr_{t+1}))$

$V_o = D_{t+1}/(1+ (rr_{t+1}+pr_{t+1})) + D_{t+2}/(1+(rr_{t+2}+pr_{t+2}))^2$

$V_o = D_{t+1} / ((rr+pr) – g)$

Why invest in equities rather than bonds?

- raise expected returns
- benefits of diversification (expand frontier)
- cost of volatility

Long term returns on equity – Jorion and Goetzmann

- US exceptional in terms of stability and returns (wars, financial crises, revolutions)
- But global portfolio returns close to the US

PERCENT PERFORMANCE OF GLOBAL STOCK INDICES, 1921–1996

Index	Real Return (Arithmetic)	Standard Deviation	Real Return (Geometric)
United States	5.5	15.8	4.3
Non-US	3.8	10.0	3.4
Global	5.0	12.1	4.3
Survived markets	4.6	11.1	4.0

Equities and inflation

- not short term hedge
- but may in long term unless real output shock (Ely and Robertson)

Time diversification in equities

- common view as expected returns high, probability of shortfall low
- Bodie – risks increase over longer time in terms of costs of insuring
- issue links to whether there is mean reversion or random walk

Equity research I: Productivity and equity prices

Conventional view labour productivity crucial indicator for equity valuation– or possibly potential output

May be inaccurate measure of firm's earnings underlying equity valuations – labour productivity gains ultimately accrue to labour

Davis and Madsen show empirically by Granger causality, VAR and vector-error-correction methods

Capital productivity slower-growing than labour productivity

Unexpected increases in capital productivity growth (IT revolution) have strongest effects on share prices in the short term - lead via increased investment to rise in the capital stock and in the presence of diminishing returns, real stock prices are bid down again.

Long term asset returns and productivity (1920-99)

% per annum	US	DE	CA	UK	FR	IT	JP
Labour productivity	1.61	3.14	2.14	1.97	2.98	2.32	3.78
Capital productivity	0.70	0.32	0.05	-0.64	0.57	0.22	-0.84
Total factor productivity	1.58	1.45	1.53	1.04	2.12	1.69	1.86
Real equity returns	8.48	7.63	6.17	6.88	5.64	2.44	4.87
Real bond yields	2.28	2.66	3.25	3.83	-3.82	-4.22	-1.65
Growth	3.03	3.26	3.76	2.18	2.92	2.94	4.31
Inflation	2.71	2.36	2.66	3.67	8.12	9.41	7.69

Granger causality results

	Capital Productivity		Total factor productivity		Labour productivity	
Depend-ent variable	DKP	DRSP	DTFP	DRSP	DLP	DRSP
Independ-ent Variable	DRSP	DKP	DRSP	DTFP	DRSP	DLP
US	**					
Germany		**				
Canada	**					
UK	**					
France		*				**
Italy	*					
Japan	**		**		**	

Equities research II: The bear market

Comparing current and 1972-4 bear market, when price falls comparable
Long period before real equity prices recovered 1972 level (1980s-1990s)
Earlier period much more severe in terms of economic developments, notably high inflation
Current situation also presents some risks, in particular a disruptive correction of US sectoral imbalances
Also evidence of overvaluation in late 1990s (risk premium and dividend yields) – and less scope for international diversification

Comparing bear markets (1)

Share price falls

1974	UK	US	Germany	Japan	France
Peak of share prices	Aug-72	Dec-72	Jul-72	Jan-73	Apr-73
Fall to trough in nominal terms	68.5% (Dec-74)	48.4% (Sep-74)	34.4% (Sep-74)	40.2% (Oct 74)	52.7% (Sep-74)
Return to original nominal level	Sep-77	Nov-80	Mar-76	Jan-79	Sep-79
Fall to trough in real terms	77.2% (Dec-74)	56.1% (Sep-74)	43.0% (Sep-74)	56.2% (Oct-74)	68.1% (Apr-77)
Return to original real level	May-87	Aug-93	Jun-85	Feb-85	Aug-86
1999					
Peak of share prices	Dec-99	Mar-00	Feb-00	Mar-00	Aug-00
Trough	Sep-02	Sep-02	Sep-02	Oct-02	Sep-02
Nominal fall	43.5%	47.9%	65.3%	47.8%	56.0%
December2002	40.3%	43.7%	63.7%	48.8%	52.5%
Real fall to November 2002	40.6%	43.6%	60.2%	44.4%	50.5%

Volatility

1974	Standard deviation		Conditional volatility (GARCH)		Difference	
	US	World	US	World	US	World
1972	1.70	3.68	3.89	5.23	-2.19	-1.55
1973	4.11	5.57	4.00	5.47	0.12	0.10
1974	7.04	6.85	5.22	6.50	1.82	0.34
1975	5.19	7.13	5.83	6.98	-0.64	0.16
1999						
1998	6.29	7.23	4.83	6.16	1.46	1.08
1999	3.87	4.81	4.82	5.65	-0.95	-0.85
2000	4.90	5.08	4.70	5.79	0.20	-0.71
2001	5.73	5.97	5.07	5.82	0.66	0.15
2002	6.18	6.85	5.12	6.22	1.05	0.63

Comparing bear markets (2)

Risk premia

	Germany	US	UK	France	Canada
1960-69	7.6	4.4	4.5	6.6	5.1
1970-79	5.8	7.5	9.4	11.4	7.6
1980-89	2.3	1.8	3.2	4.1	1.1
1990-94	0.8	1.7	1.9	-0.3	-1.2
1995-99	0.4	0.4	1.6	-0.1	-0.6
Memo: 1972	5.9	3.5	4.3	8.9	5.3
Memo: 1999	0.0	-0.4	1.0	-0.4	-0.1

Dividend yields

	UK	US	Germany	Japan	Canada	France	Italy
1972	4.2	3.3	4.3	5.4	3.9	4.9	2.9
1973	3.1	2.7	3.1	2.9	3.3	4.2	3.2
1974	3.2	2.8	3.8	2.0	3.1	3.4	1.9
1975	11.0	4.9	5.6	2.8	4.8	7.2	2.3
1998	3.3	2.0	1.8	0.8	2.0	2.0	2.7
1999	2.8	1.7	1.6	1.0	2.1	1.7	1.7
2000	2.4	1.3	1.9	0.7	2.1	1.6	2.2
2001	2.2	1.0	1.6	0.7	1.1	1.1	2.1
2002	2.3	1.2	1.3	0.8	1.6	1.3	2.5

Correlations of market indices

	UK	US	Germany	Japan	Canada	France	Italy	Country averages
1972	0.74	0.83	0.47	0.63	0.66	0.17	0.22	0.53
1973	0.64	0.96	0.51	0.65	0.88	0.45	0.03	0.59
1974	0.59	0.95	0.39	0.09	0.78	0.80	0.50	0.59
1975	0.72	0.96	0.51	0.72	0.72	0.50	0.69	0.69
1998	0.92	0.94	0.87	0.75	0.93	0.81	0.72	0.85
1999	0.71	0.97	0.88	0.61	0.85	0.86	0.54	0.77
2000	0.78	0.96	0.44	0.54	0.81	0.66	0.22	0.63
2001	0.96	0.98	0.95	0.72	0.89	0.95	0.90	0.91
2002	0.98	0.99	0.95	0.40	0.88	0.97	0.95	0.88

The equity risk premium

- see data above – "risk premium puzzle" exceeds estimated risks
- implies risk neutral investors benefit from holding equities
- forward looking measures have fallen sharply, see below
  - Risk neutral investors?
  - Speculative bubble?

Equities research III: Demographics and asset prices

Davis and Li find over 1950-99 larger 40-64 generation boosts asset prices, 20-39 neutral, tentative evidence 65+ reduces prices (intuition of life cycle saving)

Implies in longer term, future asset prices could come under downward pressure as OECD population ages

- Lower saving (“baby bust”) affecting real interest rates or risk premium
–Lower real returns on capital as economic growth declines and capital/labour ratio rises
–Switch from equities to bonds as time horizons shorten/annuitisation
Most dramatic scenarios may not be realised, e.g. due to issuance, emerging market development, monetary policy reaction

Forecast of US asset prices including AGE65