

Rates of return for FSA prescribed projections

Report of PricewaterhouseCoopers
and peer reviewers' comments

December 2007



Introduction

The Financial Services Authority publishes the enclosed report “Rates of return for FSA prescribed projections” primarily for information. It was prepared for us by PricewaterhouseCoopers and is provided along with the comments of the three peer reviewers we commissioned to provide an independent review of the research.

We are not consulting on the contents of the report, but should you wish to provide us with comments please address them to:

Donald Cranswick
Financial Services Authority
25 The North Colonnade
Canary Wharf
London
E14 5HS

Telephone: 020 7066 5578
Fax: 020 7066 5579
E-mail: donald.cranswick@fsa.gov.uk

PwC's Report

Review of FSA Projection Rates

Final Report

November 2007



Important Notice

This report has been prepared by PricewaterhouseCoopers LLP ("PwC") for the Financial Services Authority in connection with "Review of FSA Projection Rates" under the terms of the PwC engagement letter with Financial Services Authority dated 18 September 2007 (the "Engagement").

PwC neither accept any responsibility nor owe any duty of care to any person (except to the Financial Services Authority under the relevant terms of the Engagement, including the provisions limiting PwC's liability) for the preparation of the report. Accordingly, regardless of the form of action, whether in contract, tort or otherwise, and to the extent permitted by applicable law, PwC neither accepts any liability or responsibility of any kind nor owes any duty of care for the consequences of any person (other than the Financial Services Authority on the above basis) acting or refraining to act in reliance on the report or for any part thereof or for any decisions made or not made which are based upon such report or any part thereof.

This report contains information obtained or derived from a variety of sources as indicated within the report. PwC has not sought to establish the reliability of those sources or verified the information so provided. Accordingly no representation or warranty of any kind (whether express or implied) is given by PwC to any person (except to the Financial Services Authority under the relevant terms of the Engagement) as to the accuracy or completeness of the report. Moreover the report is not intended to form the basis of any investment decisions and does not absolve any third party from conducting its own due diligence in order to verify its contents.

Copyright Notice

© 2007 PricewaterhouseCoopers LLP. All rights reserved. "PricewaterhouseCoopers" refers to PricewaterhouseCoopers LLP a limited liability partnership incorporated in England or, as the context requires, other member firms of PricewaterhouseCoopers International Limited, each of which is a separate legal entity.

Contents

1	EXECUTIVE SUMMARY	4
1.1	Context and application of FSA projection rates	4
1.2	Scope of this report	4
1.3	Key findings	5
1.4	Conclusions and recommendations	6
2	INTRODUCTION	7
2.1	Background and summary of 2003 report	7
2.2	Scope of this review	8
2.3	Time horizon	8
2.4	Structure of the report	10
3	MACROECONOMIC ASSUMPTIONS	11
3.1	Price inflation	11
3.2	Earnings inflation	17
3.3	Conclusion: RPI inflation and average earnings growth	19
4	ASSET MIX	20
4.1	Overview	20
4.2	Balanced funds	20
4.3	With-profits funds	22
4.4	Conclusion: Asset mix	23
5	INVESTMENT RETURNS	24
5.1	Government bonds	24
5.2	Equities	29
5.3	Corporate bonds	38
5.4	Property	40
5.5	Conclusion: Investment returns	42
6	TAX EFFECTS	43
6.1	Overview	43
6.2	Taxed business	43
6.3	Conclusion: Tax effects	45
7	CONCLUSION	46
	APPENDIX I – TERMS OF REFERENCE (“TOR”)	47
	APPENDIX II – RECENT INFLATION HISTORY	51
	APPENDIX III – LITERATURE REVIEW ON EQUITY RISK PREMIA STUDIES	52
	APPENDIX IV – WORLDWIDE EMRP VALUES	55
	APPENDIX V - PWC “SURVEY OF THE CITY” REPORT	56
	APPENDIX VI – DIVIDEND DISCOUNT MODEL	57
	APPENDIX VII – PROPERTY EQUITY BETAS	59
	APPENDIX VIII – BIBLIOGRAPHY	61
	APPENDIX IX – CONTACT INFORMATION	63

Index of Figures

Figure 1: CPI & RPIX Inflation (%).....	13
Figure 2: Estimated index-linked government bond yields (10-year, zero-coupon) and implied inflation (%).....	14
Figure 3: Average earnings growth (%).....	17
Figure 4: the average asset allocation of pension schemes.....	21
Figure 5: Proportion of bonds, equities and property in UK life insurance companies.....	22
Figure 6: UK government bond real annual returns	25
Figure 7: UK index-linked government bonds real annual returns	26
Figure 8: Distribution of UK government bonds.....	27
Figure 9: Historic chart of index-linked government bond yields.....	28
Figure 10: "Risk-free" return on 10 year UK fixed income gilts.....	29
Figure 11: Real annual returns on UK equities.....	30
Figure 12: The worldwide equity risk premium relative to bills and bonds, 1900 – 2005	33
Figure 13: Consensus expected out performance of equities over inflation-linked government bonds for the next 15 years	36
Figure 14: Real annual returns on UK corporate bonds and UK government bonds.....	38
Figure 15: Historic spread over UK government for corporate bonds of different ratings	39
Figure 16: Property returns (%)	41
Figure 17: Recent inflation history	51

Index of Tables

Table 1: Summary of key recommended assumptions from the 2003 report.....	5
Table 2: Summary of 2003 and 2007 key recommended assumptions	6
Table 3: Summary of key recommended assumptions from the 2003 report.....	7
Table 4: Historical average price inflation.....	12
Table 5: Independent and HM Treasury inflation projections	15
Table 6: Average earnings growth.....	19
Table 7: UK and US historic equity returns	32
Table 8: Comparative EMRP values.....	32
Table 9 : Decomposition of the historical equity premium for 17 countries, 1900–2005.....	34
Table 10: Survey of US CFO equity risk premium.....	35
Table 11: "Breakeven" equity market risk premia assumptions, consistent with actual market valuations at the end of September 2007 (using constant growth DDM).....	37
Table 12: Summary of 2003 and 2007 key recommended assumptions	42
Table 13: Effective tax rates for life funds in excess of those allowed for in tax advantaged business	45
Table 14: Impact of tax on sample life funds	45
Table 15 – Actual EMRP values across 17 countries in the period 1900 – 2005	55
Table 16 – Reported expected returns on a selection of UK assets.	56
Table 17 - Comparison of historic returns on equities and lower risk assets (% average annual rates from 1973 Q1 - 2007 Q3)	57
Table 18 - Equity market valuations using the DDM	58
Table 19 - 'Breakeven' real dividend growth and equity market risk premia assumptions consistent with actual market valuations at the end of September 2007 (using constant growth DDM).....	58
Table 20 UK Property company equity and asset betas	60

1 Executive summary

1.1 Context and application of FSA projection rates

Retail financial services firms provide their consumers with illustrations of the potential returns from and charges on their products. The FSA sets rules that prescribe how these illustrations should be calculated and presented¹. Charges are specific to the individual firm or product, but the FSA rules set out the maximum rates of investment return a firm must adopt when making its projection calculations².

These rates of return were reviewed in 2003 when we conducted our study "Rates of return for FSA prescribed projections"³ on behalf of the FSA. The 2003 report which we prepared for the FSA covered a wide scope, and included the provision of:

- a central estimate and distribution for the annualised real and nominal returns for UK equities, international equities, UK commercial property and gilts/corporate bonds together with the assumptions made in deriving the estimates, along with an explanation of the methodology used;
- an opinion on the main drivers of returns from various asset classes (such as equities, commercial property and bonds);
- an opinion on the appropriate inflation assumptions to use in the projections;
- an opinion on the future returns on insurance company managed funds and pension funds; and
- an analysis of the impact of taxation on the returns generated by taxed products against the returns by tax-advantaged products.

1.2 Scope of this report

The FSA now requires that these rates of return assumptions be reviewed once again to determine if they remain reasonable and valid. The remit for the required work is narrower in scope than our 2003 report and is outlined in the Terms of Reference ("ToR") document entitled "Review of FSA projection rates"⁴.

Specifically, this assignment requires the following questions to be addressed:

- 1 Is there a reason to change the intermediate rates of return assumptions? If so, a recommendation for any necessary change(s) is required.
- 2 Is there a reason to change the inflation assumptions (price and earnings)?
- 3 Is the definition of and differentiation between taxed and tax-advantaged products still valid?

¹ FSA Handbook COB6.6 at current time – changes with effect from 1 November 2007 to reflect MiFiD

² A further rule provides that reduced rates of return must be used if the firm expects these rates to overstate the investment potential of the investment.

³ http://www.fsa.gov.uk/pubs/other/projection_rates.pdf

⁴ See Appendix I – Terms Of Reference ("TOR")

The FSA also requires an assessment of the suitability of the use of the specified projection rates for managed funds and open with-profit funds, in the context of their typical asset mix.

The scope of this review is therefore different from that of our previous report. Our 2003 report contained a significant amount of analysis surrounding the historic returns on different asset classes and a statistical analysis of the distribution of returns over a range of investment periods. In contrast, this review will primarily involve determining whether changes in the financial markets, academic literature or institutional and regulatory framework suggest that the estimates in Table 1 below remain reasonable.

Table 1: Summary of key recommended assumptions from the 2003 report

Recommended Assumption	2003 rate (p.a.)
Inflation (RPI)	2½%
Earnings growth	4%
Real government bonds return	2%
Real equities return	5% to 6%
Equity Market Risk Premium (EMRP)	3% to 4%
Nominal government bond return	4½%
Nominal equities return	7½% to 8½%

The FSA recognises in the scope of the required work that projection rates entail inevitable approximations.

1.3 Key findings

Price inflation: We begin with a review of earnings and price inflation. The assumption of expected future RPI inflation of 2½% made in our previous report now seems slightly on the low side given the change in inflation target, the latest government bond market data and independent economic forecasts. Our conclusion from our analysis of economic and market factors is that an assumption of around 2¾% for future RPI inflation over the next 10 years or so now seems more appropriate, assuming that the current inflation targeting regime continues and remains successful and credible, as it appears to have been since its introduction in late 1992. Allowing for the uncertainties surrounding any such projections, however, a plausible range for this assumption would be around 2½%-3%.

Earnings inflation: Since the successful introduction of inflation targeting in 1992, earnings growth, both including and excluding bonuses, has fluctuated around the 4% level. Earnings growth excluding bonuses has demonstrated slightly less volatility than earnings growth including bonuses, which reveals the highly cyclical nature of bonus payments, particularly in the City. We recommend maintaining a 1½% real earnings growth assumption (relative to RPI), which leads to a 4¼% overall nominal earnings growth assumption. Future real earnings growth is uncertain, however, with a plausible range of around 1-2%. Combined with the inflation range indicated above, a plausible range for future nominal average earnings growth would be around 3½%-5%.

Asset mix: There has been no material change to asset mixes over the past 4 years, with a gradual drift out of UK equities into global equities and out of nominal government bonds into index-linked government bonds. The main asset class for pension fund investment remains equities, which still comprise on average around two-thirds of the investment. Insurance products such as with-profits funds now commonly invest anywhere between 50% and 100% in bonds. Unit-linked investments vary enormously in their features and no generalisations can usefully be made.

Investment returns: In our 2003 report expected annual returns differed little depending on whether short or long periods were being considered. What does vary significantly is the range of uncertainty, which is many times larger for a short 1-year investment than for a 15 or 25 year time

horizon. Where relevant, we have considered a 10-15 year period as representing the average period of investment being projected.

Our analysis of expected returns considers both actual historical returns and expected forward looking returns, for each of the relevant asset classes. We also review the most recent academic literature on the approaches that can be used in estimating expected future returns on various asset classes. Our analysis suggests that real returns on index-linked government bonds have reduced from 2% in 2003 to 1¾% currently and this represents an appropriate forward looking assumption. An alternative approach based on conventional bond yields less RPI inflation, results in a real return of 2%, suggesting a reasonable range of 1¾-2%. It is important to note that expected nominal risk-free returns have at times been below the lower projection rate, which means projections should make clear that the lowest rate is not a minimum return.

Our recommended assumption for the overall EMRP range remains at 3% to 4%, consistent with our 2003 report. When added to a risk free rate of 1¾% to 2%, plus 2¾% inflation, this leads to a nominal equity return of 7½% to 8¾%.

Tax effects: Our analysis suggests that the reductions in respect of tax from the illustration rates of 5%, 7% and 9% in current use might vary from 0.4% for the lower illustration through 0.8% for the central assumption to 1.2% for the higher illustration. However, it should be noted that asset allocation, rate of churn, rate of return and proportion of return derived from income all have an effect on the tax payable.

1.4 Conclusions and recommendations

Our analysis of the returns in the relevant asset classes leads us to recommend the following assumptions as reasonable central estimates for making projections of retail financial products.

Table 2: Summary of 2003 and 2007 key recommended assumptions

Recommended Assumption	2003 rate (p.a.)	2007 rate (p.a.)	Change
Inflation (RPI)	2½%	2¾%	+¼%
Earnings growth	4%	4¼%	+¼%
Real government bonds return	2%	1¾% to 2%	-¼%/same
Real equities return	5% to 6%	4¾% to 6%	-¼%/same
EMRP	3% to 4%	3% to 4%	Still within same range
Nominal government bond return	4½%	4½% to 4¾%	Same/+¼%
Nominal equities return	7½% to 8½%	7½% to 8¾%	Same/+¼%

Maintaining our conservative approach taken in our 2003 report, these revised assumptions, combined with the current mix of asset classes in typical retail investment suggest that the intermediate rate of return assumption from our 2003 report should remain unchanged at 6½% per annum.

2 Introduction

2.1 Background and summary of 2003 report

As part of the FSA Conduct of Business (COB) rules, the FSA defines prescribed rates of return that financial services companies must use in their calculations when providing retail consumers with projections of future benefits. These rates of return were reviewed in 2003 when we conducted our study "Rates of return for FSA prescribed projections" on behalf of the FSA.

The 2003 report we prepared for the FSA covered a wide scope, and included the provision of:

- a central estimate and distribution for the annualised real and nominal returns for UK equities, international equities, UK commercial property and government / corporate bonds together with the assumptions made in deriving the estimates, along with an explanation of the methodology used;
- an opinion on the main drivers of returns from various asset classes (such as equities, commercial property and bonds);
- an opinion on the appropriate inflation assumptions to use in the projections;
- an opinion on the future returns on insurance company managed funds and pension funds; and
- an analysis of the impact of taxation on the returns generated by taxed products against the returns from tax-advantaged products.

Table 3 below provides a summary of the key assumptions that were set out in our 2003 report. These were based on our analysis of achieved returns and inflation over long periods in the past, expectations of investors for the future and fundamental economic analysis of the returns likely to be demanded in the future.

Table 3: Summary of key recommended assumptions from the 2003 report

Assumption	Rate (p.a.)
Inflation (RPI)	2½%
Real earnings growth	1½%
Nominal earnings growth	4%
Real government bonds return	2%
Real equities return	5% to 6%
EMRP	3% to 4%
Nominal government bond return	4½%
Nominal equities return	7½% to 8½%

These assumptions were then used to assess both an intermediate rate of return, and a distribution for likely investment returns. In assessing the intermediate rate of return, we recommended the bottom of the EMRP range (3.0%) be used to reflect the inherent riskiness of equity investment and used a mix of 67% equity investment and 33% bond investment. At the 50% percentile, our recommendation for the intermediate long-term rate of return was 6½% in nominal terms. We also concluded that there should be an adjustment of 0.8% for life funds and 0.4% for unit trusts where the product faced a higher tax liability.

The conclusion of the FSA was not to make the modest change we recommended from the central rate of 7% then in use or to alter the reduction of 1% for taxed funds, resulting in the continuation of the central rate of 6% for taxed business.

2.2 Scope of this review

The remit for the required work is outlined in the Terms of Reference (“ToR”) document entitled “Review of FSA projection rates”⁵.

The FSA requires that the currently specified rates of return be reviewed to determine if they remain reasonable and valid. Specifically, this assignment requires the following questions to be addressed:

- 1 Is there a reason to change the set of return assumptions? If so, a recommendation for any necessary change(s) is required.
- 2 Is there a reason to change the inflation assumptions (price and earnings)?
- 3 Is the allowance for tax on taxed products still suitable?

The scope of this review is therefore different from that of our previous report. Our 2003 report contained a significant amount of analysis surrounding the historic returns on different asset classes and a statistical analysis of the distribution of returns. In contrast, this review will primarily involve determining whether changes in the financial markets, academic literature or institutional and regulatory framework suggest that the key assumptions used to determine the intermediate rate of return should be altered. We therefore review the following components of the intermediate rate of return calculation:

- Inflation
 - Price inflation
 - Earnings inflation
- Bond returns
 - corporate bonds
 - government bonds
- Equity market risk premium (“EMRP”)
- Property returns
- Asset mix of retail investment products

The scope has also changed as a result of the Market in Financial Instruments Directive (“MiFID”) and the consequent changes to the Conduct of Business (“COB”) rules. From 1 November 2007, units in collective schemes such as unit trusts, which are currently subject to COB projection rules, will no longer have to follow the rates specified in the COB rules. The scope of projection rates is therefore slightly more limited than it was in 2003.

2.3 Time horizon

In our 2003 report, we analysed expected investment returns and supplied central estimates and illustrations of spreads of uncertainty associated with investment returns over a range of periods up to 25 years. The width of the spread of returns used in the FSA projection bases appears to have reflected the uncertainties associated with long periods of investment.

⁵See Appendix I – Terms Of Reference (“TOR”)

For this report, we have assumed for our recommendations an investment horizon of 10 to 15 years, to reflect the typical duration of investment illustrations provided to investors, which range from long term initial projections at the point of sale to repeatedly shorter term re-projections in annual statements during the life of the investment.

2.4 Structure of the report

The remainder of this report is organised as follows:

- **In Section 3** we discuss the macroeconomic assumptions for future UK price and earnings inflation over a 10 to 15 year time horizon. We also comment on key changes since our previous report in June 2003, most importantly the shift to a new inflation target at the end of 2003.
- **In Section 4** we investigate the way in which portfolio distributions have changed over time, allowing us to form a judgement as to a reasonable mix of risk-free and risky assets. This is for the purpose of setting assumptions which can be used to inform retail consumers as to the range of potential returns available on investment products.
- **In Section 5** we analyse historic and forward looking estimates of returns on various asset classes, namely: government bonds; equities; corporate bonds and property, although the focus of our analysis is on bond and equity returns. We also review how expected return assumptions today compare to the expected returns assumptions provided in our previous report.
- **In Section 6** we assess for each asset class the likely effect of UK taxation of income and capital gains on investment returns. The calculations set out here are best estimates based on current UK tax law and practice.
- **In Section 7** we conclude with a brief summary of our analysis and make recommendations as to whether we consider that any of the 2003 rates of return assumptions and inflation assumptions ought to be changed, and also whether the differentiation between taxed and tax-advantaged products is still valid.

3 Macroeconomic assumptions

In this section we present our assessment of plausible assumptions for future UK price and earnings inflation over a 10 to 15 year time horizon. We also comment on key changes since our previous report in June 2003, most importantly the shift to a new inflation target at the end of 2003.

3.1 Price inflation

3.1.1 Introduction

At the time of writing our previous report in early 2003, the government's official inflation target was 2½%, as measured by the Retail Price Index excluding mortgage payments (RPIX). Based upon the Bank of England's success in containing inflation up to that time and analysis of financial market data, we concluded that 2½% was a reasonable assumption for the future rate of RPI inflation in the UK (RPI and RPIX having both averaged 2½% over the period between inflation targeting first being introduced and Q1 2003, which was the latest period of which data was available at the time of our previous report). We qualified this assumption with the statement that the government had then only recently announced its intention to adopt a new inflation target based upon an alternative measure of inflation (paragraph 110 of our 2003 report).

In December 2003, this new target was indeed adopted, with the Chancellor instructing the Bank of England to move to a 2% inflation target based upon the Consumer Price Index (CPI). This change presents a number of issues that must be considered in our evaluation of whether the assumption of RPI inflation of 2½% still remains reasonable:

- 1 What is the RPI-equivalent level of inflation implied by the 2% target rate based on CPI?
- 2 Has the change in target altered future expectations of the management of monetary policy and long-term inflation expectations such that the 2½% RPI inflation assumption in our previous report should be changed?
- 3 Have other circumstances unrelated to the change in target altered long-term inflation expectations?

Before proceeding, it is worth noting that our analysis of inflation in this report will be based on the RPI index, the same index used in our 2003 report. A change might be made to use the CPI instead as the reference inflation index but the RPI remains in substantial use for the statutory rules around increases made to pensions in payment and index-linked stock coupons. Given retention of the current rules, it would, we believe, be confusing to use a different index in illustrating benefits from financial products from the rate used for establishing pension payments.

Furthermore, when analysing trends in inflation over time, it is important to maintain consistency in the price index used to measure inflation, as this is the only way in which movements in underlying inflationary expectations can be determined. The same is true with regard to estimating real earnings growth historically as a possible basis for forward projections. RPI is a much longer established index than CPI and long-run data on its level can be analysed. Although this may be gradually changing, it also seems likely that RPI is still a more generally recognised inflation measure than CPI amongst the general public and is arguably a better indicator of cost of living changes given that it includes housing costs, a key element in household spending, whereas as CPI does not. For all these reasons, we therefore continue to use RPI as our inflation measure in this report, while also recognising that the switch to a CPI inflation target of 2% may imply a different central assumption for RPI inflation for the reasons discussed below.

Table 4 below presents historical averages for the most common measures of price inflation. This shows that RPI inflation has been 3% over the past 5 years but has averaged around 2.7% over longer time periods. It should be noted that we made our previous assumption of 2½% RPI inflation based upon the government's 2½% target level, which was at that point based upon the RPIX index. The two indices are identical except that the RPIX excludes mortgage interest payments. While the inclusion of mortgage payments makes the RPI more volatile, it is reasonable to assume that over the long run the two indices will, on average, over the interest rate cycle, be very similar. This is supported by the similarity of the RPI and RPIX averages in the table over periods of ten years or longer. In particular, the average difference between the two indices in the whole period since the introduction of inflation targeting in Q4 1992 has been just 0.1 percentage points.

Table 4: Historical average price inflation

	CPI	RPI	RPIX
5-year trailing average	1.8	3.0	2.6
10-year trailing average	1.6	2.7	2.5
Average since inflation targeting adopted (Q4 1992)	1.8	2.7	2.6
Average since BoE independence (Q2 1997)	1.6	2.7	2.5
Average since 2% CPI target adopted (Q1 2004)	2.0	3.2	2.6

Source: National Statistics. Arithmetic averages based on quarterly data to Q2 2007

3.1.2 Implications of the shift to a CPI-based inflation target

The RPIX had been the government's official target measure of inflation since inflation targeting was first adopted in October 1992, following the UK's exit from the ERM. However, in December 2003, the government decided that the RPIX was no longer entirely fit for purpose as a measure for inflation targeting.⁶ Several factors prompted the adoption of the CPI as a new inflation measure:

- The construction of the CPI more accurately captures the substitution of cheaper for more expensive goods than with the RPI (through using geometric rather than arithmetic averages to aggregate data at the lowest level of product differentiation).
- Wider population coverage and greater consistency with national accounting principles makes the CPI a more representative measure of consumer spending patterns.
- The CPI is more in line with international practice, making it more comparable to measures of inflation in other countries, particularly within the EU.

Figure 1 presents CPI and RPIX inflation since the adoption of inflation targeting in the UK. The two measures of inflation, although strongly correlated, do deviate from one another, often by significant amounts. There are several reasons for these differences:

- **Formula effect:** In the CPI price changes are aggregated using geometric means, while the RPIX uses arithmetic means⁷. As the geometric mean of a set of positive numbers is always less than or equal to the arithmetic mean, the CPI will tend to be lower than the RPIX.

⁶ The decision to switch from the RPIX to the CPI remains contentious, primarily because the CPI does not include housing-related expenses. Indeed, the Governor of the Bank of England, Mervyn King, continues to express his desire for the CPI to include housing costs (See "Target difficulty", BBC News, 21 July 2007, http://news.bbc.co.uk/1/hi/programmes/inside_money/6906592.stm).

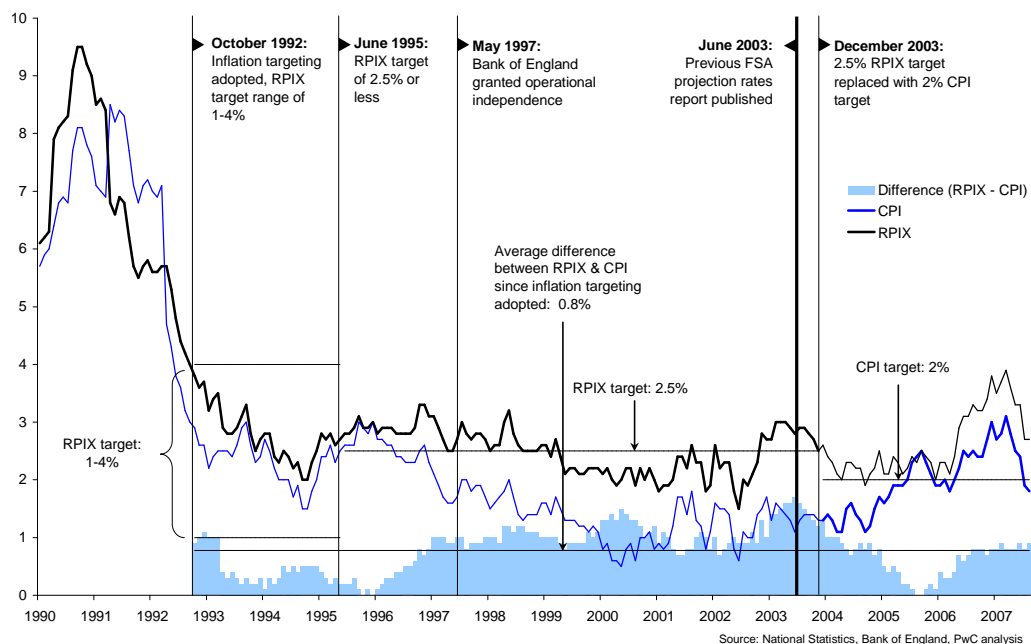
⁷ An example of the difference and impact of arithmetic and geometric means can be found on p25 of "The New Inflation Target: the Statistical Perspective", National Statistics, December 2003. This is available online at <http://www.statistics.gov.uk/statbase/product.asp?vlnk=10913>.

- **Housing effect:** The CPI excludes a series of items related to housing expenses that the RPIX includes. These include housing depreciation, council tax and buildings insurance. With housing depreciation and council taxes historically rising faster than the overall RPIX, their exclusion in the CPI also tends to exert downwards pressure on the index.
- **Population base and price measurement effects:** The CPI is based upon the expenditure patterns of all UK private households, while the RPIX excludes certain households, such as high income households and foreign visitors. Price measurement methodologies also vary between the indices, with each taking different approaches to adjusting prices for changes in the quality of underlying goods.

Analysis of historical detailed CPI and RPIX data reveals that the formula and housing effects are responsible for explaining the majority of difference between the two indices, with the other factors having only a negligible average impact.⁸ Furthermore, the formula effect has a reasonably constant impact on the difference, while the housing effect is much more volatile, varying with changes in underlying housing expense items.

The Treasury and Bank of England have made similar estimates of the long-run CPI-RPIX differential. In the Treasury's 2003 remit to the Bank of England outlining the movement to the new inflation target, the formula and housing effects were each estimated to both contribute around half a percentage point to the differential.⁹ However, owing to high price inflation at the time, the total differential was expected to be only half a percentage point within two years, rising slightly higher after that. The current viewpoint appears to be broadly in line with this, with recent estimates of the differential given at around $\frac{3}{4}\%$.¹⁰

Figure 1: CPI & RPIX Inflation (%)



⁸ For further details see "The New Inflation Target: the Statistical Perspective", National Statistics, December 2003. Available online at <http://www.statistics.gov.uk/statbase/product.asp?vlnk=10913>.

⁹ "Remit for the Monetary Policy Committee of the Bank of England and the New Inflation Target", HM Treasury, 10 December 2003. This is available online at www.hm-treasury.gov.uk/media/B/6/lettertogovofbofepbr03.pdf.

¹⁰ See "Public Expenditure System: Guidance on Managing the Change in Discount Rates for Pension Liabilities", HM Treasury, 1 February 2007, p. 3. Available online at www.hm-treasury.gov.uk/media/B/4/pes_2007_02.pdf.

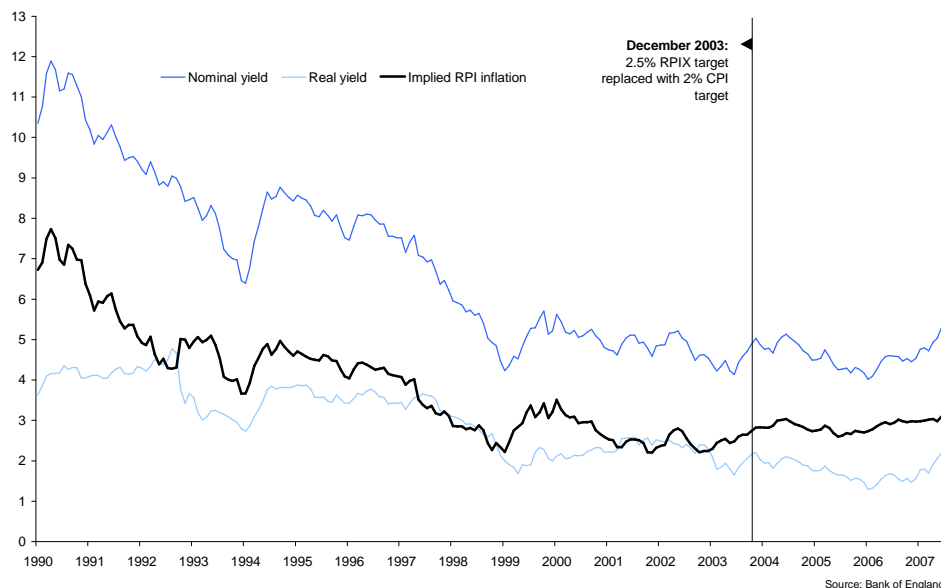
Immediately prior to the change in inflation target, the Bank of England estimated that the long-run differentials attributable to the formula effect and housing effect were 0.5 and 0.3 percentage points, respectively, giving an overall differential of 0.8 percentage points.¹¹ Recent comments indicate that this view continues to be maintained.¹² Actual data for the period since an inflation targeting regime was introduced in the UK supports these estimates: the average monthly difference in annual CPI and RPIX inflation since October 1992 has been 0.8 percentage points (see Figure 1).

With an estimated long-run differential of around 0.8 percentage points, the new CPI inflation target of 2% implies an RPI or RPIX-equivalent target of around 2.8%, slightly higher than the previous 2½% target. Thus, the shift to the CPI target could be interpreted as allowing a slightly higher level of inflation measured on an RPI/RPIX basis. This is also the Treasury view, as indicated by the fact that ever since the change in target the Treasury's medium-term inflation projections in Budgets and Pre-Budget reports have been 2% for CPI and 2¾% for RPI (rounded to nearest quarter of a percentage point – see Table 5 below for the latest such projections from the October 2007 Pre-Budget Report). Prior to the new target being introduced, Treasury projections assumed 2½% RPI inflation in the medium term. But have expectations of RPI inflation really shifted since the change in inflation target? In the following section we examine financial market data to determine if the difference in nominal and index-linked government bond yields suggests any shift in inflation expectations.

3.1.3 Inflation expectations

One way of determining expectations of future inflation is by examining the difference in yields between nominal and index-linked government bonds. The yields on index-linked government bonds are adjusted for inflation using the RPI such that they provide a constant real yield. By applying the Fisher relationship, the implied level of average future inflation can be determined by subtracting the index-linked “real” yield from the nominal yield of bonds of the same duration.¹³

Figure 2: Estimated index-linked government bond yields (10-year, zero-coupon) and implied inflation¹⁴ (%)



¹¹ “Two current monetary policy issues”, Stephen Nickell, Bank of England Quarterly Bulletin, Winter 2003, p 504-516., Available online at <http://www.bankofengland.co.uk/publications/quarterlybulletin/n03qbcon.htm>.

¹² See “Inflation Report Press Conference”, Bank of England, 16 May 2007, p.14. Available online at www.bankofengland.co.uk/publications/inflationreport/conf160507.pdf.

¹³ See “Notes on the Bank Of England UK Yield Curves”, Bank of England, 2002, for more details. Available online at <http://www.bankofengland.co.uk/statistics/yieldcurve/notes%20on%20the%20bofe%20uk%20yield%20curvesV2.pdf>.

¹⁴ See <http://213.225.136.206/mfsd/iadb/notesiadb/Yields.htm> for discussion on how yields estimated.

Figure 2 presents historical yields and implied future RPI inflation for 10-year zero-coupon government bonds, as calculated by the Bank of England. As can be seen, expectations of inflation fell steadily through the early and mid-1990s as the government's commitment to price stability gained credibility. By 1999, two years after interest rate decisions were handed over to the Bank of England's Monetary Policy Committee (MPC), implied inflation expectations had largely stabilised around the 3% level and have fluctuated at, or slightly below, this level since. There does not appear to have been any significant shift in inflation expectations at the time of the change in inflation target, although implied inflation was trending upwards marginally in the period leading up to the change. Although the Treasury announced its intention to shift to a new inflation target and measure in June 2003, the specific target of 2% was not announced until December. However, some analysts were already speculating on a 2% CPI target in the latter half of 2003 and point out this would imply slightly higher RPI/RPIX inflation for the reasons discussed above.

Assuming a long-term RPI-CPI premium of 0.8 percentage points, implied expected RPI inflation of 3% equates to around 2.2% CPI inflation, slightly above the target level. This difference may not, however, imply that the markets necessarily believe that the target will be exceeded, for two reasons:

- First, investors may require a small inflation risk premium when buying nominal as opposed to index-linked government bonds. The simple difference between nominal and index-linked government bond yields may therefore slightly overstate actual market expectations of inflation (although this effect should be small for an economy like the UK, which has had relatively low and stable inflation since the mid-1990s and where this is generally expected to continue).
- Second, relative lack of supply of index-linked government bonds (compared, for example, to high demand from pension funds) may tend to push up their price and so reduce their yield relative to conventional government bonds, which will again tend to mean that the nominal-indexed government bond differential could slightly overstate actual market expectations of future RPI inflation.

Another source of information on future inflation is to look at the average inflation projections of independent economic forecasters, as surveyed regularly by the Treasury. This survey covers forecasts from both City institutions, such as investment banks, and non-City institutions, which include economic consultancies, think-tanks and other organisations such as the IMF. Average forecasts from this survey present a reasonable approximation of average expectations of medium-term inflation. Table 5 presents the averages of independent forecasters and HM Treasury from the latest such medium-term survey in August 2007. These estimates seem to confirm medium-term expectations of CPI inflation of around 2% and RPI/RPIX inflation of around 2¾%. While forecasts are not generally available beyond 5 years, there is no particular reason to believe that inflation projections would be materially different looking 10-15 years ahead, given the plausible assumption that the current inflation target regime continues to operate effectively.

Table 5: Independent and HM Treasury inflation projections

	2007	2008	2009	2010	2011
Average of independent forecasters					
CPI	2.4	2.0	2.0	2.0	2.1
RPIX	3.2	2.7	2.6	2.6	2.8
Range of independent forecasts					
CPI	1.9-2.6	1.4-3.0	1.4-3.0	1.3-3.1	1.6-3.4
RPIX	2.4-4.2	2.2-3.7	1.9-3.9	1.9-4.1	2.2-4.1
<i>Memo: Number of forecasters in each year</i>	20	20	19	19	16
HM Treasury assumptions					
CPI	2 1/4	2	2	2	2
RPI	4	2 3/4	2 3/4	2 3/4	2 ¾
GDP deflator	3 1/4	2 3/4	2 3/4	2 3/4	2 ¾

Source: HM Treasury survey of independent medium-term forecasts (August 2007). HM Treasury assumptions are from the October 2007 Pre-Budget Report and are based on fiscal rather than calendar years.

In summary, the assumption of expected future RPI inflation of 2½% made in our previous report now seems slightly on the low side given the change in inflation target and latest government bond market data and independent economic forecasts. Assuming the 2011 figure is a reasonably representative estimate for further forecast periods, an assumption of around 2¾% for future RPI inflation over the next 10 to 15 years or so now seems more appropriate. This also assumes that the current inflation targeting regime continues and remains successful and credible, as it appears to have been since its introduction in late 1992 (and particularly since 1997 when interest rate decisions were passed to an independent MPC).

It is worth touching briefly upon some of the risks to this assumption of a continued benign inflationary environment. The low levels of inflation the UK has experienced since 1993 are attributable to several factors, inter alia:

- low or negative import price inflation for many manufactured goods due in particular to the emergence of China as a world manufacturing power;
- constrained wage inflation due in part to high levels of immigration to the UK in recent years, particularly from Eastern Europe since EU enlargement in 2004, and perhaps also the threat of off-shoring jobs to emerging markets if UK workers try to press for higher wages;
- the adoption of an explicit inflation target in the UK in October 1992 and the handing over of responsibility for achieving this to an independent Bank of England MPC from mid-1997; and
- the fact that other major economies have also adopted monetary regimes based on independent central banks setting interest rates to achieve either explicit (in the case of the ECB in the euro area) or implicit (in the case of the Fed in the US) inflation targets at similarly low levels to the UK.

The first of these factors already seems to have passed its peak, with China and other emerging markets like India potentially becoming more of a source of inflationary pressure due to the upward pressure their rapid demand growth is putting on prices of commodities such as oil, metals and basic foodstuffs. The second still seems likely to be a factor over the next 5 years or so, although it could begin to fade in the longer term as immigration potentially hits political limits and as labour costs rise in emerging markets. The third and fourth are still firmly in place.

Even if the first two factors fade, however, this does not mean that expected CPI inflation should rise above 2% (or RPI/RPIX above around 2¾%) provided that the MPC continues to set interest rates to achieve its target and this remains credible. It just implies that (real and nominal) interest rates might need to be somewhat higher than recent norms to achieve this target in the face of less favourable global conditions. Similarly, if other major economies were to adopt somewhat higher explicit or implicit inflation targets, this would make the MPC's job more challenging but not impossible – and there is no sign of such regime changes in the euro area or the US at present.

What clearly could change this picture is if the current UK inflation targeting regime came under political pressure. Since the last recession of the early 1990s largely predates the adoption of inflation targeting, the strength of the political commitment to price stability has yet to be truly tested by an environment of rising prices and contracting output. It is conceivable that in such an environment the prospect of raising interest rates would be so politically unpalatable to the incumbent government that the inflation target could be increased or, in a more extreme scenario, that the Bank's operational independence could even be rescinded. While we believe that the institutional arrangements and political commitment to price stability continue to be robust in the UK at present, it should be stressed that our price inflation (and earnings) assumptions are conditional on this regime continuing – if it changes, then the assumptions would need to be reassessed.

In the light of these uncertainties, we would see a plausible range for future RPI inflation being around 2.5-3%¹⁵. The lower end of this range is in line with the previous target, whereas the upper end reflects inflation expectations derived from gilts market yields as described above. But in the analysis below we focus on the central assumption of 2¾.

3.2 Earnings inflation

Following analysis of historical earnings data, we concluded in our 2003 report that a reasonable assumption for nominal average earnings growth was 4%, corresponding to 1½% real earnings growth as compared to our 2½% RPI inflation assumption at the time. This was in line with average real earnings growth in the previous ten years, although we did note in the report that real earnings growth had been somewhat higher (generally within a 1.5-2½% range) in earlier decades. In determining whether these assumptions remain valid, we have analysed more recent earnings growth figures.

Figure 3: Average earnings growth (%)

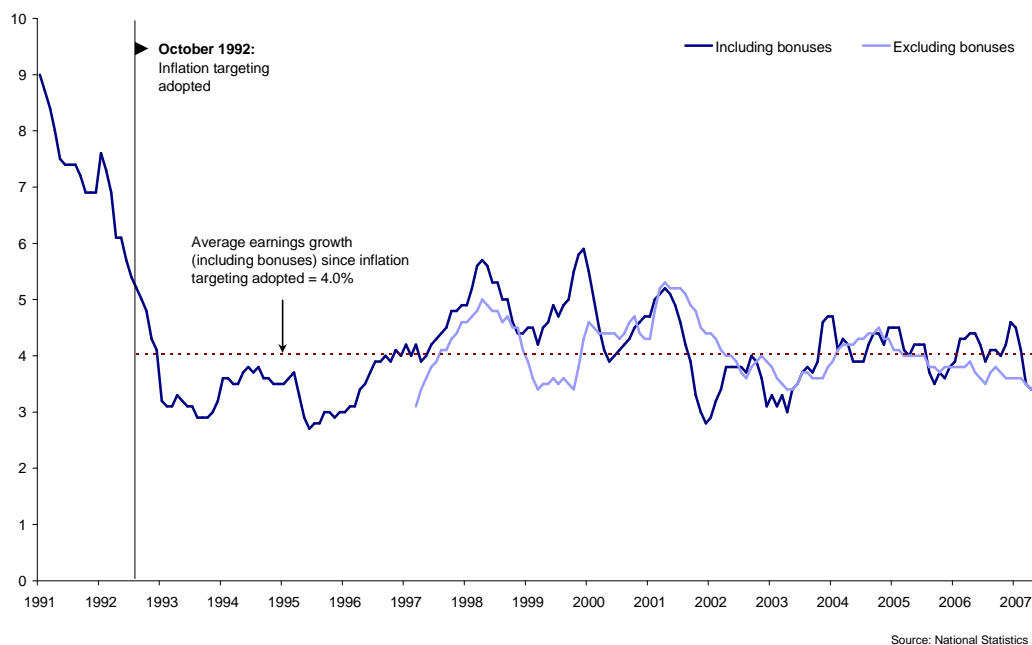


Figure 3 above illustrates the evolution of average earnings growth (as measured by the ONS), both including and excluding bonuses, since the introduction of inflation targeting in 1992. Earnings growth prior to this point is not strictly comparable to current economic conditions, as the successful introduction of inflation targeting led to a step decrease in inflationary expectations and a rapid deceleration in nominal wage growth after 1992. Since that time, earnings growth, both including and excluding bonuses, has fluctuated around the 4% level. Earnings growth excluding bonuses has demonstrated slightly less volatility than earnings growth including bonuses, which reveals the highly cyclical nature of bonus payments, particularly in the City.

By subtracting inflation from nominal wage growth, real wage growth can be estimated. Table 6 presents the average nominal and real wage growth (based upon the premium of average earnings growth (including bonuses) over the different measures of inflation). We concentrate here on earnings growth including bonuses because individuals should base their consumption and savings

¹⁵ In practice, of course, the outturn could well fall outside this range, but what we are indicating here is that 2.5-3% appears to be the plausible range for an ex-ante RPI inflation assumption given the information currently available.

decisions (including pension savings) upon total remuneration, rather than simply base pay.¹⁶ Based on the RPI/RPIX and GDP deflator measures of inflation, the estimate of 1½% real earnings growth presented in our previous report remains broadly reasonable for the past 10-15 years, although it has been more subdued recently, perhaps reflecting the impact of increased immigration and offshoring as noted above¹⁷. But a longer term average seems more appropriate to use here, given that it is better able to smooth variations over the economic cycle. The Treasury estimates the latest such cycle to have run from early 1997 to early 2007, which gives 1½% real earnings growth relative to RPI as the second row in the table below shows. Given our 2¾% recommended RPI inflation assumption as discussed above, this implies assumed nominal average earnings growth of 4¼%.

There are, however, clearly uncertainties around future real earnings growth. If the dampening effects on this of immigration and outsourcing remain as powerful as over the past five years, then real earnings growth might be rather lower than 1½% over the next 10-15 years. On the other hand, if these effects abate, then real earnings growth could be somewhat higher. To reflect these uncertainties, a plausible range for assumed real earnings growth relative to RPI might be around 1-2% (the bottom end of this range is close to actual average levels over the past 5 years, while the top end is broadly in line with estimates of trend UK labour productivity growth per employee). Combined with the inflation range indicated above, a plausible range for future nominal average earnings growth might be around 3.5-5%¹⁸.

It should be noted here that even the higher end of this range would only be in line with estimates of trend nominal GDP growth over the next 10-15 years, which would generally be around 5% per annum (i.e. 2¾% inflation plus 2.25% real growth). Some further decline in the labour share of income, in line with the trends indicated for developed economies generally by the international research by the IMF (2007), is therefore implied by our central assumption of nominal average earnings growth of 4¼%.

¹⁶ Earnings growth including bonuses seems more appropriate for the real earnings growth rate outlined in FSA Conduct of Business rule 6.6.48A, which is "*not less than* 1.5% in excess of the rate of increase in the Retail Prices Index," of 2.5% (emphasis added).

¹⁷ Analysis by the IMF (2007) confirms the significance of these factors in holding down average real earnings growth below the trend rate of labour productivity growth in developed economies over the past two decades. The implication has been a tendency for the labour share of national income to decline gradually over time, albeit with some cyclical variations.

¹⁸ This is somewhat over-simplified since low inflation would not necessarily be associated with low real earnings growth, and vice versa. The actual plausible range may therefore be somewhat narrower than 3.5-5%. However, since we are only presenting this range as a general indication of the uncertainties involved in projecting nominal average earnings growth, it seems reasonable to refer to this relatively broad range for illustrative purposes.

Table 6: Average earnings growth

	Average nominal earnings (incl. bonuses)	Average nominal earnings (excl. bonuses)	Implied average real earnings growth (incl. bonuses) based on:			
			CPI	RPI	RPIX	GDP deflator
5-year trailing average	4.0	3.8	2.1	0.9	1.3	1.2
10-year trailing average	4.3	4.1	2.7	1.5	1.8	1.7
Average since inflation targeting adopted (Q4 1992)	4.0	*	2.2	1.4	1.4	1.5
Average since BoE independence (Q2 1997)	4.3	4.1	2.7	1.5	1.8	1.7
Average since 2% CPI target adopted (Q1 2004)	4.1	3.9	2.1	0.9	1.5	1.5

Source: National Statistics and PwC analysis. Arithmetic averages based on quarterly data to Q2 2007. * Data only available from Q2 1997

In interpreting these figures it is important to bear in mind that we are referring here to average earnings growth across the working population as a whole. For individual workers, earnings growth over their lifetime would generally be expected to be higher than this due to career and salary progression, at least up to a certain age, but clearly this would vary widely across individuals¹⁹. The recent trend towards increased earnings differentials between skilled and unskilled workers (reflecting the impact of technological advances and the increased globalisation of labor as discussed, for example, in the 2007 IMF study referred to above) also seems likely to continue, but it is beyond the scope of this report to consider how earnings growth assumptions might vary across skill groups or occupations.

3.3 Conclusion: RPI inflation and average earnings growth

Our analysis above leads us to recommend the following assumptions as reasonable central estimates looking 10-15 years ahead (rounded to the nearest quarter of a percentage point to avoid spurious precision):

- average RPI inflation of around 2¾%, with the increase since our 2003 report being driven primarily by the effect of the change in inflation target, supported by latest government bonds market data and independent economic forecasts; and
- real average earnings growth of around 1½% relative to RPI, the same as in our 2003 report, implying nominal average earnings growth of around 4¼%.

There are inevitably uncertainties around any such long-term projections, however, and plausible ranges around these central assumptions might be around 2½-3% for RPI inflation and around 1-2% for real earnings growth. Combining these ranges would give a plausible range for nominal average earnings growth of around 3½-5%.

¹⁹ The impact of part-time workers working for longer past the traditional retirement age is likely to have a reducing effect on average earnings growth, but this would be minimal at an aggregate level.

4 Asset mix

4.1 Overview

Projections are made not only on single asset class products, but also on balanced funds and with-profit policies. It is, therefore, important to consider the asset allocation underlying these investment vehicles and, more importantly, the change in these allocations over time.

In theory the illustrations associated with different products should be tailored in a bespoke manner to the investment classes underlying the product. Indeed, in cases where the projection bases laid down by the FSA overestimate the returns available on particular products, firms are expected to consider the use of lower, more appropriate returns.

We understand that the projections given to customers are intended to be a rough guide to the kind of returns that might be achievable and not too over-optimistic in their illustration. As standard projections, they need to reflect typical asset mixes and in particular the general mix of risky assets (equities, property, etc) compared to low risk assets (especially bonds), whilst recognising that this may vary considerably from regulated firm to firm.

Given the wide variety of products on offer to customers, it is our opinion that greater and more detailed analysis of the individual mix of assets underlying a product would provide little marginal benefit in deriving a generic broad guide to likely future returns.

Existing illustration bases distinguish between types of product as opposed to underlying investment exposures and for this reason we devote our discussion in this section to the way in which portfolio distributions have changed over time. This allows us to form a judgement as to a reasonable mix of risk-free and risky assets for the purpose of setting assumptions which might be used to inform consumers as to the potential ranges of returns available on an investment product.

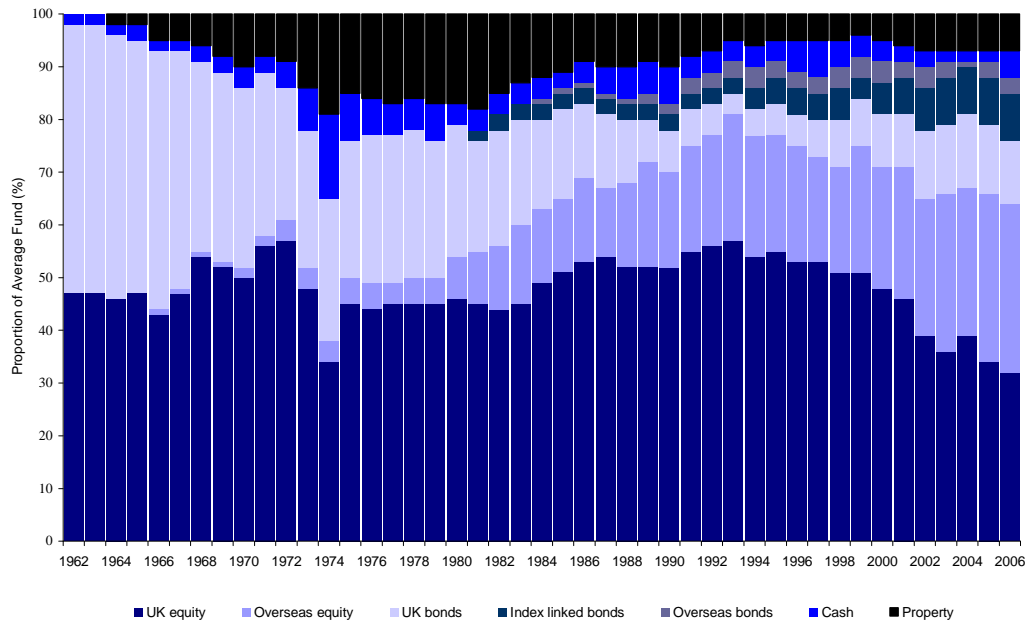
MiFID has reduced the range of products to which projection bases apply. In particular, unit trusts no longer feature in the list and we have accordingly removed them from the assessment of the impact of tax, which is accordingly a simpler issue to address.

4.2 Balanced funds

In order to gauge the change in asset allocations for pooled funds, we have used the asset allocation figures given in UBS Global Asset Management's Pension Fund Indicators 2007. This data relates to institutional investors. Equivalent data for retail investors is not so readily available, and there is a very wide range of styles for balanced retail funds. This means that there are bound to be many funds with very different asset allocations from any "median" fund. The trend in with-profits allocation is considered in the next section.

Experience recently with the increasing levels of defined contribution and personal pension provision has led providers to attempt to mirror, in the products offered to investors, the sorts of risk undertaken in the past by the trustees of sponsoring employer schemes. Thus, a high level of equity investment has generally been encouraged for those investing early in life, with options for gradual conversion to bonds as retirement approaches (so called "life styling"). The experience of institutional funds over the past few years should therefore provide a reasonable indication of the types of exposure to markets likely to be experienced by retail investors in future. However, it is important to recognise the much wider range of investment choices available through defined contribution and stakeholder pensions.

An important feature of the UBS data is its long history, going back to 1962, which gives a better indication of asset allocation trends over time. A chart of the data is shown in Figure 4 below.

Figure 4: the average asset allocation of pension schemes

Source: UBS Pension Fund Indicators 2007

There are a number of interesting features in this chart. First, equity investment has diversified considerably from being largely focussed on UK equities to a situation in which overseas stocks form a large proportion of the equity mix in funds, rising close to half of the total equity portfolio in 2006. In 2006, around 65% of the investments of the average pension scheme were equities and the tendency towards higher overseas equity holdings continues.

Although equity investment appears to have remained stable over the last few years, in fact this masks a continuing decline in equity holdings, compensated for by increases in prices during the bull market of 2003 to 2007.

The proportion of property held has decreased over the last 25 years. After first rising to almost 20% of the average portfolio in the 1980s, property now makes up approximately 5% of the average pension scheme. This proportion has remained stable over the past 5 years.

Similarly, investment in fixed interest investments remained stable over the last 5 years, although evidence of shifts towards fixed interest investments may have been hidden because of the impact of rising equity prices.

Since equities are generally expected to outperform other asset classes in the long run, high equity asset allocations (of the order of 65% to 70%) can be expected to continue for pension schemes as long-term investments. This is particularly prevalent where the liabilities are less significant in relation to the size of the sponsoring employer.

Managed funds have followed this approach, with the major retail pension funds offered by the larger life insurance companies typically having between 70% and 90% invested in equities. Those investors with lifestyle options or those advised to follow a similar course themselves tend to invest greater proportions in bonds as their retirement approaches. Rates of return intended to mimic the kind of mix of assets in which policies are invested need to reflect this choice, as well as the initial fund mix at the time of investment.

4.3 With-profits funds

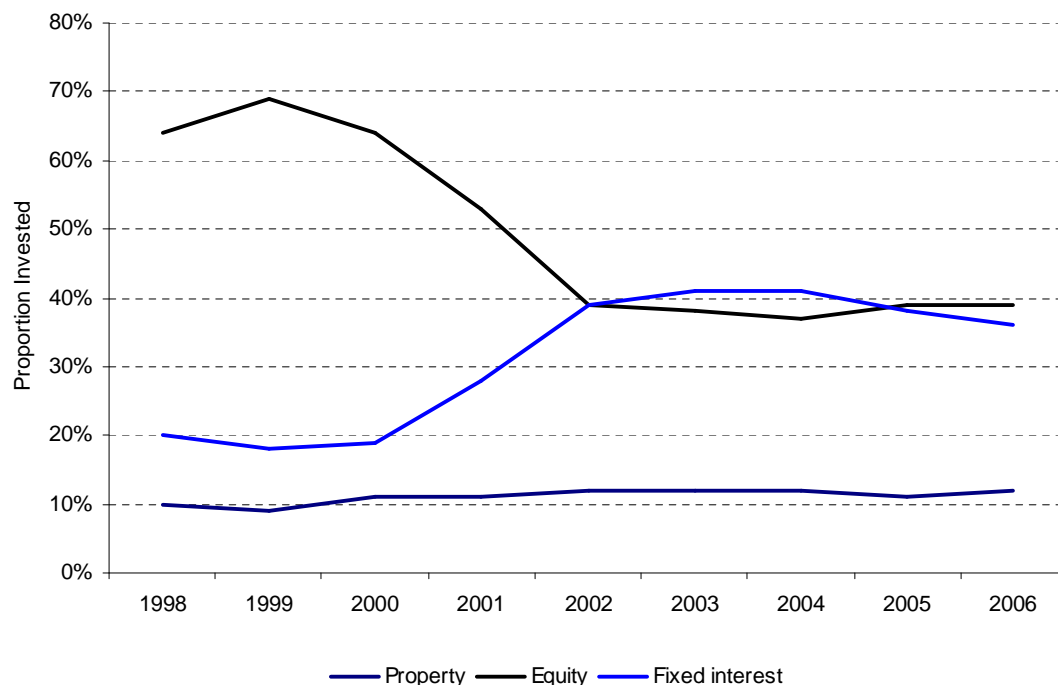
The other major source of multi-asset returns for retail investors is that of with-profits policies. There are several complicating factors here including – the fact that returns are smoothed over time; the extent to which an insurance company’s free assets are available to augment returns; the contribution to returns of profits from annuity and other non-profit business, and the cost of guarantees – but the underlying return earned by a with-profits policy is determined by the returns on the underlying assets.

Unlike those of balanced funds, the asset allocation of with-profits funds is determined by factors other than the desire to maximise returns. In particular, the expectations of policyholders were that the portfolio would be a mixture of asset classes with, in general, a majority of the investment in equity and property. However, if the level of free assets in the fund is reduced, solvency considerations require a higher proportion of fixed interest stocks.

For open with-profits funds there is a need to illustrate both new business and annual renewals. Many with-profits funds have closed to new business, some of which have rebalanced their portfolios to a more cautious strategy to avoid solvency risk. Where the asset mix makes the standard rate of return projections inappropriate, providers are encouraged to use rates appropriate to their own asset mix. We have not sought to build these funds into our analysis.

In order to show the asset allocations applicable to investors, we show in Figure 5 below the summary of the proportion of bonds, equities and property in UK life insurance companies with-profits funds over the nine years since 1998.

Figure 5: Proportion of bonds, equities and property in UK life insurance companies



Source: Financial Services Authority

This chart shows that the aggregate proportion of equities held has remained steady over the last few years after sharp reductions in the three years to 2002.

There are two conclusions that could be drawn from the data. The first is that the proportion of equities backing with-profit policies is lower than that in balanced funds. This should lead to a lower expected level of return for with-profit policies compared to balanced funds, but also lower risk levels.

A second conclusion might be that the current low equity investment backing for with-profit policies will continue as current conservative investment policies will reduce the possibility of free assets increasing quickly in the future. This has already been observed with the switch almost completely into bonds of some of the weaker offices and closed funds. All of this would further reduce the expected returns on with-profits policies of some offices. In some cases, the asset rebalancing has been such that firms have chosen to adopt lower illustration bases than the FSA projection rates and so the rates themselves are likely to be being applied to only a subset of life funds, i.e. those with the more traditional investment strategies.

There is thus a wide spectrum of investments for with-profits offices. At one end, perfect matching in gilts will virtually guarantee the return; at the other, there is still a relatively significant proportion of equities but, even for these, it might well be imprudent to specify an equity investment component of more than 50% when calculating the expected return, although against this is the possibility that some of the funds invested use their own lower projection rate.

4.4 Conclusion: Asset mix

The key points made in this section are:

- Pension funds and insurance products have very different asset allocations.
- There has been no material change to asset mixes over the past 4 years.
- The main asset class for pension fund investment remains equities, which still comprise on average around two-thirds of the investment. Insurance products such as with-profits funds now commonly invest anywhere between 50% and 100% in bonds. Unit-linked investments vary enormously in their features and no generalisations can usefully be made.

5 Investment returns

The FSA have commissioned us to review assumptions on the likely returns for different asset classes. The asset classes considered in this section are:

- government bonds;
- equities;
- corporate bonds; and
- property

As noted in Section 4, the key asset classes within balanced funds and with-profits funds are equities and government bonds; and this is where we concentrate our review.

In this section we set out actual historical returns and expected forward looking returns, for individual asset classes. We also review the most recent academic literature on the approaches that can be used in calculating historical returns and estimating expected future returns on various asset classes.

The focus of our work in this section is to consider the likely future rates of return on the range of asset classes, in order to inform the FSA's assessment of the intermediate rate to use for projections. The degrees of uncertainty associated with different durations of investment are set out in paragraph 617 of our 2003 report.

Investments vary considerably as to their duration, and the projection rules are used not only for new business but also for annual illustrations and thus would apply in the last year of a long-term pensions contract as much as for the new business illustration on a 25-year savings contract. Given the weight of investment builds up over time, in our view a typical weighted average investment horizon would be 10-15 years.

5.1 Government bonds

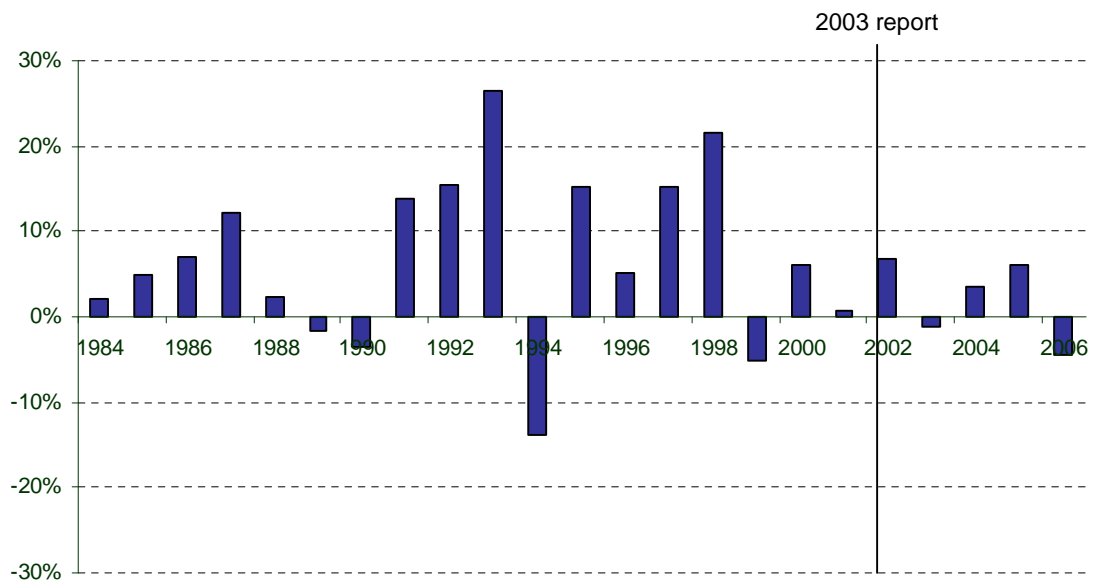
In our 2003 report we recommended an assumption for expected real government bond returns of 2.0% per annum over a long term. This was based upon the yield to maturity of index-linked government bonds. We now review the performance of government bonds and provide an updated assumption for expected future returns

5.1.1 Historic government Bond returns

Government bonds are considered a safe investment, with predictable coupon rates and their face value secured by the issuing government. Although nominal returns are contractually guaranteed, their real returns are less predictable due to the uncertain impact of inflation. Furthermore, within a shorter time frame, the value of long-term bonds is influenced by the movement in interest rates, so the short-term returns actually achieved on long-term government bonds can differ from the expected return when a government bond investment is held to maturity.

Since writing our 2003 report, UK government bonds have generated a real return of 1.0% over the period 2003 – 2006, based on Barclays Capital data. This relatively weak performance has been due to poor returns in 2006 and a stronger pace of more recent inflation eroding real returns. The performance of US bonds in the same period has also been poor, and as a result in 2006 bonds were the worst performing asset class in comparison to equities and cash. Overall, nominal government bond returns in major international markets were low from 2003 to 2006, across major international markets in 2006.

Figure 6 below shows real annual UK government bond returns since 1983.

Figure 6: UK government bond real annual returns

Source: Barclays Capital, PwC analysis

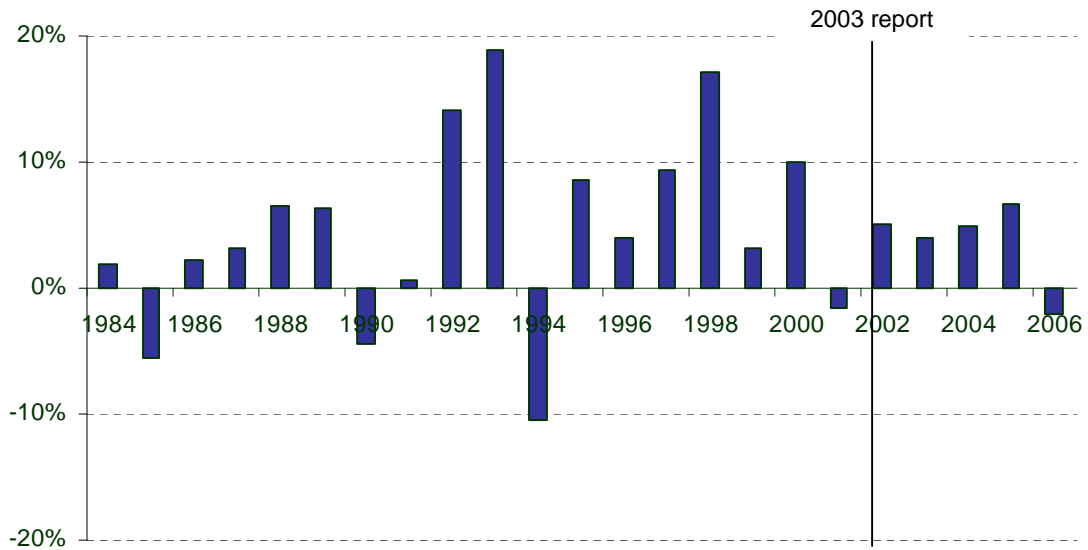
In the context of historical performance, these recent real returns are not too far from historical averages and recent returns have been generally less variable due to a more stable inflationary environment since 1997 Bank of England independence.

Over the longer term, the real return on UK government bonds, from 1900 to 2006, has been 1.3%, which is the same figure as the marginally shorter time period of 1900 to 2001 used in our previous report. Dimson, Marsh and Staunton²⁰ shows that US average real returns were 1.9% over the same period 1900 to 2006 and across the world average real returns were 1.6%.

5.1.2 Historic index-linked government bond returns

Index-linked bonds offer an inflation-protected real return. They were launched by the UK government in 1981 and therefore lack the same performance history of information on returns.

²⁰ "Global investment Returns Yearbook 2007": Synopsis, February 2007.

Figure 7: UK index-linked government bonds real annual returns

Source: Barclays Capital, PwC analysis

Over the period 2003 to 2006, index-linked government bonds achieved an average real annual return of 3.4%. The volatility in index-linked government bond returns results mainly from changes in capital values which are sensitive to the market rate of interest. Index-linked government bonds were launched when interest rates were relatively high, and as interest rates have fallen, the 10 year real return has benefited from this shift. Any further volatility in returns will be primarily due to interest rate variation.

5.1.3 Future expected returns

Whereas the historic performance of bond returns is a useful guide to the returns that have been achieved, the best estimate of the future expected return can be obtained from the market pricing on traded bond investments. The current gross redemption yield to maturity for long dated index-linked government bonds is a measure of a real risk-free rate of return, provided the bonds are held to maturity²¹. If a bond investment is not held to maturity, then the capital value at the point of sale will influence the holding period return.

In our 2003 report we presented the yield curve for UK index-linked government bonds. It was broadly flat, just above the 2% level for maturities beyond 5 years, but since then the shape of the yield curve has shifted around considerably, and longer maturity government bonds have typically been trading at much lower yields; the 50 year index-linked government bonds fell to a historic low of just 0.38% in January 2006. Even today the 30 year index-linked government bond rate of 1.0% is still considerably lower than the 10 year rate of around 1¾%. There have been numerous commentators²² who have sought to explain the historically low level of long-term interest rates, and they have attributed it to a number of factors including the savings glut in Asia, global corporate underinvestment, demographic changes and, particularly in the UK, the requirement of pension funds to match long-term liabilities with assets of comparable maturity.

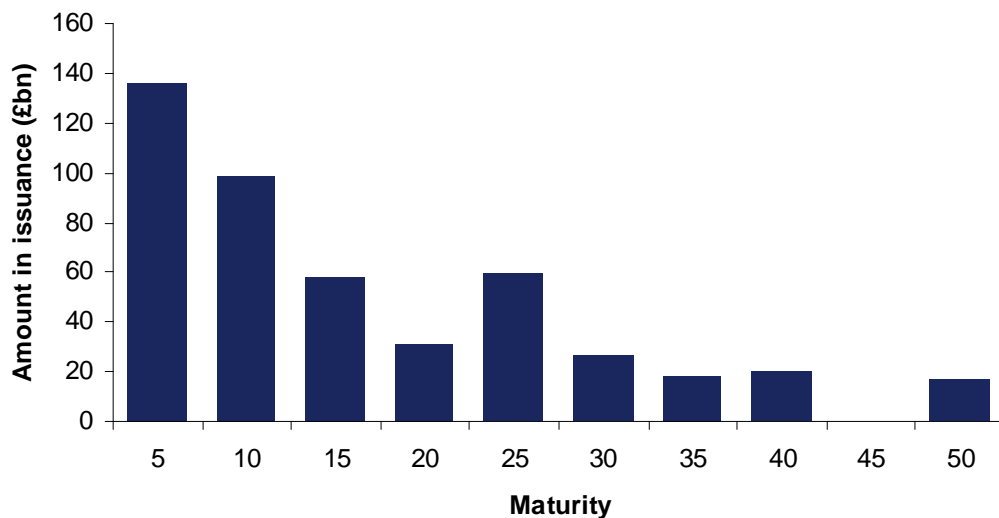
²¹ The return is technically not totally risk-free, as the inflation adjusted principal is based on the retail prices index (RPI) value three or eight months prior to the interest payment date, resulting in a very small residual inflation risk. The gross redemption yield calculation also assumes that coupons are reinvested at the gross redemption yield rate.

²² See: "Why long-term bond yields are low", Samuel Brittan The Financial Times 04/02/05 and Testimony of Chairman Alan Greenspan Federal Reserve Board's semiannual Monetary Policy Report to the Congress, before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate February 16, 2005 and "Why Are Yield Curves So Flat and Long Rates So Low Globally?", Governor Randall S. Kroszner at the Bankers' Association for Finance and Trade, New York, New York, June 15, 2006.

This does mean that the selection of investment horizon is highly important. An argument could be made that the specified generic rates of return should be dependent on the time horizon of the investment. This is a policy matter to which we would encourage the FSA to give some consideration.

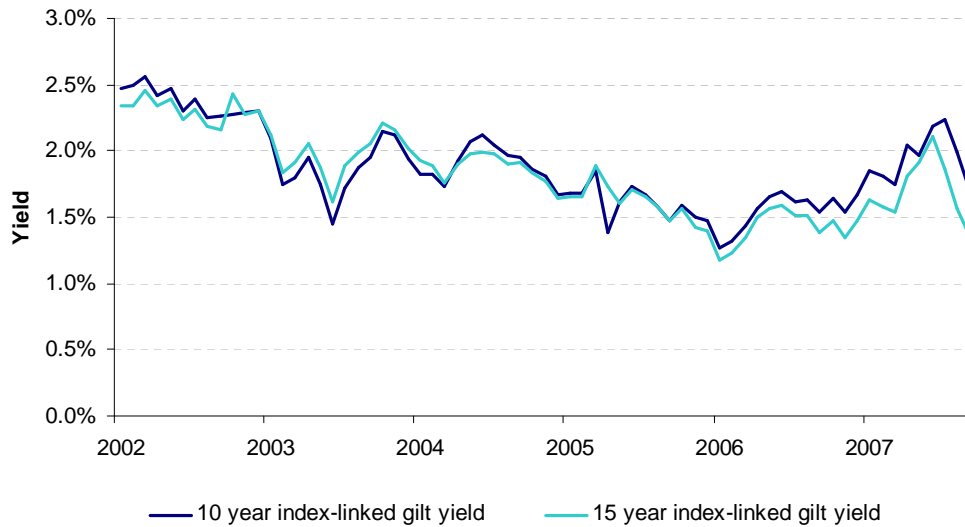
Even though pension funds will aim to include some long dated government bonds in their investment portfolios, Figure 8 below shows that the available supply of longer dated UK government bonds is somewhat limited with issuance distributed towards the shorter end, and an average time to maturity of around 14 years. This means that our assumption of a 10 to 15 year time horizon for both projection and re-projection purposes is consistent with the maturity of the overall mix of UK government bonds that are available for funds to hold.

Figure 8: Distribution of UK government bonds



Source: PwC calculations based upon Debt Management Office data

As at the date of this report the yield on a 10 year index-linked government bonds was around 1¾%. This has moved around over the past 4 years since our 2003 report, as shown in the chart below, with a 5 year average of 1.8%. Currently the 15 year index-linked government yield is slightly lower than this at around 1.5% however its 5 year average is 1.8%.

Figure 9: Historic chart of index-linked government bond yields

Source: Bloomberg (10 and 15 year UK index-linked government bonds)

This figure of expected real government bond returns of 1¾% is lower than our 2003 estimate of 2.0%, but higher than the long run 1900-2006 estimate of 1.3% for the UK. This would be a reasonable estimate of future expected real return on government bonds because:

- The reduction from 2% is backed up by recent trends in market rates which fell below 2% in August 2004 and have been regularly below 2% since, with only a brief period above 2% earlier in 2007;
- 1¾% is comfortably within the trading range for the yield on index-linked government bonds over the past 3 years, reducing the risk of selecting a figure from an extreme point in the market; and
- It is not too far from the long-term 1900-2006 average figure, and there is evidence that the real rate of interest is mean reverting over time²³.

An alternative approach would be to calculate the implied real government bond expected return based on the observed nominal government bond yield of 4¾% (rounded to the nearest quarter of a percentage point) and adjusting for the proposed inflation rate of 2¾. This results in a real return on government bonds of 2% which is ¼ of a percentage point higher than the observed return on index-linked government bonds of 1¾%.

This approach may be justified on the basis that index-linked government bond yields have been artificially depressed in recent years caused by a switch from equities into bonds by pension funds and other institutions, although it is difficult to be conclusive as to the strength of this argument. Additionally, conventional government bond markets are deeper and more liquid and therefore a more preferable source of government bond information.

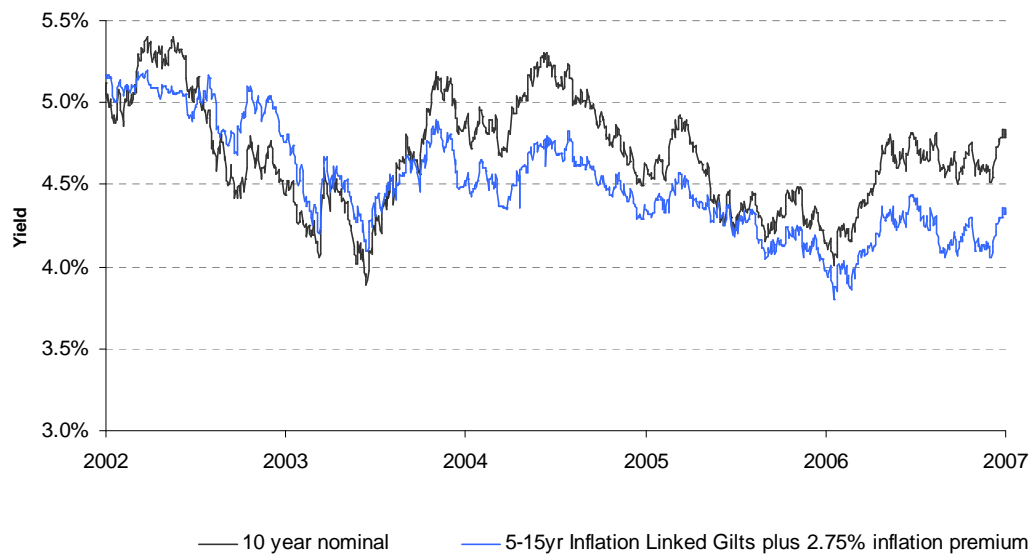
²³ Mean reversion implies that real interest rate, despite fluctuating over time, will tend to return to a constant mean. The mean reversion properties of real interest rates has produced a large body of empirical literature presenting mixed results over the past two decades. For a recent article supporting the mean reversion nature of real interest rates see Sekioua et al. (2007). An alternative analysis showing a lack of mean reversion is set out by Rose (1988).

In view of the different approaches and the need for the projection bases used by the FSA to be durable for a number of years, during which the yields may fluctuate somewhat, we conclude that a range of 1¾% to 2% is appropriate for expected future real returns on UK government bonds.

5.1.4 Implications of a risk-free rate below the 5% projection rate

Figure 10 below shows the historic gross redemption yield on UK fixed income gilts of 10 year term since 2002, and the total yield on index-linked government bonds allowing for inflation of 2¾% pa, as taken from our estimate of long-term inflation.

Figure 10: “Risk-free” return on 10 year UK fixed income gilts



Source: FT and Bloomberg (FTSE Actuaries UK Gilts)

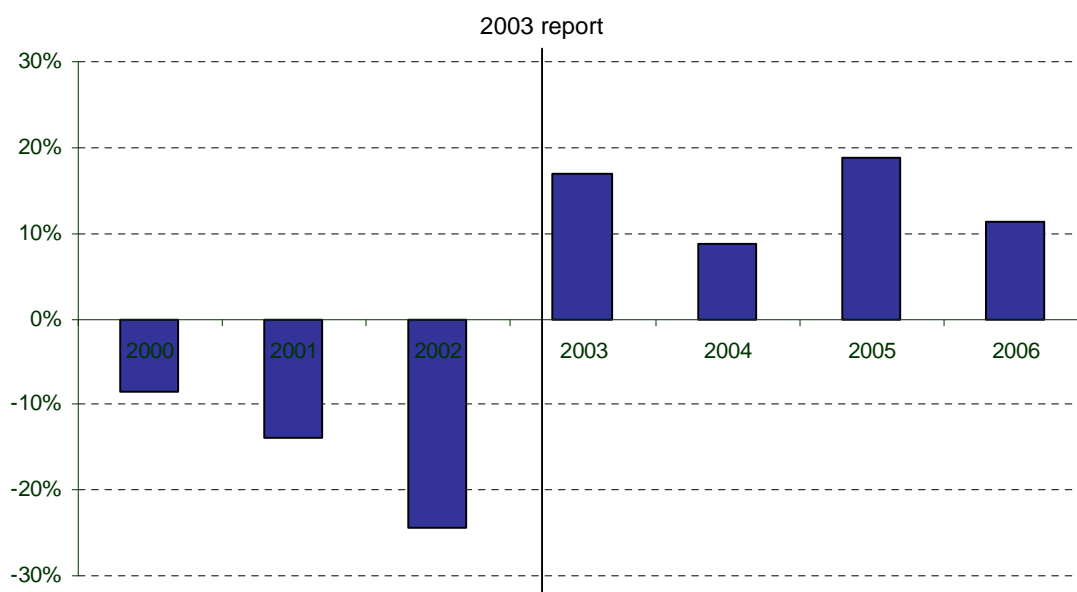
For most of the past 5 years, yields on UK 10 year fixed interest government bonds have remained in the range of 4% to 5% p.a. Taking this as a risk-free rate, the lower of the FSA’s three standard projection rates (5.0%) has often been above the risk-free rate. For this reason it may be helpful if, even when projections are used to demonstrate likely returns for low risk investments, consumers could be informed that even the lowest projection rate does not set the minimum return they could expect.

5.2 Equities

In our 2003 report, we concluded that the best estimate for the equity market risk premium (“EMRP”) is 3% to 4%, which implied a real return on equities of 5% to 6% (assuming a risk free rate of 2.0%). This corresponded to a nominal return of 7½% to 8½% (assuming a 2½% rate of inflation).

5.2.1 Recent historical returns

Since the date of the last report and up until the middle of 2007 the equity markets in the UK and the US have experienced strong performance resulting in an average real annual return of 14% as shown in Figure 11 below. Boosted by strong M&A activity as well as robust economic growth, equities have outperformed all other assets, but this did follow 3 years of consecutive negative returns.

Figure 11: Real annual returns on UK equities

Source: Barclays Capital, PwC analysis

5.2.2 Approach to estimating future equity returns

Whereas data on bond markets can be interrogated to identify an estimate of the future returns, the case is not the same for equities, due to the uncertainties over future earnings. In this section we review the academic research on the subject of the EMRP, focusing on the various approaches that have been suggested in recent years. In the following sections we present some of the results from these studies.

There is a very wide range of estimates of the global and country EMRP provided by the empirical academic literature. Academic studies include analysis of past historical returns data and those which assess the outcomes of forward looking surveys among investment professionals. A number of such articles were reviewed in our 2003 report. The remainder of this section reviews the more significant pieces of academic literature published since our last report.

The majority of the academic work on this subject continues to aim, directly or indirectly, to solve the theoretical puzzle originally highlighted by Mehra and Prescott (1985)²⁴. In their article, they concluded that the US EMRP should be very low in order to be in line with the output of models based on the standard economic theory, in contrast to the high equity returns that have been observed in relation to risk-free investments

Dimson, Marsh and Staunton (2005)²⁵ suggest that the possible solutions to the puzzle are either that standard economic models are incorrect or that US historical premia are misleading and that we should expect a lower premium in the future. By analysing 17 countries over a 106 year period they obtain a broader view of historical equity premia, and conclude that the size of the puzzle is smaller than originally thought. There are very few other studies extending beyond the US and UK markets. Amongst more recent studies are Mehra and Prescott (2003)²⁶ and Siegel (2002)²⁷ with both extending the geographical coverage of their studies. Ibbotson Associates (2006)²⁸ suggest that the

²⁴ R. Mehra and E. Prescott, "The Equity Premium: A Puzzle", *Journal of Monetary Economics*, Vol 15, 1985

²⁵ "Irrational Optimism", *Financial Analysts Journal*, Vol 60, 2005 - E. Dimson, O. Marsh, M. Staunton

²⁶ "The Equity Premium in Retrospect", *Handbook of the Economics of Finance*, Vol 1B, 2003 - R. Mehra, E. Prescott

²⁷ "Stock for the long run", third edition, McGraw Hill, 2002 - J.J. Siegel

²⁸ "The Risk Premia Over Time Report", 2006 - Ibbotson Associates,

market risk premia are also highly contingent upon the period under study. In order to control for this the authors extend their analysis to the largest possible period covering 208 years to 2006.

Several researchers, most notably Brown, Goetzmann, and Ross (1995) and Jorion and Goetzmann (1999), have suggested that survivorship bias may have led to overestimates of the historical equity premium. This has been disputed by Dimson, Marsh and Staunton (2006) and Li and Xu (2002).

The importance of the accurate definition of EMRP has been underlined by Fernandez (2006)²⁹ who suggested four different concepts of EMRP: Historical equity premium (HEP), Expected equity premium (EEP), Required equity premium (REP) and Implied equity premium (IEP). The author explains that there currently is a confusion in the academic literature due to lack of distinction between different types of equity premia as well as due to failing to recognise that although HEP is equal for all investors, the REP, EEP and IEP will differ for different investors and will depend on their individual preferences.

Recent literature has also looked into the usefulness of using past returns as an indicator of the future returns. Mehra and Prescott (2003)³⁰ state that over long time periods the equity premium is expected to remain fairly stable. Furthermore, Goyal and Welch (2006)³¹ could not identify any robust enough predictive variables robust enough to be used for forecasting the equity premium and therefore propose that an historic equity premium should be used for any forecasting purposes.

Conversely, Dimson, Marsh and Staunton (2006)³² suggest that due to the large standard error of historical data and the likelihood that premiums are non stationary, using historical data to predict the future returns is incorrect. The authors provide an estimate of a forward looking annualised risk premium adjusted for dividend yield, dividend growth, equity rerating and real currency movements.

Considering the identified limitation of historical data and that the EMRP is essentially a forward looking concept, many academics still build their forecasts on forward looking surveys. Among the more recent such studies, are those carried out by Graham and Harvey (2005)³³ and researchers at the Duke University Fuqua Business School³⁴, both in the US.

Smithers (2003)³⁵ proposed that it was difficult to assess the historic behaviour of the risk free rate and equity risk premium, and hence expected returns to equity should not be estimated from its component parts, but as a whole. This was supported by its long-run analysis of real equity returns which has been more stable across time and countries than its component parts.

There are two key messages arising from this review of academic estimation techniques. Firstly, there is no overall consensus, and the debate surrounding equity premia carries on, so in order to obtain a robust estimate of the future expected EMRP we should apply both ex-post as well as ex-ante methodologies. Secondly, the analysis should take account of data beyond that of the UK and US markets, and historical analysis should extend over the longest time period possible. These conclusions drive our approach in the next section where we analyse recent and long run returns as well as future expected returns on equities.

²⁹ "Equity premium: Historical, Expected, Required and Implied, IESE Business School Working Paper 661, 2006 - P. Fernandez,

³⁰ Ibid

³¹ "A comprehensive Look at the Empirical Performance of Equity Premium Prediction", A. Goyal, I. Welch, Review of Financial Studies, 2006

³² "The Worldwide equity premium: A smaller puzzle", Elroy Dimson, Paul Marsh, and Mike Staunton, London Business School, Revised 7 April 2006

³³ "The Equity Risk Premium in September 2005: Evidence f the Global CFO Outlook survey", Working Paper, Duke University, 2005 - J. Graham, C. Harvey,

³⁴ Duke/CFO Business Outlook Survey – www.cfosurvey.org

³⁵ "A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K", 2003 - Smithers & Co

To clear up the definitional issues raised by Fernandez (2006), we will investigate historic equity premia as an indicator of what we ultimately want to assess – the expected EMRP. Implied equity premia from market information is a useful source of the collective view of market participant's expected equity premia, but none of our analysis considers the required equity premia, because we are concerned with likely future returns from equity investment as a whole rather than equity return requirements from individual or collective investor groups.

Finally, the body of academic work still treats the real risk-free rate and the equity risk premium as separable components, so the two don't have to move in equal and opposite directions. However, the work of Smithers does suggest that our real expected equity return should not be too far from its historic average.

5.2.3 Long run historic equity returns

Long-run equity returns and EMRP rates are sensitive to the data sources used, and the time period and method of averaging applied³⁶ as well as to the geographic region under study, as is illustrated in Table 7 and Table 8 below:

Table 7: UK and US historic equity returns

Source:	UK		US	
	1900- 2001	1900 - 2006	1900- 2001	1900 - 2006
Ibbotson (nominal arithmetic average)	n/a	n/a	12.7%	12.3%
DMS ³⁷ (real geometric average)	5.4%	5.6%	6.3%	6.6%
Barclays (real geometric average) ³⁸	5.3%	5.3%	7.2%	7.1%

Given the small change in timeframe, long-run real annualised returns in the UK have not changed significantly since the date of the last report. According to the DMS data, average annual real returns were 5.6% for the period 1900 to 2006, in comparison to 5.4% for the period 1900 to 2001. This shows that the out performance of equities in the last 3 years allowed the equity markets to make up for the significant losses at the beginning of the 21st century when the UK market lost approximately half of its value.

Similarly in the US, the long run average annual real returns from 1900 to 2006 were 6.6% which is only slightly higher than the figure for the period 1900 to 2001 at 6.3%.

Table 8: Comparative EMRP values

Source:	UK		US	
	1900- 2000	1900 – 2006	1900- 2000	1900 - 2006
Ibbotson (nominal arithmetic average)	n/a	n/a	7.4%	7.1%
DMS (real geometric average)	4.8%	4.5%	5.8%	5.6%
Barclays (real geometric average) ³⁹	4.2%	4.2%	5.0%	4.8%

³⁶ The arithmetic mean represents a simple average of annual returns, whilst the geometric return take into account the compounding effect of financial returns. The geometric mean will always be lower than or equal to the arithmetic mean. For the purpose of assessing long-run returns in this report we consider geometric averages more appropriate as it is easy to relate geometric figures to the actual performance of an index over time. For further details on the difference and impact of arithmetic and geometric means see "The New Inflation Target: the Statistical Perspective", National Statistics, December 2003. This is available online at <http://www.statistics.gov.uk/statbase/product.asp?vlnk=10913>.

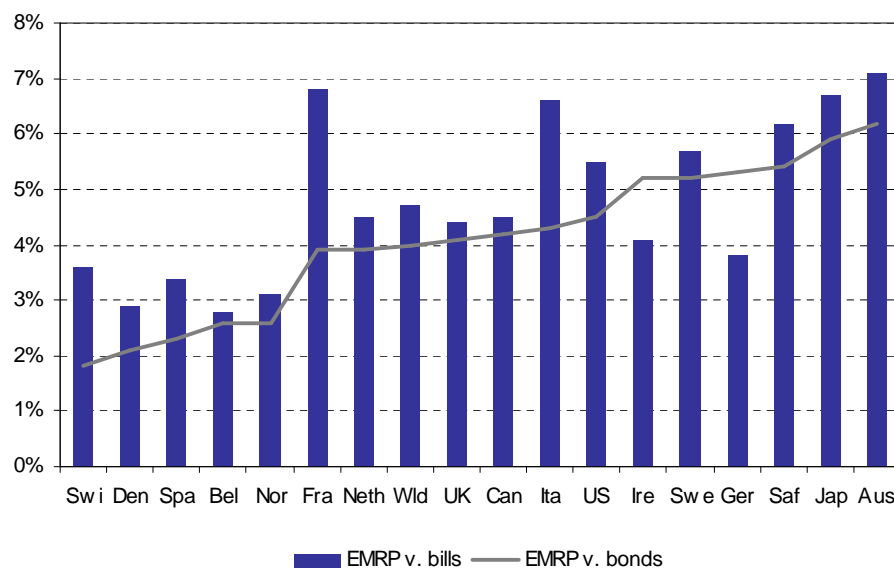
³⁷ DMS returns and EMRP rates come from the data collected by DMS and presented in the annual "Global investment Returns Yearbook 2007", February 2007.

³⁸ Barclays data for the US starts from 1925.

Both the DMS and Barclays data suggest that, if historical achieved returns are a good indicator of required returns, there has been a slight decrease in the EMRP across the UK and the US, since 2000. Furthermore, the long run Ibbotson data also suggests a slight decrease in the US EMRP since 2000 on the same basis.

The following chart shows the EMRP calculated as the additional historic return of equities over bonds and bills across 17 countries covered in the DMS data (using geometric averages)⁴⁰. The EMRP over bills ranges from 3% to just over 7%, and the EMRP over bonds ranges from 3% to about 6½%.

Figure 12: The worldwide equity risk premium relative to bills and bonds, 1900 – 2005



Source: *Global Investment Returns Yearbook 2006*

Given the increasing importance of global equity investment, and the globalisation of companies on the FTSE-100 index, global returns are an important cross-check to UK returns. In the DMS chart above the world historic excess return over bonds (4.0%) is very close to the UK figure (4.2%). The variability in the measured historic EMRP for other international equity markets, is mainly due to the fact that they often have a short time frame of available information.

5.2.4 Estimating the EMRP - adjustments to long run historic equity returns

Numerous commentators have suggested that the historically observed risk premium should be reduced to take account of factors that suggest the future will differ from the past, including less developed equity markets historically, less diversified private investors in the early part of the last century and unexpectedly high inflation in the 1970s, which depressed bond returns, thereby increasing the calculated equity risk premium. As mentioned in the academic literature review section above, DMS also recognise that the large standard errors of historical returns make it difficult to develop a robust forward looking expected premium in general.

DMS present an empirically based solution by analysing components of the historical equity risk premium individually and then considering forward expectations on the basis of these individual components. The components identified by DMS are: the dividend growth rate, expansion in the

³⁹ Barclays EMRPs are calculated by PwC from Barclays equity returns and bond returns.

⁴⁰ See Appendix IV – Worldwide EMRP values

price/dividend ratio, the average dividend yield and fluctuations in the real exchange rate. The table below presents the risk premia for 17 countries split into these contributing components.

Table 9 : Decomposition of the historical equity premium for 17 countries, 1900–2005

% p.a. Country	Real dividend growth rate	Plus* Expansion in the P/D ratio	plus Geometric mean dividend yield	plus Change in real exchange rate	minus U.S. real interest rate	equals Equity premium for U.S. investors
Australia	1.30	0.46	5.83	-0.24	0.96	6.42
Belgium	-1.57	0.08	3.95	0.62	0.96	2.05
Canada	0.72	0.98	4.46	-0.04	0.96	5.18
Denmark	-0.87	1.43	4.68	0.47	0.96	4.74
France	-0.74	0.42	3.93	-0.14	0.96	2.47
Germany	-1.54	0.97	3.69	0.23	0.96	2.35
Ireland	-0.25	0.38	4.66	0.25	0.96	4.05
Italy	-1.46	-0.08	4.05	0.10	0.96	1.58
Japan	-2.39	1.59	5.39	0.32	0.96	3.85
Netherlands	-0.16	0.41	5.00	0.27	0.96	4.54
Norway	-0.25	0.50	4.02	0.25	0.96	3.54
South Africa	0.91	0.31	5.95	-0.80	0.96	5.38
Spain	-0.62	0.24	4.13	0.00	0.96	2.75
Sweden	2.88	0.67	4.09	-0.05	0.96	6.72
Switzerland	0.32	0.60	3.52	0.72	0.96	4.22
U.K.	0.61	0.18	4.68	-0.03	0.96	4.46
U.S.	1.32	0.75	4.36	0.00	0.96	5.51
Average	-0.10	0.58	4.49	0.11	0.96	4.11
Std deviation	1.32	0.45	0.71	0.35	0.00	1.51
World (USD)	0.77	0.68	4.23	0.00	0.96	4.74

The DMS view is that the average real dividend growth rate for the UK of 0.61% and the world of 0.77% is probably a good expectation of future dividend growth, with some commentators projecting real dividend growth of zero or less⁴¹, and some relative optimists forecasting indefinite real growth in excess of 1%⁴². The expansion in the P/D ratio is likely to have been caused by, at least in part, the enhanced opportunity to reduce portfolio risk as institutions increased the scope for diversification both domestically and internationally, but this expansion is unlikely to continue so an appropriate future assumption for this component is zero. DMS also consider that real geometric dividend yields are likely to be ½ to 1 percentage point lower in the future and assume no real currency movement. By combing these forward looking components, DMS conclude:

“if current dividend levels are a guide to the future, then the prospective mean dividend yield on the world index is likely to be lower than the historical average by at least ½–1%. This suggests a current equity premium of approximately 3–3½%.”⁴³

⁴¹ “What Risk Premium is “Normal?”, Financial Analysts Journal, Vol. 58, No 2, 2002 - Arnott and Bernstein

⁴² “Long-run stock returns: Participating in the real economy”, Financial Analysts Journal 59(1), 2003 – R.G.Ibbotson, P. Chen

⁴³ Ibid

The DMS approach above has been challenged, particularly by Campbell and Thompson (2007), for the difficulty in estimating the expected dividend growth rate and dividend yield. The UK historic dividend growth rate (0.61%) is low in relation to UK economic growth and the earnings growth implied by investment which would suggest the DMS analysis may be an underestimate.

5.2.5 Forward-looking survey approaches to estimating equity returns

Recent economic literature has recognised the importance of the forward looking approach to EMRP estimation. Graham and Harvey (2005)⁴⁴ show that US CFOs have reduced their forecasts of the equity premium from 4.70% in 2000 to 2.93% in 2005.

This is broadly in line with the survey by Duke University Fuqua Business School⁴⁵ performed among CFOs of US public and private companies. Their forecasts of the average forward looking expected EMRP over the 2002 - 2004 period average 3.5%, as shown in Table 10 below.

Table 10: Survey of US CFO equity risk premium

Survey	Implied risk premium	Survey	Implied risk premium
Q2 2002	3.66	Q4 2004	3.37
Q3 2002	4.00	Q1 2005	3.47
Q4 2002	3.75	Q2 2005	3.39
Q1 2003	3.68	Q3 2005	3.01
Q2 2003	4.48	Q4 2005	2.72
Q3 2003	3.46	Q1 2006	2.88
Q4 2003	3.86	Q2 2006	3.05
Q1 2004	4.15	Q3 2006	3.38
Q2 2004	3.06	Q4 2006	3.80
Q3 2004	3.31	Q1 2007	3.42
Arithmetic average of all quarters			3.50%

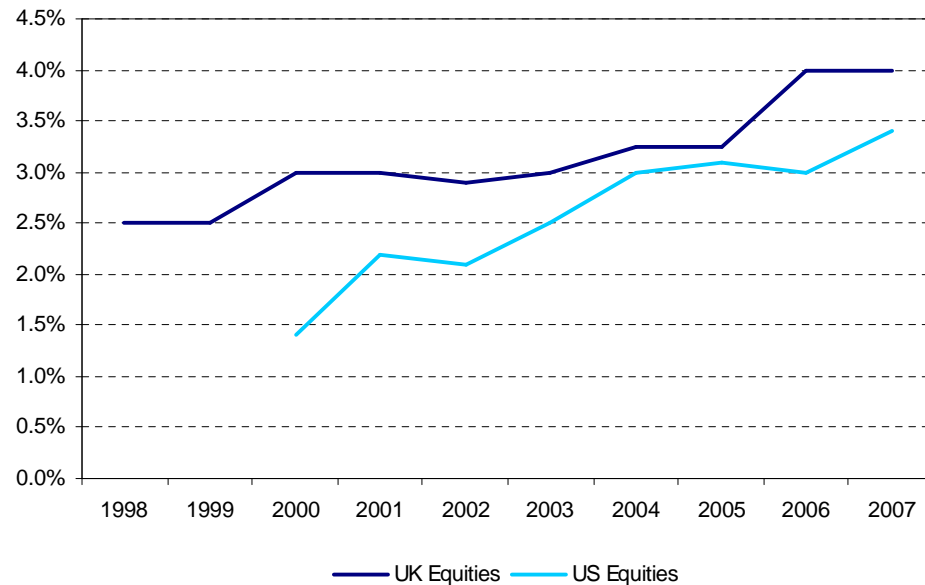
Every year, PwC undertakes its own annual survey of the City⁴⁶. The main focus of this survey is to collect a forward looking view of the UK EMRP (still the dominant asset class for UK pension funds) together with views on the expected real returns on other asset classes. Figure 13 shows the results for EMRP expectations since the survey began.

⁴⁴ "The Equity Risk Premium in September 2005: Evidence of the Global CFO Outlook survey", Working Paper, Duke University, 2005 - J. Graham, C. Harvey

⁴⁵ Duke/CFO Business Outlook Survey – www.cfosurvey.org

⁴⁶ See Appendix V - PwC "Survey of the City" report

Figure 13: Consensus expected out performance of equities over inflation-linked government bonds for the next 15 years



Source: PwC Survey

Based on the latest 2007 survey results, UK investors expect an EMRP of around 4.0% p.a. in excess of the return from index-linked government bonds over the next 15 years (in comparison to 2.9% in 2002), but with a fairly wide spread of opinions from 2% to 5.5%. For US investors the expected EMRP was 3.4% (in comparison to 2.1% in 2002), similar to the Duke University assessment referred to above.

In conclusion, recent survey approaches tend to support the view of a forward-looking expected risk premium of between 3% and 4%.

5.2.6 Forward-looking estimation techniques: the Dividend Discount Model

One of the most widely used and recognised forward-looking methods to assess equity market valuation is the Dividend Discount Model (DDM), which is based on the assumption that the current share price should equal the discounted present value of expected future dividends. Assuming constant real dividend growth, the DDM implies that an 'equilibrium' dividend yield can be estimated as:

$$D/P = r + e - g$$

Where: g = expected dividend growth rate, r = real risk free interest rate, e = equity risk premium, D/P = prospective dividend yield.

This equation can be rearranged to estimate the EMRP implied by current share prices.

Table 11 shows our calculations of the implied EMRP using the DDM (see Appendix VI – Dividend Discount Model for more details).

Table 11: “Breakeven” equity market risk premia assumptions, consistent with actual market valuations at the end of September 2007 (using constant growth DDM)

Country	September 2007	October 2002
	Implied equity risk premia from DGM	Implied equity risk premia from DGM
US	3.0	4.1
UK	3.1	3.9

The implied EMRPs for the UK and US are approximately 1 percentage point lower than they were as at October 2002 (4.1% and 3.9%) and reported in the 2003 report, partly reflecting the strong growth in equity markets over that period. But, given the margin of error on any such estimates, this difference is not that significant and does not imply any shift from the 3-4% estimate for the EMRP in our 2003 report. However it may suggest giving somewhat greater weight to the lower end of that range on grounds of prudence given currently relatively strong equity market conditions, which may not be sustained indefinitely.

5.2.7 Conclusion on the expected return on equities and EMRP

Our work shows that there is a very wide range of available estimates for the EMRP and we need to draw these together to offer a reasonable spread of returns which may be sensible to illustrate.

Since our previous report, equity markets in the UK and the US have experienced an equity rally resulting in strong returns over the past four years. Over a long period of measurement the average return in equities however has remained broadly at the same level of around 5.5% to 7.0% real returns with EMRPs of 4.5% to 7.0%. The DMS 2005 study suggested that a downward adjustment may be required, and that a more reasonable forward expectation of the EMRP is around 3% to 4%.

The DDM model also suggests EMRPs at the bottom end of a 3% to 4% range for the UK and US. This is also in line with the surveys which suggest that City CFOs and others are expecting the EMRPs to lie between 3% to 4%.

Our conclusions rest on the combinatorial approach to assessing the future expected return on equity, from its component parts: real risk free rate, inflation and equity market risk premium. In overall terms our (nominal) assumptions are unchanged, but in real terms our recommended real equity return is a ¼ percentage point lower. Following the work of Smithers (2003), we have checked that our real future expected equity return assumption is not too far from its long-run historic average. Our assumption of 4¾ to 5¾, based upon the range of 3% to 4% for the EMRP compares acceptably to the long-run historical UK equity returns from DMS and Barclays of 5.6% and 5.3% respectively (Table7).

The results overall point to a slightly lower EMRP than in 2003 but there is still considerable uncertainty and the value could lie between below 2% and above 6%. The mix of evidence provides some convergence and suggests maintaining a narrower range of 3% to 4%. Because of the inherent riskiness of equity investment we would maintain our central recommendation that for the purpose of producing financial projections a figure of 3% for the equity market risk premium is used. This produces a nominal equity return of 7½%, when combined with a 1¾% real rate of return on government bonds (at the bottom end of our range) and a 2¾% inflation.

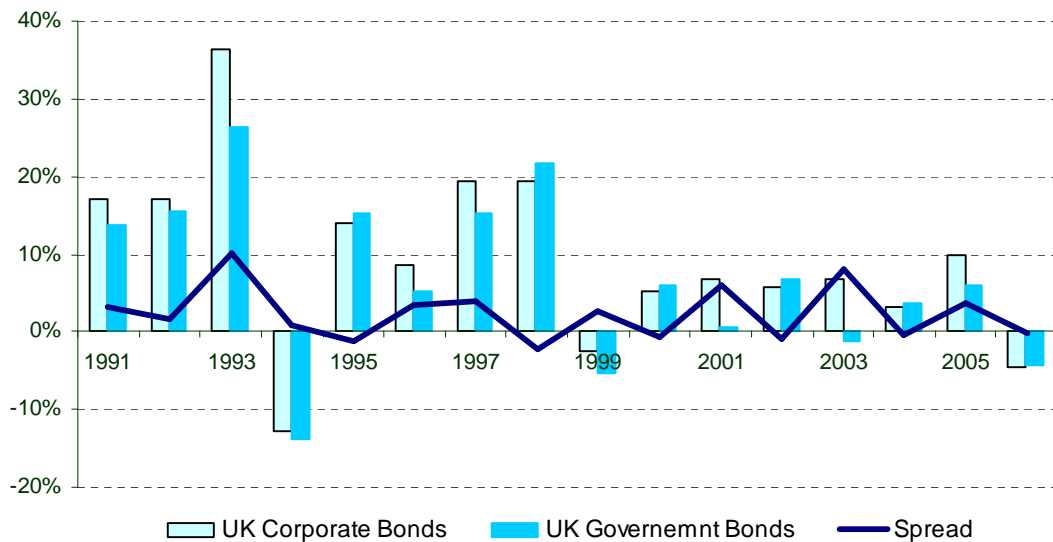
5.3 Corporate bonds

Corporate bonds make up a small part of the portfolio of a typical pension fund. In this section we investigate likely expected returns for corporate bonds in relation to government bonds and equities.

5.3.1 Historic returns

Our review of corporate bonds in the UK is based on corporate bonds data (from the Barclays Equity-Gilt study), which dates back to 1991. Any data before this period is not considered sufficiently robust for the purpose of their analyses. Furthermore, the market for corporate bonds in the preceding periods was very small compared with that for government bonds. The graph below shows the real annual returns of the UK corporate bonds relative to the returns on the UK government bonds⁴⁷.

Figure 14: Real annual returns on UK corporate bonds and UK government bonds



Source: Barclays Capital, PwC analysis

The average real return over the period 1991 to 2006 is 9.4%. The average real UK government bond return for this period was 7.0% so this equates to an average spread of 2.2% per annum. These relatively high average returns stem from the exceptional returns in the early period, and we would expect lower spreads in the future as the corporate bond market matures.

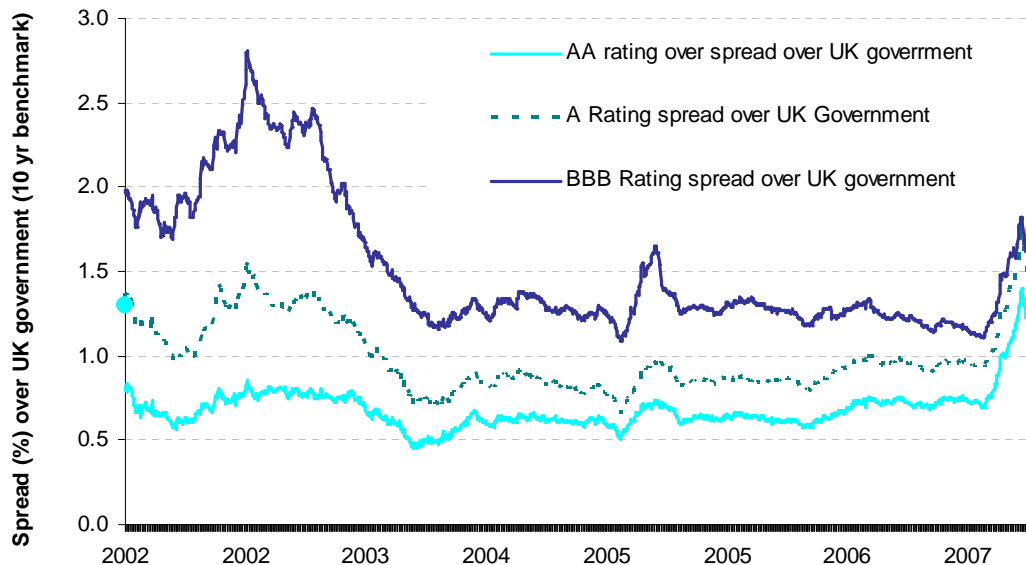
5.3.2 Future returns

Corporate bonds are graded by rating agencies (such as Moody's and Standard & Poor's). The yield to maturity will vary by rating with higher rated investment grade bonds trading at lower margins above government bond yields – a typical UK corporate bond is rated at lower end of the investment grade threshold at BBB. Figure 15 below, shows the margin above government bonds for benchmark portfolios of differently rated bonds over the period 2002 to 2006. This shows that the forward-looking expected spread for the lower end of investment grade corporate bonds has been between 1% and 1½% over this period although mid-2007 has seen some serious turbulence in fixed interest

⁴⁷Data on returns on gilts and corporate bonds presented in this report is based on the selection of fund indices constructed by Barclays Capital and published within their Equity Gilt Study 2007. For comparison purposes, the indices for both gilts and corporate bonds are constructed to represent assets with similar remaining lives and duration.

yields following on from the “credit crunch”, some of which is likely to be anomalous and corrected in time.

Figure 15: Historic spread over UK government for corporate bonds of different ratings



Source: Datastream (using Merrill Lynch indices), PwC analysis

Unlike government bonds, corporate bonds are exposed to default risk. This means that the calculated yield to maturity represents a “promised” yield, rather than a true expected return, as any defaults will reduce the actual return below the promised yield. Corporate bond spreads therefore include a premium for expected default risk and a risk premium for the uncertainty about default loss and potentially other factors, such as a liquidity premia.⁴⁸ To estimate a future expected return the expected default risk premium must be deducted.

It is possible to estimate the effect of default risk, through expected default probabilities and recovery percentages, which are provided by Moody's⁴⁹ and Standard and Poors. However the growth of the credit default swap (CDS) market has allowed greater visibility of the “price” of default risk. Recent financial market uncertainty has impacted the traded spreads on such credit instruments, but the typical spread for a UK corporate has been around ¼% to ½%⁵⁰.

By reducing the typical 1½% spread over government bonds for a BBB rated long-term corporate bond by a CDS spread of ½%, we can estimate the expected future return for a BBB rated corporate bond at around 1% above government bond returns. Similarly, a better rated corporate bond with a lower spread of 1% over government bonds can be reduced by a smaller CDS spread of ¼% to give a figure of ¾%. So the return for corporate bonds above UK government bonds is expected to be in the region of ¾% to 1%.

⁴⁸ For a breakdown of the corporate debt premia refer to Chart 1.3 of the Bank of England's Financial Stability Report, 26 April 2007.

⁴⁹ Corporate Default and Recovery Rates, 1920-2006, Moodys.com, February 2007.

⁵⁰ For example A rated Tesco CDS spreads are currently 30bps and BBB rated BSKyB CDS spreads are currently rated 50bps. Source: Bloomberg data.

An alternative approach to calculating the debt premium for corporate bonds above government bonds follows the underlying principles of the CAPM⁵¹, where the expected debt margin can be calculated as the product of the debt beta and the EMRP. Numerous empirical studies have shown that the debt beta is typically around 0.1 to 0.2⁵², which when multiplied by an EMRP of 3% to 4%, results in an expected debt margin of 0.3% to 0.8%. Allowing for the possibility of a liquidity margin these figures are broadly consistent with the analysis provided above.

For this to be an appropriate long-term assumption, we rely on corporate bond spreads and CDS margins returning to figures not too far from their historic levels after the “credit crunch” of summer/autumn 2007. There is a possibility that investors continue to require a significant uplift to historic yields, which is not reflected in default rates, and which therefore presents an opportunity for higher returns on corporate bonds in the future. It may be possible for funds investing in higher-yielding corporate bonds to achieve a higher expected return, but this requires bearing additional risk.

5.4 Property

Like corporate bonds, property assets make up a small part of investment fund assets. In this section we investigate likely expected returns for unlevered property investment, in relation to government bonds and equities.

5.4.1 Historic returns

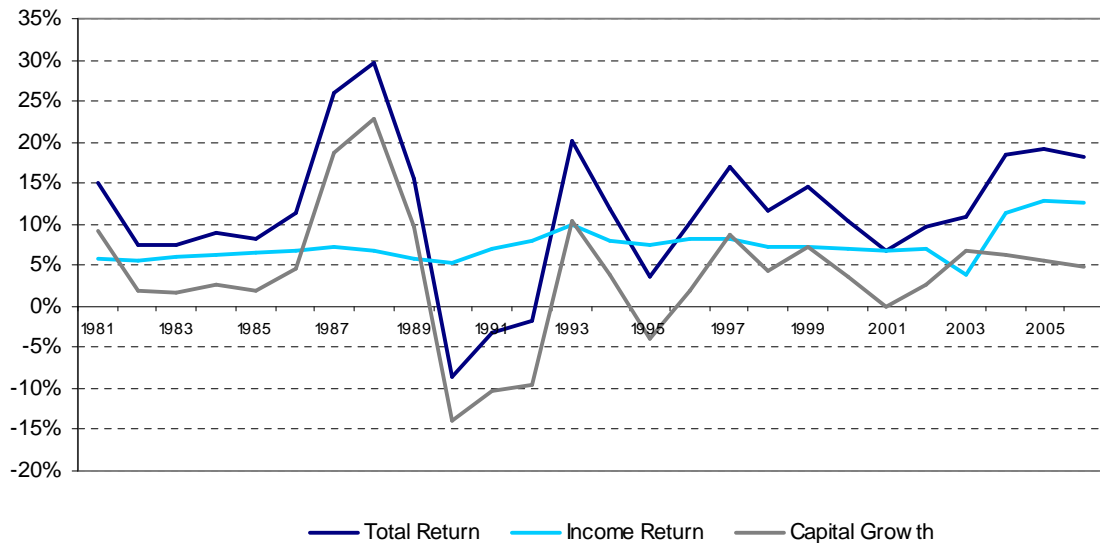
We have examined the nominal total return on UK property based on data on commercial, industrial and retail properties tracked by Investment Property Databank (IPD)⁵³. It is important to note the consistent data for property is limited and is available only since 1981. Property suffers from low liquidity which makes direct comparison with equities impossible. In our 2003 analysis, we showed that the mean nominal return on property was 10.6%, which covered the period 1981 to 2001. The updated mean nominal return for the period 1981 – 2006 is slightly higher at 11.5%.

IPD data also allows us to examine how total return on UK property is divided between capital and income returns on a nominal basis. In the chart below we show the capital and income components of the total return.

⁵¹ For a fuller explanation of the Capital Asset Pricing Model and beta, see: Ogier T, Rugman J and Spicer L, 2004 “The real cost of capital, a business field guide to better financial decisions”, FT Prentice Hall

⁵² These were discussed at the University of Exeter’s conference on Cost of Capital and Financing of Regulated Industries. See Franks, J. (2007), “Estimating debt betas”.

⁵³ IPD, “UK Property Investors Digest 2007”, 2007

Figure 16: Property returns (%)

Source: IPD, PwC analysis

5.4.2 Future returns

Historical property returns are unlikely to be a good predictor of future property returns, as there has been a period of uninterrupted capital growth since 1992. Forecasts for residential house price growth are invariably short-term, but the more well known are predicting much lower short-term growth rates. Nationwide expect house prices to rise by no more than wage inflation in 2008. Savills are predicting only a modest rise for 2008 but go on to say that they expect house price growth to pick up again at the end of 2008. Hometrack sees near stagnation in the UK housing market for 2008 and RICS have revised down their forecast to a flattening of prices for 2008 for both residential and commercial property^{54 55}.

We consider that an appropriate assumption for future expected property returns should be between corporate bond returns and equity returns for the following reasons:

- property returns tend to be less volatile than equities, but more volatile than corporate bonds⁵⁶;
- property is rated a '4' using the ABI Pension Sector Classification Scheme, with UK Gilts a '3' and UK equity a '7'. Expected returns should be commensurate with the risk taken; and
- the systematic risk – beta – for property companies tends to be lower than for the equity market as a whole⁵⁷

We therefore recommend a property expected return assumption of in between government bonds and equities; at a 2% premium over government bonds, over a 10-15 year time horizon.

⁵⁴ For a compilation of many short-term residential property price forecasts refer to <http://www.housepricecrash.co.uk/>

⁵⁵ Commercial Property Returns Lower on Global Re-pricing of Risk, RISC October 2007

⁵⁶ Our 2003 report presented a 5 year holding period real standard deviation of 8.97% for UK equities, 2.48% for UK property and 1.34% for UK corporate bonds.

⁵⁷ See Appendix VII – Property equity betas

5.5 Conclusion: Investment returns

Our analysis of the returns in the relevant asset classes leads us to recommend the following assumptions as reasonable central estimates looking 10-15 years ahead.

Table 12: Summary of 2003 and 2007 key recommended assumptions

Recommended Assumption	2003 rate (p.a.)	2007 rate (p.a.)	Change
Inflation (RPI)	2½%	2¾%	+¼%
Real earnings growth	1½%	1½%	Same
Nominal earnings growth	4%	4¼%	+¼%
Real government bonds return	2%	1¾% to 2%	-¼%/same
Real equities return	5% to 6%	4¾% to 6%	-¼%/same
EMRP	3% to 4%	3% to 4%	Still within same range
Nominal government bond return	4½%	4½% to 4¾%	Same/+¼%
Nominal equities return	7½% to 8½%	7½% to 8¾%	Same/+¼%

The asset mix of a portfolio will determine the likely future investment returns. At the time of the last review, a central estimate based on two-thirds of investment in risky assets (taken as equities) and one-third in risk-free assets (government bonds) was used in formulating a central rate of return for the projection basis.

In practice, investment portfolios include a mix of risk assets (typically equity and property) and of bond investments (a mix of government and corporate bonds), which will affect the central rate.

Maintaining our conservative approach taken in our 2003 report, we assume the low end of the range for returns on equities and government bonds of 7½% and 4½% respectively, leading to an estimate of returns of around 6½% for a portfolio invested two-thirds in equities.

Replacing 10% of equities with property with a return of 2% above that on government bonds, lowers the central rate of return to 6.4%.

Replacing 10% of government bonds with corporate bonds with a return of 1% above that on government bonds, increases the central rate of return to 6.6%.

Although property and corporate bonds are important diversifiers of risky and less risky investments, their inclusion in the analysis makes relatively small difference to the central returns which we recommend.

6 Tax effects

Here, we assess for each asset class the likely effect of UK taxation of income and capital gains on investment returns. In practice, the actual tax effect may differ from the assumptions set out below due to company and fund-specific circumstances. The calculations set out here are best estimates based on current UK tax law and practice.

We consider the impact of tax on gross returns from those products where tax applies. We consider this in context of the current 5%/7%/9% rates for tax advantaged business. If the rates were to change following our report, it might be necessary to reconsider the impact of tax.

6.1 Overview

Pensions and ISAs are tax advantaged and although the underlying investments may have suffered a variety of withholding taxes on dividends, for example, no further taxes are payable on the products themselves until, in the case of pensions, income tax is paid on the pension paid. Projections however show the full income that a pension provides, as the individual subsequent income tax is then for the customer to assess.

Under the Market in Financial Instruments Directive (MiFID), from 1 November 2007 unit trusts are no longer subject to the requirement to use the projection bases laid down by the FSA, although some providers of such products might well decide that the FSA bases are reasonable for their purpose. However, we exclude them from our consideration here.

The main taxed product to consider, therefore, is the tax position of a net life fund, which currently pays 20% tax on capital and income, apart from income received from UK equity investment, on which tax is treated as having already been paid as Advance Corporation Tax (ACT).

The mix of assets will vary hugely between differing companies and funds. A large degree of equity investment is a common feature of many products but the same projection rates apply whether the funds are fully equities or 2/3 equities 1/3 bonds. To show the impact of tax, we have performed two sets of calculations, first fully equities and second 2/3 equities 1/3 bonds, taking a proportion of overseas equity investment into account.

In the analysis below, we look at the effect of the various tax regimes on the rates of return. The gross rates vary by asset class and we have adopted rates for the purpose of this analysis consistent with the current FSA illustration rules. For government bonds, we use a rate of 4½% per annum in all scenarios; for equities (UK and overseas), we use a central assumption of 8½% per annum with upper and lower bounds of 11½% and 5½% respectively. When aggregated to give the 2/3:1/3 equity/bond portfolio, the average returns are close to the 5%, 7% and 9% assumptions used elsewhere. For property we assume returns of 6%, 7% and 8% respectively.

Where an assumption for price inflation is needed, we have used 2½% (consistent with the current FSA rates) and where different rates apply to equity capital gains and income, a dividend yield of 3% is assumed for UK equities and 2.0% for overseas equities, with a rate of rental income of 5.0% on UK property. These rates are the same for all three scenarios, meaning that the real capital gains range from 0% to 6% per annum.

6.2 Taxed business

Investment return on life business (such as endowments and high income bonds) is taxed during the life of the policy. The tax rate applied depends upon the type of return (we assume here that all life business investments are held directly):

- All income on equity and property is taxed at a rate of 20% (excluding that from UK equities, which is treated as already having been taxed). Therefore, in calculating the net return on overseas equities, the net income proportion is 80% of the gross income proportion.
- Total returns on bonds (UK and overseas) are taxed at a rate of 20% per annum. This figure is applied to the assumed 4.5% growth rate of bond holdings to give a net growth rate of 3.6%.
- Both of the above figures assume that full relief is available for withholding tax in the paying company.
- Capital gains on UK equity, overseas equity and property are currently taxed at a rate of 20% less an allowance for indexation which is based upon the movement in the Retail Prices Index (RPI) between acquisition and disposal of the equity holding.

The calculation for capital gains tax on UK equity, overseas equity and property in a life fund can be rather involved. Gains are taxed at a rate of 20% less an allowance for indexation which is based upon the movement in the Retail Prices Index between acquisition and disposal of the equity holding. Therefore, the longer these assets are held by a life company, the greater is the tax allowance against the gain and the lower the actual rate of tax paid (assuming that inflation is positive). In order to determine an average rate of tax on chargeable gains, it is necessary to assume a rate of equity churn (i.e. a rate of trading of equity). HMRC's assumption for the purposes of taxing life company holdings in unit trusts is seven years (which represents a reasonable average length of holding), and we have used this in our calculations. We have used the following approach to determine the adjustment that should be made to gross returns to allow for capital gains tax:

- A notional portfolio of equities is projected forward over a seven-year period, increasing in line with the appropriate return assumption.
- One-seventh of the portfolio is then assumed to be sold each year and immediately reinvested.
- This amount is then reduced to allow for indexation (i.e. the assumed increase in RPI).
- Tax is calculated as 20% of this amount.
- The total amount of tax over the seven-year period is calculated as the sum of the tax due in each of the seven years, and this total is divided by the total capital gain over the period to give an average annual rate of tax.
- This average tax rate is then multiplied by the assumed annual capital growth to give the reduction from the gross return in respect of capital gains.

On UK equities, the purchase of equities gives rise to a 0.5% stamp duty charge. For modelling the impact of this, we assume that an equity portfolio is sold and replaced every seven years which translates to a decrease in growth rate as a result of the stamp duty effect of 0.08% per annum. We have assumed that this small cost is implicitly allowed for in the gross rate set for projections and so no additional deduction is made when arriving at the net rate. The assumed returns on property investment are similarly assumed to be net of the impact of stamp duty land tax.

This leads to the following analysis of the impact of tax for different portfolios:

Table 13: Effective tax rates for life funds in excess of those allowed for in tax advantaged business

UK equities			
Assumed gross rate of return	5.5%	8.5%	11.5%
Assumed inflation	2.5%	2.5%	2.5%
Assumed income	3.5%	3.5%	3.5%
Additional deduction for tax in life fund	0.00%	0.63%	1.26%

Government bond income and growth			
Assumed gross rate of return	4.5%	4.5%	4.5%
Additional deduction for tax in life fund	0.90%	0.90%	0.90%

Overseas equities			
Assumed gross rate of return	5.5%	8.5%	11.5%
Assumed inflation	2.5%	2.5%	2.5%
Assumed income	2.0%	2.0%	2.0%
Additional deduction for tax in life fund	0.61%	1.24%	1.87%

Table 14: Impact of tax on sample life funds

Mixed fund (one-half UK equities, one-sixth overseas equities, one-third government bonds)			
Approximate gross return	5%	7%	9%
Additional deduction tax on UK equities	0.0%	0.3%	0.6%
Additional deduction tax on government bonds	0.3%	0.3%	0.3%
Additional deduction tax on overseas equities	0.1%	0.2%	0.3%
Total tax impact	0.4%	0.8%	1.2%

100% Equity fund (two-thirds UK equities, one third overseas equities)			
Approximate gross return	5%	7%	9%
Additional deduction tax on UK equities	0.0%	0.4%	0.8%
Additional deduction tax on government bonds	0.2%	0.4%	0.6%
Total tax impact	0.2%	0.8%	1.4%

6.3 Conclusion: Tax effects

- Life funds bear tax on income and capital gains. Our analysis suggests that for a typical mixed fund, the reductions in respect of tax from the illustration rates of 5%, 7% and 9% in current use might vary from 0.4% for the lower illustration through 0.8% for the central assumption to 1.2% for the higher illustration. However, it should be noted that asset allocation, rate of churn, rate of return and proportion of return derived from income all have an effect on the tax payable.

7 Conclusion

This section brings together our analysis from earlier sections and answers the three key questions asked by the FSA:

1. Is there a reason to change the inflation assumptions (price and earnings)?

Our analysis above leads us to recommend the following assumptions as reasonable central estimates looking 10-15 years ahead (rounded to the nearest quarter of a percentage point to avoid spurious precision):

- average RPI inflation of around 2¾%, up from 2½% in 2003, with the increase since our 2003 report being driven primarily by the effect of the change in inflation target, supported by latest government bonds market data and independent economic forecasts; and
- real average earnings growth of around 1½% relative to RPI, the same as in our 2003 report, implying nominal average earnings growth of around 4¼%.

Given the uncertainty regarding inflation, it is our view that the current FSA basis of 2½% falls within a reasonable range of 2½% to 3% for future inflation.

2. Is there a reason to change the intermediate rates of return assumptions? If so, a recommendation for any necessary change(s) is required.

Our historical analysis of the EMRP suggests a slight decrease in the UK and globally, but variations are well within the margin of error of any such estimates. Taking account of both historical and forward looking estimates however, we consider the reasonable range to remain at 3% to 4%.

The real risk free rate of between 1¾% and 2%, combines with an average RPI inflation of 2¾% and an EMRP of 3% to 4%, to result in an assumed nominal return on equities of around 7½% to 8¾%, slightly wider than our estimate in 2003. Maintaining our conservative approach taken in our 2003 report, we assume the low end of the range on equity and bond returns at 7½% and 4½% respectively, leading to an estimate of returns of around 6½% for a portfolio invested two-thirds in equities. This suggests that the 6½% recommendation made in our 2003 report is still valid.

3. Is the definition of and differentiation between taxed and tax-advantaged products still valid?

Our analysis suggests that the reductions in respect of tax from the illustration rates of 5%, 7% and 9% in current use might vary from 0.4% for the lower illustration through 0.8% for the central assumption to 1.2% for the higher illustration. However, it should be noted that asset allocation, rate of churn, rate of return and proportion of return derived from income all have an effect on the tax payable.

Nonetheless, illustrations for taxed and tax-advantaged products are not used in combination and reflecting uncertainty in a broad range of 4% between upper and lower returns continues to seem reasonable both for taxed and tax-advantaged products.

Appendix I – Terms Of Reference (“TOR”)

Assignment

The FSA Conduct of Business (COB) rules include rates of return assumptions for the calculation of prospective future benefits.

These assumptions were reviewed in 2003 by PwC and their report - *Rates of return for FSA prescribed projections* – supported the retention of the current assumptions.

We now wish to review these assumptions again to establish if they remain valid. More specifically we require answers to the following questions:

- Is there a reason to change the intermediate rates of return assumptions, if so, a recommendation for any necessary change(s) is required?
- Is there a reason to change the inflation assumptions (price and earnings)?
- Is the definition of and differentiation between taxed and tax-advantaged products still valid?

A pre-requisite for any firm undertaking this work is that they must commit to making clear and unequivocal recommendations in response to these questions. These recommendations must also be supported by a well reasoned rationale as they will be published via our website.

However, it should be noted that this review will be slightly different in scope to that carried out by PwC⁵⁸.

Background

- 1 The FSA currently prescribes how firms calculate projections of future benefits. We also prescribe the situations in which firms must or must not provide such information to retail customers.
- 2 The prescribed rates of return which firms must use in their calculations are currently listed in COB and the FSA is committed to periodically reviewing their appropriateness.
- 3 These rates make no reference to the actual assets underpinning a particular product. While firms will not normally use asset specific rates, they are nonetheless required to revise the prescribed rates downwards where a product is unlikely to achieve returns in line with those indicated by the standard rates. (An asset mix of 70% equity and 30% bond was felt to provide reasonably indicative figures for much investment business in at the last review in 2003.)
- 4 Projected values of future benefits are also used by firms to disclose the effect of charges over time, i.e. to provide an indication of returns net of charges. They are used both for long-term investment products and shorter-term investment products, although the rules were designed with long-term investments in mind.
- 5 To counteract potential misinterpretation of the projection figures, the current rules require firms to project using three different rates, so as to present the customer with an indication of growth rate sensitivity of possible outcomes. The upper rate and lower rate are simply + and - 2% from the intermediate rate and do not represent information on asset volatility. The current

⁵⁸ see 'Scope and Approach'

rules also require firms to use rates of return 1% lower for those products subject to a heavier tax liability such as life policies.

Previous review

- 1 The assumptions were last reviewed by PwC in 2003⁵⁹, when the monetary (nominal) intermediate rates were 6%, and 7% for tax-advantaged business and the inflation assumptions were 2½% (price) and 4.0%(earnings) .
- 2 PwC were contracted to provide the FSA with the following:
 - a central estimate and distribution information for annualised real returns for UK equities, international equities, property, gilts and corporate bonds over the next 1, 5, 10, 15 and 25 years;
 - a central estimate and distribution information for annualised nominal returns for UK equities, international equities, property, gilts and corporate bonds over the next 1, 5, 10, 15 and 25 years;
 - decomposition of these returns into capital and income;
 - details of the assumptions that have been made in deriving the above and an explanation of the methodology used;
 - price and earnings assumptions;
 - opinion and analysis of the main influences on total returns from the various asset classes over the different time periods; and
 - a summary and analysis of recent relevant research.
- 3 Their analysis led PwC to recommend that the central rate over 25 years for the standard asset-mix should be 6½%, for sales of tax exempt products. They concluded that there should be an adjustment of 0.8% for life funds and 0.4% for unit trusts where the product faced a higher tax liability.
- 4 After examining the costs and benefits of requiring firms to adjust rates by ½ a percentage point, and also bearing in mind the danger that introducing fractions to the prescribed rates might be an indication of spurious accuracy, the FSA decided to leave the existing rates as they were, but undertook to continue to keep them under review.
- 5 Since the 2003 report the only substantive changes/imminent changes to the COB projection rules are or as proposed are:
 - to remove MIFID⁶⁰ scope business from the application of the FSA projection rules;
 - to relax our rules for single-premium and similar business so as to make projection information voluntary;

⁵⁹ http://www.fsa.gov.uk/pubs/other/projection_rates.pdf

⁶⁰ The Markets in Financial Instruments Directive

- our proposal to require real projections (for pension income) for all pension contracts (the projection basis is not mandatory for SIPPs, but firms are encouraged to take it into account).
- 6 The intermediate return of 7% and the price inflation assumption of 2½% are also used for Statutory Money Purchase Illustrations (SMPI). For consistency of treatment in the market place, we have an understanding with the DWP and the Actuarial Profession that we will use our best endeavours to maintain the same assumptions. Should the recommendation be for a change to either or these rates, it is likely that the FSA will use this report as primary evidence to support the need for a corresponding change to the SMPI basis.

Scope and Approach

- 1 The scope for the PwC work was wide-ranging due to requirements at the time to explore a number of aspects of the bases for long-term projection assumptions.
- 2 However, we do not believe there is a case for repeating all of the analysis undertaken by PwC and we do not wish to duplicate the scope of that analysis under a fresh contract.
- 3 The present contract is aimed at establishing:
- whether the current intermediate rate of return continues to represent the appropriate single rate for illustrating potential returns for those products subject to the projection rules;
 - the appropriateness of the 1% adjustment for tax disadvantaged products; and
 - the continuing validity of the long-term inflation assumptions of 2½% for prices and 4% for earnings.
- 4 We require a review of the relevant values arrived at by PwC. We believe that the methodology adopted by PwC, incorporating the peer reviewers' comments⁶¹, is robust. Any firm undertaking this work should only divert from the PwC methodology if they have a compelling reason for believing that it is no longer appropriate.
- 5 Please note; it is our intention that that this report will also be subject to peer review.
- 6 We also require the report to provide a detailed explanation should the recommended rates assume a different proportion, i.e. the report should state why these rates are appropriate for a managed fund or an open with-profit fund.
- 7 Any recommendations should comment on the continuing appropriateness of the following factors (for ease of reference we have referred to the paragraphs in PwC's report). Any resultant departure from these factors should be accompanied by a detailed explanation:

Type	Rate	Paragraphs
1. Bond Rate:	4.5%	109,122
2. Equity MRP:	3%	118, 381,415
3. Price Inflation:	2.5%	110,902
4. Earnings Inflation:	4%	112
5. Asset Mix of Retail Investment Products:		729
6. Life Tax Adjustment:	(0.8%)	821
7. Unit Trust Tax Adjustment:	(0.4%)	821

⁶¹ As set out at the end of the 2003 report

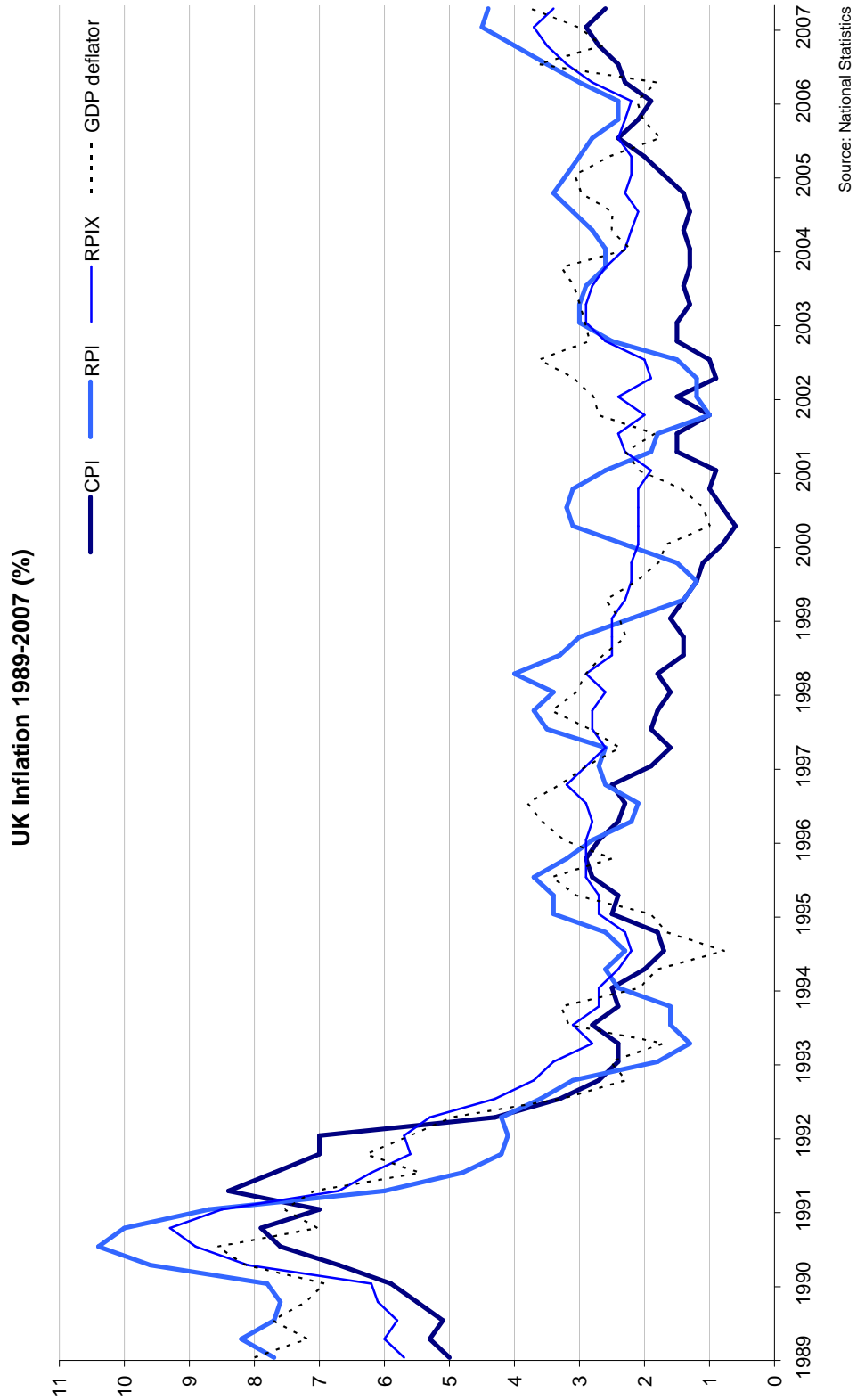
- 1 All analysis must be conducted with an understanding of the degrees of approximation which are appropriate. The intermediate rates of return which the FSA prescribes need principally to be appropriate for the broad asset classes as typically constitute UK retail investment business. The review of these rates needs to be proportionate to the inevitable approximations this entails.
- 2 Although we expect a concise report, we also expect any recommendations to be supported with an appropriate rationale and details of the scope of any proposed changes must be made clear.
- 3 We reserve the right to call for more detailed exposure within the report of the supporting rationale, assumptions made, and methodology adopted.

Skills / Attributes / Qualifications

- 1 In determining the tender, we will take into account whether it demonstrates that the bidder has:
 - an understanding of the function and content of FSA conduct of business rules which prescribe the basis for projecting assumed future benefits and the effect of charges;
 - a knowledge of, or ability to analyse, the investment products subject to the FSA projection rules sold in the UK retail market;
 - a thorough understanding of academic and industry research regarding medium- to long-term forecasting of rates of return;
 - a solid understanding of the broad economic and financial issues and themes which impact upon medium- to long-term forecasting of rates of return;
 - access to relevant economic and actuarial expertise, be it academic or professional; and
 - a thorough understanding of the tax treatment of these investment products sold in the UK retail market.

Appendix II – Recent inflation history

Figure 17: Recent inflation history



Appendix III – Literature review on equity risk premia studies

Empirical ex-post research articles

1. Is the Ex Ante Risk Premium Always Positive? Further Evidence, Australian Journal of Management Sydney; Jun 2006; Walsh, Kathleen D

The article begins with recognising that an implicit assumption of the conditional CAPM is that the ex ante equity risk premium is positive in all states of the world. As per the author studies of US portfolios find violations of this assumption. This paper tests the sign of the equity risk premium in the Australian market using two parallel tests (test developed in Bayesian inference and a standard least squares approach with a restriction of a positive risk premium). In both case the null hypothesis of single regime was rejected.

2. Equity Risk Premium: Expectations Great and Small, Richard A. Derrig and Elisha D. Orr, January 2004

This paper examines the principal strains of research on the ERP and catalogues the empirical values of the ERP implied by that research. The authors argue that the numerical estimates of the ERP that appear different may instead be about the same under a common definition.

It is also argued that there are no serious studies yet concluding that the historical results are too low to serve as ex ante estimates. Currently the estimates vary from 9% of small negative.

The article identifies several factors and definitions that will affect the value of ERP obtained:

- geometric v arithmetic averaging
- short v long-term investment horizons
- short v long-term expectations
- domestic US v international data
- data source and periods
- real versus nominal returns.

3. What Risk Premium is “Normal”?, Arnott and Bernstein, Financial Analysts Journal, Vol. 58, No 2, 2002

The authors argue that investors in 1926 were not expecting the realized, historical compensation that they later received from stocks. Arnott and Bernstein did not agree that earnings growth model is better than dividends growth model.

By holding valuations constant and using the dividend yield and real growth of dividends they calculated the equity return that investor might have expected in time period starting 1802. They concluded that the net adjustment is negative and a fair expectation of the stock return for the historic period is close to 6.1%.

4. The Risk Premia Over Time Report, Ibbotson Associates, 2006

The authors observed that historic measures of equity market risk premia are very dependent upon the period under study. In order to control for this the authors have decided to take the range of EMRP values relating to the largest period possible in order to determine its nominal value. In their

article, Ibbotson Associates provide analysis over 208 year period to 2006. The article suggests an EMRP in the range of 3.6% to 5.1%.

5. Equity Premium: Historical, Expected, Required and Implied, P. Fernandez IESE Business School Working Paper, no. 661. YES

Equity premium includes four different concepts: Historical Equity Premium (HEP), Expected Equity Premium (EEP), Required Equity Premium (REP) and Implied Equity Premium (IEP).

The authors recognise that there is confusion arising from not distinguishing among the four concepts and from not recognising that although HEP is equal for all investors, the REP, the EEP and the IEP differ depending on the investor.

A unique IEP requires assuming homogenous expectations for expected growth. The authors show that there are several pairs of IEP and growth that satisfy current prices. The authors claim that different investors have different REP's and that it is impossible to determine the REP for the market as a whole.

It has been argued by the author that from an economic point of view EEP is the best definition of risk premia as it is what guides investors' decisions. However the REP is more important for many decisions such as valuations of projects and companies, acquisitions or investment decisions while EEP is important only for investors who hold the market portfolio.

6. "The Worldwide Equity Premium: A Smaller Puzzle"; E Dimson, P Marsh, M Staunton, LBS, 2006

Equity premium puzzle represents the fact that a historical equity premium in the US – measured as the excess return on stocks relative to the return on risk free Treasury Bills – was much larger than could be justified as a risk premium on the basis of standard theory. DMS states that the equity premium puzzle is about the magnitude and not the sign of ERP.

Two possible solutions to the puzzle are suggested in this article:

- standard models are wrong
- historical premium is misleading and one should expect lower rate in the future.

It has been observed by the authors that the standard models have been corrected but they still don't explain the excess return and the observed ERP still requires a very high aversion to risk.

Second solution is that the historical premium may be misleading as the past performance of US markets may be too good to be supported into the future as. Hence, to make the ex post analysis more meaningful researchers should look at other markets than the US.

The authors analyse 17 countries over the 106 year period. The assumption is that underlying processes are non-stationary.

The article continues to analyse the viability of using historical equity return for the purpose of forecasting future equity risk premium. The authors remind that the leading textbooks have suggested using historical premiums as an indicator of the future and that many financial managers and economists believe that long run historical returns are the best measure available.

DMS analysis show that there are substantial variations in year on year and period to period returns. Hence, it is very important to look at long run data. Furthermore it is important to note that the stock returns are so volatile that it is hard to measure the mean historical premium with precision.

By focusing on non-US markets and extending the time span to 1900 – 2005 the authors managed to conclude that the equity premium puzzle has become quantitatively smaller.

However, it has been recognised that the survivorship bias may have lead to overestimates of the historical equity premium – it is possible that the DMS world index overstates worldwide historical equity returns by omitting countries that failed to survive.

The article concludes that we cannot know today's consensus expectation for the equity premium. However, after adjusting for non-repeatable factors that favoured equities in the past, they infer that investors expect an equity premium (relative to bills) of around 3 – 3.5% on a geometric mean basis (and 4.5 – 5% on arithmetic mean basis).

7. “Estimating the Equity Premium”, Campbell J., NBER Working Paper 13423, 2007

Campbell proposes to use the theory that restricts the time-series behaviour of valuation ratios, and that links the cross-section of stock prices to the level of the equity premium. The author also recognises that there is a high degree of persistence in valuation ratios which makes it difficult to obtain robust statistical models for stock return. As a result Campbell proposes to use a steady state valuation model. By running the model with those assumptions he proposes that the world geometric average equity premium was almost 4% at the end of March 2007.

Surveys (ex ante research)

- **“CFO Business Outlook Survey”, Duke University Fuqua Business School** The authors performed a survey of CFOs from a broad range of US public and private companies in relation to the predicted return on the S&P over a 10-year period. The average EMRP over the period 2002 -2004 (covering seven separate surveys) amounts to 3.5%.
- **“The long run equity risk premium”, Graham, John R., and Campbell Harvey, 2005, *Finance Research Letters* 2.** They show that US CFOs have reduced their forecasts of the equity premium from 4.7% in 2000 to 2.93% in 2005. The authors also provide the evidence on the determinants of the long-run risk premium. The article suggests that there is a positive correlation between the ex ante risk premium and real interest rates.

Appendix IV – Worldwide EMRP values

The table below displays the actual values of EMRP across 17 countries as used in Figure 12 in the main body of the report.

Table 15 – Actual EMRP values across 17 countries in the period 1900 – 2005

Country:	EMRP vs. Bills	EMRP vs. Bonds
Switzerland (Swi)	3.6%	1.8%
Denmark (Den)	2.9%	2.1%
Spain (Spa)	3.4%	2.3%
Belgium (Bel)	2.8%	2.6%
Norway (Nor)	3.1%	2.6%
France (Fra)	6.8%	3.9%
Netherlands (Ner)	4.5%	3.9%
World (Wld)	4.7%	4.0%
United Kingdom (UK)	4.4%	4.1%
Canada (Can)	4.5%	4.2%
Italy (Ita)	6.6%	4.3%
United States (US)	5.5%	4.5%
Ireland (Ire)	4.1%	5.2%
Sweden (Swe)	5.7%	5.2%
Germany (Ger)	3.8%	5.3%
South Africa (Saf)	6.2%	5.4%
Japan (Jap)	6.7%	5.9%
Austria (Aus)	7.1%	6.2%

Source: *Global Investment Returns Yearbook 2006*

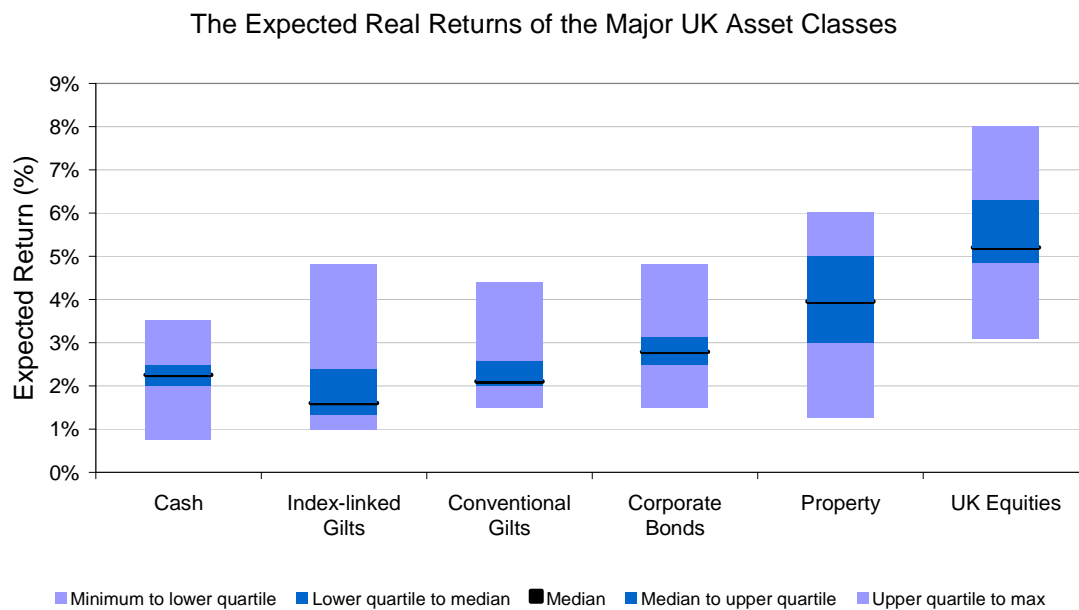
Appendix V - PwC “Survey of the City” report

The survey has been carried out since 1998. For the purposes of the latest survey PwC asked around 50 of the largest institutions of which 18 responded. These managers are responsible for over £200 billion of assets on behalf of pension funds and charities. The scope of the survey covers:

- price inflation in the UK, US and the Eurozone;
- real returns on equities in the UK, US and the Eurozone;
- real returns on index-linked government bonds in the UK, US and the Eurozone;
- real returns on fixed income government bonds (i.e. UK government bonds);
- real returns on sterling investment grade corporate bonds;
- real returns on UK property;
- real returns on sterling cash.

Below is the summary of the survey’s results for reported expected returns on a selection of UK assets:

Table 16 – Reported expected returns on a selection of UK assets.



It is important to note that the views of managers may be coloured by their own economic analysis or the weight they accord to the extrapolation of past statistical data. This may mean that the views expressed in this section is not entirely independent of those considered in previous sections.

Appendix VI – Dividend Discount Model

Background

Viewing equity markets over a long time period, Table 17 below shows that average total nominal returns on equities (which include both dividend yield and capital gain) over the past thirty years vary greatly, from 17.7% in Sweden to 9.3% in Germany. There is also variation in total real returns on equities, after taking inflation into account. Equities have, on average, continued to outperform long-term government bonds in all the selected nine countries over this time period.

Table 17 - Comparison of historic returns on equities and lower risk assets (% average annual rates from 1973 Q1 - 2007 Q3)

	US	UK	Germany	France	Italy	Nether-lands	Spain	Switzer-land	Sweden	Average (weighted)
Total nominal return on equities	11.4	14.0	9.3	13.9	13.4	12.6	13.2	9.6	17.7	12.1
Inflation	4.7	6.7	2.8	5.1	8.0	3.4	4.0	2.6	3.6	4.8
Total real return on equities	6.5	6.8	6.3	8.4	4.9	8.9	8.9	6.8	13.6	7.9
Long term real interest rates	2.9	2.5	3.7	3.6	2.4	3.6	3.9	1.7	4.9	3.0
Implied equity risk premia (vs. bonds)	3.8	4.8	2.7	5.3	3.0	5.6	5.4	5.2	9.3	4.3
Relative size of equity market	55%	13%	6%	9%	4%	3%	4%	4%	2%	n/a

The historic average implied equity market risk premium (EMRP) over a government 10-year bond yield, which is used as the 'risk-free' benchmark here, varied from 9.3% in Sweden to only 2.7% in Germany. For other countries the implied risk premia were between 3% and 5.6%, while the two biggest stock markets were quite similar, with the US at 3.8% and the UK at 4.8%. Taking a weighted average over all nine countries (weighted by market capitalisation) over this period, the implied equity risk premium has been 4.3%. The dominance of the US market (55% weight) should be noted when looking at the weighted average results.

Dividend Discount Model

One of the most widely used and recognised forward-looking methods to assess equity markets is the dividend discount model (DDM), which is based on the view that the current share price should equal the discounted present value of expected future dividends. Assuming constant real dividend growth, the DDM implies that an 'equilibrium' dividend yield can be estimated as:

$$D/P = r + e - g$$

Where: g = expected dividend growth rate, r = real risk free interest rate, e = equity risk premium, D/P = prospective dividend yield.

A key feature of the DDM is that it allows one to derive implied EMRP by inputting alternative plausible assumptions on the key variables (g and r) of the model in order to produce estimates for the implied EMRP. Essentially, the EMRP is not directly observable, and so calculating implied EMRP requires assumptions be made over the value for expected dividend growth and real risk free rates which are consistent with actual market valuations at the end of Q3 2007. This leaves the EMRP unknown, which is then derived such that it is consistent with the actual market value on the valuation date. This implied value can then be compared with its historic/benchmark average.

Specifically, these implied values were calculated using the assumptions outlined in Table 18. We used 10 year government bond yields in each country and adjusted these by independent forecasts for inflation in each country for the period between 2007 and 2016 to calculate the estimated real risk free rate in each country. We then used the average of independent forecasts of real GDP growth for the period 2007-2016 to estimate future real dividend growth (on the assumption that these should be broadly equal in the long-term). However, Switzerland is an atypical case for the DDM, since several major quoted companies (for example Novartis, Nestle and the CS Group) operate on a global basis. Therefore the use of Swiss real GDP growth may not be an appropriate proxy for expected dividend growth for Swiss equities. Consequently we used a 2.7% estimate for average OECD trend growth in place of Switzerland's 1.7% estimate.

Table 18 - Equity market valuations using the DDM

	US	UK	Germany	France	Italy	Nether-lands	Spain	Switzer-land	Sweden
10 year govt bond yield	4.6	5.1	4.4	4.5	4.6	4.5	4.3	3.1	4.3
Expected inflation	2.2	1.9	1.8	1.7	1.9	1.9	2.5	1.4	1.9
Real risk-free rate (r)	2.4	3.1	2.6	2.8	2.7	2.5	1.8	1.7	2.4
Expected real dividend growth (g)	2.9	2.4	1.7	2.1	1.5	2.2	2.8	2.7	2.8
Historic average dividend payout ratio	43%	53%	37%	45%	46%	47%	43%	28%	43%
Actual P/E ratio	17.7	13.9	14.3	14.7	16.6	11.7	21.0	18.1	13.7

The implied EMRP for each of these nine markets is shown in Table 19.

Table 19 - 'Breakeven' real dividend growth and equity market risk premia assumptions consistent with actual market valuations at the end of September 2007 (using constant growth DDM)

Country	Equity market risk premia (%)	
	Implied equity risk premia from DDM	Historic average equity risk premia
US	3.0	3.8
UK	3.1	4.8
Germany	1.7	2.7
France	2.4	5.3
Italy	1.6	3.0
Netherlands	3.8	5.6
Spain	3.1	5.4
Switzerland	2.5	5.2
Sweden	3.5	9.3

Appendix VII – Property equity betas

In this appendix we set out the equity and asset betas of some UK property companies to demonstrate the risk of property investment, relative to equity investment.

The beta value (β) was developed by the work of academics Sharpe and Litner in the 1960s which is still known as the Capital Asset Pricing Model (CAPM)⁶². They asserted that investors could cheaply diversify away much of the risk inherent in equity investment, through holding a diversified portfolio. The residual risk, also known as systematic risk, is therefore what determines the required return. β measures this risk – an asset with a high beta will require a higher return than an asset with a low beta.

Mathematically, β is calculated as:

$$\beta_i = \frac{\text{cov}(\sigma_i, \sigma_m)}{\sigma_m^2}$$

where β_i is the beta coefficient for stock i , σ_i is the standard deviation of the rate of return of stock i , σ_m is the standard deviation of the rate of return of the market and σ_m^2 is the variance of the rate of return of the market. The higher the covariance shared between the stock and the market and the stock, the higher β_i , while the higher the volatility of the market, the lower the β_i . More generally the above formula is the standard formula for the coefficient from an ordinary least squares regression, and hence the beta coefficient can be calculated using OLS estimation.

Equity betas are calculated from the market movement in share prices, but are increased by the use of debt finance which increase the volatility of equity returns. Asset betas reflect the underlying risk of the business assets and are calculated from the equity beta by adjusting it for gearing or leveraging of the company and therefore account for the inherent systematic riskiness of a company's operations. The average equity beta is by definition 1, but the average asset beta is around 0.7⁶³, assuming an average gearing of around 30%.

The table below presents the equity and asset betas for a range of property owning UK companies.

⁶² For a fuller explanation of the Capital Asset Pricing Model and beta, see: Ogier T, Rugman J and Spicer L, 2004 "The real cost of capital, a business field guide to better financial decisions", FT Prentice Hall

⁶³ The formula for unlevering is often referred to as the Harris Pringle unlevering formula: $\beta_e = \beta_a \left(1 + \frac{D}{E}\right)$ where D is the value of debt and E the value of equity.

Table 20 UK Property company equity and asset betas

Company	5 Yr Equity	5 Yr Asset	10 Yr Equity	10 Yr Asset
	Beta	Beta	Beta	Beta
Quintain Estates & Dev Plc	0.38	0.28	0.48	0.35
St Modwen Properties Plc	0.81	0.50	0.52	0.32
Daejan Holdings Plc	0.74	0.61	0.34	0.29
Grainger Plc	1.14	0.34	0.61	0.18
Capital Regional Plc	0.88	0.40	0.54	0.25
Unite Group Plc	0.70	0.30	1.00	0.43
Helical Bar Plc	0.64	0.59	0.64	0.59
Minerva Plc	0.99	0.50	0.92	0.47
CLS Holdings	0.73	0.22	0.51	0.16
Mountview Estates	0.34	0.31	0.45	0.41
Average values:	0.73	0.41	0.60	0.34

Source: Bloomberg, calculated using monthly betas over the five and ten year periods to October 2007.

Table 20 shows that property-owning companies have lower equity and asset betas than for the equity market as a whole⁶⁴ and supports our assumption that expected property returns should be lower than equity returns.

⁶⁴ This finding is further corroborated by the betas provided in the LBS Risk Measurement Service publication which shows that the equity beta as of Sep2007 for FTSE companies within the Construction and Materials sector is 1.05 and for companies within the Real Estate Finance sector is 0.88.

Appendix VIII – Bibliography

A. Goyal and I. Welch (2006), "A comprehensive Look at the Empirical Performance of Equity Premium Prediction", *Review of Financial Studies*.

Arnott and Bernsein (2002), "What Risk Premium is "Normal?", *Financial Analysts Journal*, Vol. 58, No 2.

Bali, R, and Guirguis, H. (2004), "An analysis of the equity risk premium", *Journal of Asset Management*.

Bank of England (2002), "Notes on the Bank Of England UK Yield Curves".

Bank of England, "Inflation Report Press Conference".

Barclays Capital (2007), "Equity Gilt Study 2007".

Bhanot, K. (2004), "What causes mean reversion in corporate bond index spreads? The impact of survival", *Journal of Banking and Finance*.

Brittan, S. (2005), "Why long-term bond yields are low", *The Financial Times*, 04/02/05.

Campbell J. (2007), "Estimating the Equity Premium", *NBER Working Paper 13423*.

Campbell, J. Y., and Thompson, S. B. (2005 and 2007), "Predicting the Equity Premium Out of Sample: Can Anything Beat the Historical Average?", *NBER Working Papers 11468*, National Bureau of Economic Research, Inc.

Derrig, R. A., and Orr, E. D. (2004), "Equity Risk Premium: Expectations Great and Small".

Dimson, E., Marsh, O., and Staunton, M. (2007), "Global Investment Returns Yearbook 2007 – synopsis", *ABN Amro Bank NV*.

Dimson, E., Marsh, O., and Staunton, M. (2005), "Irrational Optimism", *Financial Analysts Journal*, Vol 60.

Dimson, E., Marsh, O., and Staunton, M. (2006) "The worldwide equity premium: A smaller puzzle", *London Business School*.

Duke/CFO Business Outlook Survey - www.cfosurvey.org

Fernandez, P. (2006), "Equity premium: Historical, Expected, Required and Implied", *IESE Business School Working Paper 661*.

Franks, J. (2007), "Estimating debt betas".

Graham, J., and Harvey, C. (2005), "The Equity Risk Premium in September 2005: Evidence from the Global CFO Outlook survey", *Working Paper, Duke University*.

Greenspan, A. (2005), Testimony of Federal Reserve's Chairman before the Committee on Banking, Housing, and Urban Affairs, Board's semi-annual Monetary Policy Report to the Congress, *U.S. Senate*.

HM Treasury (2003), "Remit for the Monetary Policy Committee of the Bank of England and the New Inflation Target".

HM Treasury (2007), "Public Expenditure System: Guidance on Managing the Change in Discount Rates for Pension Liabilities".

Ibbotson Associates (2006), *The Risk Premia Over Time Report*.

Ibbotson, G. Roger, P. Chen (2003), "Long-run stock returns: Participating in the real economy", *Financial Analysts Journal* 59.

IPD (2007), "UK Property Investors Digest 2007".

IMF (2007), "World Economic Outlook", Chapter 5 (The Globalisation of labour), *Journal of Finance*, 50, 789-819

Franks, J. (2007), "Estimating debt betas".

Koszner, R. (2006), "Why Are Yield Curves So Flat and Long Rates So Low Globally?", Bankers' Association for Finance and Trade, New York

Mehra, R., and Prescott, E. (2003), "The Equity Premium in Retrospect", *Handbook of the Economics of Finance, Vol 1B*.

Mehra, R., and Prescott, E. (1985), "The Equity Premium: A Puzzle", *Journal of Monetary Economics, Vol 15*.

Nickell, S. (2003), "Two current monetary policy issues", *Bank of England Quarterly Bulletin*.

Office of National Statistics (2003), "The New Inflation Target: the Statistical Perspective".

Ogier T, Rugman J and Spicer L (2004), "The real cost of capital, a business field guide to better financial decisions", *FT Prentice Hall*.

PricewaterhouseCoopers LLP (2003), "Rates of return for FSA prescribed projection 2003".

Rose, A. K. (1988), "Is the real interest rate stable?", *Journal of Finance*, 43, 1095 – 1112.

Sekioua, S., and Zakane, A. (2007), "On the Persistence of Real Interest Rates: New Evidence from Long-Horizon Data".

Siege, J.J. (2002) "Stock for the long run", third edition, *McGraw Hill*.

Smithers & Co, (2003), "A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K".

Walsh, K. D., (2006) "Is the Ex Ante Risk Premium Always Positive? Further Evidence", *Australian Journal of Management Sydney; Jun*.

Appendix IX – Contact information

For further information please contact:

Name	Position	Tel. no.	E-mail
Peter Tompkins	Pensions partner	+44 (0) 207 804 3458	Peter.tompkins@uk.pwc.com
John Hawksworth	Head of macroeconomics	+44 (0) 207 213 1650	John.hawksworth@uk.pwc.com
Nick Forrest	Financial economist	+44 (0) 0207 804 5695	Nick.forrest@uk.pwc.com
Naz Naini	Financial economist	+44 (0) 207 213 3452	Nazanin.naini@uk.pwc.com

<http://www.pwc.com>



© 2007 PricewaterhouseCoopers. PricewaterhouseCoopers refers to the network of member firms of PricewaterhouseCoopers International Limited, each of which is a separate and independent legal entity. All rights reserved.



This publication has been prepared for general guidance on matters of interest only, and does not constitute professional advice. You should not act upon the information contained in this publication without obtaining specific professional advice. No representation or warranty (express or implied) is given as to the accuracy or completeness of the information contained in this publication, and, to the extent permitted by law, PricewaterhouseCoopers LLP, its members, employees and agents accept no liability, and disclaim all responsibility, for the consequences of you or anyone else acting, or refraining to act, in reliance on the information contained in this publication or for any decision based on it.

© 2007 PricewaterhouseCoopers LLP. All rights reserved. 'PricewaterhouseCoopers' refers to PricewaterhouseCoopers LLP (a limited liability partnership in the United Kingdom) or, as the context requires, other member firms of PricewaterhouseCoopers International Limited, each of which is a separate and independent legal entity. *connectedthinking is a trademark of PricewaterhouseCoopers LLP (US).

Comments of the Peer Reviewers

Comments of Professor Steven Haberman (Cass Business School)

The Financial Services Authority
25 The North Colonnade
Canary Wharf
London
E14 5HS

Review of FSA Projection Rates

I have been asked by the Financial Services Authority (FSA) to carry out an independent review of research commissioned from PricewaterhouseCoopers on the rates of return assumptions for the calculation of prospective future benefits for retail financial services products. In particular, I have been asked to provide my professional view of the following:

- Is the methodology adopted suitable?
- Are the data sources and research accessed reliable and appropriate?
- Is the analysis of the data relevant and appropriate?
- Are the conclusions fair and the opinions reasonable given the methodology adopted, data accessed and analysis undertaken?

My overall view is that the PricewaterhouseCoopers report is an informative piece of work that has been well researched and which addresses the specific terms of reference set by the FSA. I have commented in detail on the earlier draft of the report. My comments have focused on a number of issues including: the prospective time horizons adopted in the report and the issue of consistency; the data sources used, including the surveys of expert opinion that have been utilised; the academic research that has been used and cited; the analysis of the data; the assumptions made as part of the methodology adopted; and the arguments leading to the recommendations. The final version of the report has taken account of the majority of my comments. My overall assessment is that the methodology adopted is suitable, the data sources and research accessed are reliable and appropriate, the analysis of the data is relevant and appropriate, and the conclusions are fair and the opinions reached are reasonable.

One point that I would bring to the attention of the FSA for future consideration is the following: it is argued in paragraph 5.1.3 of the report that “specified generic rates of return should be dependent on the time horizon of the investment”. This is a point which I would fully support and would commend to the FSA for future consideration.

Yours faithfully

Steven Haberman FIA

Comments of Professor Peter Spencer (University of York)

Financial Services Authority
25 North Colonnade
Canary Wharf
London E14 5HS

13 November 2007

Dear Sirs,

Review of FSA Projection Rates

I have been asked by the Financial Services Authority to carry out an independent review of research commissioned from PricewaterhouseCoopers for their Review of FSA Projection Rates. I was asked to address the following:

- Is the methodology adopted suitable?
- Are the data sources and research accessed reliable and appropriate?
- Is the analysis of the data relevant and appropriate?
- Are the conclusions fair and the opinions reached reasonable given the methodology adopted, data accessed and analysis undertaken?

I have had the opportunity to comment on an earlier draft of this report and am satisfied that most of my comments and suggestions have been taken into account. I believe the methodologies, data sources and research accessed are reliable and appropriate for a review of this kind. The analysis is workmanlike and the conclusions are reasonable in the light of this analysis. My comments are therefore in the nature of observations rather than criticisms, and include suggestions for future work in this area.

Projecting rates of return over the medium term remains a hazardous business. However, this has been made much less risky in recent years by the monetary policy framework put in place to control inflation. This framework was modified in 2003 and in view of this I think it is sensible to revise the RPI inflation projection up from 2½ to 2¾ % as the Review recommends. The analysis set out in the Review is based on the original ONS and Bank of England analysis which indicated that the move to the new 2% CPI inflation target would raise inflation rates by around ¼%. This projection has been confirmed by recent experience. Reflecting this, the consensus of independent forecasters and the Treasury's recent Pre-Budget and Budget Reviews all put the medium term RPI projections at 2¾% while assuming that CPI inflation trends in line with the target, as shown by the lower panel of Table 5 of the Review.

Arithmetically, the ¼% increase in the projected inflation rate means that either the real projections of average earnings and investment returns must be reduced by ¼%, or the nominal projections increased by ¼%. Reflecting my comments on the earlier draft, the Review uses ranges for investment returns that accommodate this change at one limit while retaining the 2003 value at the other. For example, the previous point projection of 2% for real government bond returns is replaced by a range of 1¾% to 2%. Adding back the RPI inflation rate of 2¾% gives a nominal range of 4½% to 4¾ %, compared with the 2003 Report's recommendation of 4½%.

This range also helps to deal with the observation on page 14 of the Review that the difference between the 10 year conventional yield (of 4¾%) and the indexed gilt yield of (1¾%) is 3%. This is an estimate of the implicit RPI inflation expectation on the assumption that the Fisher equation holds (nominal return equals real return plus inflation). The problem is that it exceeds the recommended rate of 2¾%. The authors say that this could be due to an inflationary risk premium on conventional gilts (that would distort the Fisher equation). However, the new nominal range of 4½-4¾% accommodates the current conventional yield of 4¾%, while the new range of 1¾-2% for the real return accommodates the current real yield of 1¾%.

Having said that, I think that the Fisher approach is very problematic and would suggest that this problem should be addressed more rigorously in any future review. Moreover it is not clear that a

range of $\frac{1}{4}\%$ is appropriate for 10 year returns. Arguably the kind of statistical analysis conducted in the 2003 report to estimate the range of returns likely in the equity market is appropriate to any new ranges that are introduced.

Projections of real and nominal earnings growth are also highly uncertain at the moment, and in my view it would be appropriate to introduce ranges for these variables. The Review discusses a range of global influences bearing down on price inflation, but these influences and uncertainties are arguably more relevant in the case of earnings inflation. Even if the MPC successfully targets the CPI taking one year with the next, a ten year earnings figure will still be prone to systematic errors in forecasting GDP growth, labour's share and hence real earnings. Indeed, in my view, the globalisation of labour and its effect on labour's share of national income is a main risk factor for medium term macroeconomic forecasters at present.

The IMF (2007) paper provides an informed and authoritative analysis of these global effects. These help explain why it is that the rate of average earnings growth in the UK in recent years has been subdued, despite the strength of the recent expansion and the rise in the Tax and Price (TPI) index. In particular, various UK studies suggest that the influx of skilled workers from the new European accession countries since May 2004 has had a significant depressing effect on earnings. Indeed, the rate of average earnings growth since Q1 2004 has been marginally lower than since Q2 1997 despite the rise in CPI and RPI headline inflation (Review, Table 4). Real earnings growth has fallen despite the strength of the economy (Review, Table 6).

On this view, there is an argument for supposing that the rate of nominal earnings growth will remain at 4% despite the rise in RPI inflation, rather than increasing to $4\frac{1}{4}\%$ as the Review recommends. This would make a nominal range of $4-4\frac{1}{4}\%$ appropriate. Cumulative extrapolative residuals from an econometric wage equation might form an objective basis for this range in any future review. This might also reflect the dispersion of wage growth between different types of labour.

Equity returns are naturally very difficult to project. This difficulty is reflected in the paradigm shifts exhibited by the academic literature. The 1970s consensus was that equity markets followed a random walk with drift, but then in the 1980s and 1990s the literature suggested that excess returns could to some extent be predicted using valuation ratios like the dividend yield. Now the pendulum has swung back again.

Many finance economists and econometricians always remained sceptical of the proposition that excess returns to equity were predictable. Their ranks have recently been increased by the misleading signals sent out by the high valuation ratios seen during the millennium boom, which were expected to mean revert quickly but were remarkably persistent. This episode greatly reduced the ability of conventional in-sample regressions to predict returns (as the behaviour of equity markets in the post 1974 oil shock period had previously enhanced it). The basic lesson is that these regression equations are very unstable.

Indeed Goyal and Welch ('Predicting the equity premium with dividend yields', *Management Science*, 2003, 49, 639-654) demonstrate that these equations were unstable even before the recent breakdown and that out of sample tests would have indicated this much earlier. They also show that the dividend yield is now very close to a random walk, an observation that is very damaging to the predictability hypothesis since it means that these ratios no longer need to equilibrate through equity price or dividend adjustments. Goyal and Welch conclude that it is very hard to beat the historic mean excess return. This conclusion has been challenged by Cochrane ('The dog that did not bark: A defense of return prediction', DP, 2005, University of Chicago) as well as Campbell and Thompson (cited in the Review). The matter has still not been resolved, but the more recent paper by Goyal and Welch (also cited in the Review) provides a reasonable summary of the current state of play.

The Review follows the advice of Goyal and Welch and uses the historic mean return as the basis for projecting the expected real return, modified by survey evidence and forward-looking market indicators. I think this approach is sensible. The historical average real return naturally remains close (at 5.6%) to the average (of 5.4%) used as the basis of the 2003 Report, rising slightly as the market recovered from its trough in 2002 (Table 7). Excess returns (i.e. the EMRP) have however fallen slightly (on the Dimson, Marsh and Staunton measure at least) due to the better historical performance of fixed interest securities (Table 8), but remain higher than the range for the EMRP (3-

4%) in the 2003 Report. The Review recommends the same range for the EMRP as in the 2003 Report, but widens that for the real equity return in a downward direction (from 5-6% to 4³/₄-6%), reflecting the new range for real government bond returns. Adding the new RPI Inflation projection widens the band for the nominal return in an upward direction (from 7¹/₂-8¹/₂% to 7¹/₂- 8³/₄%).

As in the case of bond returns, these wider bands help accommodate movements in equity market indicators since the 2003 Report. I think they can also be justified by the uncertainty added by global factors, and in particular the effect these may (or may not) have on the division of national income between labour and capital.

One final quibble if I may. The report bases the projection of corporate bond returns on the markets for Credit Default Swaps and equities. However, these indicators provide only an indirect measure of corporate bond returns. Surely it is important to look at the behaviour of credit spreads themselves, which can behave differently. In particular spreads include a liquidity premium which is less obvious in CDS and equity markets. This has narrowed significantly in recent years, but could to widen out again in response to the current problems in credit markets.

Yours faithfully,

Peter Spencer.

Comments of Professor David C Webb (London School of Economics & Political Science)

Financial Services Authority
25 The North Colonnade
Canary Wharf
London E14 5HS

Review of FSA Projection Rates

The context of the Report is laid out clearly on page 9 with a review of the scope of the 2003 Report. The FSA believes that the methodology adopted by PwC in 2003, incorporating the previous peer reviewers' comments, is robust, and the present Report is a review of the relevant values arrived at in 2003. The scope of the Report is clearly defined on page 10 and is consistent with the terms of reference. In determining the rate projections the FSA requires that they are suitable for particular managed funds and open with-profits funds for their typical asset mix.

I was asked to address the following issues:

- Is the methodology adopted suitable?
- Are the data sources and research accessed reliable and appropriate?
- Is the analysis of the data relevant and appropriate?
- Are the conclusions fair and the opinions reached reasonable given the methodology adopted, data accessed and analysis undertaken?

My overall impression is that this is a well-argued and well-written report. The final version of the report has addressed a number of specific technical concerns that I had on an earlier draft and so these are not repeated in this report.

The body of the Report concerns projections for price and earnings inflation, government and corporate bond returns, equity returns (in particular the equity risk premium), property returns and the asset mix of retail investment products. These are the key ingredients of the intermediate return assumption. Although this typically excludes corporate bonds and property from the asset mix. The projection horizon is 10 to 15 years, which is well justified. This is both a realistic upper bound on the horizon for investment holdings, as well as being a horizon for which we can have some confidence in the projections. Longer horizon projections would be subject to high levels of uncertainty due to potential structural breaks and so on.

Section 3 of the Report discusses the macroeconomic assumptions underlying the price and earnings inflation projections. The Report considers the implications of a shift in December 2003 to the CPI as the basis for the MPC target rate of inflation. The Report gives a fairly detailed discussion of the differences between the RPI and the CPI. This is done on the basis of an historical assessment. Housing effects are documented to be important. The Report assesses the likely difference between inflation measured in the two indices. The Report relies on the Bank of England's own estimates to arrive at a figure of 0.8% broken down to reflect geometric versus arithmetic averaging (0.5) and the housing effect (0.3). A statistical analysis of this number and its decomposition is important. The present report refers to Bank of England and Treasury research. However, it will be important to track the co-movements of the two indices as this will be important in arguing for a fixed difference between the two inflation rates, rather than a range, and the choice of one index versus the other for calculating investment returns. Indeed I think it would be worth having this research undertaken and incorporated in the next FSA Projection Report.

Given a CPI target of 2% per annum, the 2003 Report argued that this corresponds to a 2.5% RPIX target. The CPI is closer to the cost of living and has the advantage of comparability across the EU. However, as the Report notes, indexation rules for pensions and some bonds are based on the RPI. The Report argues perhaps too briefly, without looking too much into the future that we should stick with the RPI index. The point is well taken. However, there are good arguments for using the CPI as the relevant measure for determining real earnings growth. Moreover, if the CPI is the basis for the monetary target, it is the headline rate and is more likely to be the basis for individuals' formation of inflationary expectations as well as their direct exposure to prices.

The Report does address whether the inflationary expectations measured in the RPIX have been affected by the change in the target rate. This partly relates to whether the RPIX premium over the CPI is stable and how it behaves. The basic approach here is to look at data on nominal and index linked 10-year government bonds. The indexation is to the RPIX data. The RPIX index inflation was constructed using the Fisher equation without an inflation risk premium. This is probably all right as this effect is very small in economies like the UK with low and fairly stable inflation. The analysis is graphical and shows no evidence of a structural break in December 2003 or indeed at the June 2003 change-announcement date. The data suggests an average rate of expected RPIX inflation of 3%. As is pointed out this could be due to a supply effect in the bond market but I doubt that there is much reason for inflation expectations to co-vary with lack of supply in this way. It would have been nice to say something about the history of this effect since monetary targeting started. I would recommend that this issue could be considered in the next FSA Projection Report.

There is some brief discussion of Independent and Treasury Inflation forecasts as opposed to analysts' expectations. The forecasters see inflation peaking this year at 3.2% before dropping to 2.7% next year, 2.6 in 2009 and 2010 and rising slightly in 2011. The table does show the range of forecasts, which is useful. The average rate over this period is 2.75%, which is in line with the official target.

The analysis gives a brief but useful discussion of the medium term risk factors that may cause structural breaks in these expectations. One is the continued credibility of the MPC, which there is no current reason to doubt. A second is a general relaxation in anti-inflation standards by the FED and the ECB, which does not look likely. There are also exogenous factors that have led to a benign global inflation environment as well as current UK labour market conditions that are likely to be with us for some time. I am comfortable with the overall balance of the risk assessment here. The commentary on the price of imports from China for example is important. Of course there could be another Middle East war or other major incident threatening oil supplies, which could change the international outlook on inflation with implications for the UK. However, the MPC has performed its job well in a world of rising and volatile oil prices.

Given the arguments presented and information available I am not unhappy with 2.75% as the projection for expected inflation. I had requested a confidence interval for this projection and that number is now reported as the central estimate of a 0.5% range.

The analysis of earnings inflation is pretty simple. It looks at earnings including and excluding bonuses. The raw data are presented in a graph, which shows average earnings growth for the two series being volatile but less so of late. No time-series analysis is provided. However, the evidence seems to suggest that extrapolating the mean from this data is probably fine. This gives an average for nominal earnings growth including bonuses of 4.0%. However, the Treasury estimate of real earnings growth over the last cycle is 1.5%, which adding to the inflation projection of 2.75% yields nominal earnings growth of 4.25%. This is taken to be the best estimate of nominal earnings growth over the next 10 to 15 years. This means that both earnings growth and inflation are expected to be remarkably stable. The report now includes a useful commentary on page 20 on the economic justification of this projection including a range for the reported estimate.

Section 4 considers Asset Mix. The Report gives a compact but effective evaluation of the principal determinants of asset mix. Here the focus is on balanced funds (managed and pension funds) and with-profits funds. There is analysis of the changes in the holdings of pension funds over the period 1962 to 2006 based on UBS data, which notes the major trends. Figure 4 contains a lot of information and does a good job. The Report notes that the apparent stability of the percentage of funds invested in equity masks a continuing decline in equity holdings compensated by increases in prices during the bull market of 2003-2007. The Report argues that the typical balanced fund is 65% to 70% equities and the remainder mostly bonds. Moreover, it tentatively concludes that this is likely to remain stable (for projection purposes). With-profits funds vary in their asset allocation and no typical asset mix is given. Here some analysis of the distribution of asset mix would be useful. Chart 5 shows an interesting fact that for this set of funds the equity share has declined but remained stable since 2004. This is now discussed in the text. It would be interesting to know the within sample distributional properties for a range of with-profits funds, however, this may not ultimately add much to the Report if, as argued I believe correctly, no general intermediate rate for this type of product can be set.

The conclusion of this section gives an accurate summary of the key findings but I think it would also be useful to have a clear (very simple) statement of what the implications are for the asset mix in determining the intermediate rate. That is to stick with the assumption in the 2003 report. However, I note that this is qualified later when the present Report considers adding corporate bonds and property to the benchmark portfolio.

Section 5 considers Investment Returns. The first class of assets is government bonds. In the 2003 Report a real rate of interest of 2% per annum was proposed. This was based on the yield to maturity of index linked government bonds. This was based on a pretty flat yield curve. The yield at the time of the present Report on 10-year index-linked government bonds is 1.75%, which is above the average rate since the last Report. I agree that there are some puzzling features at the longer end of the yield spectrum-due to maybe demographics, pension fund matching and savings in Asia. There may also be liquidity factors as we move out along the curve. In earlier correspondence I had asked for a comparison with what we obtain from the non-indexed gilts using the Fisher equation and the 2.75% expected inflation rate. This is now presented and results in a real rate of 2%. On this basis and with a sound methodology, the Report states a range for the real rate of 1.75% to 2%. The proposed figure for the projection is the lower rate and I am comfortable with this.

Next the Report considers equities. The 2003 Report gave a great deal of attention to the equity premium and concluded that it should be set at between 3% and 4%. That report set the projected (expected) equity premium below the historical equity premium. This report takes the material reviewed in the 2003 Report as read and examines additional academic research and survey evidence. The Report argues that from work by Dimson et al (LBS), Goyal and Welsh and Smithers that we do not have robust forecasting models of the equity premium. The Report relies on US survey data (Harvey and Graham) and a PwC survey (details in Appendix V). In both cases there is only limited information in the Report on for example sample size, forecasting horizon in the questions and descriptive statistics. Historically the US equity premium has been higher than the UK, yet this is reversed in the recent questionnaires that give expected risk premia. Although Figure 13 shows that the consensus estimate has been trending upwards as has also been the case in the US survey. We can of course have only have limited confidence in such volatile estimates of a long-run object like the equity premium. The volatility of the forecasts suggests a lot of noise so that there may be an argument for some time-averaging here. However, as a wide confidence interval is reported that may be enough here.

The dividend discount model is essentially treated as an identity, which given the dividend yield, the growth rate and the real rate of interest is used to back out the equity premium. The report now makes clear the strong assumptions that underlie this particular exercise. However, it is not a forward-looking estimation technique, that would require a proper statistical (econometric model). Appendix V1 gives a detailed and very useful international comparison of the DDM forecasts with historic risk premia, which shows them to be systematically relatively low. I am concerned that this may suggest a bias but that would need to be established using a statistical model.

The extended discussion of international comparisons of equity premia is well done and very useful. This is particularly important given the increased globalization of equity markets and the increased importance of international equities in managed funds.

Although I am not comfortable with the survey findings, given that the last report agreed that 3.5% was about right, I am happy with the projection. If anything were to change I would raise this to 4%. I note that the cautionary remarks of David Miles on the 2003 estimates were taken on board in the 2003 Report; also the projection is not out of line with the findings of Campbell (2007). It is particularly important to report a range here; the 1% range reported given our lack of confidence in these estimated is I think the minimum acceptable.

The Report then considers corporate bonds. Figure 14 compares the returns on portfolios of UK corporate and government bonds. Footnote 47 gives a helpful explanation of what these portfolios are so that we can see what are being compared. Figure 15 gives a clear picture of historic corporate bond spreads. The discussion of what is going on here is much clearer than in the earlier draft. I also find the discussion of the credit-default swap data useful. The section also includes an informative and cautionary discussion of the narrowing of spreads before the recent credit crunch. I am happy, on

the basis of this sound analysis with a spread for BBB over gilts of 0.75%-1%. I am happy with the conclusion drawn in the last paragraph of this sub-section.

The final asset class considered is property. This is much improved over earlier versions. Figure 16 shows that commercial property returns can be broken down into rental income and capital growth. The latter accounts for most of the volatility in total returns. Returns on property since 1981 have been high. The Report argues that the future will be more subdued with less capital growth. The Report now includes some limited discussion of real estate price growth projections.

On the basis of a beta analysis in Appendix VII it is argued that the property sector asset beta is about 0.4 so that expected returns on this asset class should lie between Gilts and equities with a 2% premium over Gilts. This is supported by ABI risk classification- a simple number classification. In future it would be useful to draw on some serious real estate valuation and return projection models-if they exist?

I am not sure what confidence we can have for using the CAPM to calculate expected returns on this asset class. Clearly there could be something missing such as a liquidity risk premium. A serious cautionary note should be sounded and range reported for the 2% above gilts assumption. I believe that more research needs to be done in understanding the nature of returns for this asset class and that the FSA may well ask for this to be undertaken for the next Projections Report.

The final part of section 5 considers 10-15 year projections. I am happy with the recommended assumptions in Table 12 but I would (as a lone voice) favour the upper-bound on the equity premium. This yields an intermediate assumption of 6.5%, (the same as in the 2003 Report but 0.5% below the 7% used by the FSA. This should be pointed out and explained. The extension of the analysis to consider the impact of including 10% corporate and 10% property in the asset mix on the intermediate rate is useful.

Section 6 considers Tax Effects. The discussion here is very clear and seems to have been executed very well. The focus is on mixed funds with 2/3 equities and 1/3 bonds. The rates vary depending upon the projected return for equities, ranging from 11.5% to 5.5%. The rate of churn plays an important role in the calculations; I assume that this is the known average for a typical balanced fund. I am happy with the conclusions.

The conclusion presents the three main questions asked and provides three simple answers that are given in the text. These are consistent with the general view that we are for the time being in a relatively stable world and that no evidence has arrived over the last four years to merit significant revisions of the projections. The changes made do not affect the intermediate rate of return assumption, which remains at 6.5% (0.5% higher than the FSA intermediate rate). In section 7 question 3 the tax adjustments are made to the prevailing FSA rates not the 6.5% proposed. This should be clarified.

My overall assessment is that this is an excellent report, which addresses the questions asked in a clear and professional way. At all stages the methodology is sound making good use of available and accessible data sources, academic and market research. The Report is well structured and clearly written. All conclusions are reached on the basis of sound economic reasoning in a balanced and measured way and are reasonable given the methodology adopted, data accessed and analysis undertaken.

David C Webb

The Financial Services Authority
25 The North Colonnade Canary Wharf London E14 5HS
Telephone: +44 (0)20 7066 1000 Fax: +44 (0)20 7066 1099
Website: <http://www.fsa.gov.uk>

Registered as a Limited Company in England and Wales No. 1920623. Registered Office as above.