Pension Protection Fund

PPF Long-Term Funding Strategy Update

November 2011

1 Foreword

In August 2010, we published our funding strategy which, for the first time, set out how we intend to have the financial resources needed to pay existing levels of compensation to current and future PPF members – and become financially self-sufficient by 2030.

As well as being fully-funded, we want to eliminate our exposure to interest rate, inflation and other market risks. We also want to build a reserve – or buy hedging instruments – to protect ourselves against future claims and the impact of members living longer than we estimate.

Our latest assessments show that the probability of achieving self-sufficiency measured on our base case has improved from 83 per cent in March 2010 to 87 per cent in March 2011. This represents a good margin above the comfort level expressed by the Board last year. It is therefore a timely cushion against the effects experienced in the period since March 2011 which has seen pension scheme deficits (and therefore the likely size of claims on the Fund in the near future) increase considerably.

But while we believe we remain on track to meet our aims, we have always said that we would monitor our funding strategy to make sure it remains fit-for-purpose and reflects any new factors which may affect its chances of success.

This document is the first formal review we have carried out since we launched the strategy and it takes into account two developments, in particular, which have influenced our thinking when carrying out this review. They are:

- the new pension protection levy framework due to take effect in 2012/13, and
- the switch from using the Retail Prices Index (RPI) to using the Consumer Prices Index (CPI) for the indexation of our compensation.

In adjusting our risk modelling to reflect these changes, we have carried out a thorough analysis of the implications for the PPF and concluded that, while we have taken into account new factors, our ultimate targets remain the same.

Therefore, we believe this will give all our stakeholders, including members and levy payers, the confidence that we remain on track to meet our long-term funding aims – which can only benefit us all.

Martin Clarke,
Executive Director for Financial Risk

2 Summary

2.1 The PPF published its long-term funding strategy in August 2010. At the time it was noted that the strategy was not static, and that the modelling and risk metrics would be updated regularly to reflect the latest position. We believe it is now an appropriate time to update the strategy. Accordingly, we have updated the research presented in August 2010 to reflect our position as at 31 March 2011.

2.2 A key motivation is the development of the new levy framework, which will change the methodology for calculating PPF levies from 2012/13 onwards. Alongside developing the new framework, we have upgraded our modelling to reflect the new formulae that this entails.

2.3 We have also adjusted our risk model to reflect the recent legislative changes in relation to using the Consumer Prices Index (CPI) as the measure of indexation (both PPF compensation as well as some of the wider pensions universe). The August 2010 Funding Strategy contained an illustrative sensitivity for CPI; we have now carried out a more thorough analysis of the implications upon PPF and incorporated appropriate CPI assumptions into our base case.

2.4 The remaining sections of this document are listed below:

Section 3	Recap of the PPF's funding strategy
Section 4	Changes since the funding strategy was set
Section 5	Review of the funding objective
Section 6	Updated assumptions
Section 7	Modelling output
Section 8	Sensitivity of output to assumptions
Section 9	Assurance and future development
Annex	Further detail on modelling

3 Recap of the PPF's funding strategy

3.1 The PPF announced its funding strategy for the first time in August 2010 in the paper 'PPF Long-Term Funding Strategy':

http://www.pensionprotectionfund.org.uk/DocumentLibrary/Documents/PPF_Funding_Strategy_Document.pdf

3.2 Our funding objective is to target a state of self-sufficiency by 2030, where self-sufficiency means a level of assets 10 per cent in excess of our liabilities. The 10 per cent margin is to cover the risk of longevity improvements greater than our best estimate, and also the residual risk of future claims. The year 2030 is chosen as being the time at which the level of risk from future insolvencies is projected to be relatively low compared with the size of the PPF.

3.3 Two risk metrics were devised in order to monitor our progress against the funding objective - the 'probability of success' and the 'downside risk'. The probability of success measures our chance of being self-sufficient at the chosen time horizon, and the 'downside risk' is our greatest deficit over the period measured at the 90^{th} percentile (so in 10 per cent of modelled scenarios the PPF deficit reaches at least the level of our downside risk at some time during the period).

3.4 We have developed the PPF Long-Term Risk Model (LTRM) to measure our progress against the funding target. The LTRM generates an extensive range of asset return, insolvency and longevity scenarios over a chosen time horizon, and on this basis projects a distribution of possible PPF balance sheet outcomes. Stochastic analysis, also termed 'Monte Carlo' analysis, involves the use of a random process to generate a large number of scenarios for a given variable over time. The technique is already widely used in the financial services industry. Its primary advantage (over deterministic or 'single point' forecasts) is the generation of a distribution of outcomes. This permits assessments of the likelihood of specific, usually adverse, outcomes.

3.5 As with any financial or economic model, it is important to exercise an appropriate degree of caution when analysing LTRM output. Economic models are not infallible; there is no guarantee that future outcomes will conform to dynamics observed in present and past data. In order to assess the level of model and parameter risk the PPF carries out multiple runs to test the sensitivity of the output to changes in key assumptions (see section 8). The PPF also carries out runs under alternative scenarios.

4 Changes since the funding strategy was set

4.1 Over the last year there have been two significant changes that impact upon the PPF and upon the pension schemes that we protect.

New Levy Framework

4.2 One significant development is the move to the new levy framework, an overview of which is available in the policy statement:

http://www.pensionprotectionfund.org.uk/DocumentLibrary/Documents/levy_policy_statement_May11.pdf

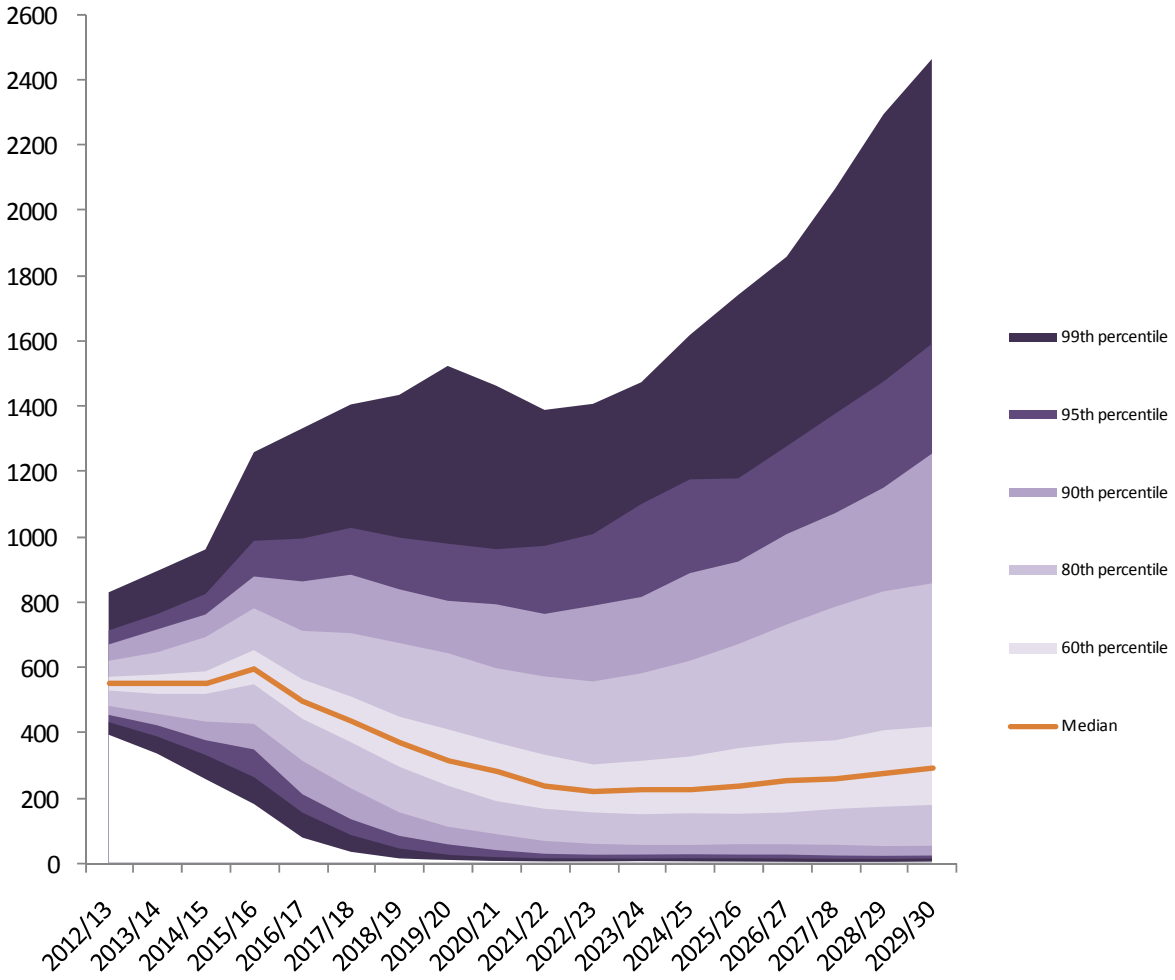
4.3 Previously our model allowed for a constant levy in nominal terms; for example £700m pa was used in last year's funding strategy. This reflected the 'top down' approach in which the PPF would decide upon the levy that it deemed appropriate in a given year, and then set the levy parameters accordingly on an annual basis. The new framework however is a 'bottom up' approach in which the intention is that the parameters will be fixed for three years and, ideally, remain stable between each three-yearly review.

4.4 To reflect this change, we have adjusted our model to accommodate a framework of fixed levy parameters. This allows us to observe how the levy would change in different economic circumstances, if the levy parameters were to remain constant indefinitely. In practice, the Board will monitor levy estimates closely, with the intention of keeping parameters fixed for three years. We have modelled the constraints of the legislative ceiling and the maximum year-on-year change of 25 per cent.

4.5 One notable feature of the new framework within our model is that levy collection is responsive to changing economic circumstances. This is because the levy is explicitly linked to funding levels of the levy-paying schemes. For example if in a particular scenario in our model there are sustained high bond yields causing high levels of funding then the levy collection in that scenario will be correspondingly lower than average.

4.6 The following fan chart illustrates this feature, by showing the projected range of levy collections over the period to 2030. The expected collection in 2012/13 is £550m (please note this amount may change as a result of the 2012/13 levy consultation) and the amounts in future years are shown in nominal rather than present day terms.

Chart 1: Range of possible levy amounts up to 2030, targeting a starting levy of £550m



4.7 The above chart illustrates the wide dispersion of possible outcomes for the PPF levy. This stems from the uncertainties both in the funding levels of DB pension schemes and in the prospects for insolvencies that may lead to claims on the PPF.

Consumer Prices Index (CPI)

4.8 The other significant development over the year was the change to legislation which indexed PPF compensation (before and after retirement) by reference to CPI, rather than by reference to the Retail Prices Index (RPI) which was the case previously. A similar change was made to the legislation governing occupational defined benefit pension schemes, and we have considered the implications of this on the wider pensions universe.

4.9 Another consideration is the effect that CPI has upon our hedging programme. We have, in common with some private sector pension schemes, an investment policy whereby we seek to immunise the Fund against unexpected changes in inflation. With the market for CPI investments being relatively limited we have considered the implications of this policy upon our balance sheet.

4.10 We address the treatment of CPI in more detail in later sections.

5 Review of the funding objective

5.1 The time horizon of the funding strategy was set last year to be the year 2030. We chose this after considering projections of annual claims on the PPF as a proportion of the size of PPF liabilities. We continue to believe that this is an appropriate time horizon because by 2030 the level of residual risk in the DB universe will be small relative to the PPF. While we are currently projecting smaller deficits in 2030 than we were projecting last year (largely as a result of the move to CPI described above) we are also projecting a smaller PPF. Furthermore, there is nothing fundamentally different about the broad occupational defined benefit pensions landscape that makes us think 2030 is no longer appropriate. We have therefore retained 2030 as our time horizon, although this will be kept under review. For example a resurgence of defined benefit pension provision would certainly push out the time horizon of our funding strategy. On the other hand an unexpected increase in pension scheme de-risking would be likely to shorten it.

5.2 Turning to the 10 per cent margin over liabilities for self-sufficiency, there is an argument that this could be increased to reflect the greater uncertainty that has arisen as a result of the move to indexation of PPF compensation by reference to CPI. Previously we made the assumption that the market in RPI-linked instruments was large enough for us to hedge almost perfectly the inflation risk we carry on our liabilities. The case could be made for increasing this 10 per cent margin to reflect the fact that CPI inflation risk cannot currently be hedged in this way.

5.3 However, as described in the next section, we make the assumption that a market in CPI instruments will develop before 2030 and that it will be sufficiently large and liquid for us to remove our inflation risk sufficiently well. We have therefore decided to retain the 10 per cent margin.

5.4 In summary, our funding objective remains the same as before: to target a level of assets at least 10 per cent in excess of our liabilities in the year 2030. Our key risk metrics, also, are unchanged – i.e. the probability of being self-sufficient at our chosen time horizon, and the measurement of our downside risk.

6 Updated assumptions

6.1 The principal modelling assumptions are described in the Annex to this document. Some of these have been updated since the August 2010 publication of our funding strategy, and these are described below.

6.2 Projections of CPI

6.2.1 As described above in section 4, recent legislation has changed the PPF's inflation measure from RPI to CPI. We have therefore developed an econometric model which produces scenarios of CPI for use in our modelling. In our base case model the annual increase in CPI is on average 1.1 percentage points lower than for RPI.

6.3 A market in CPI-linked investments

6.3.1 As well as assuming that future realisations of CPI will on average be lower than RPI, we also assume that market-implied levels of inflation will be lower for CPI than for RPI. Or to express this another way, we assume that CPI-linked investments will have higher real yields than otherwise equivalent RPI-linked investments.

6.3.2 There is currently hardly any market in CPI-linked investments, although the UK government is currently considering whether to issue bonds linked to CPI (a Debt Management Office consultation on this closed on 22 September this year). It is possible that the issuance of such bonds might serve to stimulate development of a wider market, but at this stage the prospects remain uncertain.

6.3.3 In our base case model a market in CPI-linked investments develops over the next decade, which is modelled for simplicity as instantaneous emergence in five years, and settles such that the level of market-implied annual CPI is on average 0.9 percentage points lower than market-implied RPI. Note that this gap in market-implied levels of inflation is slightly lower than the 1.1 percentage point gap in the levels of 'real world' inflation referred to in 6.2.1. Such a difference would be consistent with the inflation risk premium being higher for CPI-linked investments than for RPI.

6.3.4 The next two sections set out in detail why a market in CPI investments is of significance to our funding strategy. Since these are material assumptions we have investigated the sensitivity of our funding metrics to the assumed emergence of such a market, and to the level and timing of its emergence (see section 8 for one such sensitivity).

6.4 Actuarial bases

6.4.1 There are three sets of actuarial assumptions, or 'bases', that we use in our modelling. There is our internal valuation basis used to assess the PPF's liabilities for our Annual Report and Accounts, the basis used to determine whether a scheme should be granted entry to the PPF ("Section 143" basis) and there is the basis used for levy purposes ("Section 179" basis).

6.4.2 A fundamental feature of these bases is that they use the 'market value' method. What this means on the liability side of our balance sheet is that the discount rates used to convert projected future cash flows into present day terms are set by reference to current market rates. As noted in the actuarial valuation included in our 2010/11 annual report and accounts, which is available on our website at http://pensionprotectionfund.org.uk, there is hardly any market in CPI investments at present, and what information we have from insurance companies suggests that there is no difference in the pricing of CPI-linked annuities relative to RPI-linked annuities.

6.4.3 The implication on our funding strategy, therefore, is that our liabilities – as well as the liabilities used for PPF entry and levy calculations – should decrease when a CPI market emerges. As noted in 6.3.4, we have carried out an investigation into the materiality of our assumptions concerning such a market.

6.5 The PPF's inflation hedge

6.5.1 The PPF seeks to remove inflation risk from its balance sheet by investing in inflation-linked assets, including a large portfolio of cash flow swaps. When our compensation was linked to RPI our investment arrangements were sufficiently extensive to remove a significant amount of our inflation risk. An increase in inflation, for example, would lead to an increase in our asset value broadly equal to the increase in our liability value.

6.5.2 We cannot hedge out our inflation risk in this way so precisely now that our liabilities are linked to CPI, as there is not a significant market in CPI-linked investments. Until such a market develops, we will continue to manage our inflation exposure through the use of RPI-linked investments albeit at a lower level to reflect our expectation of RPI increases being higher than CPI. Since CPI and RPI are not expected to move in tandem this brings volatility to our balance sheet that is captured in our modelling.

6.6 Other assumption changes

6.6.1 We have taken a look at the actual experience of insolvency proceedings and, despite a recent reduction in the level of recoveries,

we have increased our assumption of the levels of future employer debt recovery as we believe our previous assumption was too low.

6.6.2 We have investigated the trend towards the closure of pension schemes, as shown in the recent PURPLE book as well as in the latest NAPF survey, and strengthened our assumption so that schemes will close to new entrants over the next decade (which we have implemented for modelling simplicity as a sudden closure in 2016). Previously we assumed closure over a shorter period of four years rather than ten.

7 Modelling output

7.1 In our base case model the assessed probability of achieving self sufficiency by 2030 has improved from 83 per cent to 87 per cent[1] over the period from March 2010 to March 2011.

7.2 To set this in context, the Board of the PPF stated last year that it was comfortable with the overall outlook for risk in circumstances in which the probability of success was greater than 80 per cent. As we are now one year closer to 2030, the equivalent comfort level is now closer to 81 per cent.

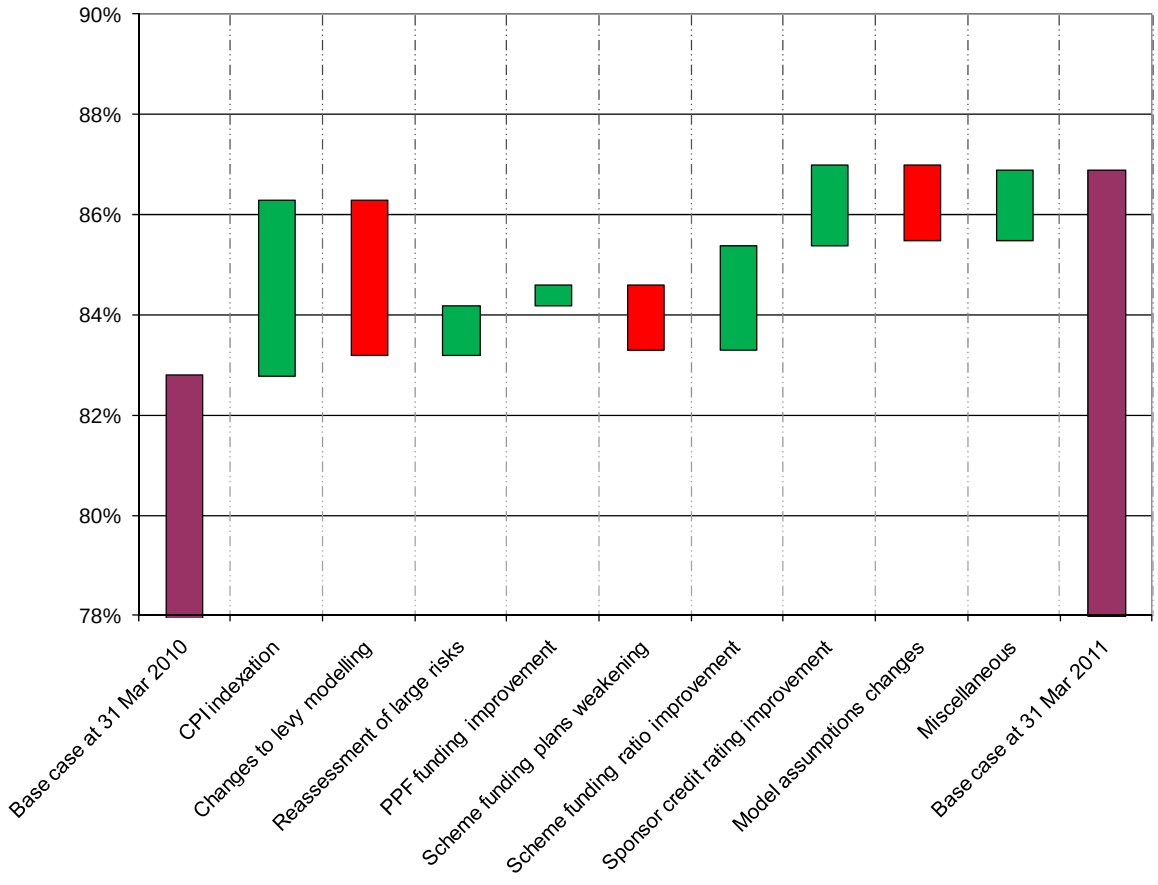
7.3 The corresponding downside risk statistic, the 90th percentile of largest deficits to develop in each of the 500,000 scenarios, is £7 billion. This statistic provides an indication of the severity of adverse balance sheet outcomes. Such a deficit is unlikely to arise in practice, given the potential for changes to levy and investment strategy should financial conditions deteroriate.

7.4 The downside risk is much lower than it was last year (£14 billion) for a number of reasons. The move to CPI is a major reason, as is the reassessment of the risk posed by some of the largest schemes.

7.5 The following waterfall chart reconciles the probability of success at 31 March 2011 with the position one year earlier. Green bars denote improvement and red bars denote deterioration of the probability of success compared with the position as at 31 March 2010.

[1] On the basis of a levy target of £550m in 2012/13

Chart 2: Reconciliation of position at 31 March 2011 with one year earlier



7.6 Chart 2 shows that the most significant contribution to the improvement in our probability of success comes from the adoption of CPI as the reference index for PPF compensation increases. This factor added 3.5 percentage points, which is the net impact of a number of effects.

The main positive financial impacts are:

- the amount of PPF compensation is expected to be lower
- when a CPI market emerges the actuarial bases will weaken (see section 6.4.3) leading to a reduction in liabilities

Offsetting this are:

- the reduction in levy collections as a result of the levy formula recognising smaller scheme deficits as a CPI market develops
- there is extra volatility in the PPF balance sheet until a market in CPI develops, which leads to fewer projected scenarios in which our funding level is above the 110 per cent target.

7.7 Here is a brief description of what the other bars represent:

- Changes to levy modelling - the 83 per cent base case probability at 31 March 2010 was on the basis of a levy assumption of £700m per annum in fixed terms. Our model now reflects the new framework in which the levy is responsive to changes in economic conditions and a lower estimate (£550m) for 2012/13.
- Reassessment of large risks - we have refined our assessment of the risk posed to us by a handful of the largest schemes, improving our probability of success by 1 percentage point.
- PPF funding improvement - our funding level as at 31 March 2011 is 105.1 per cent, a little higher than the funding level of 103.3% at March 2010. This improves our probability of success by around 0.4 percentage points.
- Scheme funding plans weakening - data from the Pensions Regulator indicates that scheme funding plans have weakened since last year. In particular, the average recovery plan length has increased. Our base case assumption is that this revised level of funding plans continues so this has worsened our probability of success by 1.3 percentage points.
- Scheme funding ratio improvement - the funding ratios of PPF-eligible schemes are higher at 31 March 2011 relative to 31 March 2010. Furthermore, we now reflect the slightly weaker mortality improvement assumption adopted for the first time in our 2010 valuation. These effects combined serve to improve our probability of success by 2.1 percentage points.
- Sponsor credit rating improvement - we capture future insolvency events by modelling the transition of sponsors between different credit ratings (with movement into the 'default' rating triggering a potential insolvency event). The position for credit ratings at 31 March 2011 is stronger than at 31 March 2010, as a direct result of rating agencies having a more optimistic view of companies' prospects. This has improved our probability of success by 1.6 percentage points.
- Model assumption changes - the Board adopted a number of minor changes to model assumptions this year, the net effect of which is to lower the probability of success by 1.5 percentage points.

7.8 We have a miscellaneous balancing item of 1.4 percentage points. Part of the reason for this is that the effects mentioned above have been assessed holding the other factors constant, whereas in reality they are not additive. This item therefore represents the impact of combining the various items above, as well as minor changes to our investment strategy and refinements in the model's implementation.

7.9 The final bar in the chart depicts our most recent base case probability of success, which is 87 per cent on the basis of an estimated levy for 2012/13 of £550m.

8 Sensitivity of output to assumptions

8.1 The modelling output has been tested for sensitivity to an extensive range of modelling assumptions. A selection of sensitivity tests is presented in Table 1 below.

Table 1: Sensitivity of results to key assumptions

	Change in assumption	Probability of meeting funding objective	Downside Risk[2]
A	Base case	87%	£7bn
B	Initial scheme funding increased by 15 percentage points	89%	£4bn
C	Length of scheme recovery plans doubles	85%	£8bn
D	1 percentage point reduction in asset returns (except cash and government bonds)	78%	£13bn
E	No market in CPI investments emerges (and we continue to target a 10% reserve)	85%	£14bn
F	Target levy for 2012/13 reduced by £100m	85%	£8bn
G	Initial PPF funding reduced by 10 percentage points	83%	£9bn
H	Sponsor insolvency probabilities increased by 20%	86%	£8bn
I	Scheme Technical Provisions reduced by 10% (relative to S179 basis)	83%	£9bn
J	No funding margin for longevity and credit risk (i.e. target 100% rather than 110%)	92%	£7bn

8.2 Some of these sensitivities are broadly unchanged from their 31 March 2010 levels as described in the August 2010 Funding Strategy document. We discuss key changes below.

[2] Downside risk measures the worst possible deficit in any year, and the figure quoted is the 90th percentile of the distribution. So in 10 per cent of the scenarios we have a deficit at least as large as the figure quoted here.

8.3 Sensitivity B: our assessed sensitivity to an improvement in initial scheme funding levels is materially smaller than was the case previously. This is because we now model how the levy would automatically respond to improved (or worsened) scheme funding levels. Disaggregating the two effects, if scheme funding improved by 15 per cent overnight, then our probability of success improves by 4 percentage points to 91 per cent, however this would feed through to a dramatic reduction in the levy collected to compensate, bringing the probability of success back down by 2 percentage points to 89 per cent.

8.4 It is worth noting that we would not expect this sensitivity to be symmetrical, insofar as a 15 per cent worsening of scheme funding would reduce probability of success by around 3 percentage points.

8.5 The most recent PPF 7800 update shows that the funding level of DB pension schemes at 30 September 2011 is around 20% lower than at 31 March 2011. However, in our base case modelling we smooth funding levels over the previous twelve months (to smooth out the impact of short-term changes in scheme funding levels) and the smoothed funding level at 30 September 2011 is in fact the same as that at 31 March 2011. Therefore the impact on our funding metrics of recent movements in scheme funding is negligible. However, if the current very low levels of funding were to persist, our base case probability would be reduced by around 3%. This ignores the possibility that we might amend our long-term economic expectations

8.6 Sensitivity C: the sensitivity to scheme recovery plan lengths is also smaller than previously calculated. This is partially the result of the dampening effect of levy described above, but is also affected by smaller projected deficits arising from the introduction of CPI. This is because doubling recovery periods has less of an effect on PPF outcomes when the deficits being recovered are smaller.

8.7 Sensitivity D: both the probability of success and downside risk remain highly responsive to assumptions concerning asset performance. In the event of subdued growth in asset prices, the Fund cannot rely on investment returns to recover the deficit on incoming claims. This effect is compounded by an increased volume of claims owing to the assumed correlation between market conditions and sponsor insolvency probabilities. Such conditions therefore increase the likelihood of the PPF undershooting the funding objective and developing a substantial deficit.

8.8 Sensitivity E: this sensitivity investigates the effect on our probability of success were no market in CPI to emerge. For this sensitivity we have adjusted the PPF entry basis and levy basis to reflect RPI levels

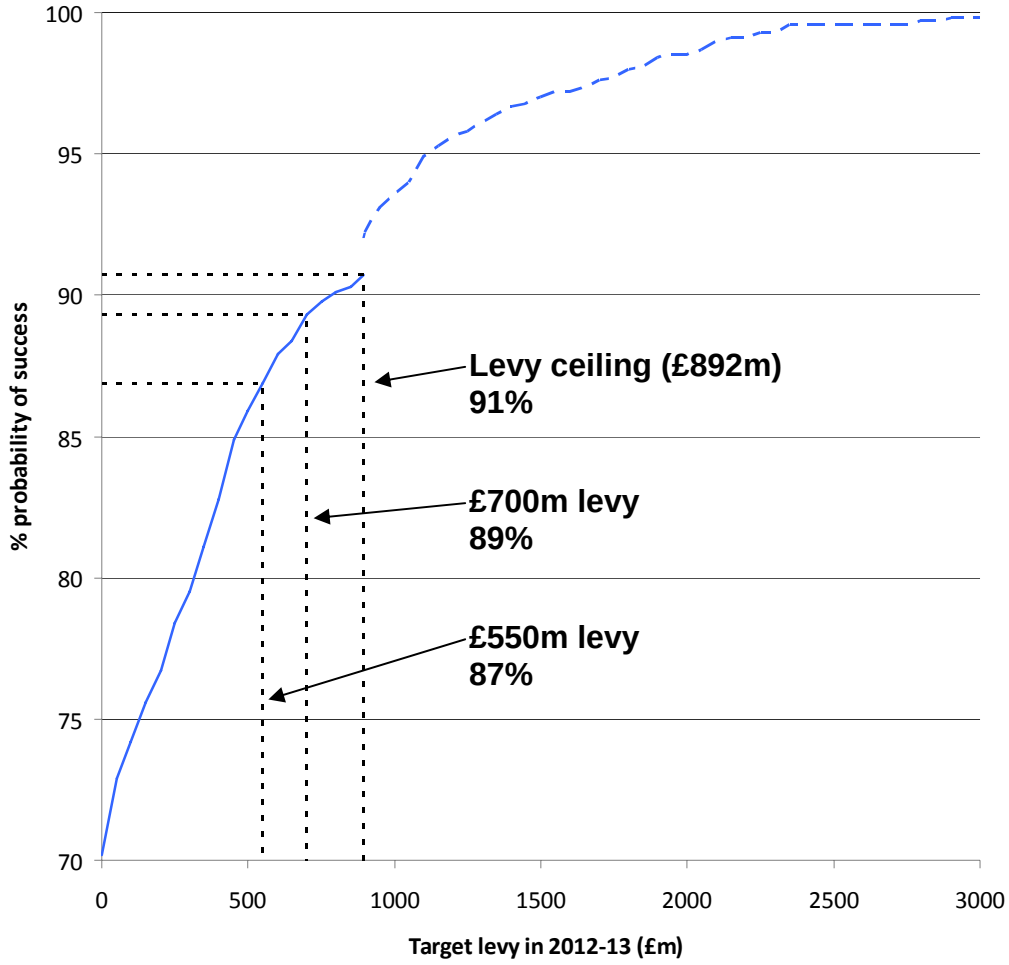
of inflation[3]. However, the PPF's own liabilities have been assessed using CPI inflation and CPI-linked yields from our base case. The impacts upon the PPF would include:

- Scheme liabilities would be higher so more schemes would be successful in their application for entry to the PPF, resulting in a higher volume of claims on the PPF
- The funding levels of schemes coming into the PPF would be lower than otherwise
- The PPF would be exposed to basis risk in its hedging programme where we would continue to use RPI-linked investments to hedge CPI inflation
- The PPF levy would be calculated by reference to lower bond yields and thus lead to higher levy collections (assuming no adjustment to the levy parameters).

8.9 A sensitivity of particular interest is the effect of the levy upon the funding strategy, given that the levy is one of the two principal levers with which the Board can attempt to recoup deficit or amortise reserves (the other lever being the investment strategy). The chart below shows the base case probability of success for different levels of levy. Where the line is dashed, this represents a theoretical levy strategy ignoring the legislative ceiling on levy collections, currently £892 million.

[3] See section 6.4 for a description of the actuarial bases

Chart 3: Probability of success for given 2012/13 levy



8.10 It can be seen that even were the levy ceiling to be removed it would take a very high levy to remove the risk of all but the highly unlikely scenarios. The other feature of the chart is that there comes a point around the £1bn mark where we begin to see diminishing returns from charging a higher levy (measured in terms of our probability of success).

9 Assurance and future development

9.1 In addition to the external audit and appraisals described in the August 2010 Funding Strategy document, the recent model developments have been subjected to external scrutiny. The Government Actuary's Department reviewed the treatment of the move to CPI as our measure of liability indexation, Aon Hewitt provided peer review of the treatment for the New Levy Framework and Fathom Consulting provided peer review of our econometric model for generating scenarios of CPI inflation.

9.2 The Long-Term Risk Model is subject to continual improvement and audit. The next audit is due in November 2011 when the model's fitness for purpose will be reassessed.

Annex: Further detail on modelling

1.1 Overview of model

1.1.1 The model used to assess progress against the funding target is the Long-Term Risk Model (LTRM), a stochastic balance sheet model. The LTRM generates an extensive range of asset return, insolvency and longevity scenarios over a chosen time horizon, and on this basis projects a distribution of possible PPF balance sheet outcomes.

1.1.2 Stochastic analysis, also termed 'Monte Carlo' analysis, involves the use of a random process to generate a large number of scenarios for a given variable over time. The technique is already widely used in the financial services industry. Its primary advantage (over deterministic or 'single point' forecasts) is the generation of a distribution of outcomes to which probabilities may be assigned. This permits assessments of the likelihood of specific, usually adverse, outcomes.

1.1.3 As with any financial or economic model, it is important to exercise an appropriate degree of caution when analysing LTRM output. Economic models are not infallible; there is no guarantee that future outcomes will conform to dynamics observed in present and past data. In order to minimise the risk of misleading output, care is taken to review and update the model on a regular basis and to reconcile its results to previous output and known outcomes.

1.1.4 The projection process begins with the generation of 1,000 economic scenarios. Each economic scenario is a set of projected paths for relevant asset prices (including bond yields, equity prices and risk-free rates). These are obtained from an Economic Scenario Generator (ESG) provided by an external provider, Barrie and Hibbert, which is adapted for use by the PPF.

1.1.5 The extent and profile of corporate insolvencies is generated on the basis of sponsor insolvency probabilities. Five hundred corporate insolvency scenarios are generated, with insolvency probabilities stochastically migrating over time according to historical data summarised in externally provided transition matrices. Each corporate insolvency scenario is mapped to each of the 1,000 economic scenarios (providing 500,000 scenarios in all), with the insolvency dynamics adjusted to reflect the degree of stress at play in asset markets.

1.1.6 PPF assets and liabilities are rolled forward under each scenario, taking account of investment returns and movements in the discount rate. Scheme funding is rolled forward in a similar manner. Funding paths combine with insolvency dynamics to determine the profile and size of claims on the Fund. These aggregate deficits are transferred onto the

PPF balance sheet at the point at which they occur. Levy collections are modelled taking into account the key features of the new levy framework. The result is a distribution of PPF balance sheet outcomes over a chosen horizon that takes account of all primary funding risks.

1.1.7 For more information on the mechanics of the LTRM, please see http://www.pensionprotectionfund.org.uk/DocumentLibrary/Documents/ltrm_paper_aug_2007.pdf

1.2 PPF characteristics

1.2.1 The PPF funding objective is set on the assumption that, in the year 2030, a reserve equivalent to 10 per cent of liabilities would be sufficient to insure, with 90 per cent confidence, against the risk of greater life expectancy over the outstanding lifetime of the fund and future claims over five years. This figure is highly dependent on assumptions about the rate of scheme closures and speed of recovery plans.

1.2.2 PPF liabilities are calculated according to the PPF valuation basis. For a description of this basis, see the PPF Annual Report and Accounts 2010/11.

1.2.3 We make the assumption that a market in CPI-linked investments will develop in 2016 and settle at a level where the market-implied rate of CPI is 0.9 percentage points a year lower than the market-implied rate of RPI. (The market-implied rate is the difference between yields on fixed interest investments and equivalent index-linked investments.) This assumption affects the yields that feed into the projected PPF valuation basis from 2016.

1.2.4 The PPF investment allocation is modelled as that set out in the March 2010 Statement of Investment Principles[4].

1.2.5 Schemes' PPF levy payments are modelled taking into account the main features of the new levy framework[5]. For this purpose we assume that schemes' D&B failure scores will evolve in a manner consistent with the evolution of credit ratings (as described further in section 1.5 below). Our base case assumption for the starting levy in 2012/13 is £550m.

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[4] www.**pensionprotectionfund**.org.uk/DocumentLibrary/Documents/SIP_Mar2010.pdf

[5] For more details see http://www.pensionprotectionfund.org.uk/DocumentLibrary/Documents/1213_consultation_document.pdf

1.3 Economics and investment returns

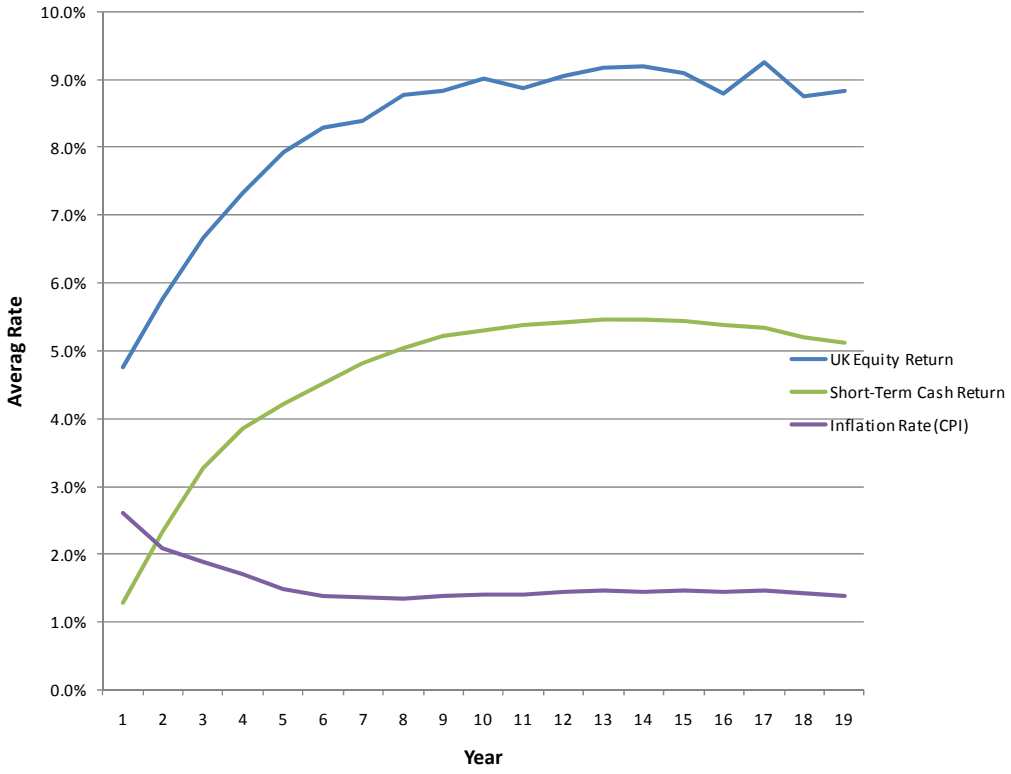
1.3.1 Distributions of projected asset return outcomes are created using assumptions based in part on past data and in part on current market conditions. Key characteristics include the volatility of asset returns and the correlation between returns on assets of different types, both of which are based largely on historical experience.

1.3.2 Interest rate (risk-free investment return) projections are based largely on implied market views. The average short-term cash return is 1.3 per cent initially, peaking at 5.5 per cent in year 13 of the projection.

1.3.3 Projections build in an average return on equities of around 3.5 to 4.0 per cent over the risk-free investment return.

1.3.4 Inflation projections derive from implied market views based on the modelling of fixed interest and index-linked bond yields. The average projection of CPI inflation falls to around 1.5 per cent in the long term.

Chart A1: Average projections for economic variables



1.3.6 Sponsor insolvency probabilities are assumed to exhibit a certain degree of correlation with equity market conditions. That is to say that when equity markets deteriorate, sponsor insolvency probabilities generally move upward, and vice versa. Therefore scheme deficits will tend to rise at the same time as the rate of insolvency. Increasing the

correlation between equity returns and credit risk substantially increases the risk of very large claims.

1.3.7 As described in 1.1.4, the economic scenarios form a set of projected paths for relevant asset prices (including bond yields, equity prices and risk-free rates). In accordance with good practice, the PPF carries out scenario testing. A scenario test is like a sensitivity test (as described in section 8) but one in which more than one of the parameters – or indeed all of the parameters – are varied from their base case levels.

1.4 Scheme and sponsor characteristics

1.4.1 Initial funding is taken for each scheme as its average between 1 April 2010 and 31 March 2011. We use a smoothed funding level in order to reduce the volatility of the funding metrics.

1.4.2 Scheme contributions are determined by schemes' current recovery plans, which target on average 110 per cent of s179 liabilities over an average of 8 years. We make the assumption that schemes' current funding plans remain in place over the longer term, with any new emerging deficit being re-spread. This means that in a scenario without any significant adverse experience, scheme deficits are entirely removed within 20 years, with most schemes completing their recovery plans within 10 years.

1.4.3 No account is taken of the possibility that sponsors may reduce their commitment to a scheme once it has become fully mature and no longer relevant to the existing workforce.

1.4.4 Schemes are assumed to reduce the risk of their investments over time. The share of scheme assets invested in long-maturity bonds gradually rises from an initial 40 per cent to around 80 per cent in the long term.

1.4.5 As at the date of the most recent PURPLE publication, 31 March 2010, only 21 per cent of schemes were open to new members, down from 35 per cent in 2006[6]. For simplicity of modelling, we assume that all schemes close to new entrants within 5 years.

1.4.6 Schemes that were open to new accrual as at 31 March 2010 are assumed to remain open to new accrual.

1.4.7 The rate of active member withdrawal is set at a constant 5 per cent per year.

[6] These figures exclude hybrid schemes

1.4.8 The pool of PPF-eligible schemes is assumed to be diminishing; no new schemes enter the universe.

1.5 Sponsor solvency

1.5.1 Movements in the probability of insolvency of schemes' sponsors have been determined by Barrie & Hibbert on the basis of historical information. When applied to the PPF-relevant population of schemes, a long-term trend emerges whereby the population becomes increasingly concentrated around an average insolvency probability of around 0.6 to 0.7 per cent per year.

1.5.2 A large proportion of our universe of employers operates in already mature manufacturing sectors. It is likely that over the long term these companies will employ fewer staff and that for a growing number of them the size of the pension schemes they sponsor will be disproportionately high compared with the size of their operational balance sheet, making the sponsor covenant weak. This likely trend is not captured in our modelling work.

1.6 Other assumptions

1.6.1 PPF funding is taken at end-March 2011. If we had chosen to start the projection as at end-September 2011, the funding levels would have been worse as a result of the decline in markets. However, this effect would be dampened by our approach of smoothing the input valuations over a twelve month period. See Section 8.5 for more detail.