Pension Protection Fund

PPF Long-Term Funding Strategy Update

October 2012

1 Foreword

As with any financial institution we face considerable uncertainty in our finances over the long term. One of the ways we monitor this uncertainty is through our funding strategy, which is a quantitative framework that captures as many of the key risks as possible. Since we first published our funding strategy in August 2010, we have stressed how important it is that we keep it under review to make sure that we know what is required for us to meet our target of financial self-sufficiency by 2030. We published the first formal review of the strategy last year, alongside our 2010/11 Annual Report, and this paper constitutes the second such review.

As at the end of March 2012 the fund was in a strong position, its assets being valued at 7 per cent more than its liabilities and the probability of our achieving self-sufficiency by 2030 being assessed at 84 per cent.

However, there are clear risks to us over the long term. Bond yields have recently reached a historic low, which has pushed up scheme deficits to record levels. Over the year to March 2012, for example, the PPF 7800 index moved from being slightly in surplus to being over £200 billion in deficit. Furthermore, low levels of economic growth suggest that we will remain exposed to the risk of a significant uptick in insolvency rates materialising during a period of high pension scheme underfunding.

It is clear our funding target has to be kept under close, constant review, particularly in light of current market tensions. We are also mindful that while financial models provide a view on the world that is useful to inform strategic decisions, models are fallible. We are therefore careful to test the sensitivity of our results to changes in our assumptions so that we can assess the strength of any conclusions that can be gauged from our base case.

For this funding review we have provided the results of two stresses to the base case assumptions. These have been compiled with the assistance of Oxford Economics, and we are pleased to say that the Fund is resilient to the particular stresses that we have looked at. While we can take some comfort from this, we strike a note of caution in that no one stress test can be considered definitive. A large part of our ongoing risk management is to devise scenarios and stress tests that are realistic and reflect changes in the global economy and developments in defined benefit pensions provision.

In summary, we believe our funding strategy remains appropriate and we continue to make good progress against it. However, there are clear risks in the current economic climate, and regular monitoring of our position remains vital.

Martin Clarke,
Executive Director for Financial Risk

2 Summary

2.1 The PPF published its long-term funding strategy in August 2010 and the first formal review in November 2011. We believe it is appropriate to review the strategy annually to check whether our funding objective remains appropriate and whether we are on track to achieve it. This report sets out our updated research which reflects our position as at 31 March 2012.

2.2 The 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 – base case
Section 8	Sensitivity of base case to assumptions
Section 9	Scenario testing
Section 10	Assurance and future development
Annex	Further detail on modelling

3 Recap of the PPF's funding strategy

3.1 A detailed description of the PPF's long-term funding strategy is given in the paper 'PPF Long-Term Funding Strategy':

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

3.2 We have set ourselves a funding objective which is, in the most general terms, to achieve self-sufficiency at an appropriate time horizon. When the strategy was first established in 2010 we defined self-sufficiency as having a level of assets 10 per cent in excess of PPF Liabilities, and we chose 2030 as our appropriate horizon. The 10 per cent margin was to give protection against unexpected longevity improvements and future claims, and we chose 2030 because our research suggested that by that time future claims would be low relative to the size of PPF Liabilities. We also expected that the PPF Protection Levy would have ceased to be significant by this time.

3.3 We use two risk metrics to monitor progress against our funding objective - the 'probability of success' and the 'downside risk'. The probability of success measures our chances of being self-sufficient at the chosen time horizon, and the downside risk is a measure of how poorly funded we might become in absolute terms. It is calculated such that in 10 per cent of modelled scenarios our deficit reaches at least the level of our downside risk at some point before 2030.

3.4 We have developed the PPF Long-Term Risk Model (LTRM) to project the level of PPF assets and PPF Liabilities in future years. The LTRM generates an extensive range of asset return, insolvency and longevity scenarios over a chosen time horizon and, using these, projects a distribution of possible PPF balance sheet outcomes.

3.5 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 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 assessment not just of our best estimate of the future but also of the likelihood of specific, usually adverse, outcomes.

3.6 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. To assess the level of model and parameter risk we carry out multiple runs to test the sensitivity of the output to changes in key assumptions (see section 8).

3.7 The shock waves from the global financial crisis continue to illustrate how much the UK and other economies are in uncharted territory. UK GDP has stuttered since 2008 into at least a double-dip recession whilst monetary policy and the so-called flight to quality in sovereign debt markets have seen UK long bond yields drop to unprecedentedly low levels. In these circumstances the appropriateness of assumptions built on past experience must be challenged as these assumptions inevitably feature a trending back to “normality”, albeit over a period of time. In order to gauge the effect of the possible emergence of a “new normal”, we have, with external assistance, constructed stresses that test the resilience of the Fund in the event that our base case were to be more heavily tilted towards scenarios that are financially damaging to the Fund. One such pessimistic scenario is described in section 9 together with, for balance, a stress that is more optimistic than the current base case.

4 Changes since the funding strategy was last reviewed

4.1 Over the last year there have been a few developments of significance to the PPF.

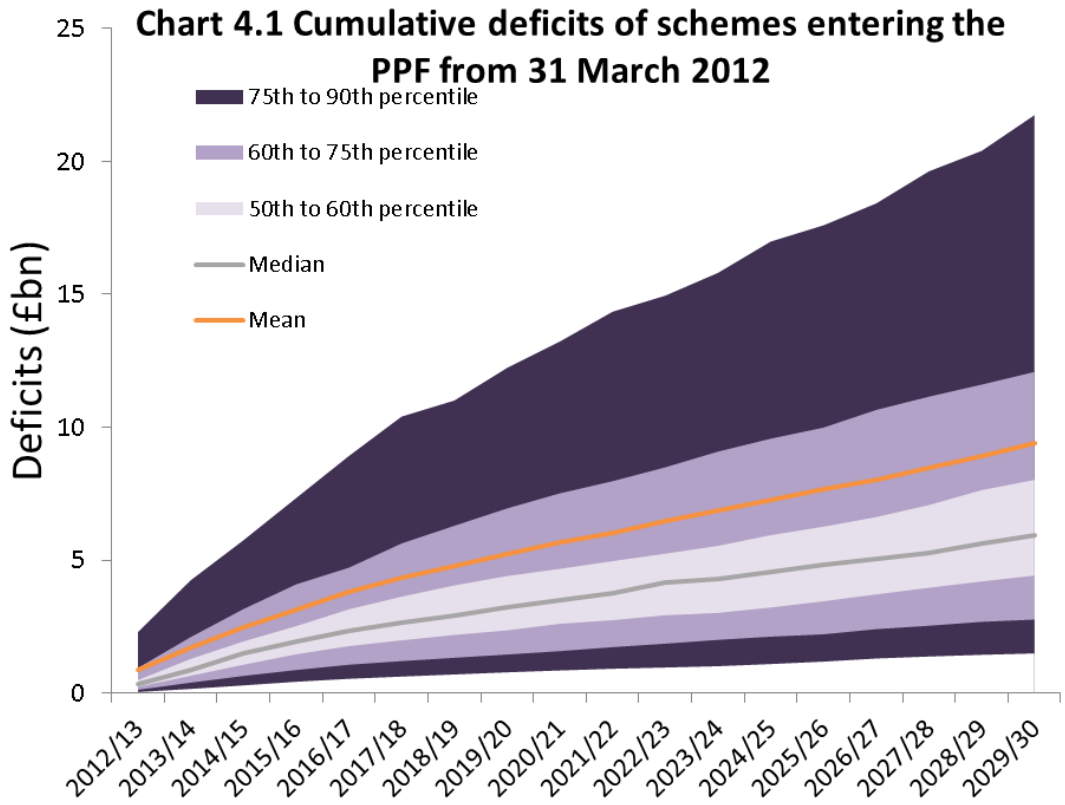
Economic turmoil

4.2 Since March 2011 the global financial crisis has entered a second phase with weakened economic growth in developed economies increasing their indebtedness and destabilising the Euro. Equity markets have performed poorly and yields of sovereign bonds from countries perceived as safe havens have become very low. The combined effect is to severely weaken the funding position of UK pension funds, with the aggregate funding level of private sector defined benefit schemes falling from 100 per cent to 83 per cent over the twelve months to 31 March 2012[1].

4.3 In our base case, scheme funding levels are expected to trend upwards over time. One reason for this is that a scheme's PPF liabilities[2] depend upon the yield on government bonds, and we expect that bond yields will rise over time from their current, historically low levels. This will tend to cause liabilities to reduce since future compensation payments will be assessed as being less valuable in present day terms. Schemes also invest some of their assets in return-seeking investments such as equities which, in return for increased market risks, are expected over a long period to produce returns in excess of the discount rates of the liabilities. Neither of these expectations is, however, assured. Should scheme funding not improve over time we would be at risk of larger scheme deficits being transferred to the PPF and this may be harmful to our funding, particularly if it coincided with an increase in insolvency rates.

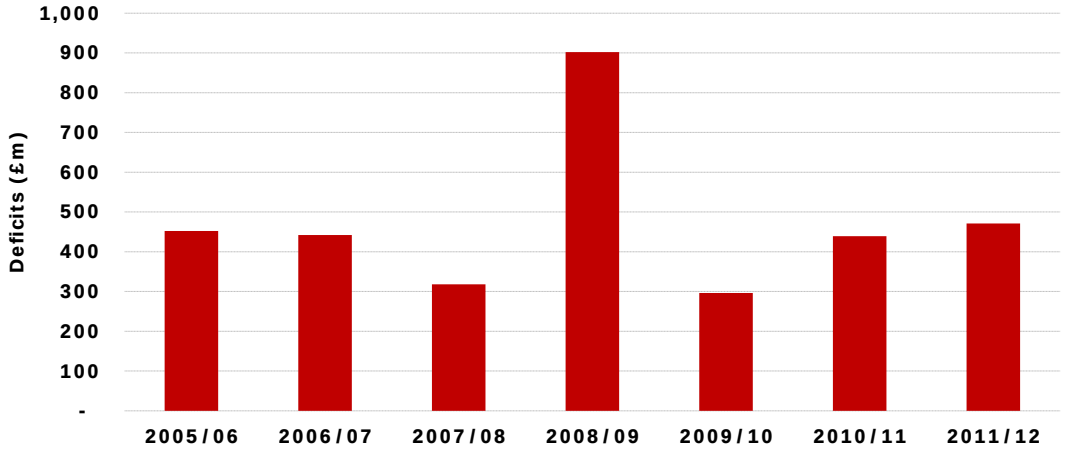
4.4 The variability in the level of projected deficits is shown in the following fan chart, derived under our base case, which measures the deficits at the point at which they enter the PPF. Should conditions not improve, as discussed in 4.3, the spread of negative outcomes would be even wider.

[1] This is the PPF 'section 179' funding level, as disclosed in the PPF7800 Index
[2] We use *scheme's PPF liabilities* to mean the amount we would add to the PPF's Liabilities should the scheme transfer to the PPF.



4.5 It seems highly likely that PPF will, at least in the short term, have to absorb much larger deficits from schemes entering the Fund than hitherto. Chart 4.1 suggests a 1 in 10 chance (the 90th percentile) under our base case that the deficits of schemes entering the PPF in the 2012/13 year will exceed £1.5 billion. This is much higher than our experience to date which is set out in the following chart. By comparison, the legislative cap on the PPF Protection Levy is currently £919 million.

Chart 4.2 Deficits of schemes that have transferred to the PPF



4.6 Given the importance of the size of pension scheme deficits to the future PPF claims experience and the underlying trend within our base case that deficits will decrease during our funding period to 2030, it is important to assess alternatives to these base case assumptions. To test the robustness of the PPF's funding to adverse economic outcomes we have carried out various stress tests in which we adjust the assumptions from our base case to reflect different possible views of the future. We describe two such stress tests, a Euro shock recession and an export-led recovery, in section 9.

The IORP Directive

4.7 The European Commission is currently reviewing the prudential framework for institutions for occupational retirement provision (IORP). One of the main proposals is to harmonise scheme funding requirements across Europe through a 'holistic balance sheet' approach which would explicitly recognise all assets, including contingent assets and sponsor support. Such an approach may increase the reported deficits of UK pension schemes; although it is not at this stage clear what would be the requirements for recovering full funding.

4.8 Were scheme funding plans to be affected by changes to the IORP Directive this would have an effect on the level of risk posed to the PPF and we would have to consider the implications for our funding objective and our assumptions. At this stage, however, we consider it premature to capture this in our base case given the remaining uncertainty as to the form of the legislation.

Central clearance of OTC derivatives[3]

4.9 The PPF approach to immunise its funding position against unexpected changes in interest and inflation rates is largely through the use of swap contracts. These derivatives will be affected by the European Market Infrastructure Regulation (EMIR). Under EMIR any new Over-The-Counter (OTC) derivative trades will need to be passed through a central clearing house, which will require assets to be deposited as margin. This potentially obliges pension schemes that use swap contracts to invest a greater amount in cash and/or government bonds than they otherwise would, with a consequent impact upon expected investment performance.

4.10 The details of the legislation will be set out in a technical standard that is currently under consultation. When that is available we will consider the effects that OTC clearing will have on our investment strategy, as well as schemes in our risk universe, and the effect upon our progress against our funding objective. At this stage the impact of this change in regulation and its effect on the PPF's investment performance and risk is uncertain.

PPF Levy

4.11 When we collected the pension scheme information submitted for the 2012/13 Levy we found that the reported level of risk was higher than we had been expecting, for a variety of reasons. For example many contingent assets submitted in previous years had not been re-certified, and far fewer new contingent assets had been certified than we had been expecting.

4.12 Furthermore, scheme funding has declined considerably over the last year. The combined effect is such that absent a change in the levy parameters the levy for 2013/14 would exceed the £685 million limit imposed by the levy cap[4]. As a result, the Board has taken a balanced view and adjusted the levy parameters so as to target a levy in 2013/14 of £630m. This has been carried through to our long-term modelling. In our modelling we automatically model the levy cap, as well as the levy ceiling[5] and our policy of having a 25 per cent limit on the year-on-year decrease in expected levy.

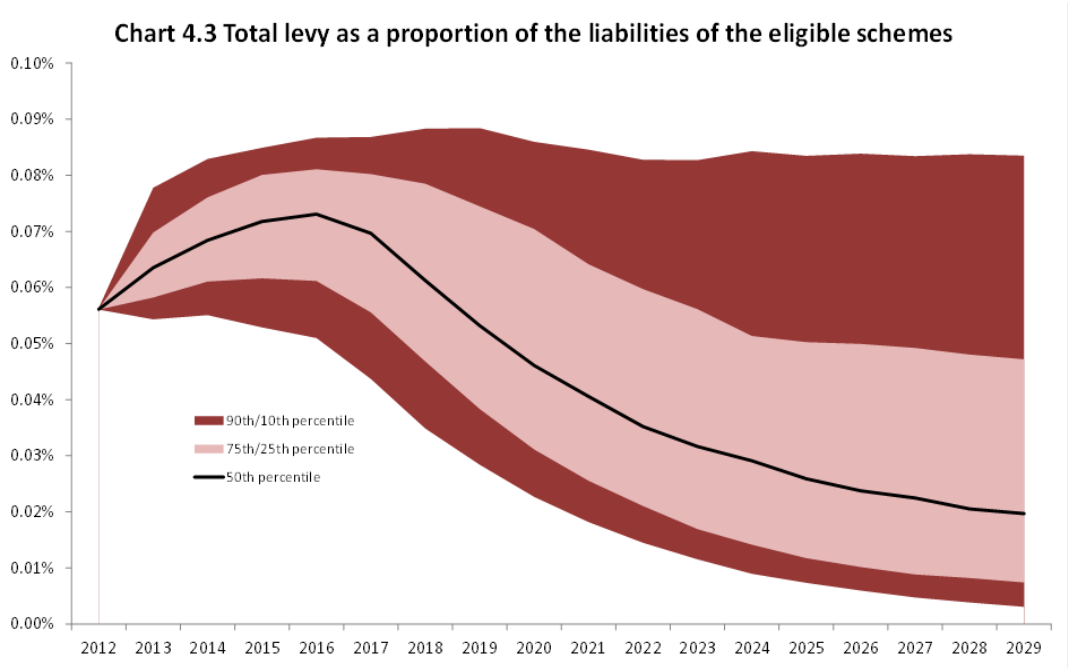
4.13 The following chart shows how the levy is projected to change as a percentage of protected schemes' PPF liabilities in future years. It is

[3] OTC derivatives are those privately arranged between two parties rather than sold on an exchange

[4] Legislation requires the Board to set a levy quantum that is no more than 25 per cent higher than the previous year

[5] The levy ceiling is the maximum collection that we are permitted to expect to collect in any year. It is currently £919 million.

expected that over the long term schemes will pay a levy that is a smaller proportion of their liabilities. This is because we expect them to reduce their deficits through a combination of contributions, investment returns and a gradual improvement in bond yields, thus reducing the risk-based element of their levy.



Potential changes in the calculation of inflation

4.14 PPF liabilities are indexed by reference to the Consumer Prices Index ("CPI"). There are currently two potential changes to CPI being considered by the UK Statistics Authority: the introduction of Owner-Occupied Housing into a new measure of inflation (CPIH) and changes to how clothes prices are measured. The UKSA is also considering amending the way that the Retail Prices Index is calculated. This would lead to a reduction in RPI which might reduce the price of RPI-linked bonds.

4.15 If these changes were to materialise it is likely that the gap between RPI and CPI would reduce. At this stage we have decided to assume that there will be a modest reduction in the gap, from around 1.1 per cent to 0.8 per cent on average. We will review this assumption, and the macro-economic implications of any change to the measures of inflation, when the proposals under consideration have become more concrete.

5 Review of the funding objective

5.1 The time horizon of the funding strategy was set to be the year 2030. We chose this after considering projections of claims on the PPF as a proportion of the size of PPF liabilities. We still believe that this is an appropriate horizon because our latest modelling shows that by 2030 the level of residual risk in the DB universe will still be relatively small. We have therefore retained 2030 as our time horizon, although this will be kept under review.

5.2 Some of the topics discussed in section 4 may in due course lead to a refinement should the evidence prove compelling. It is conceivable that a prolonged period of low interest rates and weak equity returns might lead to a much shallower trend of risk reduction than our base case implies, in which case we may have to accept a longer time horizon. On the other hand, we might consider a reduction in that time horizon in the event that sponsors materially increased their deficit contributions as a result of changes to the IORP Directive.

5.3 We also aim to keep our funding target under review. The target for self sufficiency is currently expressed as a 10% margin over the liabilities, this being held to cover residual risks being principally longevity but also including any future claims and operational risks. For the moment we have decided to retain the 10 per cent margin but over the coming year we intend to carry out a detailed review including further research into our longevity risk to assess whether our margin should be refined.

In summary, our funding objective remains the same as before: to target a level of assets as least 10 per cent in excess of PPF liabilities in the year 2030. Our key risk metrics are also 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 previous update of our funding strategy in November 2011, and these are described below.

6.2 We have assumed that existing schemes will gradually close to new accruals of benefit over the next decade. Up until now we have only assumed that schemes will close to new entrants, but there has been a clear trend over the last decade of closure to new accruals and it seems likely that this will continue. In reality some schemes will remain open to new accruals beyond the next decade, but for modelling simplicity we assume that all will close; this understates our risk very slightly.

6.3 We have refined the way that we model our exposure to a movement in swap yields relative to bond yields. Currently at long durations swap yields are lower than those on government bonds, which we believe is a historical anomaly that will correct itself in due course. If it does, our deficit is expected to increase.

6.4 We have refined our allowance for expenses incurred by the PPF. In particular we have reflected the fact that following the Pension Protection Fund (Prescribed Payments and Investment Costs – Amendment) Regulations 2011 certain expenses have been charged to the fund itself rather than being financed by the DWP's PPF administration levy.

6.5 We have assumed that the funding plans we currently have on our records, obtained from the Pensions Regulator, will be replaced in due course by new plans with slightly longer recovery periods. This is consistent with the trend towards a slight lengthening that we have seen in the data collected to date as trustees and sponsors respond to the demands of the recent recession.

6.6 We have increased the proportion of our assets that we assume will be invested in cash over the long term, following a recent strategic decision made by our Investment Committee.

6.7 We have introduced a process whereby schemes that we consider are highly likely to enter the PPF in the very near future but have not yet experienced an insolvency event are brought onto the PPF balance sheet with immediate effect for modelling purposes. Hitherto we have used publicly available information and our D&B ratings to assess creditworthiness but the extra insight we now have into certain schemes in the current environment means that this override is worthwhile.

6.8 We have amended the level of assumed increases in the Consumer Prices Index (CPI) in anticipation of a change to the way that clothing prices are sampled. This arises from a discussion held by the Consumer Prices Advisory Committee in April 2012.

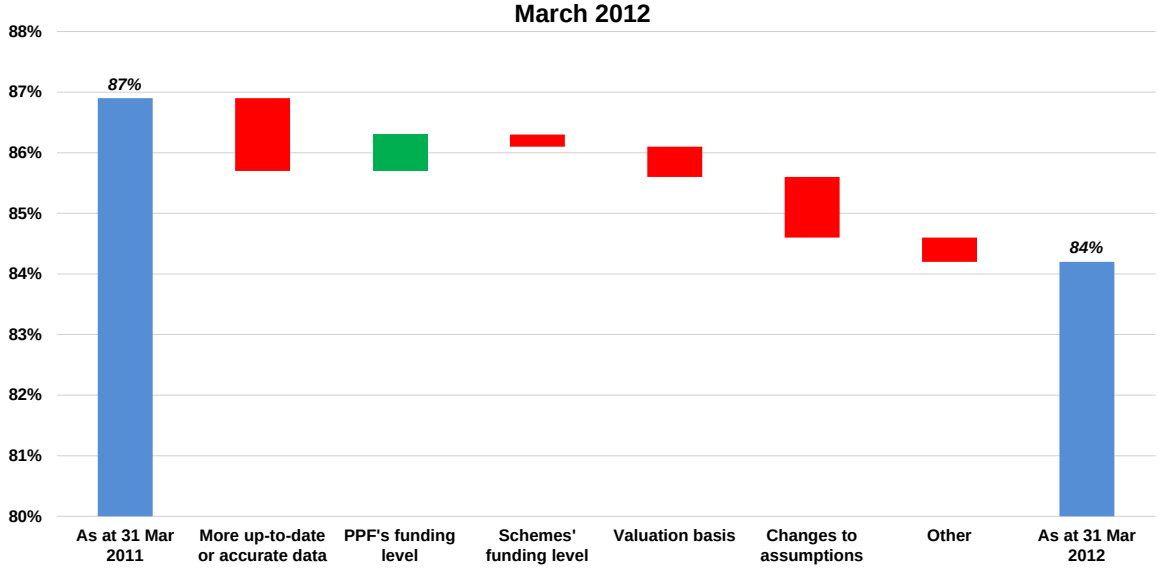
7 Modelling output – base case

7.1 In our base case model the assessed probability of achieving self sufficiency by 2030 has decreased from 87 per cent to 84 per cent over the period March 2011 to March 2012. When the funding strategy was launched in 2010 the Board of the PPF stated that it was comfortable with a probability of success greater than 80 per cent. With the passage of time we would expect this level to rise towards 100 per cent in 2030; the equivalent threshold as at March 2012 is 82 per cent. In practice the Board of the PPF monitor this success measure in a funding dashboard that rates the level of this probability in "red", "amber" or "green" ranges according to whether or not a strategic response may be required.

7.2 The corresponding downside risk statistic is £10 billion, compared with £7 billion a year earlier. 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 deteriorate.

7.3 The following waterfall chart reconciles the probability of success at 31 March 2012 with the position one year earlier. Green bars denote improvement and red bars denote deterioration over the year.

Chart 7.1 Change in probability of success between 31 March 2011 and 31 March 2012



7.4 The bars show:

- Using more up-to-date or accurate scheme and employer data, including Deficit-Reduction Contributions and Contingent Assets, led to a decrease in the probability of success of 1.2 percentage points.

- Our own funding level increased over the year, leading to an increase in our probability of success of 0.6 percentage points.
- Scheme funding decreased significantly over the year, as noted above. However, since we use an average funding level in order to minimise short-term fluctuations in our quarterly monitoring of the strategy, there was only a modest reduction in the probability of success over the year. As noted in the following section, were we not to smooth the input valuations the probability of success would have been around 4% lower at 31 March 2012.
- We changed the PPF valuation basis over the year, which led to a small weakening in our assessed probability of success.
- As discussed in section 6, we made a handful of changes to our modelling assumptions over the year. In aggregate these led to a reduction in the probability of success of 1 percentage point.
- The 'other' bar includes technical and modelling improvements that we made over the year, and the effects of rounding.

7.5 The final bar in the chart depicts our most recent base case probability of success, which is 84 per cent.

8 Sensitivity of base case 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[6]
A	Base case	84%	£10bn
B	Scheme funding levels not smoothed over the previous 12 months (causing funding levels 7% lower)	80%	£14bn
C	Length of scheme recovery plans increases by 3 years	83%	£11bn
D	25 basis point reduction in annual asset returns (except cash and government bonds)	82%	£11bn
E	No market in CPI investments emerges (and we target a 11% self-sufficiency margin)	82%	£11bn
F	Levy reduced by 10 per cent	82%	£11bn
G	Initial PPF funding reduced by 10 percentage points	79%	£12bn
H	Sponsor insolvency probabilities increased by 20%	83%	£11bn
I	Scheme Technical Provisions reduced by 10% (relative to S179 basis)	79%	£15bn
J	No funding margin for longevity and credit risk (i.e. target 100% rather than 110%)	92%	£10bn

8.2 These sensitivities are broadly unchanged from their 31 March 2011 levels as described in the November 2011 Funding Strategy document.

[6] 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.

9 Scenario testing

9.1 In 3.7 we referred to the extraordinary financial conditions that are currently prevailing and the caution which should surround the interpretation of models especially in these conditions. We indicated that we have adopted a system of stress tests that help explore the possible outcomes should further evidence challenge our view as to the appropriate base case assumptions.

9.2 Our base case is a best estimate assessment in the sense that our 1000 distributions of asset returns, bond yields and inflation have been calibrated so that the median of each represents our best estimate of what will occur in reality. Similarly the 500 credit scenarios are centred around our best estimate.

9.3 By looking at stresses to these assumptions we can explore the extent to which our funding strategy is sensitive to a change in the Board's best view of the future. It also reveals how vulnerable the PPF is to different economic shocks.

9.4 We describe below two of the stresses we have looked at in this annual review of the funding strategy, a pessimistic one (labelled "Euro shock recession") and an optimistic one (labelled "export-led recovery").

9.5 For our stresses we have retained the stochastic nature of our model and simply adjusted the statistical distributions. We have done this in quite a simplistic way by adjusting the distributions downwards (or upwards as appropriate) in the short term and then reverting to the base case distributions once the stress period is over. Other more sophisticated treatments are possible, such as changing the correlations between the various economic variables, and adjusting the distributions of outcomes in the longer term once the stress period has finished.

Euro shock recession

9.6 This scenario contains two elements which have roughly equal weight: a euro crisis leading to possible recession in the short term, but recovery thereafter, and an assumed short-term spike in claims on the PPF. In the scenario, a deepening crisis in the euro area and associated credit crunch leads to falling UK exports to the euro area, weakening business confidence and business investment. Higher unemployment leads to weaker consumer spending. However, it is assumed that the crisis is resolved and the euro area recovers.

9.7 In this scenario the average short term returns fall by up to 30 per cent per annum depending on the asset class and it takes five years for markets to return to starting levels. Bond yields also fall, which pushes up pension scheme's PPF liabilities. Insolvency probabilities are

higher although the effect is relatively small owing to the low interest rate environment.

Export-led recovery

9.8 This scenario assumes that there is strong growth in UK exports to the emerging economies. In addition, there is a rapid recovery in investment spending, a marked drop in oil prices from current levels, which boosts household spending, while it is assumed that the economy is able to operate at a lower level of unemployment without triggering inflation.

Funding metrics

9.9 The following table gives the probability of success and downside risk under these two scenarios.

Table 9.1 Funding metrics under stress tests

Scenario	Probability of success (%)	Downside risk (£bn)
Base case	84	10
Euro shock recession	76	21
Export-led recovery	93	3

9.10 There are two main reasons for the lower probability of success in the Euro shock recession scenario. One is a sudden influx of claims on the PPF arising from employers that cannot in the short term cope with the recession. The other is an exacerbation of claim sizes arising from a sharp fall in scheme assets and an increase in schemes' PPF liabilities. This latter effect is somewhat dampened by a rallying in scheme funding from around 2016 as gilt yields revert to base case levels and risky assets start to deliver returns in excess of liabilities.

9.11 The following charts show the distribution of claims on the PPF over the period to 2030 in our base case (chart 9.1) and in the Euro shock scenario (chart 9.2). In the short term the claims in the Euro shock scenario are significantly higher as a result of stressed economic conditions leading to higher deficits and more insolvency events. In the longer term the claims are slightly lower in the Euro shock scenario; there are fewer schemes still surviving to make a claim.

Chart 9.1 Distribution of annual claims - base case

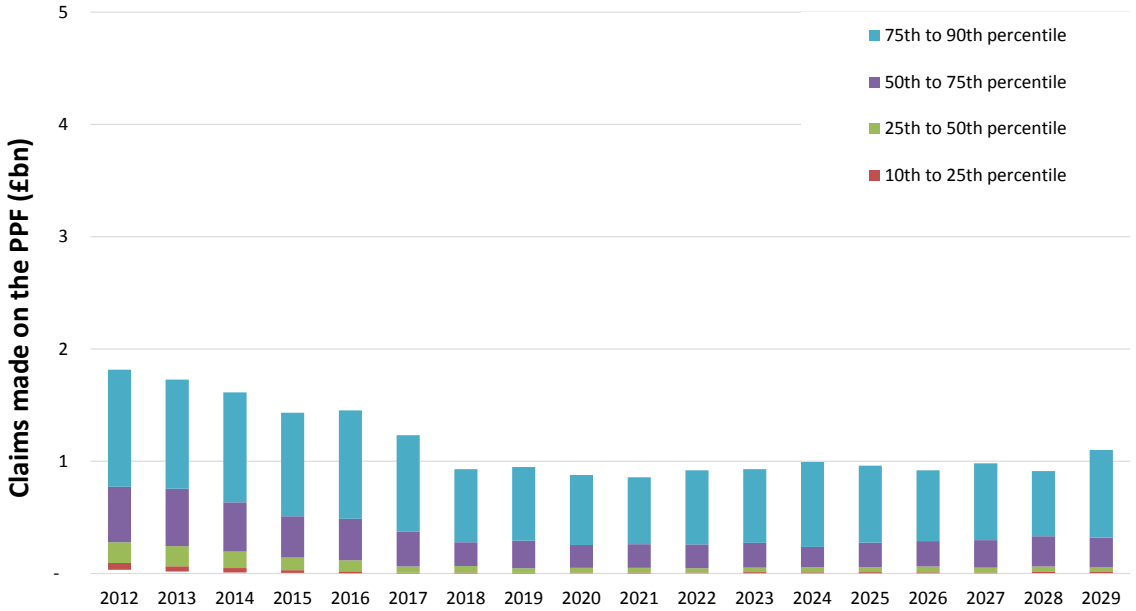
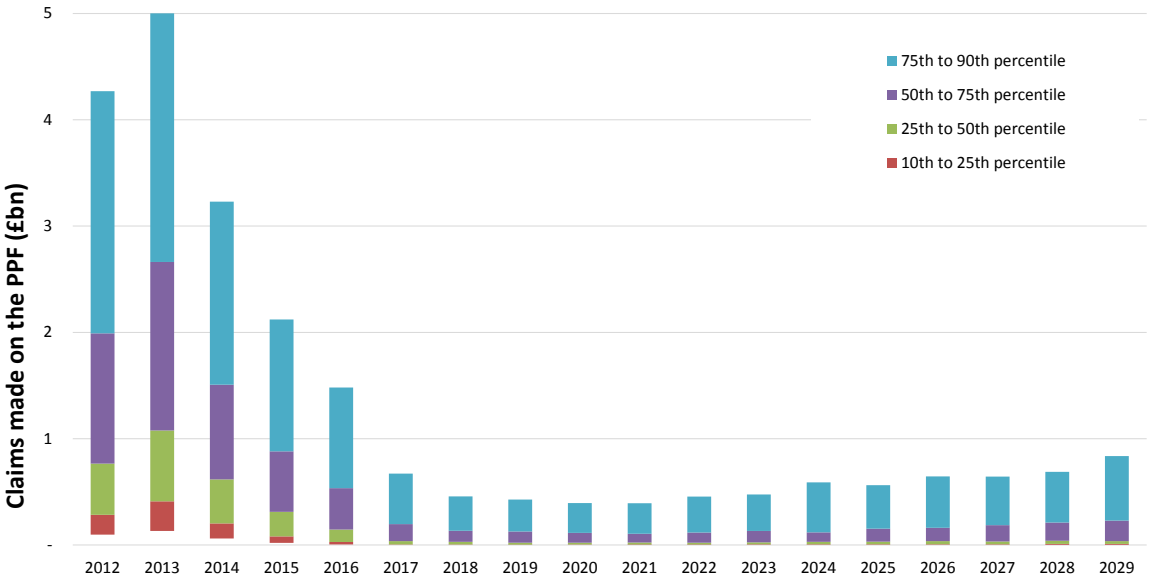


Chart 9.2 Distribution of annual claims - Euro shock scenario



9.12 It is important to remember that the "Euro shock" stress does not imply that the current stressed economic conditions are not reflected in the base case. This particular stress involves a further economic setback from the current starting position and an extended period before which recovery takes place. In these circumstances it is perhaps reassuring to note from the figures set out above, a reduced probability of success of 76 per cent in the Euro shock scenario. Whilst it is below the threshold for comfort, it is not too far below and were such evidence to emerge that the Board chose to adopt these assumptions as its base case, the Board would also know that it could

restore comfort through an increase in the amount of investment risk taken and/or an increase in the levy.

9.13 The export-led recovery scenario has rather a high probability of success. The purpose of investigating such 'optimistic' scenarios is to test the circumstances in which the PPF runs the risk of building up excessive surplus. The Board has a balance to strike between the interests of levy payers and security for members, and were this particular stress to be adopted as the base case then the Board might consider reducing the PPF levy, or else moving to an even less risky investment strategy sooner than anticipated.

9.14 While we have quoted two stress tests in this paper, it should not be inferred from this that we believe these are particularly likely to occur, and nor have we based any strategic decisions on the basis of these outputs. They serve as a comfort check on the robustness of our funding.

10 Assurance and future development

10.1 The Long-Term Risk Model is subject to continual refinement and audit. KPMG carried out a review of the model in May 2012 based upon the information that we provided them. The conclusion was that the model is fit for purpose although there are various developments and improvements that we are intending to make over the coming years.

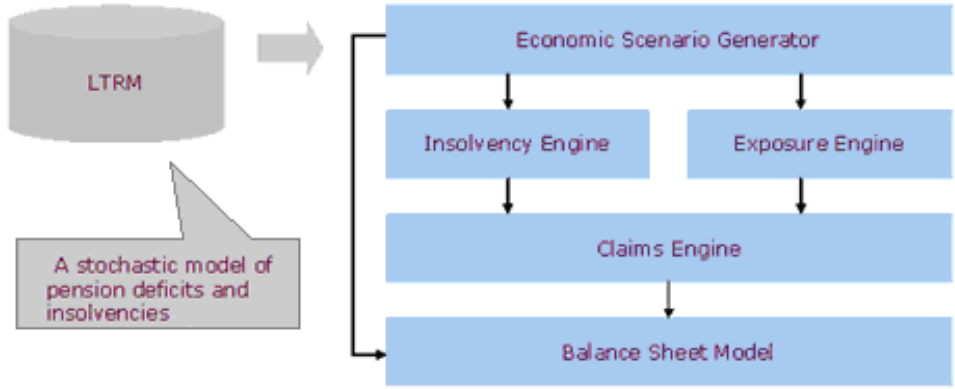
10.2 An example relevant to this particular document is that we are considering introducing 'reverse stress testing' into our annual funding review. Reverse stress testing consists of identifying economic circumstances which are particularly damaging to the PPF and identifying how close to such circumstances we are at present. It is a technique commonly used in the insurance industry and is required under Solvency II for insurance and reinsurance companies.

Annex: Further detail on modelling

1.1 Overview of model

1.1.1 The following diagram shows how the various modules make up our Long-Term Risk Model.

Structure of the Long-Term Risk Model



1.1.2 The projection process begins in the Economic Scenario Generator with the generation of a thousand economic scenarios. Each economic scenario is a set of projected paths for asset prices, interest rates, bond yields and inflation 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.

1.1.2 Insolvencies are modelled in the Insolvency Engine by assigning a credit rating to each company and using transition probabilities to model how credit ratings change over time. We have five hundred credit scenarios, with the transition rates varying in each. Each corporate insolvency scenario is mapped to each of the economic scenarios (providing 500,000 scenarios in all).

1.1.4 Scheme funding is modelled in the Exposure Engine, which captures how assets move in response to asset returns and how schemes' PPF liabilities move in response to changes in nominal and real interest rates. We model benefits paid out to pensioners, and an allowance is made for accruals of new benefit and contributions both from employees and the sponsor.

1.1.5 The output of the Insolvency Engine and Exposure Engine are fed through into the Claims Engine which produces the distribution of the size of claims on the Fund. These aggregate deficits are then fed through into the model of the PPF Balance Sheet, which also projects the returns on the PPF's investments and investment hedge, and models the paying out of PPF compensation. Levy collections under the New Levy Framework are modelled. The result is a distribution of PPF

balance sheet outcomes over a chosen horizon that takes account of all primary funding risks.

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 PPF Liabilities will be sufficient to protect, 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. We will be reviewing this assumption over the coming year.

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 2012/13 which is being published alongside this one.

1.2.3 We make the assumption that a market in CPI-linked investments will develop in five years' time and settle at a level where the market-implied rate of CPI is around 0.6 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 are used in the projected PPF valuation basis from 2017.

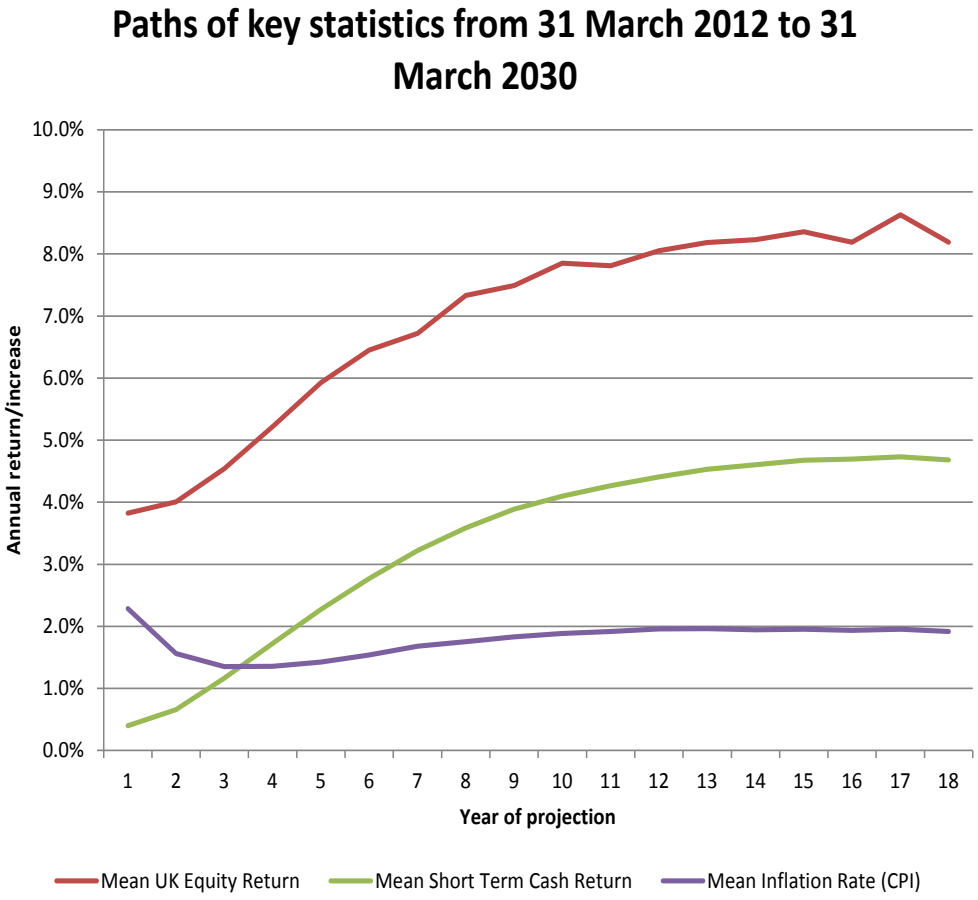
1.2.4 The PPF investment allocation is modelled as set out in the Statement of Investment Principles[7].

1.2.5 Schemes' PPF levy payments are modelled taking into account the main features of the New Levy Framework[8]. 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).

1.3 Economics and investment returns

1.3.1 Distributions of projected asset returns are created in the Economic Scenario Generator 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. The following chart shows the mean, measured across all 1000 economic scenarios, of the main distributions in our base case run.

[7] http://www.pensionprotectionfund.org.uk/about-us/pages/investment.aspx
[8] www.pensionprotectionfund.org.uk/DocumentLibrary/Documents/1213_consultation_document.pdf



1.3.2 Interest rate[9] projections are based largely on implied market views. The average short-term cash return is 0.5 per cent per annum initially, peaking at just under 5 per cent per annum in year 17 of the projection.

1.3.3 Projections build in a mean return on equities of around 3.5 per cent per annum 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 mean projection of CPI inflation settles at around 2 per cent in the long term.

1.3.5 The volume of insolvencies is assumed to exhibit a certain degree of correlation with equity market conditions. 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

[9] or "risk-free investment return"

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

1.3.6 As described above, the economic scenarios form a set of projected paths for asset prices, bond yields, inflation and risk-free rates. In accordance with good practice, the PPF carries out stress testing. A stress test is similar to a sensitivity test (as described in section 8 of the main report) but one in which more than one of the parameters – or indeed all of the parameters – are varied from their base case levels. We illustrate two tests that we have investigated recently in chapter 9 of the main report.

1.4 Scheme and sponsor characteristics

1.4.1 Initial funding is taken for each scheme as its average between 1 April 2011 and 31 March 2012. We use a smoothed funding level in order to reduce the volatility of the funding metrics as reported each quarter.

1.4.2 Scheme's contributions are determined by their recovery plans which target full funding on a statutory funding basis over a period of (currently) 9 years on average. The statutory funding basis results in slightly higher liabilities[10] than the scheme's PPF liabilities – currently around 10 per cent higher.

1.4.3 We make the assumption that schemes' current funding plans will weaken slightly at the next valuation but will then 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 before 2030, with half of schemes completing their recovery plans within a decade.

1.4.4 Schemes are assumed to reduce the risk of their investments over time. The 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 2011, only 18 per cent of schemes were open to new members, down from 35 per cent in 2006[11]. Our base case assumption is that schemes close to new accruals of benefit over the next decade which, for simplicity of modelling, we treat as sudden closure in five years' time.

1.4.6 The rate of active member withdrawal is set at a constant 5 per cent per year. This is a simplification of reality in which members closer to retirement typically withdraw from service at a lower rate.

[10] Referred to as "Technical Provisions"
[11] These figures exclude hybrid schemes

1.4.7 The pool of PPF-eligible schemes is assumed to be diminishing; no new schemes enter the universe. We explicitly model schemes as winding up if they have no active members and reach a given level of funding.

1.5 Sponsor solvency

1.5.1 Movements in the probability of insolvency of schemes' sponsors have been determined on the basis of historical information. When applied to the population of schemes eligible for PPF protection, 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 expressly captured in our modelling work.

1.5.3 For schemes that we consider are highly likely to enter the PPF in the very near future but have not yet experienced an insolvency event we bring them onto the PPF balance sheet with immediate effect for modelling purposes. We therefore exclude their contribution to the long-term projection of claims and levies.

1.6 Other assumptions

1.6.1 PPF funding is taken at end-March 2012.