



Funding sensitivities

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Funding sensitivities

5.1 Summary

- All the funding sensitivities in this chapter are on a section 179 (s179) basis.
- Changes in estimated market conditions and financial and demographic assumptions since January 2003 have caused the monthly aggregate funding position of pension schemes measured on a s179 basis to vary by around £375 billion (with the greatest surplus in June 2007 at £173.4 billion and the greatest deficit in March 2009 at £200.6 billion).
- The estimated number of schemes in deficit on a s179 basis was at its lowest point in June 2007 at around 3,000 schemes (around 44 per cent of the dataset) and peaked in March 2009 at around 5,900 (around 85 per cent).
- Since March 2009, a recovery in equity markets and rising bond yields have resulted in an improvement in aggregate scheme funding of £77.6 billion by the end of October 2009. In addition, the change in actuarial assumptions which took effect at the end of October improved the estimated funding position by a further £70.5 billion⁷. These together meant that the aggregate deficit fell to £52.5 billion.
- An increase in longevity, such that the experienced mortality is now equivalent to that of an individual two years younger, would increase schemes' liabilities by around five per cent (£51 billion).
- If the assumed rate of inflation increases by 0.1 per cent, with nominal interest rates unchanged, then the s179 liabilities for schemes increase by approximately 0.9 per cent or £9 billion.
- A 0.1 per cent (10 basis points) reduction in gilt yields raises scheme liabilities by 2 per cent and raises scheme assets by 0.4 per cent. A 2.5 per cent rise in equity markets raises scheme assets by 1 per cent.
- Broadly, a 0.1 per cent rise in gilt yields is equivalent in its impact on scheme funding at 31 March 2009 to a 6.4 per cent rise in equity prices compared with 3.4 per cent at 31 March 2008 in Purple 2008.
- The increased sensitivity to a rise in gilt yields reflects the fact that, at the end of March 2009, the aggregate deficit was much larger together with the low absolute level of bond yields (so that a 10 basis points change is a bigger percentage change in bond yields).
- The sensitivities do not take into account any possible hedging of interest rates, inflation, equities or longevity.

⁷ For more details see the November PPF 7800 release: http://www.pensionprotectionfund.org.uk/DocumentLibrary/Documents/PPF_7800_November_09.pdf.

5.2 Introduction

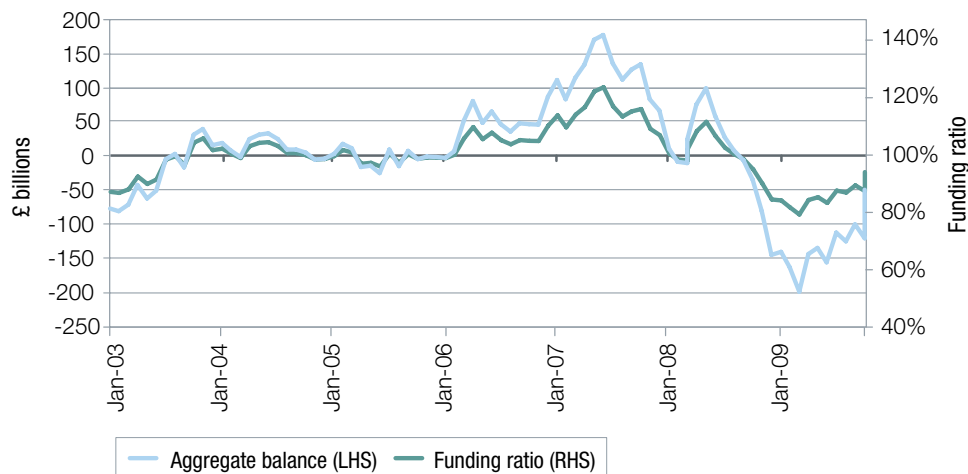
The analysis in Chapter 4, Scheme funding, provides a snapshot of funding at four points in time, the end of March in 2006, 2007, 2008 and 2009. In practice, funding levels are inherently volatile and are susceptible to changes in relation to the following:

- asset values, especially equity prices. These tend to be a more volatile asset class than bonds but demonstrate the potential to offer higher returns (based on very long-term empirical evidence);
- the discount rate used to value liabilities;
- the deficit reduction contributions made by employers;
- inflation;
- the assumptions relating to expected mortality; and
- the actuarial basis adopted⁸.

This chapter describes this volatility and sets out various sensitivities⁹.

5.3 Aggregate s179 funding¹⁰

Chart 5.1 | Estimated s179 aggregate balance (assets less liabilities) and funding ratio of pension schemes in the Purple 2009 dataset



Source: PPF/The Pensions Regulator

⁸ PPF changes the actuarial basis periodically in line with market pricing.

⁹ The focus is on monthly volatility. Purple 2008, page 54, also demonstrated high volatility on a daily basis.

¹⁰ Funding levels in this chapter are derived by comparing assets and liabilities in the PPF 7800 and Purple 2009 datasets at 31 March 2009. This ratio is then applied to assets and liabilities at all other dates.

Funding levels are inherently volatile.

Changes in market conditions resulted in £375 billion variation in s179 funding.

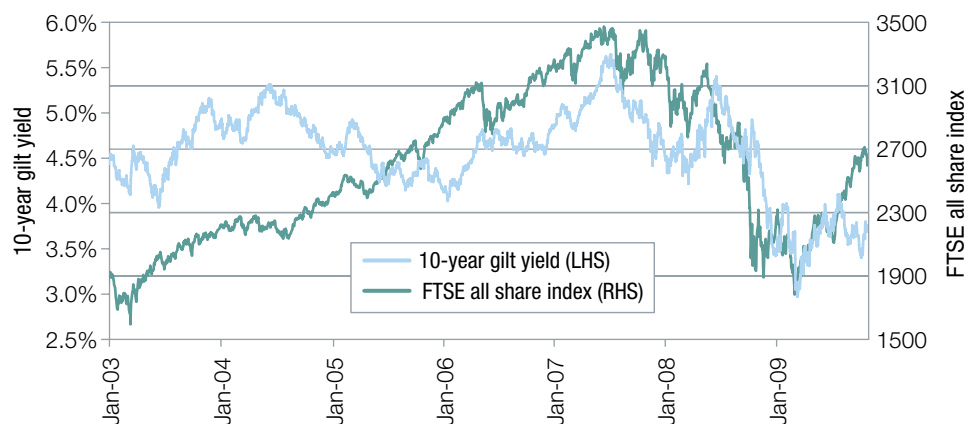
Calculations based on the Purple 2009 dataset show how changes in market conditions since January 2003 have caused the aggregate funding position of pension schemes on a s179 basis to vary considerably, as shown in chart 5.1. The aggregate funding position varied by around £375 billion with the largest deficit to date at £200.6 billion¹¹ in March 2009 and the greatest surplus at £173.4 billion in June 2007. The funding ratio (total assets divided by total liabilities) was at its highest in June 2007 at 124.0 per cent and at its lowest in March 2009 at 79.6 per cent.

These figures are based on adjustments in the assets and liabilities of individual pension schemes, calculated at their respective valuation dates on an approximate basis, using changes in market indices for principal asset classes and the fixed interest and index-linked gilt yields used to value liabilities.

The approximation does not allow for benefit accrual or payments, actual scheme experience, changes in mortality assumptions, or any scheme hedging. This is consistent with the methodology adopted for the purposes of the PPF 7800 index which has been published by the PPF since July 2007¹².

The s179 valuation estimate as at 31 March 2009 includes deficit reduction contribution (DRCs) certificates submitted to the PPF by 7 April 2009 corresponding to the s179 valuation results used in this estimate. These certificates show DRCs paid since the latest scheme valuation. Earlier DRCs will have been subsumed in the scheme asset figures as at the valuation date. The transformation methodology implicitly assumes that the DRCs are paid on the date to which the valuation result is transformed. Movements in scheme funding are then driven almost entirely by movements in financial markets. To this extent, schemes that have been making large special contributions in recent years (as suggested by the Office for National Statistics (ONS) data in Chapter 12, Risk reduction) will cause the estimated earlier funding figures shown in Chart 5.1 to give too favourable a picture of the 'real' funding position and underestimate the improvement in recent years (further analysis was provided in Purple 2008, page 55).


Chart 5.2 | Movements in stock markets and gilt yields



Source: Bloomberg

¹¹ These figures are based on actuarial assumptions as at March 2008 for s179 valuations, version A4. More information on version A4 actuarial assumptions is available at: <http://www.pensionprotectionfund.org.uk/TechnicalGuidance/Pages/GuidanceValidforPreviousPeriods.aspx>.

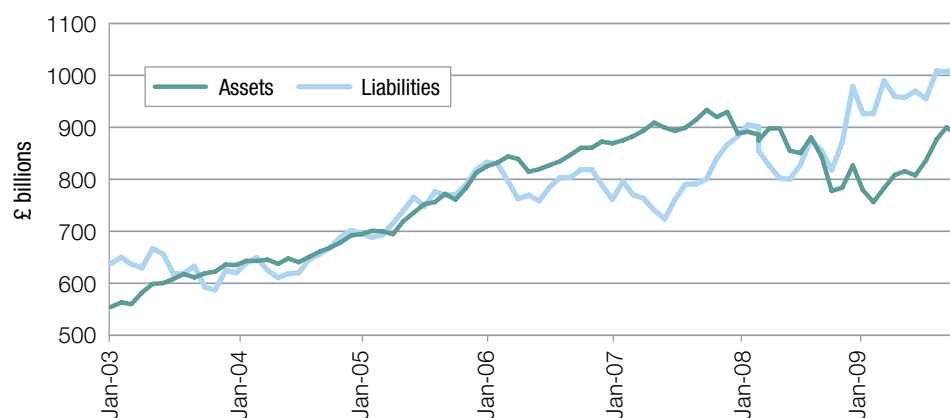
¹² This is available at: <http://www.pensionprotectionfund.org.uk/Pages/PPF7800Index.aspx>.



The market conditions behind the variation in s179 funding can be seen in Chart 5.2, while Chart 5.3 shows the movements in assets and s179 liabilities that underlie the figures in Chart 5.1. In summary:

- Falling gilt yields and equity markets resulted in a deficit of £83.8 billion in February 2003.
- The period from March 2003 to the end of 2003 saw equity markets and gilt yields rising, leading to the aggregate deficit becoming an aggregate surplus.
- From the end of December 2003 to December 2005 the aggregate funding level remained relatively constant (with a funding variation of around £58 billion) due to the continuing rise in equity levels being largely balanced by falling gilt yields.
- Between early 2006 and June 2007 the aggregate s179 funding position significantly improved as a result of rising gilt yields alongside rising equity markets, with the surplus peaking in June 2007 at £173.4 billion.
- The credit crunch resulted in falling equity markets and gilt yields so that by the end of March 2009 there was an aggregate deficit of £200.6 billion. At the end of March 2008, the actuarial assumptions for calculating s179 liabilities was changed to reflect the lower cost of buy-out resulting from greater competition (captured by higher discount rates in the calculation of liabilities).
- Since March 2009, a recovery in equity markets and rising bond yields have improved aggregate scheme funding by £77.6 billion by the end of October. In addition, another change in actuarial assumptions to reflect developments in the buy-out market took effect at the end of October and improved estimated funding by a further £70.5 billion. These together meant that the estimated aggregate deficit fell to £52.5 billion.

Chart 5.3 | Estimated movements in s179 assets and liabilities of schemes in the Purple 2009 dataset



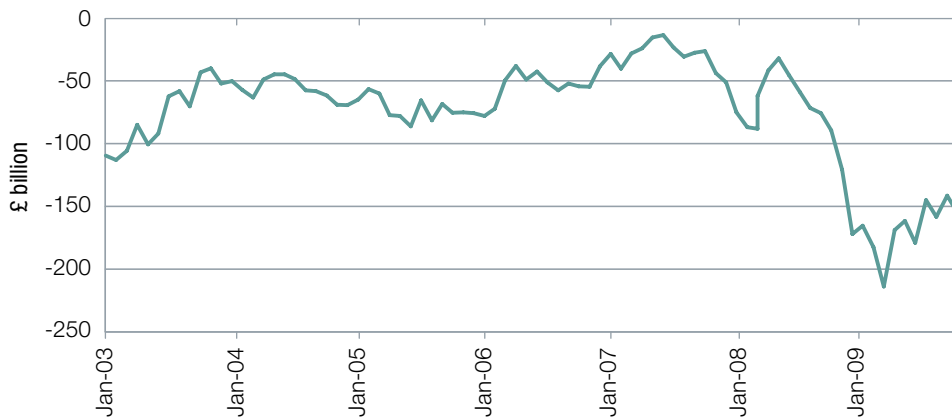
Source: PPF/The Pensions Regulator

5.4 Schemes in s179 deficit

The movements of s179 assets, liabilities and deficits for schemes in deficit are shown in Charts 5.4 and 5.5 since January 2003. Over this period, the smallest deficit of schemes in deficit was £13.2 billion in June 2007 and largest in March 2009 at £216.7 billion. In September 2008 the deficit started to increase sharply, peaking in March 2009. By the end of October 2009, the deficit had improved to £109.0 billion.

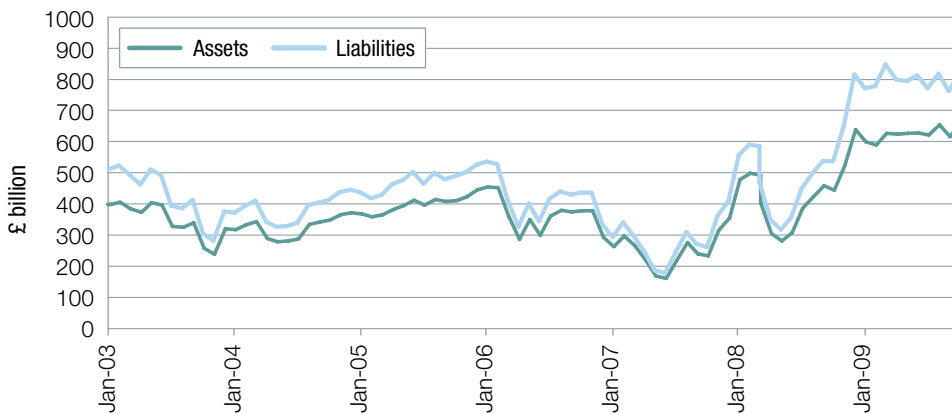
The difference between the largest and smallest aggregate s179 deficits (£203.5 billion) is narrower than in the case of all schemes (£375 billion) because financial market conditions can swing schemes from surplus to deficit, or deficit to surplus. For example, consider a scheme where movements in financial markets result in the funding position moving from a deficit of £30 million to a surplus of £10 million. The aggregate balance improves by £40 million whereas the aggregate deficit for all schemes in deficit only improves by £30 million because at the point the scheme moves into surplus it ceases to be a scheme in deficit. In March 2009, there were estimated to be 5,883 schemes in deficit (around 85 per cent of all schemes) and in June 2007 there were estimated to be 2,984 schemes in deficit (representing 43 per cent of schemes). It should be noted that in Chart 5.5 the changes in actuarial assumptions in March 2008 and October 2009 result in a reduction in the aggregate assets of schemes in deficit because improved estimated funding results in a number of schemes moving from deficit to surplus.

Chart 5.4 | Estimated aggregate s179 assets less aggregate s179 liabilities for schemes in deficit



Source: PPF/The Pensions Regulator

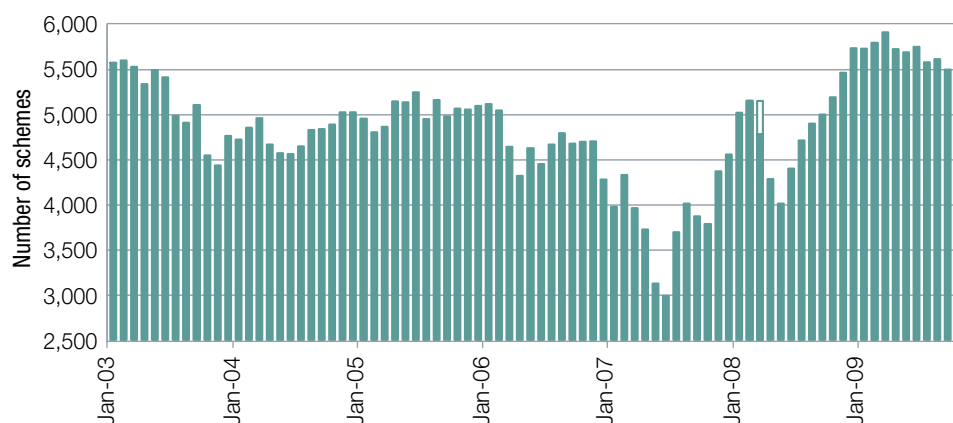
Chart 5.5 | Estimated aggregate s179 assets and s179 liabilities for schemes in deficit



Source: PPF/The Pensions Regulator

Changes in market conditions have resulted in the number of schemes in deficit varying by nearly 3,000.

Chart 5.6 | Estimated number of schemes in deficit each month in the Purple 2009 dataset



Source: PPF/The Pensions Regulator

5.5 Rules of thumb for the aggregate s179 funding position

Table 5.1 | Analysis of expected movement in s179 funding levels from a base aggregate deficit of £201 billion at 31 March 2009

s179 assets less s179 liabilities (£ billions)							
Movements in equity prices	Movements in gilt yields						
	-0.3%	-0.2%	-0.1%	0%	0.1%	0.2%	0.3%
7.5%	-235	-216	-197	-178	-161	-144	-127
5.0%	-243	-223	-204	-186	-168	-151	-134
2.5%	-250	-231	-212	-193	-175	-158	-142
0%	-258	-238	-219	-201	-183	-166	-149
-2.5%	-265	-245	-226	-208	-190	-173	-157
-5.0%	-272	-253	-234	-215	-198	-181	-164
-7.5%	-280	-260	-241	-223	-205	-188	-171

Source: PPF/The Pensions Regulator

Table 5.1 relates the sensitivities of the aggregate deficit to instantaneous changes in gilt yields and equity prices at 31 March 2009. From this it can be seen that:

- A 0.1 per cent (10 basis points) reduction or increase in gilt yields¹³ increases or reduces scheme funding by around £18 billion.
- A 2.5 per cent increase or decrease in equity markets will increase or reduce scheme funding by around £7 billion.
- So broadly, a 0.1 per cent (10 basis points) rise in gilt yields has a roughly equivalent effect on the aggregate funding position as a 6.4 per cent rise in equity markets.

¹³ The asset sensitivities reflect the duration of the FTSE UK Gilts All Stocks Index (9.7) and FTSE UK Gilts Index-Linked All Stocks Index (13.0) at 31 March 2009.

Funding has become more sensitive to changes in gilt markets and less sensitive to changes in equity markets.

Compared with Purple 2008, funding has become more sensitive to changes in gilt yields and a little less sensitive to changes in equity markets. In Purple 2008, a 0.1 per cent rise in gilt yields was roughly equivalent to a 3.4 per cent rise in equity prices. The greater sensitivity to changes in gilt yields in Purple 2009 mainly reflects the fact that at the end of March 2009 the aggregate deficit was much larger together with the low absolute level of bond yields (so that a 10 basis point change is a bigger percentage change in bond yields).

When the changes are combined it can be seen that a 2.5 per cent increase in equity prices coupled with a 0.1 per cent increase in gilt yields as at 31 March 2009, would reduce the aggregate deficit (with all other things being equal) from £201 billion to £175 billion. The equivalent falls in equity prices and gilt yields would lead to a deficit of £226 billion.

Tables 5.2 and 5.3 below show the equivalent sensitivity of s179 assets and liabilities to instantaneous movements in gilt yields and equity indices rebased to 100.

Table 5.2 | Analysis of expected movement in s179 assets from a base of 100 at 31 March 2009

s179 assets relative to a base of 100							
Movements in equity prices	Movements in gilt yields						
	-0.3%	-0.2%	-0.1%	0%	0.1%	0.2%	0.3%
7.5%	104	104	103	103	102	102	102
5.0%	103	103	102	102	101	101	101
2.5%	102	102	101	101	101	100	100
0%	101	101	100*	100	100	99	99
-2.5%	100	100	99	99	99	98	98
-5.0%	99	99	99	98	98	97	97
-7.5%	98	98	98	97	97	96	96

Source: PPF/The Pensions Regulator

*100.4 to one decimal place

Table 5.3 | Analysis of expected movement in s179 liabilities from a base of 100 at 31 March 2009

s179 liabilities relative to a base of 100							
s179 liabilities to relative 31 March level (=100)	Movement in gilt yields						
	-0.3%	-0.2%	-0.1%	0%	0.1%	0.2%	0.3%
	107	104	102	100	98	96	94

Source: PPF/The Pensions Regulator

In terms of their effect on the aggregate balance a 0.1 per cent rise in gilt yields is equivalent to a 6.4 per cent rise in equity markets.

5.6 Sensitivity analysis for schemes in deficit on a s179 basis

Table 5.4 | Analysis of expected movement in s179 funding levels from a base total deficit of £217 billion at 31 March 2009, excluding schemes in surplus

s179 Assets less liabilities (£ billion)							
Movements in equity prices	Gilt Yields						
	-0.3%	-0.2%	-0.1%	0%	0.1%	0.2%	0.3%
7.5%	-249	-231	-214	-198	-182	-167	-152
5.0%	-256	-238	-220	-204	-188	-173	-158
2.5%	-263	-244	-227	-210	-194	-179	-165
0%	-269	-251	-233	-217	-201	-185	-171
-2.5%	-276	-258	-240	-223	-207	-192	-177
-5.0%	-283	-265	-247	-230	-213	-198	-183
-7.5%	-290	-272	-253	-236	-220	-204	-190

Source: PPF/The Pensions Regulator

Table 5.4 shows how the underfunding position of schemes in deficit (on a s179 basis) of £217 billion varies with gilt yields and equity markets at 31 March 2009. It can be seen that if gilt yields rise by 0.3 per cent and equity markets rise by 7.5 per cent then the deficit of these schemes would fall to £152 billion. Conversely, if gilt yields fell by 0.3 per cent and equity markets fell by 7.5 per cent the total deficit would rise to £290 billion.

5.7 Benefit and inflation effects

If the assumed rate of inflation increases by 0.1 per cent then the s179 liabilities for schemes in the Purple 2009 dataset increase by approximately 0.9 per cent or £9.0 billion. A year ago, the same rise in assumed inflation resulted in a 1.5 per cent increase in liabilities. This calculation assumes that nominal yields are unchanged so that real yields reduce as a result of the increase in inflation. Conversely, if the assumed rate of inflation decreases by 0.1 per cent, then s179 liabilities would fall by approximately £8.8 billion or 0.9 per cent. If it is assumed that real yields are constant so that nominal yields fall as inflation declines, then liabilities increase by around 1.3 per cent (£12.5 billion), compared with 0.7 per cent last year. The lower sensitivity to a change in real yields this year, and higher sensitivity to changes in nominal yields, is because there is a smaller proportion of non-pensioner liabilities in the dataset this year (58 per cent compared with 65 per cent). Non-pensioner liabilities have a greater sensitivity to changes in inflation due to the revaluation the benefits receive during deferment.

Table 5.5 | Analysis of expected movement in s179 liabilities from changes in the rate of inflation at 31 March 2009 (base = £981.0 billion)

	s179 liabilities (£ billions)			
	Change in nominal yields		Change in real yields	
	-0.1%	0.1%	-0.1%	0.1%
£ billions	993.5	968.8	990.0	972.2
Percentage change	1.3%	-1.2%	0.9%	-0.9%

PPF/The Pensions Regulator

5.10 Impact of changes in expected mortality

The future expected mortality experience of scheme members is one of the key assumptions required to place a value on a scheme’s liabilities. An increase in longevity such that experienced mortality is now equivalent to that of an individual two years younger would cause total scheme liabilities to increase by £51.4 billion, or 5.2 per cent of liabilities. Meanwhile, a decrease in longevity of the same size would reduce scheme liabilities by £52.8 billion, or 5.4 per cent, (we do not have age information for each individual so we reduce the estimated average age for deferred members (48) and pensioners (63) by two years).