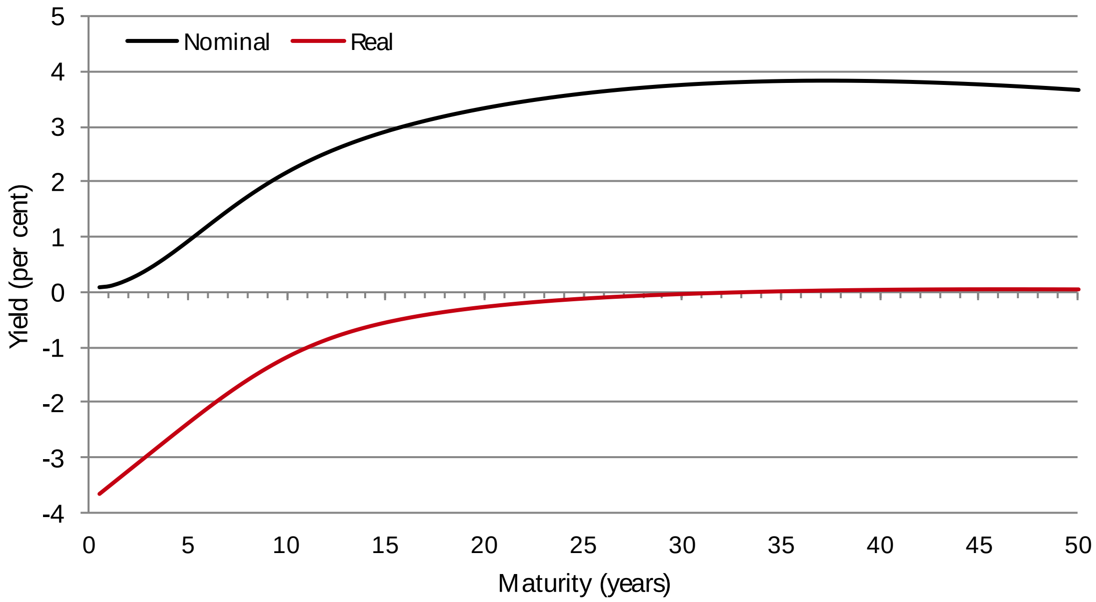
Extract from Debt and reserves management report 2013-14

Annex B

Cost

B.1. In assessing the cost of different types of debt issuance by maturity and type the Government undertakes an analysis of the nominal and real yield curves. Chart B.1 shows the shape of the nominal and real spot curves as at 11 March 2013.

Chart B.1: Nominal and real spot yield curves (11 March 2013)



Source: DMO

B.2. As part of this analysis, the Government seeks to estimate bond risk premia in the yield curve in order to identify maturity segments where premia are lower. Issuing into these maturity segments might deliver cost savings over a long time horizon.

B.3. Modern asset pricing theory suggests that the observed yield on a bond can be decomposed into two components, a 'risk neutral' yield and a risk premium. The risk neutral yield is the interest rate under 'pure expectations'. The risk premium represents the charge that the investor imposes on the issuer in order to protect investments against a variety of risks.[1] Theory suggests that the risk premium should be positive and increase with maturity, reflecting the fact that investors require compensation for holding riskier (i.e. longer maturity) assets. The variability and trends in the risk premium over time give an indication of which gilt maturities should be most cost-effective for the Government to issue.

B.4. Results from the DMO's risk premia analysis indicate the existence of a time-varying risk premium in the conventional gilt market which is usually positive and, as a general rule, increases with maturity.[2] Premia increased at all maturities during the second half of 2008, but the magnitude of this rise varied with maturity and it was followed by a significant fall after April 2011. The premium at December 2012 was close to its lowest level since the start of the financial crisis.

B.5. Over the period examined, the risk premium at short maturities (proxied by the 5-year maturity point) has been consistently lower than at other maturities, indicating that short gilts have been the most cost-effective maturity of conventional gilts to issue.[3] Chart B.2 plots the spread between the risk premium at the short-end of the yield curve and at all other maturities. It shows that spreads are negative due to the premium at the short end being lower than at other (longer) maturities. These spreads widened significantly at the onset of the financial crisis and peaked in 2011 before narrowing slightly during 2012. This suggests that the relative cost-effectiveness of short maturities in December 2012 remained close to the highest point in the period. These results have been tested against an analysis of the forward curve.[4]

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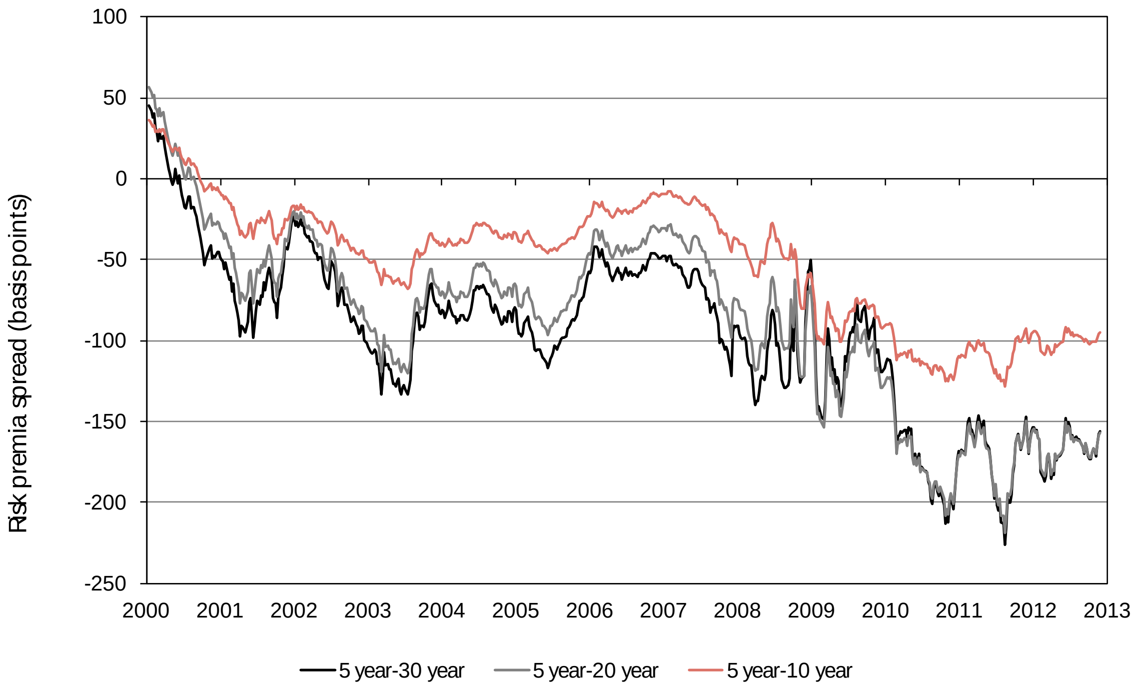
[1] The risk premium can be considered to have several components, including, but not limited to: (i) a term premium, which compensates investors for the fact that uncertainty increases for longer maturity investments; (ii) a credit and default risk premium; (iii) a liquidity premium due to the lower level of liquidity in some bonds or maturities, which restricts investors ability to hedge; and (iv) an inflation risk premium to compensate investors in nominal bonds for uncertainty due to inflation.

[2] This analysis is based on recent academic research by Christensen, Diebold and Rudebusch. Refer to the DMO's Annual Review 2011-12 for further details, http://www.dmo.gov.uk/documentview.aspx?docname=publications/annualreviews/gar1112.pdf.

[3] Data sample: January 2000 to December 2012.

[4] Analysis of the forward curve provides a useful indication of the existence of historical risk premia.

Chart B.2: Risk premia spreads



Source: DMO

B.6. Alongside this analysis of the relative cost-effectiveness of conventional gilts across different maturity sectors, the Government undertakes an evaluation of index-linked gilt cost-effectiveness, using conventional gilts as a benchmark for comparison, by examining the evolution of break-even inflation rates.[5]

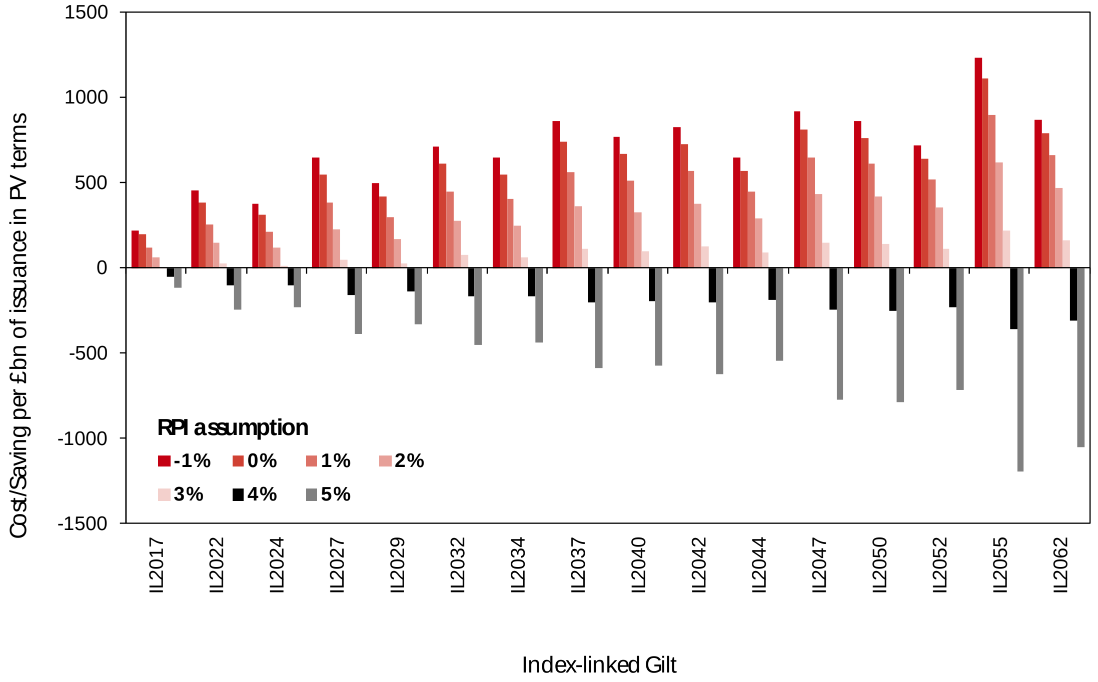
B.7. The break-even inflation rate is the rate of inflation that equalises the return on an index-linked gilt with that of a conventional gilt of the same maturity. It can be seen as the average rate of inflation, over the life of an index-linked gilt issue, that will make the Government indifferent on cost grounds between issuing either a conventional or an index-linked gilt.

B.8. To the extent that future inflation turns out to be higher or lower than the break-even inflation rate prevailing at the time an index-linked gilt is issued, it will have been more cost-effective for the Government to have issued a conventional or an index-linked gilt respectively.

B.9. As such, the Government can compare prevailing break-even inflation rates on index-linked gilts against a range of paths for future inflation (see Chart B.3) to evaluate (at a point in time) the relative cost-effectiveness of conventional and index-linked gilt issuance of similar maturities.

[5] A more detailed explanation of the methodology used in this analysis can be found in the DMO's Annual Review 2011-12, http://www.dmo.gov.uk/documentview.aspx?docname=publications/annualreviews/gar1112.pdf.

Chart B.3: Cost-effectiveness of index-linked gilts relative to equivalent maturity conventional gilts under a range of RPI inflation assumptions



Source: DMO

B.10. On the assumption that inflation returns to the Bank of England's target rate in the medium term, and based on the neutral assumption than inflation remains at target thereafter, an assessment of the path of long-term inflation relative to that priced in by the market indicates that there is currently a cost advantage to the Exchequer from issuing long-dated index-linked gilts relative to equivalent maturity conventional gilts.[6]

Risk

B.11. The other key determinant in the Government's decisions on debt issuance by maturity and type of instrument is its assessment of risk. In reaching a decision on the overall structure of the remit, the Government considers the risks to which the Exchequer is exposed through its debt issuance decisions.

B.12. Different maturities and types of issuance give rise to different risk exposures. The Government assesses the relative importance of each risk in accordance with its risk appetite. These risks are also considered in the context of supporting fiscal resilience in the medium term while remaining consistent with the long-term focus of the debt management objective.

[6] Assuming that the long run wedge between the Consumer Prices Index (CPI) and Retail Prices Index (RPI) is within the range of external estimates.

B.13. The Government currently places a relatively high weight on minimising near-term exposure to refinancing risk as far as possible. One of the ways in which the Government can manage this exposure is by maintaining a high proportion of long-dated debt in its portfolio, which can reduce the need to roll over debt frequently. The Government also places significant importance on avoiding large concentrations of redemptions in any one year. To achieve this, it will issue debt across a range of maturities, smoothing the profile of gilt redemptions.

Cost and risk simulations

B.14. An additional input to the analysis underpinning the Government's decisions on its issuance strategy is an exercise in which cost and risk simulations are generated to illustrate the cost-risk trade-off associated with different issuance strategies.[7] This allows the Government to investigate the near-term implications of different annual issuance strategies.

B.15. This exercise provides estimates of the evolution, over a 5-year horizon, of cost and risk metrics of the gilt portfolio. Debt service cost is defined as the cost of the coupon payments and redemptions associated with government debt, measured in terms of the relevant yield. Risk is defined as the standard deviation of debt service cost or debt service cost volatility.

B.16. The metrics resulting from this analysis combine the impact from alternative issuance strategies for financing new government debt with the existing characteristics of the debt portfolio inherited from previous financial years. The DMO's Portfolio Simulation Tool (PST), which calculates debt interest cost, is used in conjunction with a macroeconomic-based unrestricted Vector Autoregressive (VAR) model, which provides a distribution of projections of the yield curve, to depict risk in cost terms.[8] [9] In this way, the PST 'maps' the projected yield curve distribution to a debt service cost distribution so that simulated cost and risk metrics can be derived.

B.17. Table B.1 illustrates three issuance strategies. Strategies 1 and 3 represent two extreme issuance programmes with 100 per cent allocation to short and long gilt issuance respectively. Strategy 2 represents a split of issuance based on the actual 2012-13 issuance split followed by the DMO, which is well diversified across

[7] The Government does not use this simulation tool to determine a single optimal debt issuance strategy.

[8] There are differences in the methods used to calculate debt interest cost by the DMO and the OBR (the latter publishes the official debt interest forecast).

[9] The variables in the VAR model are: GDP, CPI and the Bank Rate as macroeconomic variables and three 'latent factors' taken from the work of Diebold and Li (2006) that describe the yield curve, using 10 benchmark maturity points. The VAR is estimated using data from October 1991 to September 2012 without restrictions and is then used for forecasting. For each year of the 5-year horizon, a yield curve forecast is produced. In order to generate a distribution of yield curve forecasts, simulations around the central forecast are made by drawing from a normally distributed series of errors, one thousand times. This implies that the volatility of the yield curve forecasts varies every year, i.e. there is more uncertainty and volatility the longer is the forecast horizon. The VAR currently only forecasts nominal yields; the break-even inflation rate from the Variable Roughness Penalty yield curve model (used by the Bank of England) is used to derive the real yield curve.

maturity buckets. All strategies have the same issuance split between conventional and index-linked gilts, 78 and 22 per cent respectively.

Table B.1: Gilt issuance strategy composition (per cent)[10]

	Short conventional (0 – 7 years)	Medium conventional (7 – 15 years)	Long conventional (over 15 years)	Index-linked
Strategy 1	78	0	0	22
Strategy 2 2012-13 skew	34	22	23	22
Strategy 3	0	0	78	22

B.18. Debt service cost is shown in Chart B.4, with the standard deviation of debt service cost also plotted around Strategy 2. The debt servicing costs of following Strategy 2 are expected to increase towards 3.4 per cent of GDP by 2017-18 despite the fact that overall gross financing is predicted to fall. The increase is mainly driven by the projected increase in yields over this horizon.

B.19. Of the three strategies considered, Strategy 1 results in the lowest cost, whereas Strategy 3 results in the highest cost. These results mainly reflect the upward sloping shape of the yield curve, i.e. short-term issuance is comparatively more cost-effective than long-term issuance in the near term.

B.20. The standard deviation of debt service cost, or debt service cost volatility, is also shown in Chart B.4. This illustrates the cost volatility that might occur around Strategy 2, amounting to around +/-0.1 per cent of GDP by the end of 2017-18. This means costs could vary in a range between 3.3 and 3.5 per cent of GDP by the end of the horizon, reflecting the impact of potential yield movements on financing and refinancing of existing debt over the forecast horizon.[11]

B.21. Although not depicted in Chart B.4, the results also show that the debt service cost volatility of Strategy 1 is the highest of all strategies, as short maturity gilts need to be refinanced more often and short-term yields are typically more volatile than long-term yields.[12] The opposite is found for Strategy 3, with the lowest cost volatility of the three strategies considered. Strategy 2, with a more 'even' skew of issuance, lies between the two. These results illustrate the trade-off that is required between cost and risk when making choices on the skew of issuance.

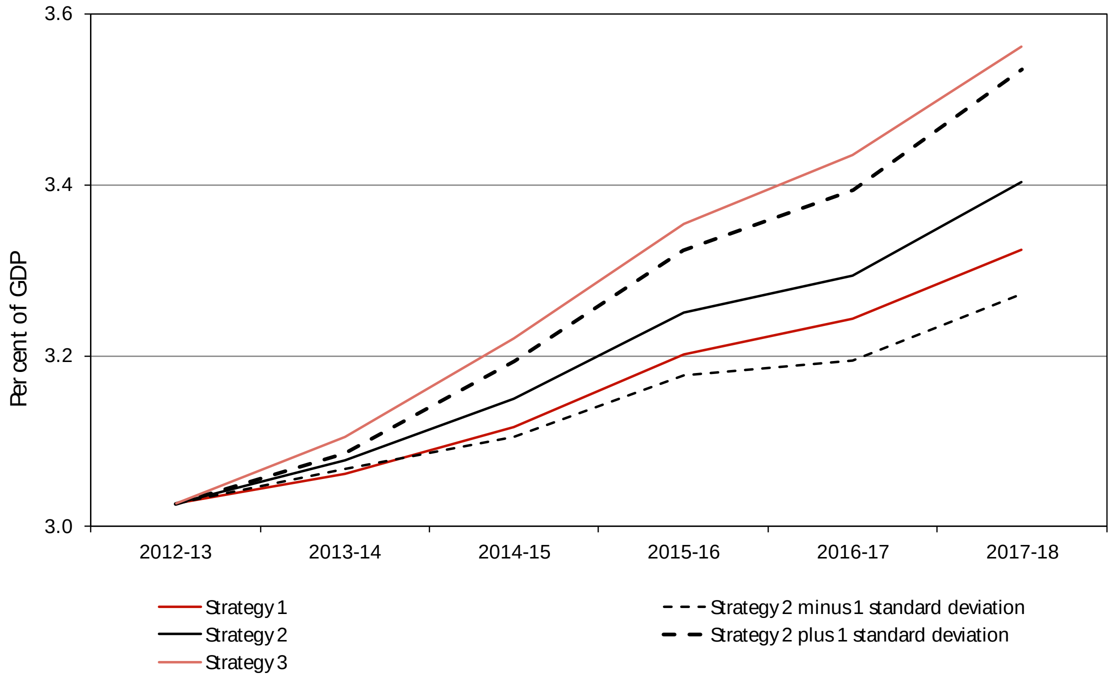
[10] Numbers may not sum to 100 due to rounding.

[11] For a normal distribution, the probability of values occurring within one standard deviation at either side of the mean of the distribution is 34.1 per cent at each side. On this basis, the range of costs presented has a probability of occurring of just over 68 per cent.

[12] Quantitative easing has compressed short-term yield volatility given current historically low short-term yields.

B.22. It is worth noting that Chart B.4 also illustrates that cost volatility (reflecting yield curve movements over the forecast horizon) can potentially dominate the projected cost savings that could be achieved by following a particular issuance strategy. For example, this can be seen by observing that cost volatility of one standard deviation more relative to Strategy 2 would lead to cost associated with that strategy only slightly below the cost associated with the 'central case' for Strategy 3. Likewise, cost volatility of one standard deviation less could lead to Strategy 2 turning out to be cheaper than the central case associated with Strategy 1.

Chart B.4: Debt service cost and standard deviation of debt service cost



Source: DMO

B.23. It is worth noting that in the simulation it takes several years before the different issuance strategies start to diverge significantly in terms of their cost and risk characteristics.[13] This is due to the large existing debt stock relative to the flow of new issuance, which in essence induces 'inertia' in the debt portfolio, with any changes to its structure as a result of issuance being slow to take effect.

B.24. Given the long-term nature of the Government's debt management objective, further analysis is carried out to illustrate the impact on the profile of gilt

[13] In order to depict completely the cost and risk characteristics of each issuance strategy, a longer horizon that covers all cash flows up to the maturity of the longest bond should be considered. This is, however, beyond the scope of this analysis.

redemptions and coupon payment obligations from projecting forward the current issuance strategy over a longer horizon.[14]

B.25. Overall, the results of the cost and risk simulations support the Government's approach to the issuance across maturities, which balances the estimated lower cost of shorter maturity issuance (with its higher exposure to near-term refinancing risk) against the higher cost (and reduced near-term exposure to refinancing risk) associated with longer maturity issuance. The results also provide a useful indication of the implications for the debt stock over a longer term horizon of rolling forward a particular issuance strategy over successive years.

[14] In practice, however, issuance strategies are determined on an annual basis.