# B Context for decisions on the Debt Management Office's financing remit

## Introduction

B.1 This annex provides the context for the government's decisions on gilt and Treasury bill issuance in 2015-16, setting out the qualitative and quantitative considerations that have influenced the government's decisions.

B.2 The government's decisions on the structure of the financing remit, which are taken annually, are made in accordance with the debt management objective, the debt management framework and wider policy considerations during the period of fiscal consolidation (see Chapter 2).

B.3 In determining the overall structure of the financing remit, the government assesses the costs and risks of debt issuance by maturity and type of instrument. The government's decisions on the composition of debt issuance are also informed by an assessment of investor demand for debt instruments by maturity and type as reported by stakeholders, and as manifested in the shape of the nominal and real yield curves, as well as the government's appetite for risk.

B.4 Alongside these considerations, the government takes into account the practical implications of issuance, for example the scheduling of operations during the course of the year and the appropriate use of different issuance methods.

## Demand

B.5 The Gilt-edged Market Makers (GEMMs) and end-investors report ongoing demand for conventional and index-linked gilts that is well diversified across the maturity spectrum and by investor type.

B.6 At the government's annual consultation meetings with gilt market participants in January 2015, both GEMMs and end-investors anticipated continued strong demand for UK government debt from domestic pension funds and insurance companies in 2015-16, with a particular focus on index-linked gilts.[1]

B.7 In the coming financial year, market expectations are for continued demand for gilts from a range of international investors, including central banks and reserve managers, as well as investors looking to diversify their bond holdings from other sovereign bond markets.

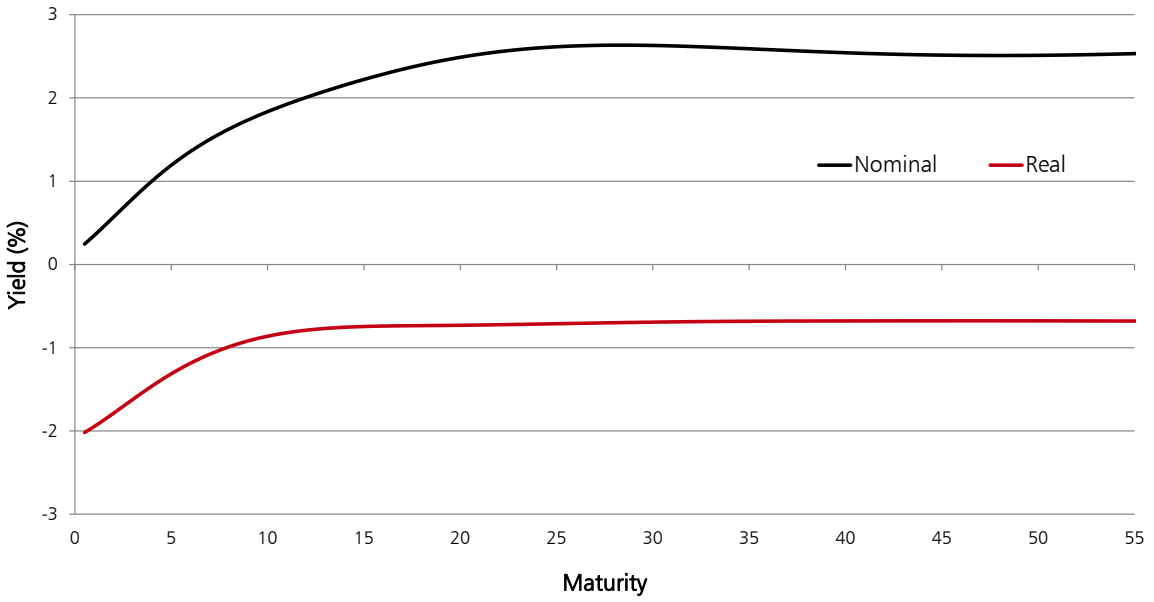
B.8 Domestic banks and building societies have become significant holders of gilts in recent years for regulatory purposes. No major changes in gilt investment by domestic financial institutions are expected in the coming year.

## Cost

B.9 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 at 17 February 2015.

[1] Minutes of the meetings are available at: http://www.dmo.gov.uk/documentview.aspx?docName=/gilts/press/sa210115.pdf

**Chart B.1: Nominal and real spot yield curves (17 February 2015)**




*Source: DMO*

B.10 Modern asset pricing theory suggests the observed yield on a bond can be decomposed into 2 components: a 'risk neutral' yield and a risk premium. The risk neutral yield is the interest rate under 'pure expectations'. In practice, forward yields follow a different path, as investors impose a charge on the issuer in the form of higher yields in order to protect investments against a variety of risks.[2] This gives rise to the *risk premium*. Theory suggests that the risk premium should be positive and increase with maturity, reflecting the compensation investors require for holding riskier (i.e. longer maturity) assets. The variability and trends in risk premia reflect investors' risk preferences over time.

B.11 Results from the DMO's risk premia analysis in the conventional gilt market indicate the existence of a time-varying risk premium which is usually positive and, on a historical basis, increases with maturity.[3] However, risk premia have fallen significantly in the last year. As at December 2014, the risk premium was estimated at very similar levels at all maturities of conventional gilts, primarily as a result of premia narrowing for longer maturity bonds. Longer maturity bonds have therefore become more cost-effective since last year relative to short and medium conventional gilts.

B.12 Alongside this analysis of the relative cost-effectiveness of conventional gilts across different maturity sectors, the government undertakes an evaluation of the cost-effectiveness of index-linked gilts, using conventional gilts as a benchmark for comparison, by examining the evolution of breakeven inflation rates.[4]

[2] The risk premium can be considered to have several components, including, but not limited to: (i) a premium which compensates investors for duration risk that 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. In general, the premium is the extra return investors expect to obtain from holding long-term bonds as opposed to holding and rolling over a sequence of short-term securities over the same period. The risk premium estimated by the DMO's model also includes a 'convexity premium' component – this increases with maturity and yield volatility and it offsets to some degree the other risk premium components as it represents a charge that the investor pays the issuer.

[3] This analysis is based on academic research by Christensen, Diebold and Rudebusch. Further details can be found in the DMO's Annual Review 2011-12: http://www.dmo.gov.uk/documentview.aspx?docname=publications/annualreviews/gar1112.pdf. The model has not been adjusted to account for 'zero bound effects'.

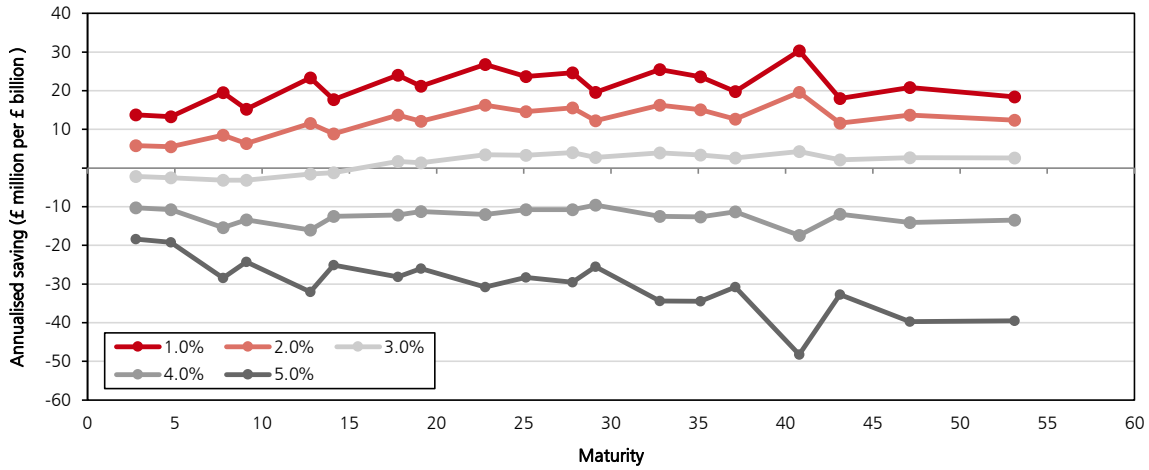
[4] A more detailed explanation of the methodology used in this analysis can be found in the DMO's Annual Review 2011-12: http://www.dmo.gov.uk/documentview.aspx?docname=publications/annualreviews/gar1112.pdf.

B.13 The breakeven 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, which will make the government indifferent on cost grounds between issuing either a conventional or an index-linked gilt.

B.14 To the extent that future inflation turns out to be higher or lower than the breakeven 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.15 As such, the government can compare prevailing breakeven inflation rates on index-linked gilts against a range of paths for future inflation (see Chart B.2) to evaluate the relative cost-effectiveness of conventional and index-linked gilt issuance of equivalent maturities. In order to facilitate the comparison of cost-effectiveness by maturity, the data are evaluated on an annualised basis.

**Chart B.2: Annualised cost-effectiveness of index-linked gilts relative to equivalent maturity conventional gilts under a range of RPI inflation assumptions**




*Source: DMO*

B.16 The analysis shows that, for future average RPI inflation of up to around 3%, longer-maturity index-linked gilts are marginally more cost-effective than conventional gilts.

B.17 On the assumption that inflation is in line with the Bank of England's target rate in the medium term, and based on a 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, at the margin, longer maturity index-linked gilts are generally cost-effective relative to equivalent maturity conventional gilts.[5]

## Risk

B.18 In the context of the long-term focus of the debt management objective, 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 and assesses the relative importance of each risk in accordance with its risk appetite.

B.19 The government places a high weight on minimising near-term exposure to refinancing risk. The government can partly manage this exposure by maintaining a high proportion of long-

[5] This conclusion is based on the assumption that the long run wedge between CPI and RPI is within the range of external estimates.

dated debt in its portfolio, which reduces the need to roll over debt frequently. Significant importance is also given to avoiding large concentrations of redemptions in any one year. To achieve this, the government will issue debt across a range of maturities, smoothing the profile of gilt redemptions.

B.20 Prudent debt management is also served by promoting sustainable market access. The government places significant importance on maintaining a deep, liquid and efficient gilt market and a diverse investor base in order to maintain continuous access to cost-effective financing in all market conditions.

B.21 The design of the structure of the remit can support sustainable market access by maintaining a deep and liquid gilt market that can readily be understood and engaged with by investors globally, a healthy intermediation model and a well-diversified investor base. Promoting these features of the gilt market will also serve to minimise debt costs to the issuer because investors reward the issuer for providing a continuous and ready market and a globally recognised benchmark product.

## Modelling of cost and interest rate/refinancing risk

B.22 An additional input to the analysis underpinning the government's decisions on its issuance strategy is an exercise in which debt interest cost and risk simulations are generated to illustrate the cost-risk trade-off associated with different issuance strategies.[6] This allows the government to investigate the medium-term implications of deviations in the future issuance skew from the current annual issuance strategy. This year the exercise has been carried out over a longer 15-year horizon to approximately match the average maturity of the gilt portfolio.[7]

B.23 Debt interest 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 interest cost or debt interest cost volatility. This can be seen as a measure combining both interest rate risk and refinancing risk.

B.24 The metrics resulting from this analysis combine the impact from alternative issuance strategies for financing new government debt (to meet the central government net cash requirement (CGNCR) and the refinancing of redemptions) with the existing characteristics of the debt portfolio inherited from previous financial years.[8] The DMO's Portfolio Simulation Tool (PST), which calculates debt interest cost, is used in conjunction with a macroeconomic-based Vector Autoregressive (VAR) model, which provides a distribution of projections of the yield curve, to depict risk in cost terms.[9,10] In this way, the PST 'maps' the projected yield curve distribution to a debt interest cost distribution so that simulated cost and risk metrics can be analysed.

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

[7] Beyond the 5 year horizon, for which CGNCR forecasts are not available, a balanced budget assumption, i.e. CGNCR=0, has been made. This implies: (i) that in years 5 to 15 the debt interest cost incurred every year is covered by a surplus in the other components of the CGNCR; and (ii) that total financing in those years for the DMO is equal to redemption refinancing, assuming no pay down of debt.

[8] The financing assumptions used in this exercise are in line with Autumn Statement 2014 numbers.

[9] There are differences in the methods used to calculate debt interest cost by the DMO and the Office for Budget Responsibility (OBR), who publish the official debt interest forecast.

[10] The variables in the VAR model are: GDP, CPI and the Bank Rate as macroeconomic variables and 3 '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 1992 to January 2015, making use of the official OBR December 2014 forecasts for the macroeconomic variables. For each year of the 15-year horizon, a yield curve forecast is produced. In order to generate a distribution of yield curve forecasts for each year, simulations around the central forecast are made by drawing from a distribution of errors, 1,000 times (thus the volatility of the yield curve forecasts varies over time, with uncertainty increasing over the forecast horizon). Two alternative yield curve distributions are analysed, normal and bootstrapped distributions. A restriction is applied that the nominal yields forecast should be positive. The VAR currently only forecasts nominal yields; the breakeven inflation rate from the Variable Roughness Penalty (VRP) yield curve model (originally developed by the Bank of England) is used to derive the real yield curve.

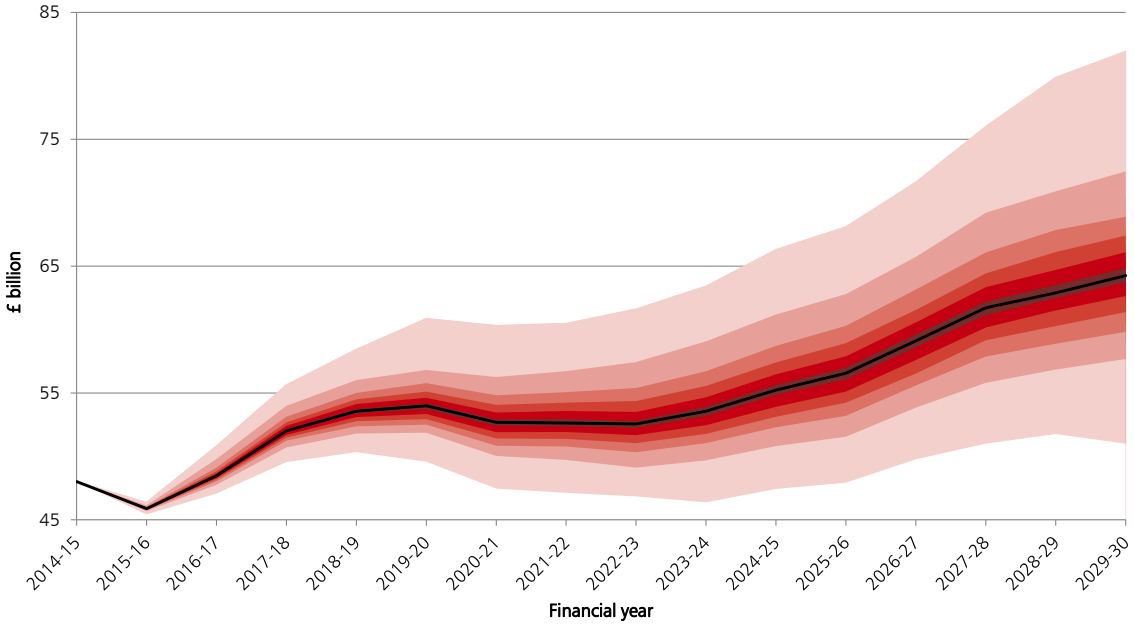
B.25 As an example, Table B.1 illustrates the issuance skew as at December 2014 followed by the DMO in 2014-15, which is well-diversified across maturity buckets.

**Table B.1: Gilt issuance strategy composition (%)[11]**

| | **Short conventional** (0 – 7 years) | **Medium conventional** (7 – 15 years) | **Long conventional** (over 15 years) | **Index-linked** |
|---|---|---|---|---|
| Issuance skew 2014-15 | 26 | 22 | 27 | 25 |

B.26 The resulting probability distribution of debt interest cost if issuance continued to follow the 2014-15 issuance maturity skew as set out in Table B.1 for the next 15 years is shown in Chart B.3.[12] In this example, rather than assuming that future yields follow a normal distribution, a bootstrapping technique has been used for the simulation of yields.[13]

**Chart B.3: Probability distribution of debt service cost (2014-15 issuance skew)**




*Source: DMO*

B.27 The central line of the fan chart represents the median debt interest cost after 1,000 simulations using the PST model (each simulation using an alternative yield curve) for each financial year. The shaded red areas (from darker to lighter red respectively) around the median debt interest cost projection represent the percentiles of the probability distribution, with each colour range representing an additional 10% probability.[14] The debt interest values in the lightest shades of red at the top and at the bottom of the fan chart represent the 'tails' of the distribution, with only 5% probability associated with them. For example, debt interest values on the upper tail of the distribution would not be expected to be reached with a 95% probability.

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

[12] Debt interest from APF holdings is not netted out here while it is in the OBR's official debt interest forecast, in line with changes brought about by ESA10 statistical guidelines.

[13] Bootstrapping is an econometric technique that does not make an assumption about the parametric form of the distribution of errors from estimation, such as the normal distribution. Instead, resampling techniques are applied to actual estimation errors in order to deduce the underlying distribution of the data sample.

[14] A percentile is a statistical measure indicating the value below which a given percentage of observations in a group of observations fall. For example, the 20th percentile is the value below which 20% of the observations may be found.

Forecast uncertainty increases further into the future and, therefore, the 'fan' widens over the horizon. Overall, at the 15-year horizon, it can be said with 90% certainty (i.e. excluding the top and bottom 'tails' of the distribution) that debt interest cost will be between £58 billion and £72 billion, with a median value of £64 billion.[15]

B.28 It is important to note when looking at Chart B.3 that debt interest simulations reflect the combination of simulated future yields and projected debt issuance together with the unfolding of existing portfolio dynamics. In this way, for example, it can be seen that debt interest seems to pick up in the later part of the horizon. Amongst other factors, this reflects the redemption profile of the debt portfolio, with a higher volume of redemptions that will mature and be refinanced at new rates of financing. Given the long average maturity of the UK's debt portfolio, which induces 'inertia' in the debt portfolio, any impact on its structure as a result of debt issuance is slow to take effect. Following the current issuance skew example, after 15 years only about half of the entire debt interest cost bill would have been refinanced at new yield levels.

B.29 Overall, the results of the cost and risk simulations support the government's approach to issuance across maturities, which balances the simulated lower cost of shorter maturity issuance (with its higher exposure to near-term refinancing risk) against the simulated 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.

## Gilt distribution

B.30 The gilt issuance programme in 2015-16 will be slightly larger than in the previous financial year, and remains large by historical standards. To raise this amount of financing in 2015-16, the government will issue conventional and index-linked gilts across a range of maturities, with auctions remaining the primary method of issuance.

B.31 There will be an additional planned supplementary issuance programme, which will comprise sales via syndication and, subject to demand, sales via gilt mini-tender. The government has reviewed the performance of the syndication programme in 2014-15 and has decided it should continue to be used in 2015-16 in the same way as in 2014-15: (i) to launch new gilts and/or to re-open high duration conventional and index-linked gilts; and (ii) for the size of transactions to be determined in response to market demand for the gilt being sold. The government anticipates that there will be around 6 syndicated transactions in 2015-16.

B.32 The main purpose of the mini-tender programme continues to be to accommodate variations in proceeds from syndicated offerings. In 2015-16, this will be reflected by permitting a small proportion of the remit to be allocated to issuance via either syndication or mini-tender. Mini-tenders may be used for the issuance of conventional and index-linked gilts across maturities.

B.33 To maintain the operational viability of the final syndicated offerings (by type) of the programme, the overall size of the long conventional and index-linked programmes may be increased by up to 10% (in cash terms) at the time of the relevant transactions. Scope to up-size the programmes in this way would only be deployed if, at the time of the final operations for either or both types of gilt, all the unallocated supplementary issuance amount had been exhausted, whether as a consequence of re-allocation decisions at previous syndications or as part of the sizing decision at the final operation.

[15] Note that the bootstrapped distribution in this example is asymmetric, so that for the same underlying probability, the area of debt interest values above the median of the distribution is larger than the area of values found below the median.

## Gilt issuance by maturity and type in 2015-16

B.34 The relatively high weight that the government places on managing its near-term exposure to refinancing risk has continued to influence its decision on the amount of short-dated conventional gilt issuance. Risk premia analysis suggests short conventional gilts are likely to be as cost-effective as medium and long conventional gilt issuance. Short conventional gilts will constitute a broadly similar proportion of gilt sales relative to 2014-15.

B.35 The government recognises the important role that medium conventional gilts (particularly in the 10-year maturity area) play in facilitating the hedging of a wide range of gilt market exposures through the futures market, which in turn underpins the overall cost-effectiveness of the government's financing programme. In addition, the liquidity of the sector means that issuance of medium conventional gilts enables the government to raise finance efficiently. However, the relative cost-effectiveness of medium conventional gilts has fallen since last year. Taking into account these factors, the government intends to issue a slightly smaller proportion of medium conventional gilts in 2015-16.

B.36 The risk premia analysis suggests long conventional gilts are as cost-effective to issue as short and medium conventional gilts, in contrast to previous years. The government has also considered the role of long conventional issuance in mitigating its near-term exposure to refinancing risk. The government has therefore chosen to increase the allocation of issuance to long conventional gilts in 2015-16 relative to that planned for 2014-15 at Budget 2014.

B.37 There is a slight reduction in the proportion of index-linked gilt issuance in 2015-16 relative to 2014-15. This reflects the government's judgement about the appropriate balance of cost, risk and demand considerations. In relation to risk, the government is aware the significant volume of index-linked issuance in recent years has consequences for the overall amount of index-linked debt outstanding and is mindful of the need to retain a balance in the debt portfolio as well as in its annual issuance programmes.

B.38 In reaching its conclusion, government has taken into account its analysis of the relative cost-effectiveness of index-linked gilts, its risk preferences including for the portfolio as well as the issuance programme, and the market feedback it has received, highlighting ongoing strong demand for index-linked gilts. The absolute amount of index-linked issuance is broadly unchanged from that planned at Budget 2014 for 2014-15.

## Treasury bill issuance in 2015-16

B.39 The government has also assessed the contribution to financing made by Treasury bill issuance and has concluded that Treasury bills continue to offer value in terms of cost-effectiveness as well as contributing to effective risk management. For example, changes to the Treasury bill stock offer an efficient way to accommodate in-year changes to the financing requirement, particularly towards the end of the financial year, and maintaining a larger stock is a means to increase investor diversification.[16]

B.40 Accordingly, the government has determined that the planned end-March 2016 Treasury bill stock should be increased by £7.0 billion to £72.0 billion, relative to end-March 2015.

[16] In 2013-14 and 2014-15, the planned stock-build in Treasury bills announced at Budgets 2013 and 2014 respectively facilitated a smooth handling of a significant reduction in the financing requirement announced at the following Autumn Statement, protecting the gilt sales programme from a significant in-year change.

## Interaction with NS&I

B.41 In determining the contribution to financing of both Treasury bills and short conventional gilts, the government has also considered the risk exposure that arises from the large net contribution to financing from NS&I in 2014-15 and 2015-16. Inflows from NS&I are likely to be in the form of relatively short-dated deposits.