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 2017-18, setting out the qualitative and quantitative considerations that have influenced them.

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. 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 Both Gilt-Edged Market Makers (GEMMs) and end-investors have reported ongoing demand for conventional and index-linked gilts that is well diversified across the maturity spectrum and by investor type.

B.6 At the annual consultation meetings in January 2017 attendees anticipated continued demand for UK government debt from domestic pension funds in 2016-17, with a particular focus on index-linked gilts.[1]

B.7 Market participants also expected ongoing demand for gilts from a range of international investors, including central banks and reserve managers.

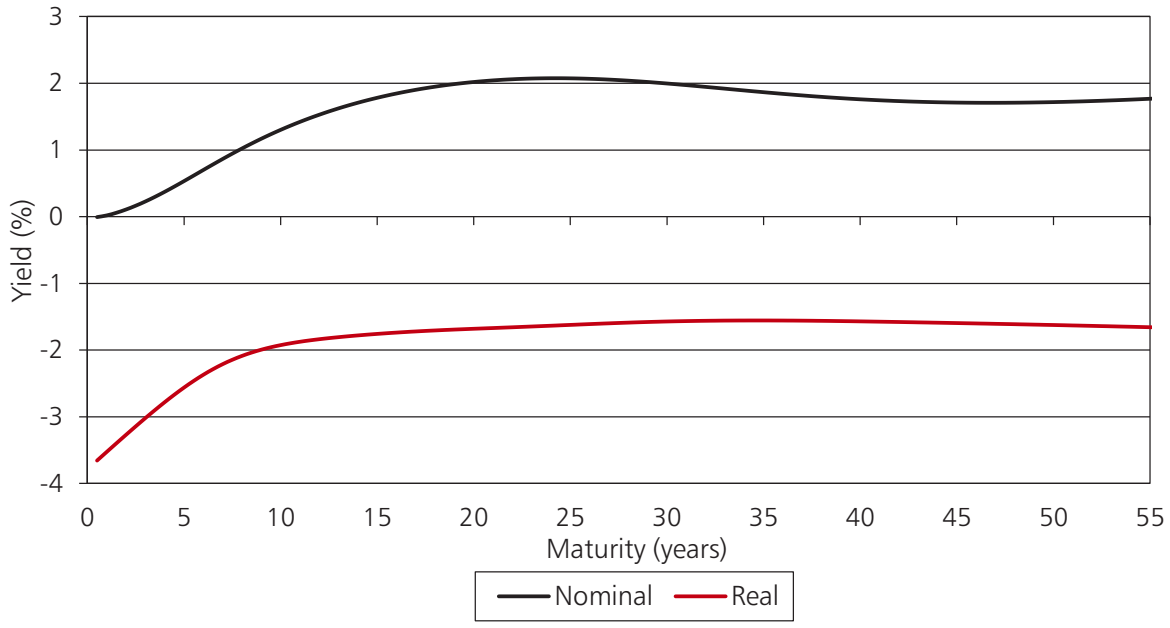
B.8 Domestic banks and building societies have become significant holders of gilts in recent years for regulatory purposes. No major changes in gilt investment by domestic financial institutions are expected in the coming year.

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 20 February 2017.

[1] Minutes of the meetings are available at: http://www.dmo.gov.uk/documentview.aspx?docName=/gilts/press/sa240117.pdf.

Chart B.1: Nominal and real spot yield curves (20 February 2017)



Source: DMO

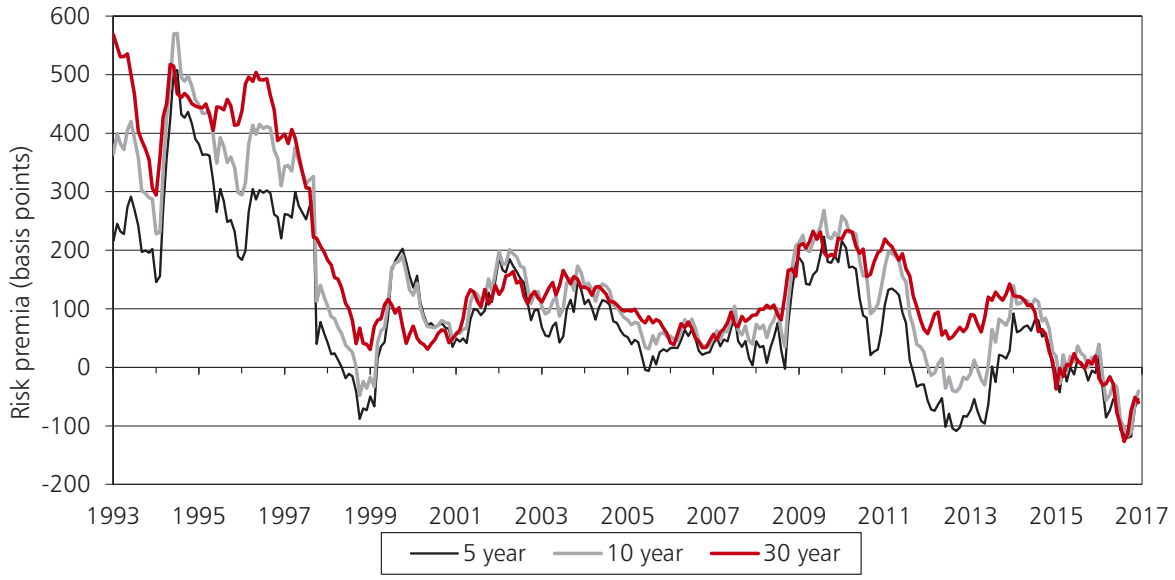
B.10 Conventional asset pricing theory suggests the observed yield on a bond can be decomposed into two components: a 'risk neutral' yield and a risk premium. The risk neutral yield is the interest rate under 'pure expectations'. In practice, forward yields follow a different path, as markets demand higher yields in order to protect investments against a variety of risks.[2] This gives rise to the risk premium. The variability and trends in risk premia reflect investors' risk preferences over time. It is cost-effective for a government to issue at maturities where the risk premium demanded by the investor is lowest relative to other maturities.

B.11 Chart B.2 shows risk premia in the nominal yield curve between 1992 and end-December 2016. Results 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, although this appears to have reversed in the last year.[3] In 2016-17, risk premia remained close to historically low levels at all key benchmark maturities. Premia for different maturities are now within a very narrow range. This suggests that, on this measure, conventional gilts across the maturity spectrum are broadly equal in terms of cost-effectiveness.

[2] The risk premia has 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 owing 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 owing 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. The model has not been adjusted to account for 'zero bound effects'.

Chart B.2: Risk premia



Source: DMO

B.12 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 breakeven inflation rates, the difference between nominal and real yields.[4]

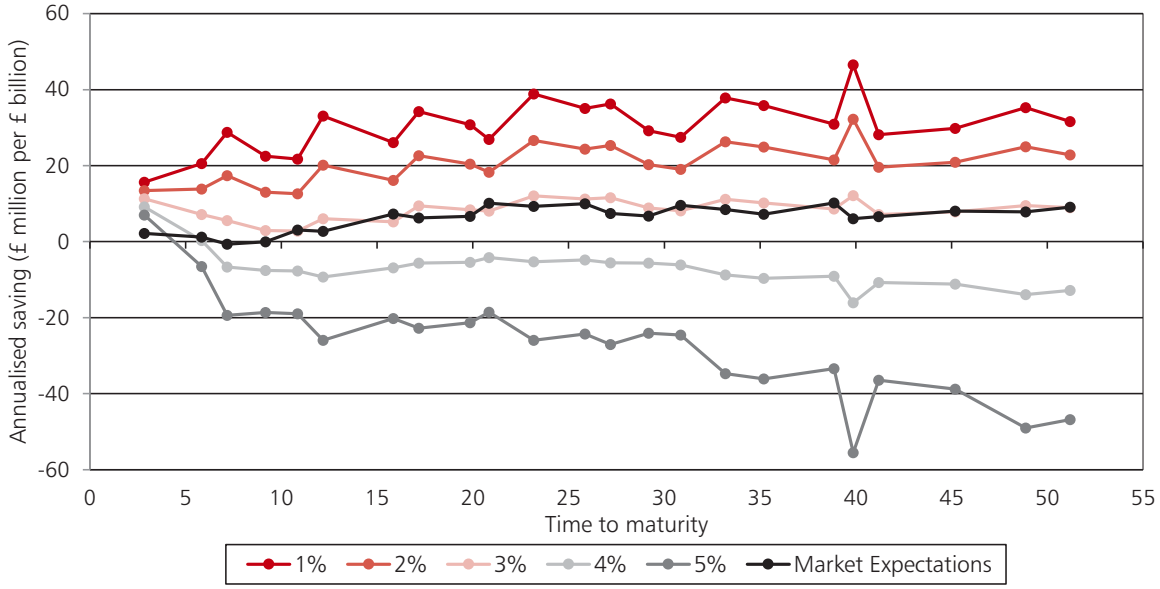
B.13 Similar to nominal yields, breakeven rates can also be decomposed into two components: a 'risk neutral' inflation rate, which is the pure market implied expectation of future inflation embedded in nominal yields, and a risk premium, which includes the premium for inflation risk in conventional gilt yields.[5] The government can choose either to pay the inflation risk premium and the level of inflation priced in the conventional gilt yield, which is 'fixed' at issue for the life of the bond, or it can issue an inflation-linked gilt, pay future realised inflation at a later time and bear the inflation risk. The two strategies are cost-equivalent if future realised inflation turns out to be equal to the level implied in the breakeven rate at issue. Chart B.3 shows the cost-effectiveness of issuance of index-linked gilts, relative to conventional gilts, under a range of paths for future inflation, which also includes market-implied pure expectations.

B.14 As at end-January 2017 the model shows that for an assumption that RPI remains constant at 3% over the life of the bond, index-linked gilts are generally more cost effective than equivalent maturity conventional gilts. Results using the market implied inflation forecast are very similar, although there is some divergence at shorter maturities reflecting the market's expectations around the path of near-term inflation. Compared to a year ago, the majority of index-linked gilts are marginally more cost effective across the curve.

[4] A more detailed explanation of the methodology used in this analysis can be found in the following documents: http://www.oecd-ilibrary.org/finance-and-investment/assessing-the-cost-effectiveness-of-index-linked-bond-issuance_5k481881kjwh-en and http://www.bankofengland.co.uk/research/Pages/workingpapers/2015/swp551.aspx.

[5] There is an additional risk due to liquidity conditions in the two markets. This is in relation with the cost to finance the purchase of the bond in the money market and to transact in the secondary market. A more detailed explanation of the methodology to estimate breakeven inflation risk premia can be found in the following document: http://www.bankofengland.co.uk/research/Pages/workingpapers/2015/swp551.aspx.

Chart B.3: The cost effectiveness of index-linked gilts under different RPI assumptions (end-January 2017)



Source: DMO

Risk

B.15 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.16 The government places a high weight on minimising near-term exposure to refinancing risk. The government can partly manage this exposure by maintaining a sizeable proportion of long-dated debt in its portfolio, which reduces the need to refinance debt frequently. The government places importance on avoiding, when practicable, 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.17 Prudent debt management is also served by promoting sustainable market access, which the remit is designed to support. The government places significant importance on encouraging 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.18 Promoting these features of the gilt market will also serve to minimise debt costs to the government because investors reward an issuer for providing a continuous and ready market and a globally recognised benchmark product.

Modelling of cost, interest rate and refinancing risk

B.19 The analysis underpinning the government's decisions on its issuance strategy includes 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

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

the medium-term implications of different possible future issuance skews relative to the current annual issuance strategy.

B.20 Debt interest cost is defined as the cost of the coupon payments and redemptions associated with government debt, accrued over the life of each bond, measured in terms of the relevant yield.[7] Risk is defined as the standard deviation of debt interest cost or debt interest cost volatility, reflecting potential variation in the relevant yield. This can be seen as a measure combining both interest rate risk and refinancing risk.[8]

B.21 As in previous years the exercise has been carried out over a 15-year horizon, close to the average maturity of the gilt portfolio, and therefore captures a rollover of approximately half of it.[9] The metrics resulting from this analysis combine the impact from alternative issuance strategies for financing new government debt (to meet the CGNCR and the refinancing of redemptions) with the existing characteristics of the debt portfolio inherited from previous financial years.[10]

B.22 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 two alternative distribution assumptions for simulating the yield curve, to depict risk in cost terms.[11] In this way, the PST maps the projected yield curve distributions to a debt interest cost distribution so that simulated cost and risk metrics can be analysed.

B.23 As an example, table B.1 shows the issuance skew planned by the DMO at the start of 2016-17, which was well diversified across maturity ranges.

Table B.1: Gilt issuance strategy composition

	Short conventional (0-7 years)	**Medium conventional** (7-15 years)	**Long conventional** (over 15 years)	**Index-linked**	**Unallocated**
Issuance skew 2016-17	23.5%	19.2%	28.0%	23.2%	6.2%

Figures may not sum due to rounding.

Source: Budget 2016

B.24 The resulting probability distributions of debt interest cost (if issuance continued to follow the current issuance maturity skew for the next 15 years) are shown in charts B.4 and B.5.[12] It is worth noting that the choice of distribution has a significant impact on the resulting projected yields and that neither distribution used generates short and long-run yields that are in line with current market expectations. This supports the view that there are negative risk premia priced in the yield curve currently.

[7] There are small differences in the methods used to calculate debt interest cost here from those used by the Office of Budget Responsibility (OBR), which publishes the official debt interest forecast. These include differences in coverage, on the RPI inflation assumption used and some simplifying assumptions with respect to the debt management operational details.

[8] Interest rate risk is defined as the risk associated with new issuance while refinancing risk is the risk associated with the roll-over of maturing debt.

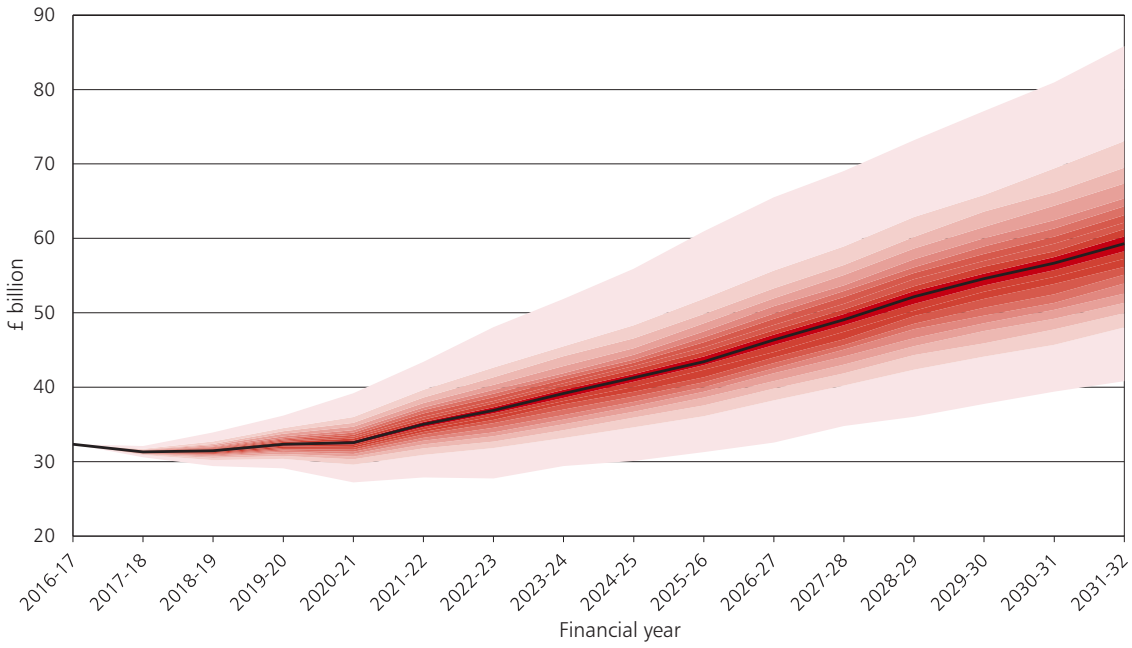
[9] It is worth noting that the index-linked part of the debt portfolio has a longer average maturity of around 22 years.

[10] The financing assumptions used in this exercise are based on Autumn Statement 2016 numbers.

[11] The VAR is estimated using data from October 1992 to December 2016, making use of the OBR EFO November 2016 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, one thousand times. Two alternative yield curve distributions are analysed, normal and bootstrapped distributions. Nominal yields' forecasts are not restricted to positive values. 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. The VAR currently only forecasts nominal yields; the break-even inflation rate from the Variable Roughness Penalty (VRP) yield curve model is used to derive the real yield curve.

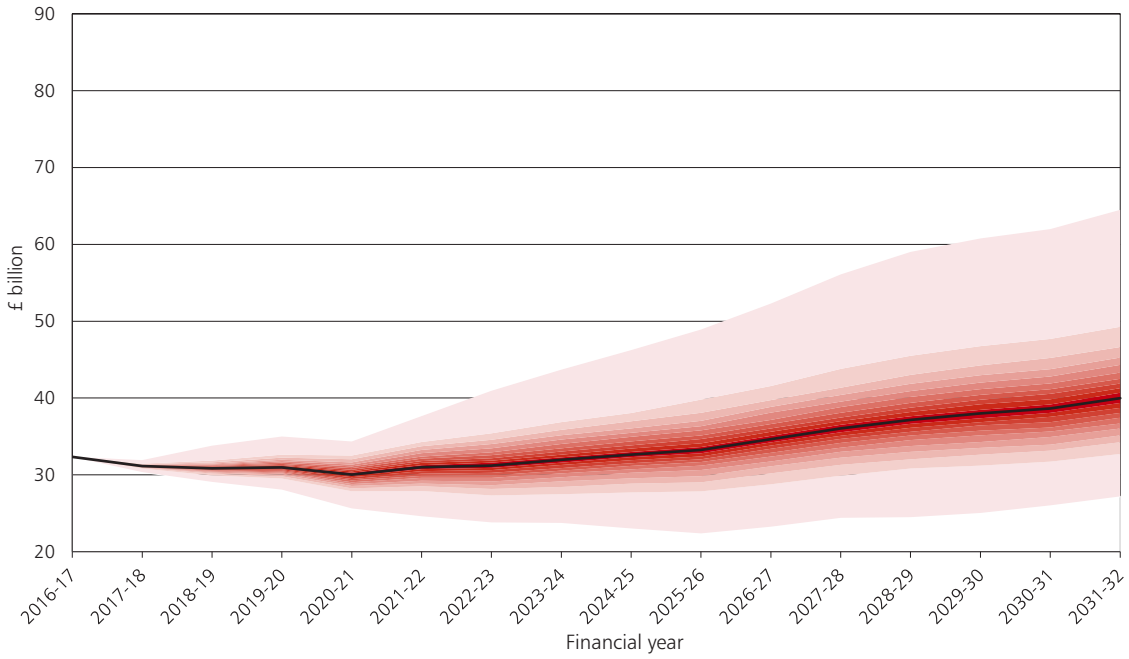
[12] Debt interest from APF holdings is netted out here, in line with the OBR's debt interest forecast.

Chart B.4: Probability distribution of debt service cost (normal distribution)



Source: DMO

Chart B.5: Probability distribution of debt interest costs (bootstrapped distribution)



Source: DMO

B.25 The central line of each fan chart represents the median debt interest cost after 1,000 simulations using the PST model (each simulation has 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 area representing an additional 5% probability. 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.

Forecast uncertainty increases further into the future and, therefore, the 'fan' widens over the horizon. Overall, at the 15-year horizon, under a normal distribution it can be said with 90% certainty (i.e. excluding the top and bottom 'tails' of the distribution) that debt interest costs will be between £48 billion and £73 billion, with a median value of around £59 billion. Under a bootstrapped distribution there is a 90% probability that debt interest costs will be between £33 billion and £49 billion, with a median value of around £40 billion.

B.26 It is important to note that debt interest simulations in charts B.4 and B.5 reflect the combination of simulated future yields and projected debt issuance together with the unfolding of existing portfolio dynamics. As a consequence, debt interest appears to pick up in the later part of the horizon. 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, amongst other factors. Given the long average maturity of the UK's debt, which creates 'stickiness' in the evolution of the portfolio, any impact from debt issuance is slow to take effect. In the 2016-17 issuance skew example, only about half of the entire debt interest cost bill would have been refinanced at new yield levels after 15 years.

Gilt distribution

B.27 Auctions will remain the primary method of issuance.

B.28 The government will continue the syndication programme in 2017-18. Gilts of any type and maturity can be sold via syndication. However, the current planning assumption is that:

- syndications will be used to launch new gilts or to re-open high duration conventional and index-linked gilts
- the size of transactions will be determined in response to the size and quality of market demand for the gilt being sold

B.29 Reflecting the lower financing requirement in 2017-18 relative to recent years, the government expects to hold five syndicated offerings in 2017-18.

B.30 Gilt tenders will be made available in 2017-18 for the issuance of conventional and index-linked gilts across maturities. The purpose of gilt tenders is to allow the government to respond more flexibly to changing market and demand conditions.

B.31 The government remains committed to the GEMM model to distribute gilts through auctions, syndications and tenders and the government recognises that GEMMs play an important role in helping to facilitate liquidity in the secondary market.

B.32 At the government's annual consultation meeting with the GEMMs and end-investors in January, many attendees reported that the package of measures introduced at Budget 2016 had been valuable in supporting gilt distribution and smooth delivery of the DMO's financing remit in 2016-17. The package of measures introduced at Budget 2016 will be retained in 2017-18.

Gilt issuance by maturity and type in 2016-17

B.33 In determining the split of gilt issuance, the government has considered its analysis of the relative cost-effectiveness of the different gilt types and maturities, its risk preferences including for the portfolio as well as the issuance programme, and the market feedback it has received.

B.34 Continuing demand for short conventional gilts is anticipated, including from overseas investors. However, the relatively high weight that the government places on managing its near-term exposure to refinancing risk has also continued to influence its decision on the amount of short-dated conventional gilt issuance.

B.35 In deciding the proportion of medium conventional gilts to issue, the government recognises the important role that medium conventional gilts (particularly in the 10-year maturity) play in facilitating the hedging of a wide range of gilt market exposures through the futures market, which helps underpin liquidity in the sector.

B.36 Market feedback suggests ongoing demand for long-dated conventional gilts from domestic investors in particular. Additionally, in determining the amount of long-dated conventional gilts to issue, the government has taken into account the role of long conventional issuance in mitigating its near-term exposure to refinancing risk.

B.37 For conventional gilts, the risk premia analysis suggests that issuance across the maturity spectrum is broadly equivalent in terms of cost-effectiveness. Under market implied inflation expectations, index-linked gilts are expected to be more cost effective to issue than equivalent maturity conventional gilts, particularly at longer maturities. 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 inflation exposure in its debt portfolio. Accordingly, the cost-effectiveness of index-linked gilts has been weighed against the need to retain a balance in the debt portfolio as well as in the annual issuance programmes.

B.38 Taking these considerations into account, the government's intention is to deliver in 2017-18 a gilt issuance programme that is well-diversified amongst different types and maturities of gilts, but with a slight bias towards longer maturities.

B.39 A slightly smaller portion of issuance will be held in initially unallocated form in 2017-18 compared to last year. The main purpose of the unallocated portion of issuance is to give increased flexibility to the DMO to issue any type or maturity of gilt by any issuance method in response to in-year evolution in demand and market conditions, while remaining consistent with the principles of predictability and transparency.

Treasury bill issuance in 2016-17

B.40 Treasury bills are used for both debt and cash management purposes. With regards to the former, changes to the Treasury bill stock have historically offered an efficient way to accommodate in-year changes to the financing requirement.

B.41 As in 2016-17, the government will not target a planned end-year Treasury bill stock in 2017-18. Information on the outstanding stock of Treasury bills will continue to be published monthly in arrears on the DMO's website.

B.42 It is expected that the net contribution from Treasury bills to debt financing in 2017-18 will be -£9.5 billion.