A bank within a bank: how a commercial bank's treasury function affects the interest rates set for loans and deposits

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- Banks determine the interest rates on loans and deposits through an internal pricing approach that seeks to take account of the relevant costs and risks of their business. This article focuses on 'funds transfer pricing' (FTP), a key component of banks' internal pricing methodologies.
- It discusses issues in some banks' FTP practices, the impacts of economic and regulatory developments on FTP, and some potential implications for monetary and financial stability.

Overview

The interest rates that banks set on their loans and deposits have a crucial impact on economic activity through their effect on borrowers' and savers' decisions. In determining these rates, banks take into account a variety of internal and external factors, including the associated costs and risks, their strategic objectives and competitors' behaviour.

For most banks, '**funds transfer pricing**' (FTP) is part of the process of setting retail and commercial interest rates and is a mechanism designed to account for the cost of funds faced by banks as well as the associated liquidity, interest rate and currency risks associated with lending and taking deposits. FTP is an internal process typically carried out by the bank's treasury function, acting as a central risk management hub for all business lines (such as the retail and commercial banking arms).

The treasury function 'borrows' deposits raised by deposit-taking units of the bank and 'lends' to loan-originating units — hence the notion of a 'bank within a bank'. Most retail and commercial banks generate a number of different transfer prices. These transfer prices determine the rates at which the treasury provides funds to business lines to make various different types of loans and the rates at which it remunerates business lines to raise deposits. The treasury function will usually assign a transfer price for a particular loan or deposit product based largely on the bank's funding costs (of the relevant maturity), associated risks and any additional management decisions to incentivise certain types of lending or deposit-taking, reflecting the bank's strategic priorities. A business line will typically decide the rate at which to extend loans or raise deposits, taking the transfer price into account.

A Prudential Regulation Authority (PRA) cross-firm review of FTP practices at major UK banks found a range of transfer pricing models used in the industry, with varying levels of sophistication. The review also revealed some issues in banks' internal transfer pricing policies. For instance, some banks failed to differentiate between loans and deposits of different maturities. In other cases, management strategy decisions were not transparent to business lines.

FTP methodologies matter because they can affect a bank's profit allocation and influence business lines' activities and appetite for risk. For example, if FTP practices lead to funding costs being underestimated in the transfer price, the bank's lending units may offer cheaper loans to customers (and expand their lending volumes) in the mistaken belief that this lending is profitable.

In addition to the implications for individual banks, FTP practices may influence competitor pricing in the market, affecting the overall stance of monetary policy and generating risks for the stability of the financial system. Robust governance of FTP regimes within banks is therefore important to ensure that the treasury function is managing risk and setting internal transfer prices appropriately. Given the relevance of FTP for monetary and financial stability, the PRA will continue to monitor banks' FTP methodologies.

(1) The authors would like to thank Steve Perry for his help in producing this article.

Borrowers and savers are concerned with the interest rates at which banks and building societies (hereafter 'banks') extend loans and pay for deposits. These rates affect banks' profitability and, to the extent that profits are retained, the amount of equity capital available to the banking sector. Retail and commercial interest rates therefore have a direct bearing on individual banks' safety and soundness, which the Prudential Regulation Authority (PRA) is tasked with promoting, as well as on the stability of the financial system.[1][2] Interest rates on loans and deposits are also integral to the transmission of monetary policy, feeding into the aggregate level of spending and inflationary pressure in the economy.[3]

In determining the rates on loans and deposits, banks seek to take account of the relevant costs and risks of doing business. This article explains funds transfer pricing (FTP), a key component of banks' approach to setting retail and commercial interest rates. The first section of this article explains what FTP is and how it works: typically, a bank's treasury function 'borrows' deposits raised by one part of the bank and 'lends' to the business lines that originate new loans.

There are many possible approaches to FTP: a PRA cross-firm review found that major UK banks used a range of FTP models for different business lines. **Importantly, the specific FTP methodologies that a bank adopts play a key part in the bank's profit allocation and can influence business lines' appetite for risk and the interest rates that they charge on loans and deposits**.

The second section of this article illustrates these points by considering issues in FTP approaches employed by some banks and how these can lead to the mispricing of loans and deposits, and by examining the possible systemic implications.

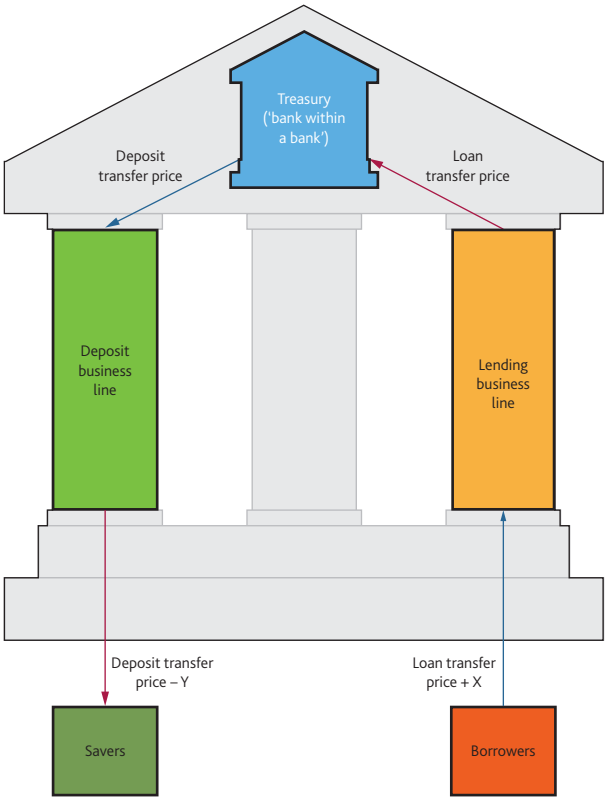
The role of FTP in the pricing of loans and deposits

A bank's treasury function usually acts as a central risk management hub for all the different business lines within the bank (such as the retail and commercial banking arms) that extend loans and accept deposits. The treasury centre typically funds all assets originated by the bank's business lines by borrowing internally (from the bank's deposit-taking business lines) as well as externally (from wholesale funding markets) and assumes the associated liquidity, currency and interest rate risks. One can think of the FTP process as the treasury centre extending an internal loan to the business line to fund customer lending, or accepting an internal loan from the business line made up of customer deposits. **In performing this function, the treasury centre operates in essence as a 'bank within a bank'. The rest of this section explains how the treasury centre determines different transfer prices for its business lines and how these, in turn, affect the pricing of loans and deposits**.

Loan rates, deposit rates and the transfer price

The interest rate at which the treasury charges business lines for extending new loans, or remunerates it for raising new deposits, is called the 'transfer price'. For most banks, there will be a different transfer price assigned by the treasury to each type of loan (or deposit) product.[4] Taking the transfer price as a starting point, a business line will then usually decide the rate at which to extend loans or raise deposits. Typically, a new loan is priced at a spread above its transfer price, while a new deposit is priced at a spread below its transfer price. A stylised example of the flows between treasury, business lines and customers for loans and deposits is shown in **Figure 1**.

Figure 1 Schematic of transfer pricing for a typical product within a typical bank[a][b][c]



(a) The transfer price is specific to each new loan or deposit product.
(b) A blue arrow indicates the rate at which the business line is remunerated for lending funds to the treasury centre or to borrowers. A red arrow indicates the rate at which the business line pays to borrow funds from the treasury centre or savers. The treasury centre also transacts directly with counterparts in wholesale markets for wholesale funding and to invest any excess funding.
(c) X and Y are the margins which the business lines accrue and represent the difference between the customer rate and internal transfer price.

(1) For more detail on the role of the PRA, see Bailey, Breeden and Stevens (2012).
(2) In addition to **microprudential** regulation, the Bank of England is also responsible for **macroprudential** policy. Specifically, the Financial Policy Committee (FPC) is charged with taking action to remove or reduce systemic risks with a view to protecting and enhancing the resilience of the UK financial system as a whole. For more detail on the role of the FPC, see Tucker, Hall and Pattani (2013) and Murphy and Senior (2013).
(3) For more detail on the transmission mechanism of monetary policy, see www.bankofengland.co.uk/monetarypolicy/Pages/how.aspx.
(4) A representative retail bank typically offers the following products: mortgages (fixed rate and variable rate), unsecured loans (credit cards, personal loans and overdrafts) and deposits (term deposits, sight deposits, ISAs).

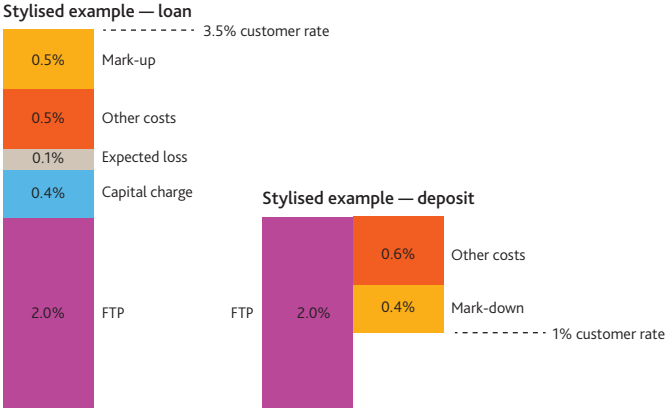
The spread above or below the transfer price reflects internal and external factors, such as other costs that the business line faces, associated with lending and deposit activities; the rate of return that business lines would like to generate on their loans and deposits, the bank's strategic objectives and competitor behaviour.

Pricing loans versus deposits

For lending rates, the spread above the transfer price will include the costs associated with any expected loss on the loan, the capital charge associated with the loan and other factors such as the bank's operating costs and margins (or mark-up). The expected loss represents the average expectation of loss associated with a loan and can be thought of as a combination of the likelihood that a borrower will default and the loss suffered by a bank if the default were to occur. Estimates for expected losses are affected by the outlook for the creditworthiness of borrowers and general economic conditions. The capital charge represents the cost of capital to cover losses that exceed banks' central expectations. The amount of capital needed to cover unexpected losses will be affected by national and international regulation, including the Basel III minimum capital requirements. Operating costs include the bank's costs associated with the origination and servicing of the loan such as staff costs and other overheads. The margin, or mark-up, typically represents the amount lenders charge over their marginal costs to ensure that each loan extended generates an expected rate of return.(1)

This is best understood by considering a stylised example for loan rates. In **Figure 2**, a bank's business line pays a 2% transfer price to the treasury function but charges the customer 3.5% for a loan. The business line bears additional costs and risks associated with the loan of 1% in the form of the expected loss, capital charge and other operating costs which are managed by the business line rather than centrally by the treasury function. In this simple example, the business line thus generates a 0.5% rate of return, or mark-up, on each new loan, that is the difference between the customer rate (3.5%) and the transfer price (2%) and additional costs (1%).

Figure 2 Stylised examples of loan and deposit pricing



The internal pricing of a deposit differs from that of a loan since a deposit is a source of funds for a bank. Unlike loans, where the customer-facing business line pays the treasury centre an internal price to originate the loan, the business line receives an internal rebate for acquiring deposit funding. This rebate reflects the value to the bank of deposits gathered. In the stylised example in **Figure 2**, a bank's business line receives a 2% transfer price from the treasury centre but pays the customer only 1% on the deposit. This spread reflects the costs associated with raising deposits as well as the rate of return the business line aims to generate on each new deposit.

Components of the transfer price

Each transfer price is determined by the way in which the treasury centre manages the risk of business lines' transactions. Typically the treasury centre does so by matching the maturity and interest rate profile of new lending and funding, together with the currencies in which they are transacted, to manage liquidity, interest rate and currency risks centrally within the bank.

For a given currency, the FTP process usually involves assigning to each loan or deposit product a curve that reflects its transfer price at different maturities. The FTP curve usually reflects the bank's **cost of funding** and any strategy decisions (known as '**management overlays**') that the treasury centre may wish to apply to incentivise desired behaviour within the business lines. The transfer price for a loan (or deposit) is the point on the FTP curve that reflects the loan's maturity, with the addition of the **cost of holding a buffer of liquid assets**. The rest of this section explains these different components of a bank's FTP curve in more detail.

While the marginal funding cost curve is usually applied universally to all products and business lines of the bank, the application of management overlays means that the FTP curve will typically be specific to each loan or deposit product.

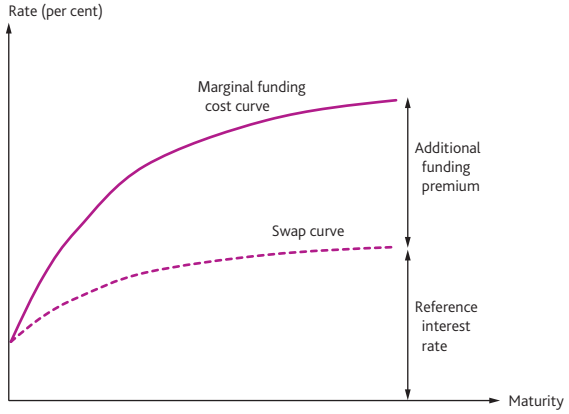
The marginal funding cost

Banks finance their lending activities with various sources of funding.(2) When a bank extends a new loan, it will consider the cost of raising additional funding to finance the loan. The marginal funding cost associated with the loan is thus a key driver of the transfer price.

Typically in the transfer price for a new loan, the funding cost is calculated on a maturity-matched basis to reflect liquidity risk. The treasury centre also typically manages interest rate

(1) For more details, see Button, Pezzini and Rossiter (2010).
(2) For more details, see Beau *et al* (2014).

Figure 3 Illustrative example of the marginal funding cost curve for a bank's business line[a][b]



(a) Additional funding premium captures the credit risk and liquidity risk associated with term funding.
(b) The curve will not always be upward sloping — the curve's shape reflects market expectations of future moves in interest rates as well as investors' need for compensation for tying up their money for longer periods. A downward-sloping curve would imply that the market expects lower future interest rates.

risk centrally rather than in each business line. The marginal funding cost can be decomposed into two parts, as shown in **Figure 3**.

- **Reference interest rate** to hedge interest rate risk. As explained in Annex 1, when a bank funds a fixed-rate loan, the reference rate is typically the swap rate of the same maturity as the loan, for example the two-year swap rate for a two-year fixed-rate loan. When a bank instead funds a floating-rate loan, the reference rate is usually a short-dated rate such as the three-month London interbank offered rate (Libor) rate.

- **Additional funding premium**. This is the spread of the bank's own marginal cost of funding over the reference rate at the relevant maturity. The funding premium will reflect a combination of the bank's own credit risk premium and the liquidity risk premium at the relevant maturity. The cost of funding tends to be greater at longer maturities, as investors seek compensation for tying up their money for longer periods.

To determine the funding cost for a new loan, the treasury centre needs to pick the point on the funding curve, as illustrated in **Figure 3**, of the appropriate maturity. But it also needs to consider which funding curve to base this on: this is not straightforward, because banks use several sources of funding to finance their lending. They typically raise funding in the form of deposits from households and companies, as well as borrowing in wholesale funding markets. As observed in the PRA cross-firm review, there is not a single established methodology in the industry for choosing the funding curve. This reflects in part the fundamental differences in banks' business models.

Annex 2 discusses different approaches to choosing the cost of funding curve and the merits and limitations of each approach. In particular, banks have traditionally adopted curves reflecting the marginal cost of unsecured wholesale funding. However, banks that are materially funded by household deposits or secured wholesale funding may need to consider a marginal funding curve that more accurately reflects their actual funding sources. In recent years, there has been a trend towards using a blended cost of funding curve when estimating a transfer pricing curve. This is consistent with the Bank of England's recent *Bank Liabilities Surveys* where lenders reported that they put weight on different sources of funding when setting their transfer prices.[1] But as discussed in Annex 2, there are practical difficulties with calculating such a curve accurately.

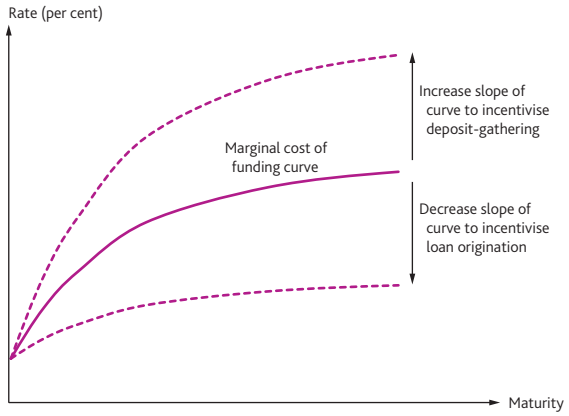
Once the treasury function has chosen an appropriate cost of funding curve, it will select the marginal funding cost of a new loan by using the point of the curve that corresponds to the maturity of the loan. For the purpose of FTP, the maturity of loans and deposits is calculated not on a contractual basis, but on a 'behavioural' basis, that is, based on the bank's assumption of how long these balances are likely to stay on its balance sheet. For example, if a business line extends a 25-year mortgage, but it believes that the customer will seek to refinance the loan after two years, then it will give the mortgage a 'behavioural' life of two years. A further example is that of current accounts: contractually they may be withdrawn on demand, but they often remain on a bank's balance sheet for several years. The choice of behavioural assumptions is, therefore, an important determinant of the transfer price that gets assigned to a loan (or deposit) product of a specific maturity.

Management overlays

Banks may also add subsidies or charges to the transfer price, or 'management overlays', to drive desired behaviours in specific business lines, as illustrated in **Figure 4**. The treasury centre applies overlays to reflect the bank's strategic appetite for asset or liability growth. For example, the treasury centre may apply an overlay by increasing the slope of the marginal cost of funding curve to disincentivise loan origination and incentivise retail deposit-gathering (by raising both the internal charges levied on new loans and the internal rebates paid for new deposits). A bank may do this if it plans to rebalance its funding mix away from wholesale funding and increase the share of retail deposits. As mentioned previously, the application of management overlays means that the FTP curve will typically be specific to each loan or deposit product.

(1) See *Bank Liabilities Survey*, 2015 Q1, available at www.bankofengland.co.uk/publications/Documents/other/monetary/bls/2015/q1.pdf.

Figure 4 Stylised example of how management overlays may be applied to the marginal cost of funding curve



Cost of holding a buffer of liquid assets

A further component of the transfer price is the cost of holding a 'buffer' of liquid assets(1) to meet contingent liquidity risks, such as the risk of unanticipated withdrawal of wholesale funding or retail deposits in a stress. For example, a bank may assess that 5% of its retail deposits would be at risk of sudden withdrawal in the event of stressed market conditions. As a result, in this simple example, suppose it raises an additional £5 million of funding (for example term wholesale funding with a maturity of five years) for every £100 million of retail deposit balances, and holds this £5 million in the form of liquid assets. If the yield on the liquid assets is 0.5% and the interest rate paid on the funding source is 1.0%, then the bank will typically allocate a 0.5% (1.0%–0.5%) cost of the buffer to its retail deposits to reflect their liquidity risk.

Vulnerabilities in banks' FTP practices and potential systemic implications

The PRA has carried out a cross-firm review of FTP approaches at the major UK banks. The review found that there is a range of FTP models used in the industry, with varying levels of sophistication and complexity. **This section sets out some of the potential vulnerabilities in FTP practices, based on the findings of the PRA cross-firm review**. It also examines how FTP approaches have been influenced by recent economic developments and the challenges for FTP posed by future economic and regulatory developments (see the box on page 159). The section concludes by considering the potential implications for monetary and financial stability of FTP approaches that do not adequately take account of funding and liquidity risks.

Vulnerabilities in banks' FTP practices

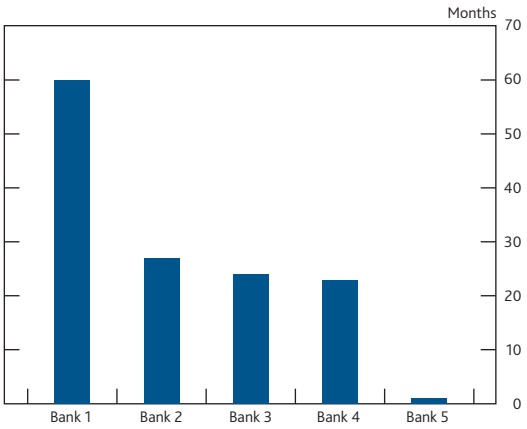
Behavioural assumptions

As discussed in the previous section, banks tend to calculate the maturity of loans and deposits on a 'behavioural' basis, rather than on a contractual basis. The choice of behavioural assumptions matters for the transfer price assigned to a loan or deposit product.

In general, to maximise the margins that the bank attaches to a given retail product, a business line will have an incentive to ascribe longer behavioural maturity (or 'stickiness') to deposits gathered (for which they are remunerated) and shorter behavioural maturity to loans originated (for which they are charged). This is because, in an upward-sloping funding cost curve environment, the business line responsible for raising deposits will get remunerated at a higher interest rate than it otherwise would have and the business line responsible for making loans will get charged a lower interest rate than it otherwise would have.

The PRA cross-firm review of FTP practices at major UK banks found that behavioural assumptions can vary quite considerably for a given product type. This is illustrated in **Chart 1**, where banks' behavioural longevity assessments for one-month deposits from small and medium-sized enterprises (SMEs) ranged from one month to five years.

Chart 1 Behavioural assumptions for the lifespan of one-month SME deposits



Source: PRA review (2013).

The impact of banks' behavioural assumptions for the lifespan of loans and deposits can affect the marginal cost (or benefit) of funding in unintended ways. While the effects of varied behavioural assumptions have been less visible in recent years due to the flat market yield curve environment, they could be more material in an environment with a steeper market yield curve. This is because the internal FTP mechanism usually charges new loans (and remunerates new deposits) on a maturity-matched basis. To illustrate this, **Figure 5** shows two FTP curves, corresponding to a flat and a steep market yield curve environment. Suppose that the correct behavioural life of a deposit is two years, but that a bank assumes a five-year behavioural life instead. In an environment with a flat market

(1) A liquid asset is one which can be easily sold or converted into cash with little or no loss in its value.

Figure 5 Sensitivity of behavioural inaccuracies to the steepness of the FTP curve

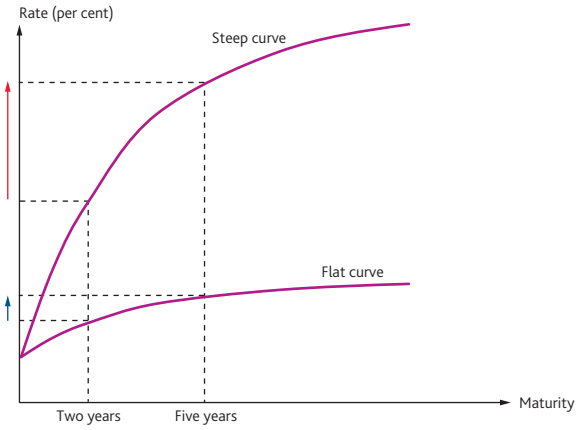
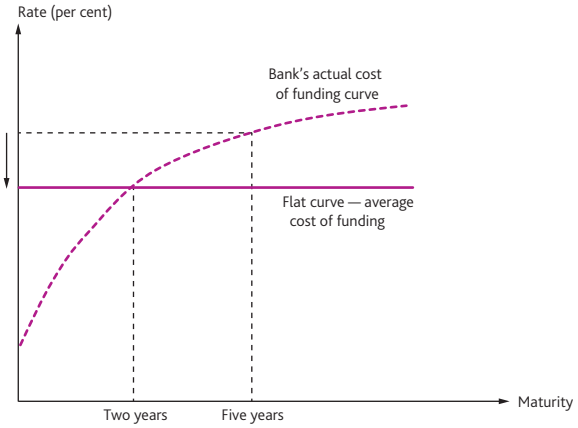


Figure 6 Internal pricing based on a single average rate



yield curve, this inaccuracy leads to a slightly larger internal rebate to the business line for raising the new deposit (blue arrow in **Figure 5**); while in a steep market yield curve environment, it leads to a significantly larger internal rebate (red arrow) and to a corresponding larger impact in the calculation of the product's profitability.

Use of a single average rate to price new loans and deposits, irrespective of their maturity

The PRA review found that some banks applied an average cost of funds to the assets and liabilities they originate, irrespective of their maturity. This fails to recognise that, all else being equal, longer-dated assets present greater risk than short-dated assets and *vice versa* for liabilities. A longer-dated loan ties up the bank's resources for longer and bears a greater chance of impairment due to adverse credit events or market interest rate movements than a shorter-dated loan. Conversely, a longer-dated deposit presents a more stable source of funding with less refinance risk than a shorter-dated deposit. In terms of incentivising different types of business activity, this 'one size fits all' approach therefore benefits longer-dated loans at the expense of shorter-dated loans and benefits short-dated deposits at the expense of long-dated deposits. The approach sacrifices accuracy of performance measurement for operational simplicity.

The impact can become more material when the market yield curve slopes upward steeply since this raises the cost differential for banks of investing in long-dated as opposed to short-dated assets, or for raising short-dated as opposed to long-dated liabilities. This is illustrated in **Figure 6** where the weighted average cost of funding estimated by the bank equates to its cost of funding at a two-year maturity. Charging all new loans and rebating all new deposits at this two-year rate means that the funding charge (or rebate) of a five-year loan (or deposit), for example, is artificially low. This approach skews the incentives of banks' business lines towards increasing maturity transformation, by incentivising five-year lending and disincentivising five-year deposit-taking relative to shorter terms.

This approach also leaves the bank unable to accurately track the performance of individual products, since, for instance, for the five-year loan the marginal cost of funding of the same maturity is not considered — rather it is embedded in an overall weighted average cost across maturities. Over time, this may affect the safety and soundness of the bank itself and have wider implications for monetary and financial stability in general.

Lack of transparency in the application of management overlays

Banks often apply management overlays in determining the transfer price to drive business lines' incentives, but these are not always transparently applied. Transparency in a bank's FTP model confers several important advantages. It enables business lines to understand and support the FTP model and increases its influence over business behaviour. It also allows the bank to distinguish between product margins booked by business lines before and after the application of a subsidy, without which certain products might not be profitable.

The PRA review found that some banks were not separating the management overlays from their cost of funding curve. Some banks were found to be applying different cost of funding curves to new loans and deposits in order to incentivise loan origination and deposit-gathering simultaneously. This was achieved by increasing the cost of funding curve for liabilities (to encourage deposit-gathering) and decreasing the cost of funding curve for assets (to encourage loan origination). This practice consequently skews business incentives and makes it less clear what performance is for individual products before and after any management overlay.

To sum up, the PRA review revealed some issues in FTP practices at the major UK banks. **Vulnerabilities included the behavioural assumptions applied to loan or deposit**

Impact of economic and regulatory developments on FTP

The recent financial crisis has had a major impact on banks' business models and their internal pricing methodologies. This box examines how FTP practices have been affected by economic developments after the crisis, and how FTP practices are likely to be affected by future economic and regulatory developments.

Impact of post-crisis economic developments

Changes in FTP methodologies

Prior to the crisis, some banks deemed funding to be readily available and consequently did not adequately reflect liquidity and credit risk when pricing new loans and deposits. During the crisis, funding markets became less liquid, so banks have started to include both an additional funding premium and the cost of holding a liquid asset buffer in their FTP methodologies. They have also had to consider a greater range of different funding curves when estimating their transfer price curve. This reflects a diversification in banks' sources of funding following the crisis.

Net interest margin

The economic environment after the crisis has also presented challenges for banks' net interest margins — the difference between the interest charged on loans and paid on deposits. In response to the downturn, central banks widely reduced policy rates significantly; in the United Kingdom, Bank Rate fell sharply to a historical low of 0.5%. Prior to the crisis, banks typically offered rates on new household deposits below Bank Rate. But the low-rate environment effectively placed a lower bound (or 'floor') on the rates that banks offer on sight deposits, since, if deposit rates were to become negative, depositors might withdraw their deposits and hold them as cash. As a result, the difference between Bank Rate and rates on sight deposits fell sharply and has been a source of downward pressure on banks' net interest margins since the start of the financial crisis. This pressure on banks' net interest margins may have led banks to make offsetting adjustments to margins on other products, for example by raising the rates charged on new loans or reducing rates on other (non-sight deposit) savings products. However, if banks' FTP models do not reflect the new environment, then individual business lines may continue trading without adjusting rates, to the detriment of the overall net interest margin. Appropriate governance arrangements are required to guard against this latter risk, so that true product economics underpin business decisions.

Challenges from future regulatory and economic developments

Ring-fencing

In the United Kingdom, the Independent Commission on Banking has set out proposals intended to insulate high street banking businesses from riskier investment banking arms. Banks will have to put their UK retail banking business in a separately capitalised subsidiary.(1) Similar reforms have been promoted in the European Union(2) and the United States.(3) Among the key questions for banks is what the marginal cost of funding should be for entities within and outside this ring-fence. Outside the ring fence, the marginal cost of funding curve might be based on wholesale secured and unsecured funding, whereas ring-fenced entities may need to consider mainly retail and corporate deposits for their marginal funding. This could have implications for the way banks estimate their marginal funding cost curves, particularly for banks that currently use a curve based on a single source of funding (see Annex 2).

Recovery and resolution

Banks are now required to have a plan in place that sets out how they would wind-down in an orderly manner in the event of resolution, reducing the impact on financial stability and risks to the taxpayer.(4) One resulting issue is the possible impact on banks' cost of capital and on 'bail-inable'(5) wholesale debt. The likely impact on debt funding costs will need to be incorporated into banks' transfer pricing methodologies to ensure they are properly accounting for all costs associated with their lending and deposit-taking activities.

Impact of higher interest rates

As the economy normalises, Bank Rate is likely to start to rise.(6) The level of Bank Rate, and the shape of the market yield curve, are likely to have implications for banks' profitability and how they manage their margins through FTP.

Among the key questions are the likely behaviour and pricing of sight deposits and current account balances, as depositors are more incentivised to put their money to work in a higher-rate environment. Migration of deposit balances away from patterns established over the past five years may impact the revenues which banks derive from them. FTP models may need to account for this potential change in the behaviour of customer deposits.

(1) www.bankofengland.co.uk/publications/Pages/news/2014/125.aspx.
(2) http://ec.europa.eu/finance/bank/structural-reform/index_en.htm.
(3) www.federalreserve.gov/bankinforeg/volcker-rule/.
(4) See *PRA Policy Statement PS1/15*, 'Implementing the Bank Recovery and Resolution Directive — response to CP13/14', January 2015; www.bankofengland.co.uk/pra/Documents/publications/ps/2015/ps115.pdf.
(5) www.ecb.europa.eu/press/key/date/2013/html/sp130930.en.html.
(6) But, as noted in the November 2014 *Inflation Report*, when Bank Rate does begin to rise, the pace of rate increases is likely to be gradual, with Bank Rate probably remaining below its historical average level for some time. See www.bankofengland.co.uk/publications/Documents/inflationreport/2014/ir14nov.pdf.

products, using a single average interest rate which did not recognise the maturity of loans and deposits, and a lack of transparency in the application of management overlays. Banks need to continually review these assumptions to ensure that their FTP curves accurately reflect the funding and liquidity risks associated with their loan (or deposit) portfolios. Robust bank governance is therefore an important pre-requisite for an FTP regime to be effective in driving business lines' risk-taking incentives.(1)(2)

Other potential implications arising from FTP practices

From a bank-specific perspective, poor FTP practices may result in inaccurate appraisals of product profitability and inappropriate incentives for the bank's business lines. In the longer run, this may engender a misallocation of resources and affect the resilience of the bank.

Of course banks may *intentionally* choose to price aggressively, even at a loss, to build market share or to meet some other strategic objectives. It would, therefore, be simplistic to suggest that FTP practices alone drive banks' pricing of loans and deposits. For example, there is evidence that after the crisis major UK banks priced two-year fixed mortgages with 75% loan to value (LTV) similarly to one another, over a period when their indicative funding costs differed significantly, as shown in **Charts 2A** and **2B**. Instead of signalling inadequate FTP practices at some of the banks, this trend may well have been driven by their strategic decisions to follow competitors in that market. What is important is that strategic decisions are made acknowledging the true economics of the business (as in the example discussed above), and not unwittingly as a result of inappropriate internal pricing methodologies.

As well as affecting individual banks' profits and risk-taking, FTP approaches that do not adequately take account of funding and liquidity risks associated with a bank's lending and deposit-taking activities could also have implications for monetary and financial stability.

Financial stability implications

A stable financial system is a prerequisite for a healthy economy. The Bank of England has a statutory objective to protect and enhance the resilience of the UK financial system. In addition, the FPC is responsible for macroprudential policy — that is, taking action to remove or reduce systemic risks with a view to protect and enhance the resilience of the financial system as a whole. Inadequacies in transfer pricing practices may have implications for both the microprudential as well as the macroprudential aspects of the Bank's financial stability objective.

In addition to the implications for an individual bank's profitability and capital position, the impact on pricing arising from inappropriate FTP practices may also have systemic implications. Where a bank underestimates its internal transfer price and charges lower rates on new loans, competitor banks may decide to charge lower rates than they otherwise would, in order to defend their market share. It may also incentivise competitors to shift their lending operations towards other areas where they may lack proficiency, amplifying risks to their own safety and soundness and to the

Chart 2A New lending rates on UK two-year 75% LTV mortgages(a)

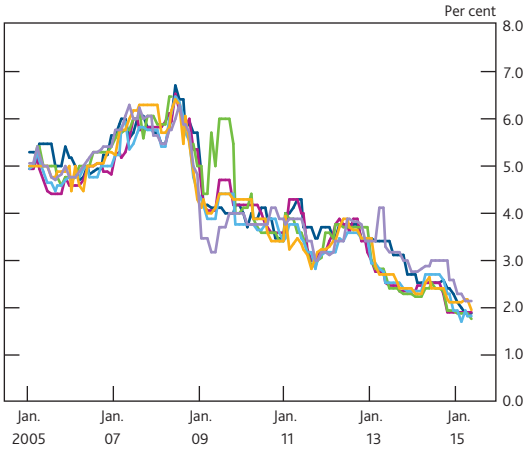
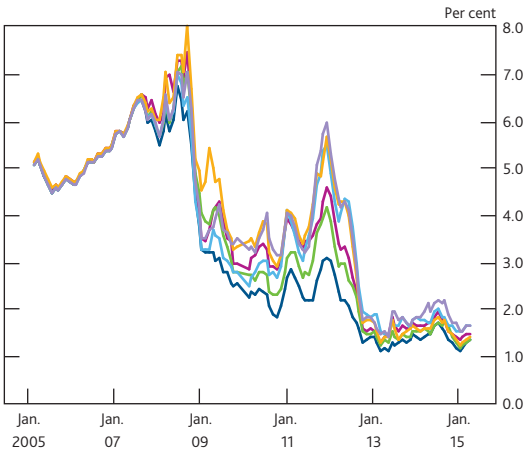


Chart 2B Indicative measure of long-term wholesale funding costs for UK banks(b)



Sources: Bloomberg and Bank calculations.

(a) Quoted rates on two-year 75% LTV mortgages for the major UK lenders. The Bank's quoted interest rates series are weighted averages of interest rates derived from relevant products offered by a sample of the largest banks and building societies.
(b) This is an estimate for the marginal funding cost associated with extending two-year fixed-rate loans, based on constant-maturity secondary market yields for the major UK lenders' five-year euro senior unsecured bonds, where available. Where a five-year bond is unavailable, a proxy has been constructed based on the nearest maturity of bond available for a given institution. The gap in the time series between 1 December 2009 and 11 January 2010 reflects a lack of suitable bonds outstanding in secondary markets in that period.

(1) The benefits of robust governance are further set out in www.bis.org/fsi/fsipapers10.htm and www.eba.europa.eu/regulation-and-policy/liquidity-risk/guidelines-on-liquidity-cost-benefit-allocation.
(2) The centralised model of a treasury function having control over business lines can be beneficial as it ensures there is consistent pricing and risk management discipline across business lines. There could be a risk of conflict of interest where a bank's treasury centre might calibrate its transfer prices to maximise its own profitability at the expense of the wider bank. To avoid such outcomes, the treasury centre's FTP setting function is typically not configured as a profit centre — the bank does not evaluate the treasury centre with reference to the profit or loss accumulated from charging and remunerating business lines for loans and deposits.

system as a whole. These behaviours could result in a misallocation of resources in the economy with an oversupply of lending in certain markets. They could also have implications for the overall profitability and solvency of the banking system.

Monetary policy implications

The Bank of England's Monetary Policy Committee (MPC) has a primary objective of delivering price stability, defined by the Government's 2% CPI inflation target. The main instrument of monetary policy is Bank Rate, the policy rate set by the MPC each month.(1) Bank Rate affects short-term market interest rates, which in turn influence a range of interest rates set by commercial banks as well as asset prices and the exchange rate. These factors influence consumer and business demand and the aggregate level of spending and inflationary pressure in the economy.

Effective transmission of monetary policy depends on the extent to which changes in Bank Rate are passed through to market interest rates and the rates that banks charge on loans and pay on deposits. The extent of pass-through of Bank Rate to retail interest rates is largely determined by a range of factors such as banks' overall funding costs, their strategic objectives and their competitors' behaviour. But it will also depend on whether the treasury functions in individual banks adequately pass on changes in Bank Rate, via internal transfer pricing, to the different business lines.

As a result, bank FTP approaches can have implications for the overall stance of monetary policy, by influencing the level of spending and inflationary pressure in the economy. Where a bank overestimates its internal transfer price and charges higher rates on new loans, its lending becomes less affordable for households and companies. This can, in turn, lead to a reduction in lending volumes in the economy. And if internal transfer prices are underestimated, business lines might offer cheaper, more affordable loans and originate more loans than they otherwise would have done. These effects would be exacerbated if competitor banks matched the pricing changes. And the more widespread these pricing changes, the greater the potential impact on the aggregate level of spending in the economy.

Conclusion

The rates that banks set on their loans and deposits have a crucial impact on economic activity through their effect on borrowers and savers' decisions. Banks use FTP to help determine these rates.

A PRA cross-firm review found that there are a range of transfer pricing models used in the industry with varying levels of sophistication, in part due to the range of banks' business models. The cross-firm review also revealed some potential shortcomings of some banks' FTP policies.

Internal FTP methodologies play a key part in profit allocation within a bank and influence business lines' activities. If funding costs are underestimated, business lines may offer customers cheaper loans and increase lending volumes in the mistaken belief that they are profitable. If funding costs are overestimated, business lines may mistakenly require higher customer rates to remain profitable, making loans less competitive and affordable and limiting volumes. In addition to the implications for individual banks, poor FTP practices may influence competitor pricing in the market, affecting the stance of overall monetary policy and generating risks for the stability of the financial system.

Of course banks may intentionally choose to price aggressively, even at a loss, to build market share or to meet other strategic objectives. But it is important that such decisions are made acknowledging the true economics of the business and that they are not made unwittingly as a result of inappropriate internal pricing methodologies.

Robust governance of FTP regimes within banks is therefore important to ensure that the treasury function is managing risk and setting the internal transfer prices appropriately. Given the relevance of FTP for the Bank's objectives, the PRA will continue to monitor banks' FTP methodologies, both on a bank-specific and industry-wide basis.

(1) In March 2009 the MPC announced that in addition to setting Bank Rate, it would start to inject money directly into the economy by purchasing financial assets — often known as quantitative easing. For more detail, please see www.bankofengland.co.uk/monetarypolicy/Pages/qe/default.aspx.

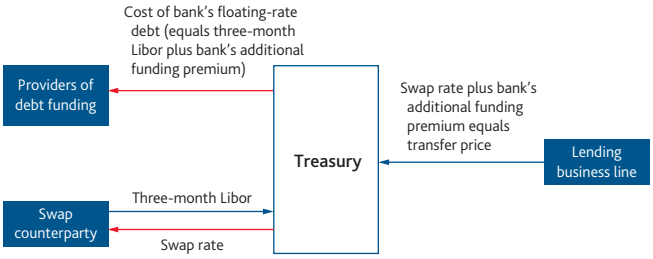
Annex 1
Stylised examples of transfer pricing

Below we discuss three simple examples of how the reference interest rate and additional funding premium components of the transfer price are determined for a five-year fixed-rate loan, a two-year floating-rate loan and a fixed-rate deposit. For simplicity the cost of holding a buffer of liquid assets and any management overlays are excluded in this discussion.

When funding a fixed-rate loan, for example a five-year car loan, the treasury centre sets the transfer price by considering the cost of raising fixed-rate debt of the same maturity as that of the loan being originated (five years in this example) to hedge the interest rate risk associated with the loan's stream of fixed-rate cash flows.

Alternatively, the bank may need to raise floating-rate funds to finance the loan. In this case, the transfer price can be seen as the cost for the bank of raising floating-rate debt for the same maturity and executing an interest rate swap for a corresponding length of time where it receives a stream of floating-rate cash flows and pays a stream of fixed-rate cash flows (**Figure A1**). So the reference rate for a fixed-rate loan is the swap rate of the same maturity as the loan, and the additional funding premium is the spread of the bank's own marginal cost of funding over the swap rate at that maturity.

Figure A1 Funding cost component of FTP for a fixed-rate loan funded with variable-rate funding[(a)]



(a) A blue (red) arrow indicates the cash flows received (paid) by the treasury centre.

When funding a floating-rate loan, for example a two-year personal loan, the treasury centre sets the transfer price by considering the cost of raising variable-rate debt pricing against the same interest rate benchmark (such as Libor) and of the same maturity as that of the loan being originated (two years in this example). So the reference rate for a floating-rate loan is the floating-rate benchmark interest rate paid by the bank in the swap, such as three-month Libor, and the additional funding premium is the spread of the bank's own marginal cost of funding over the swap rate of the maturity of the loan.

A business line raising a fixed-rate deposit, for example a one-year retail bond, may pay interest to the customer, but will also receive a rebate internally reflecting the funding value of the deposit to the bank. When rebating fixed-rate balances raised by the business line, the treasury centre sets the transfer price by considering the opportunity cost of sourcing alternative funds (for instance the cost of raising fixed-rate wholesale debt of the same maturity). This could also be seen as raising floating-rate wholesale debt of the same maturity and executing an interest rate swap for a corresponding length of time where the bank receives a series of floating-rate cash flows and pays a series of fixed-rate cash flows.

Annex 2
Choice of the curve describing a bank's marginal cost of funding

There is not a single established methodology in the industry for choosing the cost of funding curve, due to business model differences between banks and because the practice of embedding the bank's own cost of funding and the cost of holding a liquid asset buffer in FTP is still relatively recent.

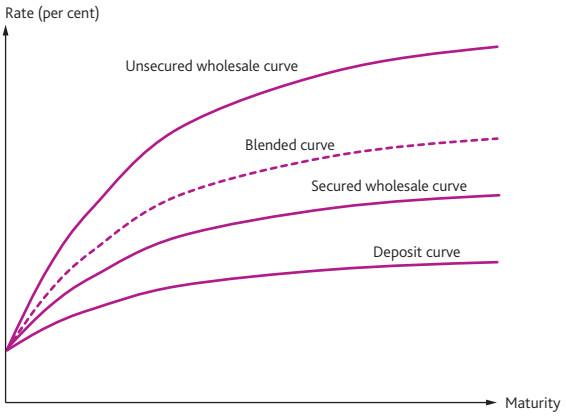
Traditionally, banks have adopted the curve describing their marginal senior unsecured wholesale funding across maturities, even where they also used other sources of funding, such as household deposits. A benefit of this approach is that the curve is observable in market prices and can be easily and frequently updated, which can be a key benefit from the perspective of internal governance and transparency of the FTP process. Further, the unsecured wholesale curve can be compared to that of competitors, before any management overlays are applied.

However, the cost of senior unsecured wholesale funding may not reflect the actual marginal funding cost for a bank that has a significant portion of household and corporate deposits or secured wholesale funding. For such a bank, benchmarking marginal funding costs to unsecured wholesale costs would render its internal transfer price inaccurate if the bank's unsecured wholesale funding costs differed from its deposit or secured wholesale funding costs over a prolonged period.

Banks that are materially funded by household deposits or secured wholesale funding may need to consider a marginal funding curve that more accurately reflects their actual funding sources. An option is to consider a marginal blended cost of debt funding which more accurately reflects the bank's business model. In constructing a marginal blended cost of funding curve a bank would need to take the weighted average, for each maturity point along the curve, of the current marginal pricing and volume of its deposit and wholesale debt funding. A stylised illustration is shown in **Figure A1**.

While in principle a marginal blended cost of funding may be seen as conceptually simple and the optimal choice, it may present some challenges. First, for some sources of funding, the marginal cost of funding may be difficult to capture accurately.(1) Second, if the blended rate includes the marginal rate on deposits, it will be difficult to determine the transfer price for new deposits, as this would imply an iterative calculation where the marginal rate on deposits is both an input and an output. A third challenge may be how to weight different marginal funding sources. Banks may choose to weight them according to:

Figure A1 Stylised example of choice of the marginal funding curve



- their respective shares of the flow of new funding, for example over the past month or quarter; but this may lead to a volatile measure;

- their respective shares of the target future funding mix of the bank; but any uncertainty around the realisation of the bank's target would be reflected in the pricing of new loans and deposits; or

- their respective shares of the existing funding mix — but this would not be a pure measure of marginal funding costs, as it would reflect the stock funding mix.

The PRA cross-firm review of FTP practices at major UK banks found that banks' approaches to capturing marginal funding costs varied significantly across institutions, and included:

- application of a single unsecured wholesale funding curve;

- application of a single blended secured and unsecured wholesale funding curve;

- a single blended rate applied to all new loans and deposits irrespective of their maturity,(2) derived from retail and wholesale funding, weighted by their respective volumes and prices forecast over the following twelve months; and

(1) This is because the marginal cost of funding has two components: the cost associated with raising a marginal unit of funding and the possible increase in costs for all existing units as a result of raising an additional unit. For some sources of funding, such as wholesale unsecured funding, it is reasonable to assume that the marginal cost of funding is the same as the cost of the marginal unit (ie unsecured bond spreads). This is because the cost of servicing existing wholesale funding does not usually change as a result of raising new funding units. However, for other sources of funding, especially sight deposits, the marginal cost of funding will need to capture both the cost of the marginal unit of funding as well as the possible increased average costs of all previously raised units. While the former can be captured by the interest rates banks offer on new sight deposits, the latter is difficult to capture as it is not directly observable.

(2) The application of a single weighted average rate, with no differentiation for the maturity of new loans and deposits, has deleterious implications which are discussed in the section covering inadequate FTP practices and potential systemic implications.

- a single blended rate applied to all new loans and deposits irrespective of their maturity, derived from retail, corporate and wholesale term funding costs, weighted against a target funding mix.

The trend towards using a blended cost of funding curve is consistent with the latest *Bank Liabilities Survey*, where lenders reported that they put weight on different sources of funding while setting their transfer prices.(1)

To sum up, banks' different approaches to choosing the benchmark funding curve reflect not only business model differences but also the trade-off between practicality and accuracy. Using the unsecured wholesale funding curve has the advantage that it is readily observable in market prices, a key benefit from the perspective of internal governance, even though it may not accurately reflect the actual marginal cost of funding of the bank. Alternatively, using a blended marginal cost of funding would be more accurate, but the corresponding curve may also be more complex to construct and less transparently anchored in market prices.

(1) See *Bank Liabilities Survey*, 2015 Q1, available at www.bankofengland.co.uk/publications/Documents/other/monetary/bls/2015/q1.pdf.

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