PRACE NAUKOWE UNIWERSYTETU EKONOMICZNEGO WE WROCŁAWIU
RESEARCH PAPERS OF WROCŁAW UNIVERSITY OF ECONOMICS nr 482 • 2017

Wrocław Conference in Finance: Contemporary Trends and Challenges ISSN 1899-3192
e-ISSN 2392-0041

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BALANCE SHEET SHAPING THROUGH A DECISION MODEL AND FUNDS TRANSFER PRICING

KSZTAŁTOWANIE POZYCJI BANKU POPRZEZ MODEL DECYZYJNY I PROCES CEN TRANSFEROWYCH

DOI: 10.15611/pn.2017.482.12
JEL Classification: G0, G280, C0

Summary: The banking industry is currently facing a number of challenges driven by the regulatory requirements, low or even negative interest rates and margin compression. As a result, active and conscious balance sheet management has increased in importance and banks are required to optimize and allocate resources very precisely to their businesses. There is a clear need for maximization of the assets income, redesign of the funding mix to achieve the lower funding costs and, at the same time, to respect regulatory requirements. This article verifies the hypotheses that the application of the optimization technique improves the management of the banking book in terms of quantifiable impact on a bank's P&L and that the funds transfer pricing (FTP) process could be used as a mean to achieve the target position of a bank. It proposes a two-step approach to prove the above hypotheses, i.e. the application of the decision model and the FTP process. In addition, the article provides the reader with the main concepts of the FTP process, FTP landscape and details regarding the Balance Sheet shaping.

Keywords: funds transfer pricing, decision model, optimization, FTP curve.

Streszczenie: Sektor bankowy staje obecnie w obliczu szeregu wyzwań spowodowanych wymogami regulacyjnymi oraz niskimi, a nawet ujemnymi, stopami procentowymi. W rezultacie aktywne i świadome zarządzanie bilansem ma coraz większe znaczenie i banki są zobowiązane do optymalizacji zarządzania swoimi zasobami. Istnieje wyraźna potrzeba maksymalizacji dochodu aktywów, zmiany struktury finansowania banku w celu obniżenia kosztów, a jednocześnie do przestrzegania wymogów prawnych odnośnie minimalnego poziomu płynności i zachowania standardów pomiaru i zarządzania ryzykiem stopy procentowej. Niniejszy artykuł proponuje dwuetapowe podejście do optymalizacji wyników finansowych banku poprzez zastosowanie modelu decyzyjnego oraz procesu wewnętrznych cen transferowych, jako narzędzia do osiągniecia pozycji docelowej banku. Artykuł wyjaśnia, co oznacza model decyzyjny i opisuje jego konstrukcję oraz oszacowuje ekonomiczną korzyść. Artykuł zapoznaje czytelnika z głównymi pojęciami cen transferowych, oraz szczegółami dotyczącymi kształtowania bilansu banku komercyjnego.

Słowa kluczowe: proces cen transferowych, model decyzyjny, optymalizacja, krzywa cen transferowych.

You can't blame gravity for falling in love

Albert Einstein

1. Introduction

The role of the optimization of financial resources in the banking industry is constantly growing and balance sheet optimization is gaining the strategic importance. This is due to several factors such as a more restrictive regulatory landscape and extremely low interest rates environment resulting from the financial crises in 2007. The significant regulatory pressure to improve the risk management and capital allocation practices within banks has been imposed by the Basel Committee on Banking Supervision [2016], the European Banking Authority [2014] and the Prudential Regulation Authority [2015], they all require the banks to revamp their approach towards the financial risk management and practice. Also, the recent Basel III regulation highlights the necessity of the maintenance of the balance funding structure and minimum liquidity cushions and, therefore, forces banks towards a new business model to create the right incentives and to respect regulatory limits.

The idea of maximization of the profitability of a financial institution is not new. There have been different approaches adopted by researchers to understand the regulatory impact on banks' income. Hellemons [2012] proposes the optimization model which maximizes the retained earnings and minimizes conditional expected loss at a certain confidence level giving the banks the opportunity to choose a portfolio allocation that fits their risk appetite. Baldan, Zen and Rebonato [2012] launched the hypothesis that there is a direct relationship such that reducing the exposure to the liquidity risk induces a reduction in the interest rate risk, as well – consequently, it is possible to establish a position which minimizes the exposure to both risks.

The objective of this article consists in the proposal of the decision model for determination of the most profitable structure of the asset and liability sides of the banking book under existence of risk conditions. The analysis is performed through the application of the optimization method for the stylized bank based in the European Union, meanwhile risk conditions are determined by its exposure to certain risk level. The decision model outcome results in the target proportions (weights) of the asset portfolios and funding structure which are based on the risk appetite of the bank. Once the target structure of the banking book is defined by the decision model, the next step aims to achieve such a structure by the application of the tunds transfer pricing process. Funds transfer pricing (FTP) is a term used to describe the sum of polices and methodologies a bank applies in its internal steering

systems to charge for the use (and credit for the generation of) funding and liquidity [Widowitz et al. 2014].

The article formulates the hypothesis that the application of the optimization technique improves the management of the banking book under risk conditions in terms of quantifiable economic impact on the P&L of a bank and the target profile is achievable through the application of the FTP process implying certain kind of behaviour within a given bank.

The article is organized as follows. The first section explains the building blocks of the decision model and quantifies the resulting economic benefit for a small (in terms of assets volume) European bank. The subsequent section is expected to provide the reader with the main concepts of the FTP process, FTP landscape and details regarding the shaping of the balance sheet. It concludes with three take away messages.

The article does not intent to provide any details related to numerical optimization techniques applied by the decision model, as this is the subject of another paper by the author.

2. Decision model – maximization of assets income and minimization of funding costs

The real challenge for senior management of a bank is to understand the trade-off between the profitability of a bank's asset base and willingness to take certain amount of risk resulting from bank's activity. The main risks arising from granting funds to clients are credit, liquidity, interest rate and currency risk. However, it is difficult to build the model capable to include all these risks under one holistic approach. For this reason, in order not to over-engineer the model and, consequently, not to expose the bank to the excessive model risk, it is suggested to focus on these risks which could potentially cause significant losses, as banks have different risk appetite towards different risk categories.

For example, some banks, especially in Europe, are currently very much focused on the client rating and are willing to grant loans only to the precise client segments in order to limit the exposure to credit risk. More prudent credit risk management is mainly driven by the restrictive capital absorption regime, the increasing amount of non- performing loans and finally, the reputation of the financial institution. Another important financial risk is the interest rate risk. The Net Interest Income sensitivity (NII sensitivity) is arising mainly from different re-pricing tenors of assets, imperfect correlation between administered rate mortgages and market rates (especially in UK) and early redemption optionality embedded in the client loans (prepayments). Fixed rate assets have an impact on the structural exposure to the interest rate risk and overall duration of the banking book. Finally, without any doubt, the liquidity risk is probably one of the most scrutinized risks by the regulator so its inclusion

into the decision model is an imperative. This is due to the already mentioned Basel III standards which aim to achieve two separate, yet complementary, objectives: to promote short-term resilience of a bank's liquidity risk profile and to reduce funding risk over a longer time horizon [BCBS 2013].

To be able to manage the cash flows from the tied-up capital of the assets and liabilities, the bank's liquidity position has to be displayed within the capital commitment gap, known as GAP balance (or maturity ladder). The cumulative GAP can be used for the observation of the liquidity position development through a specific time-span [Bergner et al. 2014]. The bank is thereby provided with an analysis instrument that allows managing and observing the entire liquidity development. Capital redemption of asset positions lead to a positive gap and to an increase in liquidity. The target composition of the asset structure which results from the application of the decision model allows maximizing the asset income and, at the same time, to respect the regulatory and internal limits set up by the regulator and senior management.

The article is meant to provide the reader with the illustrative example of the application of the decision model for assets. For this purpose, the initial assets base of the European bank has been analysed.

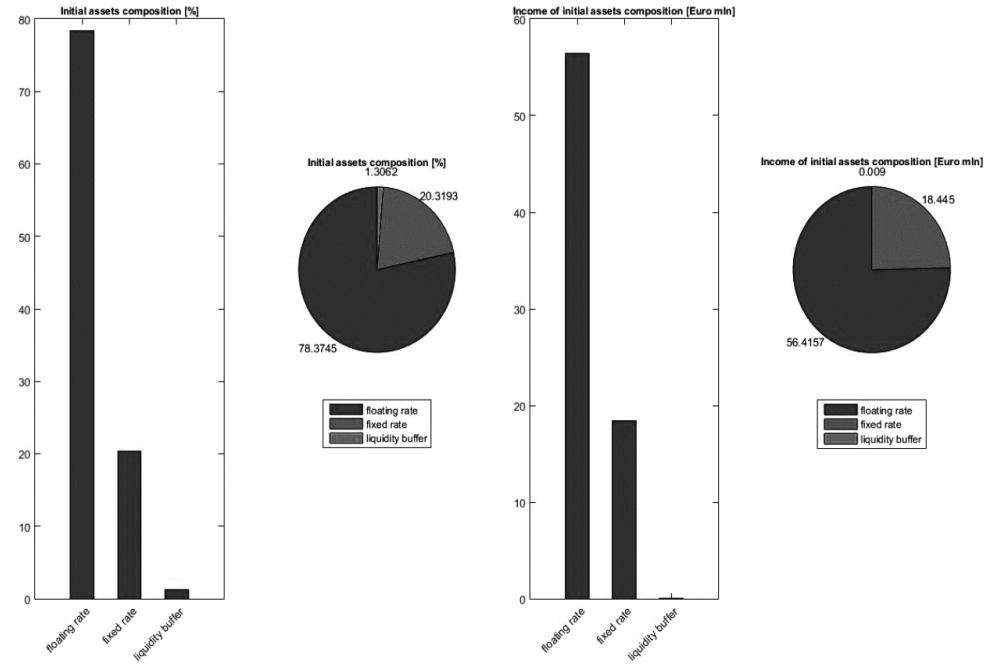

Fig. 1. Example of the initial composition and income of assets in the European bank

Source: own study.

The Risk Sensitive Assets (RSA) base amounts to Euro 5 billion and is composed as follows:

- Floating rate assets – 78.37%,
- Fixed rate assets – 20.31%,
- Liquidity buffer – 1.3%.

In this example, the resulting income based on the initial assets composition amounts to Euro74.86 million over 6 months' period. The internal risk tolerance towards credit risk, liquidity risk and interest rate risk set the constraints for the objective function which maximizes the assets income:

- Floating rate assets – 30.58%,
- Fixed rate assets – 66%,
- Liquidity buffer – 3.4%.

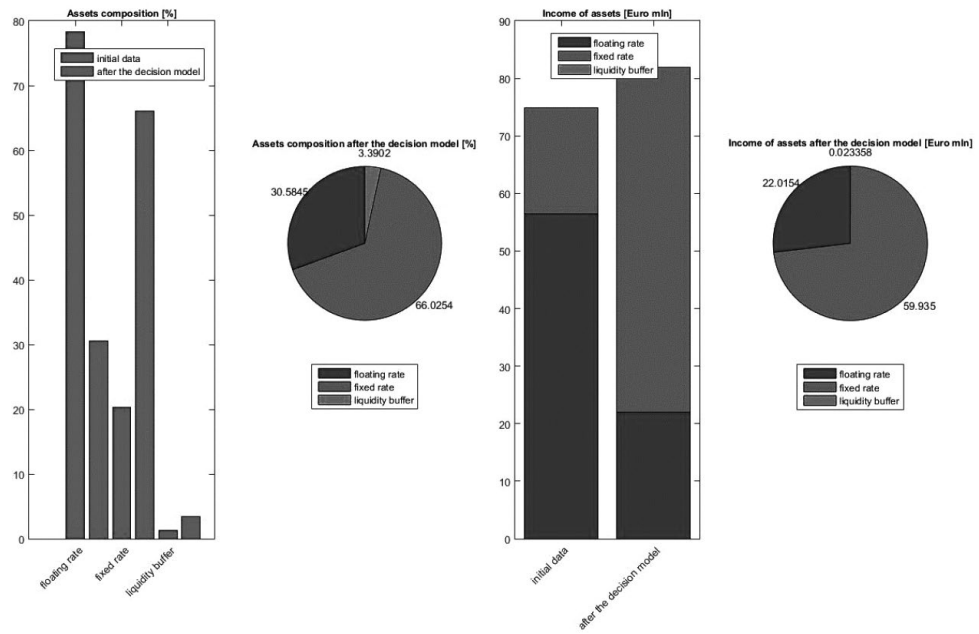

Fig. 2. New composition and income of assets in the European bank and resulting increased income after implementation of the decision model

Source: own study.

The resulting interest income under the base scenario (no stress assumption) is equal to Euro 81.96 million over 6 months' period. The economic benefit from the implementation of the decision model is equal to Euro14.2 million on an annual basis.

Another important application of the decision model is related to the minimization of the overall funding cost of the bank. Such an exercise consists, in this case, in

seeking the funding composition which helps to reduce the funding cost and to remain within the internal limits determined by the Board of Directors and regulatory requirements (Basel III, funding concentration and more restrictive approach towards interest rate risk measurement and management). As opposed to the decision related to the assets composition, which is strictly linked to the business model of the bank and, consequently, is a strategic decision taken by senior management, the funding composition is mostly decided by the Treasury department. It is within the Treasury/ALM responsibility to minimize the funding cost and to keep the NII sensitivity created by the interest rate and liquidity exposure of the banking book within the predefined level. Again, the real challenge here consists in understanding the trade-off between profitability coming from the possibly achievable cheapest funding base (target position) and risks which Treasury/ALM run in order to ensure the profit. Thus, the treasurer has to assess the directional gap the bank should take on from the interest rate risk perspective and to put in place funding strategies, such that the liquidity of the bank is managed in a proper manner.

In order to provide a reader with an illustrative example of the active management of the interest rate risk, let us consider two situations which a treasurer could potentially face. This example is meant to provide better understanding of the decision model applied to the funding base.

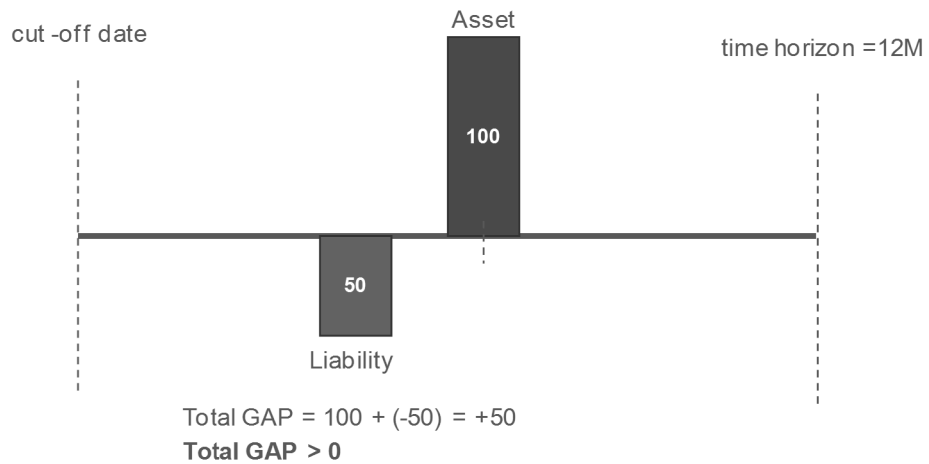

Fig. 3. Case 1: Total re-pricing gap of the banking book is higher than zero

Source: own study based on the examination of banks based in Italy and UK.

In Case 1, the treasurer is willing to keep the positive directional gap if she/he believes that the short-term market rates are about to increase. Obviously, she/he needs to be aware of the magnitude of the NII sensitivity caused by this open position and, at the same time, to maximize the profitability of the banking book from the interest rate positioning.

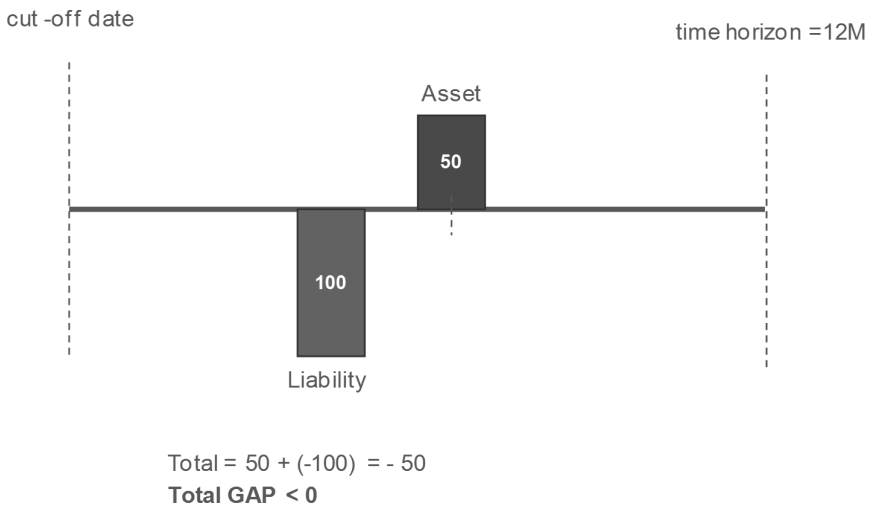

Fig. 4. Case 2: Total re-pricing gap of the banking book is lower than zero

Source: own study based on the examination of banks based in Italy and UK.

In Case 2 she/he is willing to keep the negative directional gap if she/he believes that the short-term market rates are about to decrease. As in Case 1, she/he needs to make sure this open position does not exceed the internal limits for the NII sensitivity.

The liquidity management is another imperative for the treasurer and one of the highest points on the agenda, as she/he has to manage it from both: short-term (sufficient amount of the liquidity buffer and the counterbalancing capacity of the bank) and from the medium long-term perspective (maturity transformation and structural liquidity position).

The figure below shows the impact of the maturity transformation resulting from the difference between the maturity of asset and liability and the potential impact on the NII in case of the increase/decrease in the funding costs of a bank.

Consequently, the understanding of the trade-off between the degree of the maturity transformation of a bank and of the potential impact on the P&L, resulting from the difference between the liquidity spread of assets and liquidity spread of liabilities, is the first thing to be assessed and discussed in ALCO, based on the liquidity risk appetite of the financial institution.

Finally, the importance of the appropriate size of the liquid assets portfolio has to be highlighted, as holding these assets represents the negative cost of carry, especially where the yield of liquid assets (mainly government bonds) is low; meanwhile the funding costs of the financial institutions have significantly increased over the past years. The amount of liquidity buffer is assessed through stress testing procedure which has become a key component of the supervisory assessment process of bank's capital and liquidity adequacy [Hauschild, Buschmann 2014].

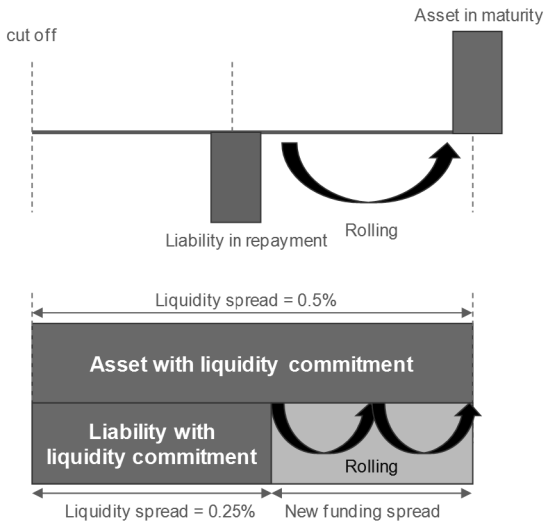

Fig. 5. Liquidity mismatching and potential NII impact

Source: own study based on the examination of banks based in Italy and UK.

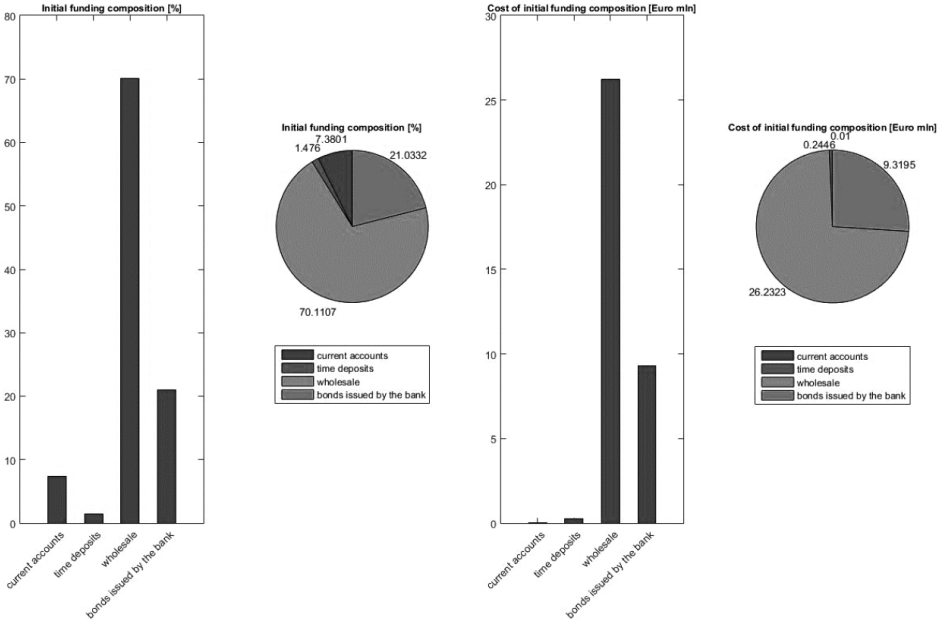

Fig. 6. Example of the initial funding structure and corresponding costs of a bank under base scenario

Source: own study.

The following example shows the application of the decision model applied to the funding base of the European bank with Euro 3.7 bln of Risk Sensitive Liabilities and the resulting economic benefit.

The initial funding base of the bank is composed of:

- Corporate current accounts – 7.4%,
- Corporate time deposits – 1.5%,
- Wholesale funding – 70%,
- Bonds issued – 21%.

The resulting cost of funding for this bank under base scenario is equal to Euro 35.79 mln over 6 months' period. After the decision model is put in place the composition of the funding base changes as follows:

- Corporate current accounts – 2.53%,
- Corporate time deposits – 7.65%,
- Wholesale funding – 79.99%,
- Bonds issued – 9.8%.

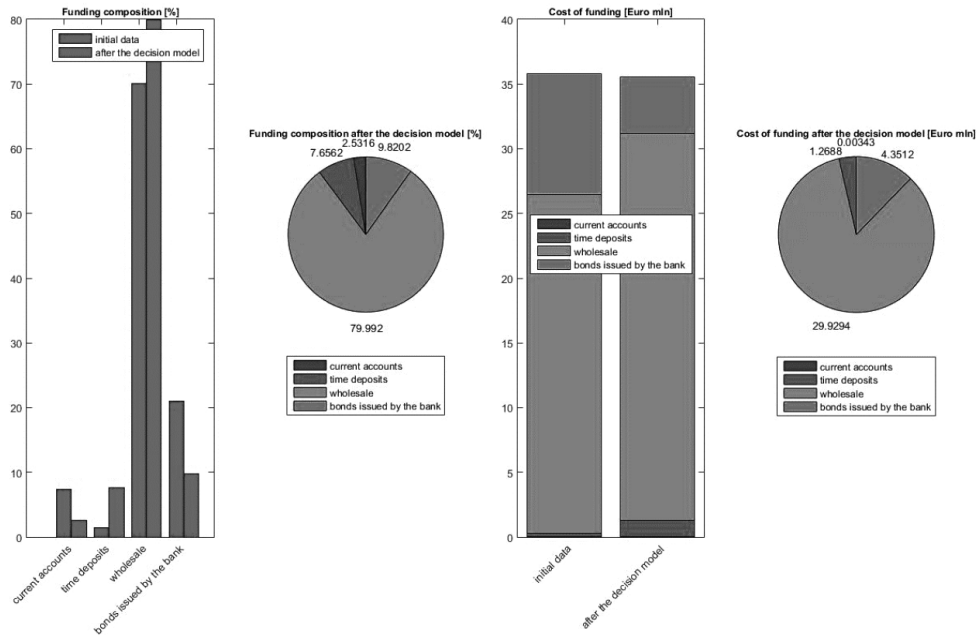

Fig. 7. The funding base and corresponding costs after application of the decision model

Source: own study.

The resulting cost of funds of the funding base under base scenario is equal to Euro 35.54 mln over 6 months' period. The economic benefit from the implementation of the decision model amounts to Euro 0.56 mln on an annual basis.

It has to be noted that the economic benefit achieved as a result of the application of the decision model is strictly related to the size of the balance sheet. The presented example represents a small-sized bank based in Europe. For medium and big-sized financial institutions, the magnitude of the economic benefit is proportional to the size of the balance sheet. Another factor to be taken into consideration is model sensitivity, as different external or internal factors impact the economic benefit achieved by the model in a different way. For example, it turned out that both the change in the behavioural assumptions for current and savings accounts and the change in the assets structure are factors to which the decision model appears to be the most sensitive.

Once the target position both for assets and/or for liabilities is determined, the next step consists in using the FTP scheme as a tool towards the achievement of the target structure estimated by the decision model. In particular, after having the direction provided by the model on the appropriate composition of the assets and/or funding, the next step is the navigation in the FTP landscape.

3. Funds transfer pricing – overview and general concepts

Funds transfer pricing (FTP) is an extremely powerful tool which is deeply rooted in any divisional P&L or profit centre calculation. In fact, FTP is the means by which a bank's overall Net Interest Income can be split into originating units and subunits, thus enabling the bank's management to perform an effective planning, monitoring and control cycle [Widowitz et al. 2014]. The FTP rate is composed of several components which basically represent the transference of the interest rate and liquidity risk from the Business Units to the Treasury/ALM, to be managed centrally and keep the Business Units immune to financial risks.

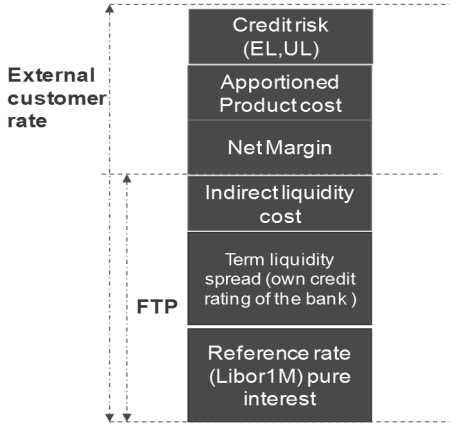

Fig. 8. FTP building blocks

Source: own study.

Consequently, the FTP separates the Net Interest Income components arising from client business margins, interest rate positioning and liquidity maturity transformation. Even though the best FTP practices are still under development, there is the necessity to include the new Basel III regime into the framework which leads to the more sophisticated approach for the FTP.

There are at least four elements that need to be included in the holistic FTP framework. The first element consists in the definition of the framework for all products which represent the sources of liquidity cost, both based on the deterministic cash flows (known as term liquidity) and for contingent liquidity arising from the stochastic cash flows. The second one, in the view of the author – the most important one, is the FTP curve set up. This is driven by the underlying principle that assets get charged by their cost of funds which is credited to the bank's funding units and the base of this calculation is the FTP curve. The third is the FTP methodology and the fourth element is the FTP target operating model. In the sections below the aforementioned elements are presented in detail.

3.1. The FTP landscape

As already mentioned, the FTP landscape should include all the products which represent the sources of liquidity cost, both based on the deterministic cashflows (known as term liquidity) and contingent liquidity arising from the stochastic cashflows. The FTP rate should be allocated to these products based on their financial characteristics.

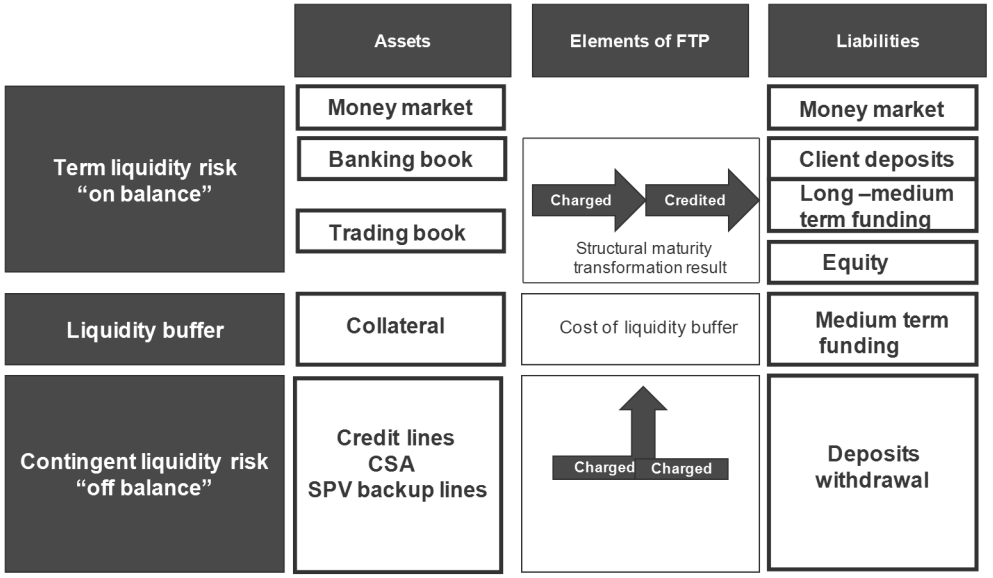

Fig. 9. FTP landscape

Source: [Widowitz et al. 2014, pos. 7280].

The figure below shows the illustrative FTP landscape indicating products which should get the FTP rate and those which are out of scope.

3.2. The FTP curve set up

The basic FTP concept is that assets get charged their cost of funds which is credited to the bank's funding units. The base of this calculation is the FTP curve. The most common approach in the past years and still very often implemented in the European banks consists in the curve construct based on the gross marginal cost of funds. The marginal cost of funds approach basically answers the question: what is the opportunity cost to fund one unit of new asset volume in the wholesale market [Widowitz et al. 2014]. Neu et al. [2012] show that approximately 92% of the large 25 large European banks base their FTP approach on this paradigm. The graph below shows the FTP curve based on the gross marginal cost of funds.

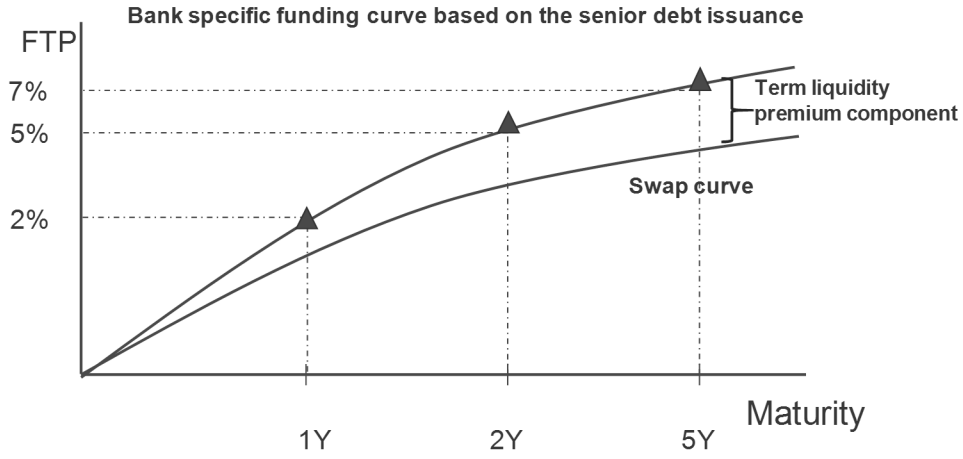

Fig. 10. FTP curve based on the bank's funding cost in the wholesale market

Source: own study.

Nevertheless, it has to be noted that the aforementioned approach was developed and implemented at the time when balance sheets were growing and the growth was funded by additional capital market issuances very easily. In some cases, in order to further incentivise the growth of the balance sheet, the FTP curve is dampened, i.e. the medium long-term curve set up is lowered by the factor which reflects the target maturity transformation run by the bank. As a result, only a certain portion of the bank's funding spread paid in the wholesale market is charged to assets. After the 2007-9 crisis, things are different, as banks are shrinking their balance sheets and are trying to reduce their dependence on the wholesale funding. In addition, treasurers are more restricted in issuing specific tenures on capital markets [Widowitz et al.

2014]. This leads to the necessity of more sophisticated and tailored FTP curve set--up. For example, having stable and cheap deposit base is an imperative to maintain competitiveness. This fact has to be reflected in the FTP curve construct. The challenge in the FTP curve set up is to answer the question: what is the opportunity benefit of investing one unit of new deposit? [Widowitz et al. 2014].

There are different solutions for the dynamic FTP curve construct and, in the view of the author, there is no best practice with reference to it. Setting the right curve is a very bank-specific and individual task. Given that this article is meant to provide the reader with the overview of the two-step approach for the balance sheet optimization of the financial institution, the FTP curve construct concept is not further developed. However, the importance of this element in the FTP framework needs to be stressed, as the curve construct should be aligned with the strategic objectives (decided on by the senior management) and support the business model of the institution. The first rule, to achieve this goal, is transparency in the curve setting and deep understanding of the specifics of the balance sheet (target funding base and extent of the maturity transformation run by the bank).

3.3. FTP methodology to calculate the FTP rates

Defining the FTP methodology is a very broad topic. This section focuses only on several product categories which are included in the FTP landscape (Figure 9). Consequently, it provides a short overview of how FTP works for fixed and floating rate loans, amortizing and revolving loans. FTP rate for loans is largely implemented by almost all banks. It is a market standard to calculate and include the liquidity spread in the product pricing. Liquidity spread is usually derived from the difference between the bank's funding curve (swap curve shifted by the bank's term funding spread) and the swap curve for the tenor which corresponds to the behavioural or contractual life of the product. In case of the amortizing loans, the common market practice is to calculate the Internal Rate of Return (IRR) on the bank's term funding curve for both interest rate and mismatch liquidity risk. Consequently, the transfer price for the loan with the amortization schedule is calculated as follows:

$$\sum_{t=1}^{T}(N_{t-1} * IRR_{LM} + A_t) * exp(-(r_{swap}^{t} + BLS_t) * t) = N_0,$$

$$RR_{LM},$$

where N_t denotes the outstanding notional at time t, A_t denotes the amortization amount in period t–1 to t and r_{swap}^{t} denotes the swap rate at time t and BLS_t the bank's term funding spread above the swap curve [Widowitz et al. 2014].

The transfer price for the revolving credit facility is calculated according to two approaches. The simplified approach consists in the allocation of the FTP rate to the drawn part of the product, in line with its drawn amount and its tenor. For the

undrawn portion, the contingency liquidity costs are allocated. Although simple, this approach represents some limitations such as the necessity of generating a large number of funding tickets that have to be adjusted upon each change of the drawn amount. Furthermore, the Treasury/ALM neglects the fact that many short-term draws are rolled over and are actually drawn until the final maturity of the facility.

In order to overcome these limitations, an alternative approach is to carry out the behavioural analysis of portfolios of the revolving facility and identify the core and volatile part of the product. The core part, which is supposed to be drawn until the final maturity, is charged by the term liquidity cost equal to the final maturity of the facility. Meanwhile the volatile part is short term with a short-term fluctuating usage. For the uncertainty of the volatile part, the contingent liquidity, for which the costs should be allocated to the product, needs to be held. The behavioural analysis is performed for other items, such as current or savings accounts.

Behavioural assessment begins with the segmentation based on key factors, preferably using a single customer view. Segmentation models should enhance customer understanding and be based on historical data, market information and expert opinion. Distinctive segments are to enable an institution to model the lifetime value of the customer segment in terms of their expected behavioural life and stressed outflow for the FTP calculations.

Finally, it is extremely important to keep in mind the challenge faced by the Treasury given the recent Basel III requirements for liquidity. The recognition of the additional costs resulting from the implementation of the new regulatory requirements is an imperative for the more sophisticated FTP framework. For many banks, the question of how to integrate the cost to comply with these ratios into the FTP still remains an open issue.

3.4. Target Operating Model

One of the main objectives of the Target Operating Model for the FTP is to ensure that transparency is the main principle in the FTP framework. To achieve this transparency, interest rate risk and liquidity risk need to be separated into different portfolios within Treasury/ALM. As a basic rule, the banking book results can be split into the following components:

- the result of interest rate positioning and interest rate maturity transformation,
- the result from liquidity maturity transformation,
- the result from the investment book management (credit spread risk management).

The example below shows the split into interest rate and liquidity component in measuring the results from the FTP. Assume, for example, a bank underwrites a five-year loan which is funded by the issuance of a coupon bond. The FTP results in the banking book are split according to the scheme.

Having such transparency, Treasury/ALM can actively manage the interest rate and liquidity risks in the banking book. In the example above, both risks are closed if the Treasury/ALM enters a 5Y payer swap (m = 5Y), issues a 5Y coupon bond

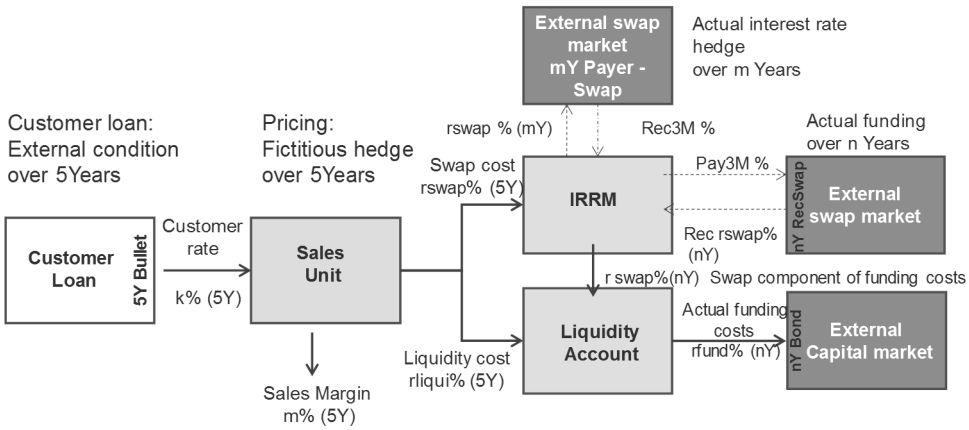

Fig. 11. Decomposition of the FTP results into interest rate and liquidity components

Source: own study.

to fund the asset and enters a 5Y receiver swap (n = 5Y). There is an exposure to liquidity risk only (interest rate risk exposure is closed) if the Treasury/ALM enters a 5Y payer swap (m = 5Y), issues a 3Y coupon bond to fund the asset and enters a 3Y receiver swap (n = 3Y). Finally, there is an exposure to the interest rate risk and there is no exposure to liquidity risk if the Treasury/ALM enters a 3Y payer swap (m = 3Y), issues a 5Y coupon bond and enters a 5Y receiver swap (n = 5Y).

Transparency and simplicity in the FTP framework should be an unquestionable driver in the definition of the target operating model, as only the clear methodology rules shared by every single participant in the FTP process can lead to the achievement of the strategic objectives of a bank and the correct shaping of the balance sheet. Another important aspect in the FTP governance and framework is the oversight of the incentive premium scheme and of the management overlays.

A Prudential Regulation Authority (PRA) [Cadamagnani et al. 2015] cross-firm review of the FTP practices at major UK banks revealed important issues in bank's internal transfer pricing policies and framework. One of the major issues, underlined in the PRA's review, was that banks were not separating the management overlays from their funding curve. Some banks were found to be applying different cost of funding curves to new loans and deposit to incentivize loan origination and deposit-gathering simultaneously. The PRA view is that this is a vulnerability in the FTP framework of the bank, as dampening practice skews business incentives and makes it less clear what performance is for individual products before and after any management overlay. An important point was made that strategic decisions need to be made acknowledging the true economics of business and not unwittingly, as a result of the inappropriate internal pricing methodologies [Cadamagnani et al. 2015].

Given that the internal FTP methodologies play a key part in profit allocation within a bank and influence business lines' activities, a robust FTP regime is a must. If funding costs are underestimated, business lines offer customers cheaper loans and increase funding volumes in the mistaken belief that they are profitable. If funding costs are overestimated, business lines may mistakenly require higher customer rates to be perceived as profitable. The incentive premium scheme and management overlays are powerful tools in the desired balance sheet shaping. The underlying logic behind those tools is to incentivize the growth of the certain product categories or the certain tenors through an additional mark-up of the funding curve.

In case of the incentive premium scheme, there is usually a temporary tool which recognizes the additional premium to the business unit to incentivize the growth of the certain asset or liability class. For example, if the current accounts represent a strategically important product and the senior management intends to grow its base, the Treasury /ALM will recognize additional mark-up in the FTP rate to the business unit responsible for this product. Obviously, given that, under the principle of the incentive premium scheme the Treasury/ALM should remain P&L neutral (i.e. it should not pay for the growth of the current account base), ALCO participants should make a decision which product should fund the incentive premium scheme (i.e. the P&L bonus of one product has to be offset by the P&L negative bonus of another product).

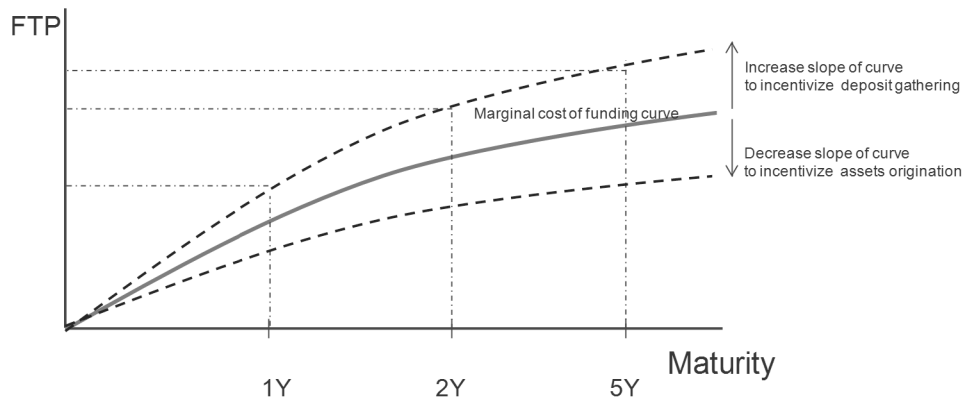

Fig. 12. Stylized example of how management overlay may be applied to the marginal cost of funding curve

Source: [Cadamagnani et al. 2015, p. 157].

Instead, the management overlays consist in the shift of the whole segments of the funding curve up or down, either to recognize the higher structure funding costs a bank is running in the certain markets (for example in the Euro or USD market), or to subsidize growth of certain products, for example assets, by charging them lower cost of funds than the costs a bank pays in the external market.

As already mentioned those tools are powerful and for this reason their implementation and inclusion in the FTP framework should be well governed, documented and transparent. The graphs below show the funding curve with and without the management overlay.

4. Conclusions

Active and conscious balance sheet management has increased in importance due to the scarcity of resources after the financial crises 2007-2009, such as capital and funding. Because of regulatory landscape, historically low interest rates environment and significant margin compression, banks are required to optimize and allocate resources very precisely to their businesses. New regulatory requirements set the minimum levels for funding structure and liquidity buffers. Maturity transformation, which is important revenue source, is also under regulatory scrutiny. There is increasing pressure on unsecured funding driven by widening liquidity spreads. All these factors force banks to redesign their target funding mixes and asset portfolios composition.

There is a clear need for the maximization of the asset income and minimization of the funding costs in situations where a bank has to respect different limits (both internal and regulatory). In line with the aforementioned, this article proposes the application of the decision model to define the target balance sheet structure and FTP scheme as a tool for shaping. Obviously arriving in the target state usually takes time, as the existing portfolios run off gradually and it is the incoming new business which reshapes the balance sheet. FTP scheme offers powerful tools to drive the direction of the correct balance sheet shaping and an accelerating engine to arrive at that point.

Finally, the article leaves the reader with the three take-away messages:

- Application of the optimization technique improves the management of the banking book under risk condition in terms of quantifiable **economic** impact on the P&L of a bank deriving from the optimization process. Decision model discussed in this article is a concrete example of the application of the optimization techniques.
- Mathematical models can provide useful information to understand the optimal structure for the banking book in terms of its composition of assets and liabilities. The article states that the optimization of the banking book is a valid and useful strategic exercise, as it increases the profitability of the asset side and decreases the overall cost of funding. Moreover, it can be seen as an integration of the exposure to the interest rate risk, liquidity and credit risk in one approach.
- FTP scheme is a powerful tool in the balance sheet management process which supports the achievement of the desired target structure of the bank defined by the decision model. As a tool to assist strategic balance sheet management, the incentives and subsidies need to be made transparent and come on the top of a true and fair view of the bank's liquidity cost.

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