

INTEREST RATE RISK IN THE BANKING BOOK*

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1. INTRODUCTION

In general, banks' financial situation is sensitive to fluctuations in market interest rates. On the one hand, the portfolio of tradable financial instruments, in particular bonds and derivatives, is subject to continuous valuation according to the respective market value and this is a function of the current interest rates. On the other hand, asset and liability positions in non-traded financial instruments are susceptible to valuation according to the best estimate of the market value that would prevail if they were traded or settled at the moment of valuation. The traditional approach is the one generally accepted to measure these positions at market values: it consists in calculating the present value of expected cash flows on overall assets and liabilities,¹ using as discount rates the market rates for similar maturities. The simulation of changes in the level of the discount rates used allows for an approximation to the magnitude of the variation in net worth, assessed at market values, caused by changes in the interest rates.

In these terms, interest rate risk, which results from changes in the value of financial instruments induced by changes in interest rates, is included in the broadest category of market risks. It should not, however, be associated to any kind of default. The bank, therefore, does not consider situations where, as a result of changes in the level of interest rates, default on contractual terms takes place (the most significant example being the non payment of principal and interests in pre-defined periods). In these situations credit risk is at issue.²

Most assets and liabilities have a high degree of permanence on the balance sheet, in particular the instruments of the banking book, where credits and deposits stand out. Assuming there is no liquid secondary market for these instruments and that most of them are not held for negotiation and profit-taking purposes, the changes in the value of these instruments are interpreted as temporary, and this explains why they are not valued at market prices.

In terms of tradable assets not designed as held-to-maturity only the changes in value lead to the accounting record of potential gains or losses with impact in the net worth of banks, but the consideration of total balance sheet items in the measurement of interest rate risk aims at recognizing this, because if there is a need to sell some assets to obtain liquidity or to allow for an earlier settlement of liabilities, existing potential losses, may well turn out to be definitive, with subsequent impact on the bank's capital.

In addition, it must be borne in mind that this approach to interest rate risk, i.e. through the valuation at market prices of the interest rate sensitive set of assets and liabilities, even if it is assumed that they

* The views expressed in this article are those of the authors and do not necessarily reflect those of Banco de Portugal. The authors would like to thank Fátima Silva and Nuno Ribeiro for helpful comments and suggestions. Any errors and omissions remain our own.

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(1) Whether they are tradable or non-tradable and whatever their degree of permanence or continuity in the balance sheet.

(2) Nevertheless, it should be borne in mind that the boundary between market and credit risk is difficult to establish. As Chris Morrison refers in *The Fundamentals of Risk Measurement*, Mc-Graw Hill, 2002 (page 5), "The aspect of risk before the default happens is generally considered to be market risk. The actual default is considered credit risk".

are not all tradable, allows for identification of existing mismatches in the timings of assets and liabilities' interest rate repricing. These will translate, in the long term, into asymmetric oscillations in interest streams (income and expenses) and, as a consequence, in the banks' net interest income. From this perspective, the management and control of the interest rate risk aims at protecting net income related to intermediation and its importance will depend on the relevance of this activity in a bank's total income generation.

It has long been recognized that the monitoring of the bank's exposure to this risk by the supervision authorities must follow a set of principles. In this context, a 1997 recommendation of the Basel Committee,³ laid down a set of qualitative principles. The most recent version of this document dates from July 2004 and considers a more systemic and quantitative approach to interest rate risk in the banking book, in particular under Pillar 2 of the new Capital Accord. Supervisors are expected to work pro-actively with banks. These developments are also visible in the European Directive which embodies the changes in own funds requirements in line with the new Capital Accord.

The regulatory framework in Portugal evolved in line with international developments. Through Instruction no. 72/1996, regarding the definition of internal control systems by institutions, the Banco de Portugal asked the institutions to verify a set of procedures which aimed, among other things, at an accurate management of interest rate risk. Later, in 2005, the Banco de Portugal started asking banks for information concerning the banking book⁴ (in the context of the Instruction no. 19/2005). This required a standardized report designed to estimate the impacts of a 200 basis points (b.p.) change in the interest rate on net worth and on net income. The qualitative nature of the prudential approach to interest rate risk in the banking book also justifies an assessment of the consistency and robustness of the banks' internal models used to measure and control the risk. Thus, in the context of the report defined in the above-mentioned instruction, banks must also remit to the Banco de Portugal a report with the characteristics of the interest rate risk control systems, up-dated whenever relevant modifications are introduced.

In contrast to the banking book, interest rate risk in the trading book has been an explicit part of the Portuguese regulatory framework since 1996, with Notice no. 7/1996 reflecting the Second Capital Adequacy Directive (CAD II) and, more generally, the Capital Accord revision.⁵ In this framework, institutions must assure minimum capital levels to cover explicit quantitative requirements, in the scope of the prudential treatment of global market risks. In the terminology of the new Capital Accord this means that these risks are approached within the scope of Pillar 1.

The rest of this article is organised as follows. Section 2 summarises the typologies and measurement techniques of interest rate risk. Section 3 presents the Portuguese and international legal framework. Section 4 presents the results obtained for Portugal in the context of Instruction no. 19/2005. Section 5 presents the conclusions.

(3) "Principles for the management and supervision of interest rate risk".

(4) The banking book includes all the instruments not included in the trading book. The trading book is defined in the Notice no 7/1996, which can be found in the site of Banco de Portugal.

(5) "Amendment to the Capital Accord to Incorporate Market Risks", January 1996.

2. APPROACHES TO INTEREST RATE RISK

2.1. Types of risk

In analytic terms, it is useful to distinguish different typologies of interest rate risk. This gives us more accuracy when isolating the source of this risk on the balance sheet structure of the institution. The types of interest rate risk most frequently analysed are repricing risk, yield curve risk, basis risk and optionality.

Repricing risk arises from timing differences in the financial instruments' interest rate residual maturity and/or repricing. The transformation of maturities is at the heart of traditional bank activities: borrow short, lend long. Assuming as a typical situation a positive slope in the yield curve, this transformation, when assets and liabilities pay fixed rates, tends to be a relevant source of income for banks. In this context, in the case of sharp repricing mismatches, the banks' income and economic value are exposed to adverse movements as a result of interest rate changes and may compromise the profitability of the institutions and their stability. Consider, for instance, a portfolio consisting of a long-term fixed-rate loan funded by a short-term deposit (duration mismatch). This portfolio decreases in value in a rising interest rate scenario, since the cash flows associated to the loan are fixed over its lifetime, while interest paid is changeable and increases after the short-term deposits reach maturity.

Analysis of the yield curve risk constitutes a refinement of the repricing risk approach and is different in the sense that it allows for the possibility of non-parallel shifts in the yield curve. For instance, a sharper rise in short than in long-term rates may compromise the profitability of funding long-term loans with short-term deposits. Similarly, and as an example, though a long position in 10-year government bonds covered by a short position in 5-year government bonds is hedged against parallel shifts in the yield curve, its economic value is sensitive to changes in the yield curve shape.

Basis risk is related to the lack of perfect correlation between rates received and paid on different instruments. Even on the assumption that the other characteristics of the financial instruments are similar, in particular repricing, movements in interest rates lead to non-anticipated changes in cash flows and in the income of assets, liabilities and off-balance sheet (OBS) elements. For example, a strategy of funding a one-year loan that reprices monthly based on the three-month Euribor, with a one-year deposit that reprices monthly based on the six-month Euribor, exposes the institution to the risk that the spread of these two index rates may change.

Optionality results from the option embedded in balance sheet or OBS instruments. Formally, an option provides the owner the right, but not the obligation, to buy, sell or in some manner alter the financial flow of an instrument. Many times this option is exercised as a response to changes in interest rates, with impact on the amount of interest rate risk to which a bank is exposed. For example, at an international level there are experiences of debtors initiating significant early liquidations of fixed rate long-term mortgage credit in the context of significant reductions in interest rates. In these situations, there is a divergence between the financial flows expected up to contract maturity and the financial flows effectively received by the bank.

It is possible to conceive an approach to interest rate risk that takes into consideration the changes in all financial flows related directly or indirectly to intermediation stemming from changes in market interest rates, including non-interest income, where the aggregate amount depends on the interest rate level to the extent that it influences clients' behaviour. This income includes commissions related to the management of assets for third parties, such as investment funds and commissions related to the

early liquidation of assets and liabilities on client initiative. However, these changes in financial flows, as well as those related to optionality, are much more difficult to estimate. This leads to the traditional and more generally accepted interest flow approach being exclusively used.

In operational terms, the impact of interest rate changes in the banks' financial situation is usually assessed from two perspectives. The first, known as the earnings perspective, consists in the simulation of interest flow' changes in a short-term horizon, typically less than one year, bearing in mind repricing moments in that horizon. The second, known as the economic value perspective, consists in the simulation of changes in net worth, assuming that all assets and liabilities equalized to debt are assessed at market prices.

2.2. Interest rate risk measurement techniques

This section summarizes the various techniques used by banks to measure the exposure of earnings and economic value to interest rate changes. The simplest techniques can be summed up as the construction of maturity and repricing schedules. The more complex techniques develop from the utilization of static or dynamic models that incorporate assumptions about the behaviour of the bank and its customers in reaction to changes in the interest rate. Some of these approaches can be used to measure interest rate exposure from both an earnings and an economic value perspective, while others are more typically associated with just one of these two perspectives. In addition, the degree of complexity affects the ability to pinpoint the different sources of interest rate risk. The simplest techniques, of the maturity/repricing type, are intended primarily to pinpoint the risks arising from maturity and repricing gaps. Those more complex, of the simulation type, mean that the vast majority of interest rate risk sources can be pinpointed.

The simplest techniques to measure a bank's interest rate risk exposure begin with a maturity/repricing schedule that distributes interest-sensitive balance sheet and OBS positions into a number of pre-defined time bands according to their residual maturity (if fixed rate) or time remaining to their next repricing (if floating-rate). Those positions lacking definitive repricing intervals (e.g. sight deposits) or actual maturities that could vary from contractual maturities (e.g. mortgages with an option for early repayment) should be assigned to time bands according to the past experience of the bank. Among the maturity/repricing techniques, gap analysis tends to be used for earnings and duration for economic value.

Simple maturity/repricing schedules can be used to generate simple indicators of the interest rate risk sensitivity of both earnings and economic value. When this approach is used to assess the interest rate risk in current earnings, it is typically referred to as gap analysis. Gap analysis was one of the first techniques developed to measure interest rate risk, and continues to be widely used by banks, given its simplicity. In operational terms, this technique results from the calculation of what is commonly referred to as the repricing gap, i.e., the difference between assets, liabilities and OBS elements sensitive to interest rate in each time band. This repricing gap can be multiplied by a change in the interest rate to obtain an estimate of the change in net interest income in each time band that would result from such an interest rate movement. The size of the interest rate movement used in the analysis can be based on a variety of factors, including historical experience or future expectations.

A negative gap occurs when liabilities exceed assets (including OBS elements) in a given time band. This means that an increase in market interest rates could cause a decline in net interest income. Conversely, a positive gap implies that the bank's net interest income could decline as a result of a decrease in the level of interest rates.

Although gap analysis is the most frequently used technique to assess the exposition to interest rate risk, it has some limitations. First, it ignores the characteristics of the different positions within a time band. In particular, all positions within a given time band are assumed to mature or reprice simultaneously, a simplification that is likely to have impact on the accuracy of an estimate, in particular, if there are bands with large time horizons. Second, gap analysis ignores differences in spreads between market interest rates and rates applied (basis risk). Third, it does not contemplate the possibility that the timing of instrument redemption may suffer changes as a result of changes in interest rates. Finally, most gap analyses fail to capture the variability in non-interest revenue and expenses,⁶ a potential source of risk to current income.

A maturity/repricing schedule can also be used to evaluate the effects of changing interest rates on a bank's economic value by applying sensitivity weights to each time band. Typically, these weights are based on estimates of the duration of assets and liabilities that fall into each time band. This measure is known as duration, which, as can be seen by the formula, corresponds to average time weighted by the realization of portfolio cash flows:

$$D = \frac{\sum_{t=1}^N \frac{t * C_t}{(1+r)^t}}{P}$$

Where D is the duration, C_t is the cash flow at time t, r is the interest rate for each period, P is the portfolio market value and N the number of periods until maturity.

Duration reflects the timing and size of cash flows that occur before the instrument's contractual maturity. In absolute value, the longer the maturity or next repricing date and the smaller the payments that occur before maturity, the higher the duration. A higher duration is associated to a significant impact in the economic value as a result of an interest rate change.

The relation between market value and maturity becomes clearer if we evaluate the sensitivity of this value to changes in the interest rate. Given that

$$P = \sum_{t=1}^N \frac{C_t}{(1+r)^t}$$

then,

$$\frac{dP}{dr} = -\frac{D}{1+r} * P$$

or,

$$\frac{dP}{P} = \frac{D}{1+r} * dr$$

From these two expressions it is easy to prove that a higher duration is associated with a higher sensitivity of the value to a change in the interest rate.

Considering $D/(1+r)=DM$, modified duration, finally we have

$$\frac{dP}{P} = -DM * dr$$

(6) For example, commissions that are also sensitive to interest rate changes and can have repercussions on the profit and loss account.

i.e., the percentage change in the market value is a function of interest rate change and of modified duration, which points to the sensitivity of the economic value to a change in the market interest rate.

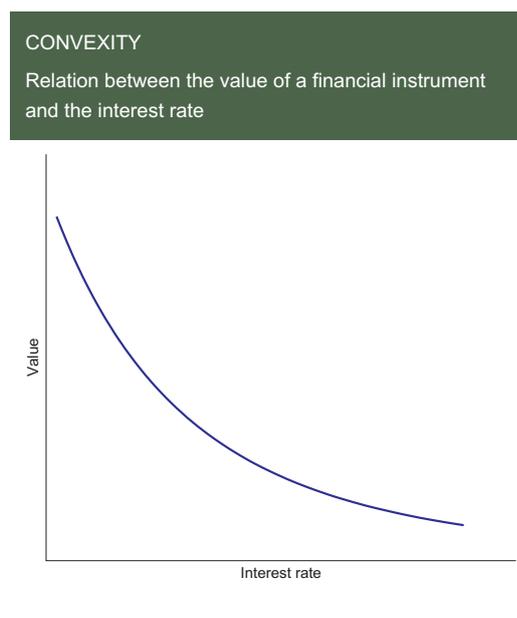
The duration technique does, however, have some limitations. On the one hand, it is a linear approximation, therefore it does not suffice to rigorously explain the relation between instrument value and interest rate, which is characterised as non-linear (Chart 1). In these terms, the use of duration to measure the sensitivity of the change in value to changes in the interest rate is more reasonable the lower the interest rate changes under consideration.⁷

Moreover, this measure only contemplates risks that result from factors related to repricing. It does not consider, for example, the yield curve risk (i.e., only parallel shifts in the yield curve are considered, an infrequent situation) and the option risk (the typical and simplest cases are the option to prepay a loan or withdraw a deposit as a response to changes in the interest rate). Finally, the use of an average duration for each time band implies that estimates do not reflect the differences in the current sensitivity of the positions, which can emerge from differences in the coupon rates or in the time that payments take place.

Simulation techniques are usually associated with more advanced interest rate measurement techniques. In general, they involve assessments of the interest rate effects on the profit and loss account and on economic value, through the simulation of future interest rate trajectory and its impact on cash flows. To some extent, they can be seen as an extension and refinement of the maturity/repricing schedules. However, these techniques involve a more detailed coverage of the different positions on and off the balance sheet, such as through the incorporation of a specific hypothesis on the payment of interest and principal and on the non-interest component of profits and losses. In this sense, the simulation approaches, as they allow changes in the slope and shape to be incorporated, are more demanding in technical terms.

In static simulations, the assessment is only made for cash flows resulting from balance sheet and OBS positions. To assess the impact on the profit and loss account, cash flows and resulting income

Chart 1



(7) For higher interest rate changes, the concept of convexity can be used. This is based on the second derivative of the asset value function to the interest rate, and permits a more accurate approximation to changes in the value of instruments from changes in the interest rate.

streams are estimated, based on interest rate scenarios. In general, these scenarios comprise changes in the yield curve, or changes in spreads of the different interest rates. Finally, it is possible to obtain an estimate of the impact on economic value, if the cash flows resulting from the simulation cover the banks' expected life time positions and are properly discounted.

The dynamic simulation comprises more detailed assumptions about the future course of interest rates, including the expected changes in a bank's business activity. For instance, the simulation can involve assumptions at the level of operation pricing strategy (spreads), about the behaviour of clients and/or about the future evolution of loans. Given its greater complexity in technical terms, it is more capable of pinning down and thus covering most interest rate risk sources. As with other approaches, the usefulness of dynamic simulation as a measure of interest rate risk depends on the validity of the underlying hypothesis and the accuracy of the basic methodology.

3. REGULATORY FRAMEWORK

At an international level, the interest rate risk legal framework is based on the "Principles for the Management and Supervision of Interest Rate Risk", issued by the Basel Committee on Banking Supervision (BCBS). The aim of this document, the last version of which dates from July 2004, is to buttress the approaches to interest rate risk in the context of the new Capital Accord.⁸

Though the new Capital Accord considers the interest rate risk in the banking book as potentially significant, therefore recommending its adequate coverage by capital, it does not impose explicit capital requirements within the scope of Pillar 1 (minimum capital requirements). This approach clearly contrasts with that adopted for the trading book (which led to the adoption in Portugal of a regime set out in Notice no. 7/1996).

The non-adoption of explicit requirements relative to the banking book derives from the heterogeneity in the range of operations and internal control processes covering risks of this nature in banking institutions. This applies above all to banks with considerable international operations, a situation that makes it more difficult to impose harmonised requirements.⁹ The option chosen was to define a set of principles considered fundamental for good management of interest rate risk by banking institutions and for its accurate assessment by supervisory authorities. From the 15 stated principles, 13 have a general application to interest rate risk management, independently of the type of balance sheet item to which they apply. The other two are specific to the management of interest rate risk in the banking book. In general terms, the principles refer to 1) the role played by administration in the supervision of interest rate risk management, 2) the need to clearly define policies and management procedures that allow for the gathering of all interest rate risk sources and that ensure an adequate assignment of responsibilities, 3) the importance of establishing and confirming adequate limits, to conduct exercises comprising extreme but plausible scenarios (stress test) and to have information systems adequate to evaluate, monitor, control and regularly report on the exposure to interest rate risk and 4) the need to have well-defined internal control systems, regularly subject to independent appraisal. Institutions must have the ability to evaluate interest rate risk from an earnings as well as an economic value perspective, adopting the analysis that, depending on their respective balance sheet positions and activity complexity, allow them to pinpoint all materially relevant risk, both in balance and OBS accounts.

(8) A presentation of the new Capital Accord can be found in chapter 7 (section 7.2 – The new Capital Accord: current situation) of the Financial Stability Report – 2004, Banco de Portugal.

(9) Supervisory national authorities are, however, allowed to establish minimum capital requirements, if there is sufficient homogeneity between institutions supervised in terms of risk and its control and assessment methods. In addition, supervisory authorities must have the ability to demand on an occasional basis, that institutions reduce their exposure to risk and/or increase their coverage, when the impact exceeds certain requirements.

The legal framework covering interest rate risk in the banking book in Portugal is defined in Instruction no. 19/2005. Based on internationally established principles, banks are required to furnish information that permits the evaluation of the impact of an interest rate change of 200 b.p. either on net worth and on the financial margin.¹⁰ This information must include the results of models internally used to measure and evaluate the interest rate risk in the banking book, and a detailed description of the respective methodologies. A simplified report is also required with a time-based breakdown of assets, liabilities and OBS positions included in the banking book and sensitive to the interest rate.¹¹ The exposure reported must be compared with the financial margin as well as with own funds of each institution, so as to evaluate its importance. The report must permit monitoring of the exposure to interest rate risk in the banking book and must supply the basis for any corrective measures undertaken by the Banco de Portugal, within its prudential monitoring remit. The central bank will take into account any interest rate risks taken on and the specific nature of institutions or banking groups.

Assessment of the impact on net worth is based on a simplified analytical framework, with several assumptions, including the classification of financial instruments into time bands according to the residual maturity, weights are assigned to reflect the modified duration in each band and the interest rate change applied to simulate the impact. The weights are based on average maturity of each time band and on the assumption that all balance sheet and OBS items yield and are discounted at a common 5 per cent rate, independently of maturity and type of instrument. It is also assumed that each instrument's cash flow profile is equivalent to an annual coupon bond with the same maturity (Table 1).

Similarly, the evaluation of the impact on the financial margin is based on an array of weighting factors, which must now reflect the impact on interest gains and losses, in a one year horizon, associated to a 200 b.p. change in the interest rate (Table 2). As can be seen, the weights are inversely proportional to the period between the simulation date and the respective temporal horizon, which is 12 months.

Table 1

IMPACT ON OWN FUNDS				
Time band	Maturity (1)	Proxy for modified duration (2)	Change in interest rate (3)	Weighting facto (%) (4) = (2)*(3)
Sight - 1 month	0.5 months	0.04	+/- 200 bp	+/- 0.08
1 - 3 months	2 months	0.16	+/- 200 bp	+/- 0.32
3 - 6 months	4.5 months	0.36	+/- 200 bp	+/- 0.72
6 - 12 months	9 months	0.71	+/- 200 bp	+/- 1.43
1 - 2 years	1.5 years	1.38	+/- 200 bp	+/- 2.77
2 - 3 years	2.5 years	2.25	+/- 200 bp	+/- 4.49
3 - 4 years	3.5 years	3.07	+/- 200 bp	+/- 6.14
4 - 5 years	4.5 years	3.85	+/- 200 bp	+/- 7.71
5 - 7 years	6 years	5.08	+/- 200 bp	+/- 10.15
7 - 10 years	8.5 years	6.63	+/- 200 bp	+/- 13.26
10 - 15 years	12.5 years	8.92	+/- 200 bp	+/- 17.84
15 - 20 years	17.5 years	11.21	+/- 200 bp	+/- 22.43
> 20 years	22.5 years	13.01	+/- 200 bp	+/- 26.03

(10) The magnitude of the interest rate change was determined with reference to the historical volatility observed in G10 countries' interest rates (corresponding, fundamentally, to an event with 1 per cent probability of occurring in a 1 year horizon). A similar methodology should be adopted in the determination of an interest rate shock relative to other currencies, wherever exposure to these exchange values is materially significant (over 5 per cent of the banking book, either on the assets or liabilities side).

(11) The time bands considered refer to residual maturity in the case of fixed interest instruments, and to repricing in the case of floating rate instruments.

Table 2

IMPACT ON FINANCIAL MARGIN				
Time band	Maturity (1)	Residual term up to 1 year (2) = $\frac{12 - (1)}{12}$	Change in interest (3)	Weighting factor (%) (4) = (2)*(3)
Sight	0	1.00	+/- 200 bp	+/- 2.00
Sight - 1 month	0.5 months	0.96	+/- 200 bp	+/- 1.92
1 - 2 months	1.5 months	0.88	+/- 200 bp	+/- 1.75
2 - 3 months	2.5 months	0.79	+/- 200 bp	+/- 1.58
3 - 4 months	3.5 months	0.71	+/- 200 bp	+/- 1.42
4 - 5 months	4.5 months	0.63	+/- 200 bp	+/- 1.25
5 - 6 months	5.5 months	0.54	+/- 200 bp	+/- 1.08
6 - 7 months	6.5 months	0.46	+/- 200 bp	+/- 0.92
7 - 8 months	7.5 months	0.38	+/- 200 bp	+/- 0.75
8 - 9 months	8.5 months	0.29	+/- 200 bp	+/- 0.58
9 - 10 months	9.5 months	0.21	+/- 200 bp	+/- 0.42
10 - 11 months	10.5 months	0.13	+/- 200 bp	+/- 0.25
11 - 12 months	11.5 months	0.04	+/- 200 bp	+/- 0.08

4. EXPOSURE IN THE MAIN BANKING INSTITUTIONS – AGGREGATE MEASURES AND EMPIRICAL DISTRIBUTION

For a quantitative assessment of the importance of the interest rate risk in the banking book we next resort to data from a set of 13 banking groups,¹² collected within the terms of Instruction no. 19/2005.

Assuming a 200 b.p. interest rate rise, which is extremely unlikely in current circumstances, results point to a low level of overall exposure, evaluated both in terms of the impact on own funds (5.2 per cent increase) and in terms of the impact on the financial margin (3.8 per cent increase). They reveal, on the other hand, that the total impacts (on net worth and on financial margin) reflect (in general and on aggregated terms) positive impacts on the balance sheet items (8.2 and 10.5 per cent, respectively on net worth and financial margin) and negative in the case of OBS elements. This offsetting seems to imply that banks are, to varying degrees, adopting active policies of interest rate risk coverage.

The impacts on net worth and on financial margin assume a variable importance between the institutions under review (Charts 2 and 3). This relative dispersion may reflect not only differences in the balance sheet structure but it may also result from the hypothesis used by the institutions to affect the instruments to time bands, mostly in the case of non-contractual fixed maturities.

Despite the relative dispersion, it can be concluded that for the whole set of institutions under review, and for most of them, the impact of an increase in the interest rates will be positive in terms of interest rate risk, both on a net worth level and in terms of the interest margin. Therefore, Portuguese institutions seem well positioned, at this level of risk, to face increases in key European Central Bank interest rates.

It should be noted that, according to the Parliament and European Council Directive regarding access to credit institution operations, analysis and evaluation by the competent authorities must include the exposure of credit institutions to interest rate risk arising from their banking book operations. Measures are likely to be needed for institutions that lose more than 20 per cent of own funds, following a sudden and unexpected change in interest rates. The scope of this must be determined by the competent au-

(12) Set of institutions that, on a consolidated basis, adopted the new International Accounting Standards in the beginning of 2005

thorities and be equal for all institutions. In December 2005, none of the institutions under review were in this situation.

As far the impact on net worth derived from balance sheet items, it can be observed that differentiation between institutions occurs significantly for more than one year horizons, suggesting that in short-term periods institutions have a similar temporal pattern of interest rate repricing. In fact, most credit granted by Portuguese banks have interest rate repricing schedules of up to one year horizons or have short maturities. On the other hand, the majority of customer deposits are concentrated in interest rate repricing horizons of less than one year. In addition, the majority of securities issued have floating interest rates. It is therefore easy to deduce that if significant liquidity gaps exist they are, in general, concentrated in short maturity classes. They are thus less weighted and hence with typically low exposure to interest rate risk. Available information therefore suggests that, for over one year periods, differentiation between institutions most probably reflects different levels of resource application to financing at medium and long-term fixed rates, and, in some way, different hypotheses in the classification of financial instruments where contractual maturity differs, in general, from “behaviour maturity” (i.e., from options assumed by the depositor or the borrower).

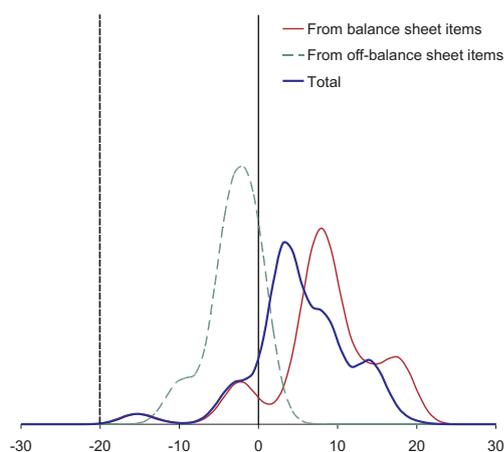
The positive impact on the financial margin associated to balance sheet items is explained by the tendency towards excessive asset positions over liability positions in the repricing horizon of up to one year. This situation is likely to reflect, to a large extent, the proportion of credit to total bank assets.

The impact on net worth and on the financial margin deriving from OBS items, is particularly noticeable in the case of one specific non-domestic institution.¹³ In fact, in terms of the financial margin impact there is a larger effect than that of the balance sheet items.

Lastly, it should be noted that these results must be analysed with some caution. As previous referred, they are sensitive to the special nature of each institution and to the hypotheses that they work with.

Chart 2

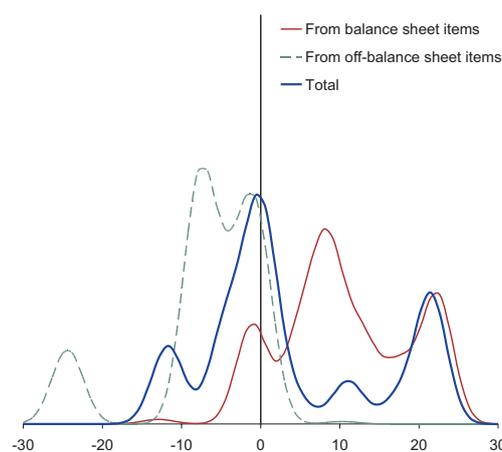
CUMULATED IMPACT ON NET WORTH FROM INTEREST RATE SENSITIVE INSTRUMENTS
As a percentage of own funds



Source: Banco de Portugal.
Note: Empirical distribution obtained through by recourse to a gaussian Kernel that weights institutions by their own funds.

Chart 3

CUMULATED IMPACT ON FINANCIAL MARGIN FROM INTEREST RATE SENSITIVE INSTRUMENTS
As a percentage of own funds



Source: Banco de Portugal.
Note: Empirical distribution obtained through by recourse to a gaussian Kernel that weights institutions by their financial margin.

(13) Account is thus taken of institutions managed by non-resident institutions, whether these are governed by Portuguese law, subsidiaries of non-resident banking groups (subject to the supervision of the Banco de Portugal) or branches of credit institutions with head office abroad.

Nevertheless, specific features, as well as the interest rate risk control systems considered, overall, are subject to qualitative scrutiny by the Banco de Portugal.

5. CONCLUSION

The aim of this work is to present the concept of interest rate risk in the banking book and its application in Portugal. Even though the approach used is subject to some limitations, the results obtained allow us to conclude that the Portuguese banking system has limited exposure to interest rate risk in the banking book.

It can be concluded therefore, that interest rate risk does not seem significant for the Portuguese banking system. This stems from low gross exposure and also from the hedging instruments used.

Specifically in terms of balance sheet items, this results from the fact that most interest rate sensitive items are typically indexed to short-term money market interest rates. Some 90 per cent of total new loans to households and non-financial corporations fit into this bracket. Furthermore, debt securities only account for some 7 to 8 per cent of total assets (on a consolidated basis) and only 3 per cent are issued by public sector entities at a fixed rate. In turn, some 90 per cent of total deposits have term between 6 months and 1 year (deposits with a 6 month term account for more than 50 per cent). In addition, by the end of 2005, some 70 per cent of securities issued by subsidiaries and branches abroad were at a variable rate. However, interest rate risk assessment remains an important topic, specially if fixed rate credit contracts gain extra importance as a response to recent interest rate hikes.

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