Monetary Policy and the Adjustment of Belgian private bank interest rates- An econometric analysis*

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Abstract

In this paper, we analyze the pass-through of market rates to micro retail interest rates for a basket of different types of loans and deposits using a panel of 37 Belgian banks over the January 2003- September 2006 period. We find that Belgian banks adjust relatively rapidly their interest rates to changes in the market rates, but that their reaction is only partial. In addition, we find significant heterogeneity across sectors, products and banks.

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1 Introduction

In this paper, we analyze the evolution of micro interest rates set by Belgian commercial banks for a basket of different types of loans and deposits using a panel of 37 Belgian banks, which represent 92 % of the Belgian market. These banks are observed on a monthly basis during the January 2003 – September 2006 period. More precisely, we analyze the way market interest rates, and therefore monetary policy, are transmitted to bank retail rates in Belgium.

Such an analysis has already been conducted for Belgium (Baugnet and Hradisky, 2004, using aggregated data, and De Graeve *et al.*, 2004, 2007, using micro data) but this article is the first to exploit the new harmonized MFI interest rate dataset (MIR, henceforth). This data set provides an important improvement for the analysis of the transmission mechanism, insofar as it refers to interest rates that are effectively paid or received by customers instead of advertised rates. Compared to the existing empirical literature based on Belgian data, our analysis uses therefore more relevant measures of interest rates. However, given that these data are available since January 2003 only, this study is conducted on a relatively short observation period (45 months), which may affect our estimates of the short term and/or long-term interest rates dynamics.

The monetary policy transmission, which is the way monetary policy decisions ultimately affect prices and output, is a complex process operating through a variety of channels. A refined comprehension of these mechanisms is crucial for policy makers, as they determine the effectiveness of the monetary policy. In this paper, we concentrate on one aspect of the transmission process, the interest rate channel, which is the transmission of the central bank official rate, through the money and capital markets rates, to retail rates set by banks. These rates are those on which firms and households base their investment and savings decisions. Therefore, the banks' behavior, in particular the scope and the speed at which they adapt their retail rates to changes in market conditions, is of great importance for the ultimate effect of monetary policy on prices and activity. Banks can amplify, dampen or even neutralize its impact on the real economy. Furthermore, banks' pricing policy influences their

profitability and consequently financial stability, which in turn may affect economic growth.

The interest rate channel cannot be isolated from other monetary policy transmission mechanisms. Prices are not the only way banks react to a monetary policy change. In this respect, the bank lending channel considers the reaction of the loan supply to monetary policy changes. A monetary policy tightening, which leads to a rise in capital market rates, encourages economic agents to substitute securities for deposits (less remunerated). Banks are negatively affected in their collect of funds and insofar as they do not perfectly access deposits substitutes or cannot easily realized their liquid assets, they will have to be more restrictive in their loan supply. These considerations imply that banks' financial structure – their liquidity, their solvency, their disposal of a stable pool of deposits, their size (a proxy for their access to financial markets)– matters when analyzing the response of bank rates to a monetary policy change.

The response of banks rates has also to be put in perspective with the way monetary policy affects the global demand and particularly, the borrowers' risk profile. Through the balance sheet channel, a monetary policy tightening raises the risk of default because the contraction of the demand for goods and services and the increase in the interest rate charges have a negative impact on the financial position of the borrower. In addition, the rise in long-term rates reduces the value of collateral necessary for borrowing operations. Both effects induce banks to be more restrictive in their credit conditions (financial accelerator) and this amplifies the impact of the interest rate increase.

Capital market imperfections, and especially information asymmetry, which typically affects the loan market, imply that the risk-return characteristic of a project cannot be fully observed by one party. In order to avoid adverse selection problems, banks might prefer to ration lending rather than increase tariffs. According to Berger and Udell (1992), a key testable implication of credit rationing is that commercial loan rates are sticky. To limit moral hazard problems, banks may favor granting short-term debt and use the implicit threat of withdrawing credit as a disciplining service. If this is the case, we would observe a higher mark-up on short-term debt reflecting the debtor's riskier profile. Banks can also develop screening and monitoring sophisticated methods, and/or engage in exclusive and long-term relationships

(relationship lending). The intensity of problems related to information asymmetry, which can be exacerbated by the business cycle, and the banks' capacity of solving them are therefore other determinants of the interest rate channel.

The responsiveness of banks' rates will also depend on the expected reaction of the demand (supply) for loans (deposits) to interest rate movements. The slope parameter can depend on several factors, among which the competitive structure (concentration, degree of openness, market contestability, etc.). On one side, theories related to structure-conduct-performance assert that the setting of prices is less favorable (both in terms of level and of adjustment speed towards an optimal price) to consumers in more concentrated market as a result of competitive imperfections in these markets.[1] A related theory is the "relative market power" hypothesis, which asserts that firms with large market shares and well-differentiated products are able to exercise market power in pricing these products. These theories help explaining the positive relationship between profitability and market structure (concentration, market share). On the other side, efficiency theories argue that firms producing at more efficient scales (scale efficiency) or firms with superior management or production technologies (X-efficiency) have lower costs, and therefore higher profits. As these firms are assumed to gain large market shares, that may result in high levels of concentration. Therefore, the relationship between the degree of concentration and the level of the price / the speed of adjustment relative to the optimal price is not straightforward. Demand inelasticity can also result from high search or switching costs. Conversely, more sophisticated or better-informed customers may be prompter to react to interest rate changes, raising the quantity adjustment costs for the bank.

Finally, investigations in banks' retail pricing encompass marketing and strategic considerations (universal vs. specialized banks, cross-subsidization, etc). Legislation and regulatory constraints can also influence banks' price setting policies.

To sum up, although our main focus is on the interest rate channel, it is considered in a much broader view, including the bank lending channel, the balance sheet channel and aspects of the market structure of the banking industry.

The paper is structured as follows. In section 2, we present a review of the existing empirical literature on interest rate pass-through. Section 3 is then devoted to

[1] Berger (1995)

a description of the Belgian banking system. In section 4, we briefly describe the data and the model we are estimating. Our results are then summarized in section 5 and our main conclusions are presented in section 6.

2 What do we know about interest rate pass-through?

Many studies have explored the interest rate pass-through, in terms of the degree and the speed of commercial interest rate adjustment[2]. Some studies[3] focus on aggregate interest rate series for individual countries, typically using error-correction models (ECM), to quantify the dynamics of the pass-through. In these studies, differences across countries or products are related to structural features such as financial market characteristics or the degree of competition. Other studies[4] use micro bank data and panel data techniques to examine the price-setting behavior of banks in relation with bank-specific characteristics or market structure. As seminal studies use a common "ad-hoc" market rate against which to measure the pass-through whatever the maturity of the product analyzed, a recent strand in empirical work uses a cost-of-fund approach, selecting a market rate of comparable maturity distinctive for each product. The latter approach allows controlling for the differences in the transmission of short-term interest rate movements to the respective maturities of the entire yield curve. This recent strand also reflects the increasing degree of competition between traditional bank products and non-banks (market-based) products.

Both macro- and micro-studies try to answer the question of the completeness of the pass-through in the long run and to quantify the degree of stickiness in the short run. Despite the fact that several studies assume a complete long-term pass-through, no clear consensus has emerged regarding its completeness.

Most studies detect stickiness in bank rates in the short-run, which can be explained by several factors, such as uncertainty and adjustment costs. The more uncertain banks are about the future development of market rates, the longer they are

2 See Sørensen and Werner (2006) for an exhaustive overview of studies on interest rate pass-through in the euro area and in the euro area countries.

3 See for instance, Cottarelli and Kourelis (1994), Borio and Fritz (1995), Mojon (2001) and De Bondt (2002).

4 See for instance, Weth (2002), Gambacorta (2004), Lago-Gonzales and Salas-Fumás (2005) and De Graeve *et al.* (2007)

likely to leave their rates unchanged (Weth, 2002). In this respect, the communication surrounding monetary policy decisions, and in particular the information regarding future rate movements and the degree of gradualism, can shape expectations and can impact on the speed of adjustment. A delayed response may also be due to adjustment costs, such as menu costs, with the result that preference is given to less frequent, larger interest rate changes over continuous adjustments of interest rates

The most advertised determinant for interest rate rigidity is banks' competitive environment. If competition is weak, banks may adjust slower to market rate movements. In particular, they may increase their interest rate margin by reducing their lending rates more slowly than their deposit rates in period of declining interest rates, and doing the opposite in period of rising interest rates. Two early influential studies on interest rate pass-through and market structure are Hannan and Berger (1991) and Neumark and Sharpe (1992), both focusing on the US deposits markets. Both find that price rigidity is significantly greater in concentrated markets and that this rigidity is higher when the interest rate change is upward, revealing asymmetry in banks' reaction to monetary policy changes. Borio and Fritz (1995) show that lending rates tend to be adjusted less strongly in periods of falling interest rates and faster in times of rising interest rates. However, the relationship between market concentration and the speed of adjustment is not necessarily monotonic, as found by Lago-Gonzales and Salas-Fumás (2005), for the retail banking industry, which is consistent with an oligopolistic market structure where banks face quantity adjustment costs.

Heterogeneity in the pass-through is found across banking products, both in the short and in the long runs. Some recent papers report a higher pass-through for long-term products compared to short-term products (De Graeve *et al.*, 2004, Sørensen and Werner, 2006).[5] This can be rationalized from a bank's perspective: the longer the maturity of a product, the larger the scope for moral hazard. In an attempt to avoid this phenomenon, banks can follow the market more closely. In the same way, as products with larger maturities are typically those with large underlying amounts, deviations from competitive pass-through would be more costly. This argument also

[5] Seminal studies using a short-term rate as the explanatory variable (and thus not following a cost-of-fund approach) do not share this result. An incomplete pass-through of the key rates to the longer maturities of the yield curve could indeed lead to underestimate the coefficients for long-term products.

holds for the customers (firms or households), who engage in a more intensive search for competitive conditions in the segment of products with longer maturities or higher underlying amounts. Despite the high level of heterogeneity, most studies find that rates on loans for enterprises and rates on time/term deposits react more rapidly to changes in market rates than rates on loans to households or on overnight and savings deposits. These results are consistent with the less sophisticated profile (in terms of search intensity and access to alternative finance) of households compared to firms.

In micro studies, the heterogeneity of banks' responsiveness to monetary policy has been related to some bank-specific characteristics. Analyses of the US economy have demonstrated the existence of a bank lending channel, as smaller, poorly capitalized (Kishan and Opiela, 2000) and illiquid banks (Kashyap and Stein, 2000) tend to display a comparatively stronger loan supply response to monetary policy shocks. For the euro area, however, results of the Monetary Transmission Network indicated that only asset liquidity seems to be relevant for explaining individual bank lending responses while bank's size and bank's capitalization is not.[6] Studying lending rates in Germany, Weth (2002) found that large banks and banks with few savings deposits adjust their lending rates faster than others. Gambacorta (2004) also finds that although interest rates on short-term lending of liquid and well-capitalized Italian banks react less to a monetary policy shock, size is however never relevant. The scope of relationship banking (measured by volumes of long-term business with the private sector) is usually related to stickier prices (Weth, 2002, Gambacorta, 2004).

Finally, we mention four studies using micro data for the Belgian market. Bruggeman and Wouters (2001) investigate the determinants of the levels of interest rates charged for a number of standardized credit products (national Retail Interest Rate, hereafter NRIR, database, covering the Jan. 1993 - Sept. 2000 period). They find that the mark-up set by Belgian banks (the spread between the rate charged and the corresponding market rate) is higher for credit products characterized by a longer maturity, a higher risk and/or a lower amount. The mark-up also varies across banks as large and/or liquid banks tend to charge lower rates, whereas highly capitalized banks seem to charge higher rates. Finally, the authors find that the mark-up, although stationary, does change over time, decreasing with the business cycle and increasing

[6] See Ehrmann et al. (2003).

with the cost of the bank's resources (approximated by the rates paid by the bank on deposits and/or savings notes).

Using the same database on a slightly longer period (Jan. 1993 - Dec. 2002), De Graeve *et al.* (2004, 2007) measure the speed of the pass-through in the Belgian market. They reject the completeness hypothesis for a majority of products, although not for the long-term deposits, the mortgage loans, and two of the corporate loans (those with longer maturity). Globally, they find that the pass-through is more complete and faster for products with higher maturities. Corporate loans are priced more competitively than loans to households.[7] Overnight and savings deposits have the more rigid prices. The heterogeneous price-setting among banks is driven by differences in market power and the bank lending channel.

Finally, using aggregated NRIR data for the January 1993 – December 2003 period, Baugnet and Hradisky (2004) find that the short-term pass-through is much higher for corporate loans than for loans to households; for the six loan products under consideration, the completeness of the long-term pass-through is never rejected.

Other related issues are asymmetry and non-linearity in the pass-through, as well as the impact of the EMU on the speed of adjustment. These three issues, while highly interesting, are not treated in this paper given that our estimation period (2003-2006), covers only a cycle of rates hikes.

3 The Belgian Banking System

Even if Belgian banks lost importance in the balance sheets of the Belgian private sector during the last decade, they still remain an important player.

Concerning households, banks are the largest provider of mortgage loans, which represent the bulk of households' liabilities, while their market share regarding consumer loans is lower.[8] Other lenders (installment loan sellers, mail order companies, financing companies, companies specialized in financial leasing) are dominant for small value loans, while banks still dominate the market for large value installment loans such as car loans.

[7] By more competitive pricing, we mean a more complete and rapid pass-through of the market rate.

[8] At the end of June 2006, 84% of the amount households' mortgages, representing 82% of all concluded contracts, and 72% of the amount households' consumer loans, representing only 47% of all concluded contracts, were granted by banks (Central Individual Credit Register).

Turning to their assets, at the end of June 2006, households kept 31% of them in banks, mostly via deposits (81% of their bank assets); amongst the deposits, the largest category was the regulated savings deposits (75%),[9] followed by overnight deposits (18%), other short-term deposits (6%) and long-term deposits (1%).

The Belgian corporate sector relies less on banks than households. Financial account statistics indicate that, at the end of 2005, only 5 and 8% of non-financial corporations' assets and liabilities had banks as counterparts. However, these statistics are heavily influenced by the presence in Belgium of large non-financial holdings and coordination centers.[10] Data from the Central Balance Sheet Office allow for the exclusion of the non-financial holdings and the coordination centers. In that case, the share of bank loans in the total liabilities of large firms was 14% at the end of 2004, while this ratio reached 22% for SMEs. Surveys conducted amongst Belgian SMEs confirm that banks are clearly their most important financing source.[11]

Regarding corporate loans covered by the MIR survey, three instruments emerge as the most important ones. Bank overdrafts come first in the financing of SMEs, while loans up to one million euros with an initial period of fixation under one year are the instrument commonly used by large firms. Loans over one million euros with a initial period of fixation under one year are only used by very large firms.

Finally, regarding the market structure, one particular feature emerges, common to all segments under consideration: the four largest banks, stemming from the wave of mergers and consolidations at the end of the nineties, dominate the Belgian landscape with a market share of around 75%.

4 A partial adjustment model of interest rate

[9] Their very favorable tax treatment explains part of the success of traditional savings deposits. It should be mentioned that the return for this type of deposits typically includes a base rate (reported in the MIR database), a growth premium and a fidelity premium, those premiums being dependent on specific conditions.

[10] Both entities play a significant role in the financing of their affiliated firms, either resident or non-resident, by granting them funds via acquisition of unquoted shares (non-financial holdings) or intra-group loans (coordination centers). These entities finance themselves by issuing shares, merely quoted in the case of non-financial holdings and unquoted in the case of coordination centers. The inclusion of both entities in the financial statistics leads thus to an overestimation of the amount of issued shares and other participations and of non-banks loans in the corporate balance sheet (both at the assets and at the liabilities side).

[11] See htpp:\\www.cefip-kefik.be for more details on the financing of Belgian SMEs.

The empirical analysis conducted in this paper is inspired by Lago-Gonzales and Salas Fumás (2005). In their paper, the authors develop a simple Partial Adjustment Model for interest rates derived under the assumption of monopolistic competition on the loan / credit market with quadratic adjustment costs.

This last assumption may be considered as a strong restriction. Non-convex adjustment costs such as fixed costs have proved to be a realistic representation of adjustment costs in several contexts, which are characterized by a high degree of lumpiness, such as the analysis of production factor adjustment or micro price adjustment. However, they do not seem to be needed in the context of the analysis of the interest rate patterns observed at the micro level, especially in the context of the MIR database. Indeed, because of the nature of the data analyzed, which consists of weighted averages of the interest rates of a basket of deposits / loans for different maturities (see section 4.1. for more details), there is not much, if any, lumpiness in the adjustment of interest rates at the monthly frequency. Therefore, quadratic adjustment costs are a reasonable assumption but this assumption could be challenged if more precise / frequent measures of interest rates were available.

Under the assumption of monopolistic competition with quadratic adjustment costs, r_{ijt} the interest rate applied by Bank i for a particular product (loan or credit) j at time t is adjusted gradually to its long run value, r_{ijt}^{*}. This long run value depends on the market rate used as reference by banks for the particular product j, the inflation rate and the real growth rate of the economy. As Lago-Gonzales and Salas Fumás (2005), we have introduced these two variables to take changes in the macroeconomic conditions that may affect the loans' demand and deposits' supply into account.

As mentioned above, variations of the long run value r_{ijt}^{*} are transmitted gradually by banks to their customers. The partial adjustment model relative to the product j can therefore be written as:

$$r_{ijt} = r_{ijt}^{*} + \varepsilon_{ijt} = \alpha_0 + \alpha_1 R_{jt} + \alpha_2 \pi_t + \alpha_3 g_t + \varepsilon_{ijt} \qquad (1)$$

And

$$r_{ijt} - r_{ij,t-1} = \delta\left(r_{ijt}^{*} - r_{ij,t-1}\right) + \omega_1 \pi_t + \omega_2 \pi_{t-1} + \omega_3 g_t + \omega_4 g_{t-1} + \eta_{ijt} \qquad (2)$$

where : r_{ijt} is the interest rate of product j set by bank i at time t ;

R_{jt} is the market rate used as reference for product j at time t;

π_t is the inflation rate at time t;

g_t is the real growth rate at time t.

Equation (1) describes the long run behavior of interest rates, while equation (2) characterizes their short-run dynamics.

The most important parameters in the context of the analysis of micro interest rate patterns are α_1, which measures the degree of long run pass-through of the market reference rate, and δ, which measures the speed of the adjustment.

If α_1 is close to one, a variation of the reference market rate is, in the long run, fully transmitted to the rates applied by the banks. The smaller the α_1, the smaller is the pass-through of market variations in the banks micro interest rates. When α_1 exceeds one, the actual interest rate over-shoots the reference rate.

If δ is close to one, the adjustment to the long-term is almost completed after one period. The smaller the δ, the slower is the adjustment to the long run value.

For the empirical estimation, we have introduced some heterogeneity in equation (1), which describes the long-term behavior of interest rates. Indeed, a bank-specific constant term (affecting the average level of interest rates of a specific bank) has been introduced, while all other parameters (including the one describing the degree of long-run pass-through) are common to all banks. Therefore, equation (1) becomes:

$$r_{ijt} = r_{ijt}^{*} + \varepsilon_{ijt} = \alpha_{0i} + \alpha_1 R_{jt} + \alpha_2 \pi_t + \alpha_3 g_t + \varepsilon_{ijt} \qquad (1)'$$

In equation (1'), α_{0i} can be interpreted as a bank-specific average or equilibrium mark-up over the reference interest rate R_{jt}.

Equations (1)' and (2) have been estimated for each loan or deposit using the SURE estimation procedure. For some loans, for which a very limited number of banks provided the interest rate series, we have grouped different loans of similar maturities to increase the cross-sectional dimension of the panel. Results of these estimations are reported in Table 5.

In a second type of empirical estimation, we further explore whether the behavior of banks is characterized by other forms of heterogeneity. We investigate in the first instance whether the short-run pass-through is heterogeneous across banks.

Thereafter, we test whether there is heterogeneity in the degree of long-run pass-through.

Lago-Gonzales and Salas Fumás (2005) discuss the impact of the bank's characteristics and market conditions on the speed of adjustment. They introduce bank-specific heterogeneity in the δ parameter, which can be related to some characteristics such as the size or the market power of the relevant bank.

Therefore, we have also introduced this type of heterogeneity in our model and we have tested the impact of several explanatory variables X_{ik} on the speed of interest rates adjustment[12], assuming that bank i's specific speed of adjustment, δ_i, is given by:

$$\delta_i = \delta + \sum_{k=1}^{K} \beta_j X_{ik} \qquad (3)$$

Finally, we have also tested for one particular form of heterogeneity in the long run pass-through by assuming that the bank specific α_{1i} coefficient is a quadratic function of the banks' market share (MSi):

$$\alpha_{1i} = \alpha_1 + \gamma_1 MS_i + \gamma_2 MS_i^2 \qquad (4)$$

For this type of heterogeneity, we have restricted our analysis to the impact of market share, as we consider that the other variables examined in equation (3) should only have an impact on the short-term dynamics.

The assumptions of heterogeneous δ (eq. (3)) or heterogeneous α_1 (eq. (4)) have been tested separately. Moreover, in order to increase the cross-sectional dimension of our panel, and therefore the efficiency of our estimates, pooled data grouping all types of deposits or all types of loans have been used. Tables 6A and 6B report the results on respectively heterogeneity in δ (speed of short-run pass-through) and α_1 (degree of long-run pass-through)

[12] We have tested several variables which are described in section 4.1. Some variables, such as market share and a measure of the risk faced by each bank have been introduced in a quadratic form. The impact of other variables, such as the degree of liquidity, the importance of long term relation, the profitability is assumed to be linear.

4.1 Data and stylized facts

As mentioned in Section 1, the bank interest rate statistics used in this study are based on the micro data from the new MIR dataset for Belgium. These harmonized and detailed data have been collected each month by the National Bank of Belgium from January 2003 onwards.[13] This new data collection replaces the non-harmonized retail interest rates statistics (NRIR). It covers euro-denominated loans and deposits to Belgian households and non-financial corporations. In contrast to the NRIR database, the MIR data set presents an important advantage from the point of view of monetary policy and in particular, for the analysis of the transmission mechanism, as it refers to the interest rates that are individually agreed between a MFI and its clients.[14] Thus, it refers to the interest rates that are effectively paid or received by the private sector. The MIR rates should therefore differ in general from the advertised rates, not only in terms of the level but possibly also in terms of the adjustment speed, as households and non-financial corporations might be able to negotiate better conditions than those advertised. A comparison of both series show indeed that NRIR rates are subject to less frequent and larger variations than MIR rates.

The micro data used in this study apply to new business, (i.e. any new agreement between the customers and the MFIs[15]) and cover short- and long-term maturities instrument categories vis-à-vis all households or non-financial corporations. The MFI statistics are particularly appropriate to assess the pass-through of changes in market rates to banks' interest rates as they reflect the demand and supply conditions at the time of the agreement.

We cover more or less the entire spectrum of retail banking activities by analyzing 9 deposit products[16] and 13 loan instrument categories[17] reported by 37

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13 For this analysis, the observation period ends in September 2006.

14 MFI interest rates exclude charged fees.

15 New agreements are (i) all financial contracts, terms and conditions that specify for the first time the interest rate of the deposit or loan, and (ii) all new negotiations of existing deposits and loans.

16 (i) Overnight deposits from households and non-financial corporations, (ii) time deposits from households and non-financial corporations (with an agreed maturity up to one year, with an agreed maturity over 1 year and up to two years and with an agreed maturity over two years) and (iii) redeemable deposits with a notice up to 3 months from households.

17 (i) Bank overdraft to households and non-financial corporations, (ii) loans for consumption purposes (with a floating rate and up to one year initial rate fixation, with over one year and up to 5 years initial rate fixation, over 5 years initial rate fixation), (iii) loans for house purchase (with floating rate and up to one year initial rate fixation, with over one year and up to 5 years initial rate

banks, which account for 92% of total assets of the Belgian banking sector, and respectively 90 and 91% of the loans and deposits covered by the survey.[18] As the period of notice or the initial period of interest rate fixation available for each instrument category refers to a time band rather than to a precise horizon, the interest rate reported by each bank is an average interest rate for all deposits or loans within that time band. For instance, interest rates reported by bank i on loans for consumption purposes over 1 year and up to 5 years is a weighted average of interest rates across all consumption loans provided by bank i with a period of initial rate fixation between 1 year (but excluding 1 year) and a maximum of 5 years.

As mentioned above, the observation in the MIR data set of the interest rates effectively applied is a strong improvement compared to the NRIR data set. The greater relevance of the data for the analysis of the monetary policy transmission has however a cost. Since the new harmonized data set has been set up in January 2003, the observation period available is relatively short. As mentioned in Section 1, this drawback may affect our estimates of the short-run (δ) and long-run (α_1) pass-through parameters.

The market rates, proxies for the banks' marginal costs, have been selected on the basis of the maturity of the different products (see Table 1 in appendix). The objective is to match market rates' maturity with that of the deposit and loan rates considered in order to choose the most appropriate banks' cost-of-funds (deposits) or opportunity costs (loans). By so doing, we are able to disentangle the transmission of the ECB interest rates to the yield curve from the pass-through of market interest rates to retail interest rates. For some instrument categories, the Belgian law determines explicitly the reference market rates.[19] In this context, for the bank overdraft, we use the 3 months Euribor, while for loans with a variable interest rate and an initial rate fixation of up to one year, the yield on the 12 months Belgian Treasury Certificate is selected, since variable interest rates on loans for consumption purposes and house purchase with an initial rate of fixation less than 1 year are prohibited. In addition, in

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fixation, with over 5 years and up to 10 years initial rate fixation and over 10 years initial rate fixation), (iv) loans to enterprises of up to € 1 million and over € 1 million (with a floating rate and up to one year initial rate fixation, with over one year and up to 5 years initial rate fixation, over 5 years initial rate fixation).

18 For most products, the number of banks is smaller, as all banks do not provide the full set of instrument categories.

19 AR 4-08-1992 and AR 26-10-2006.

line with the Belgian legislation, Belgian government bond yields (OLO) of comparable maturity are chosen as reference rates for longer-term maturity instruments. By so doing, we avoid the selection of the market rates based on a maximum correlation with the retail interest rates criterion, as this approach could entail upward biases in the long-run pass-through coefficient α_1. Finally, as MIR statistics cover new agreements during the whole month, average monthly market rates published by the NBB and by Thomson Financial Datastream are used as proxy for the cost of funds, instead of end-of the month interest rates.

In addition to market rates, other general economic indicators also enter in the long-run equation. Especially, inflation - measured by the y-o-y growth rate of the Belgian HICP - and the NBB industrial confidence indicator - a proxy for real activity – are used as additional explanatory variables. As mentioned, these macroeconomic variables capture cyclical movements and allow us to control for changes in the loan/deposit demand/supply.

Considering the equation of the short run dynamics, we test the impact of some banks' characteristics on the speed of adjustment using banks' balance sheet data and profit and loss account data collected by the NBB on a monthly or quarterly basis. Based on this information, we compute different ratios, which could be relevant for the heterogeneity in the banks' pricing behavior. The ratios have been averaged over the period 2003-2006[20], during which no mergers and acquisitions in the banking sector took place. We focus on (1) size, (2) liquidity, (3) long-term relationship, (4) banks' liability structure, (5) risk, (6) market share for each market separately[21], (7) diversification and (8) profitability. Table 2 in annex provides a description of the different measures under consideration. For the econometric estimations, all these ratios have been normalized with respect to the average across all banks.

Table 3 provides some indications about the distribution of these structural indicators (not normalized). One particular pattern emerges: the distribution of the variables size and market share is strongly skewed to the right, reflecting the structure of the Belgian banking sector, which is dominated by four big institutions. As these

[20] Given the structural nature of these indicators - which capture banks' characteristics, which do not vary so much over time - and the short time period covered by this study, we average the different ratios over the sample.

[21] As mentioned in section 4, we also investigate whether market share has an impact on the long-term pass-through.

two ratios are highly correlated, we have only analyzed the impact of the market share. Finally, crossing the different ratios provides additional information on the banks' financial structure. Large banks rely on average less heavily on traditional banking activities (i.e. intermediation) since only 30% of their income stems from interest, against 73% on average for smaller banks. Therefore, big MFIs tend to be much more diversified than smaller credit institutions. In addition, they tend to report a lower percentage of bad loans (% of total loans) and, as in most countries, they finance themselves with a smaller amount of deposits. Large banks rely indeed more heavily on inter-bank lending or bonds. With the sole exception of the share of traditional banking activities, these differences are nevertheless not statistically significant. In contrast to some countries such as Italy (Gambacorta, 2004) or the U.S. (Kashyap and Stein, 2000), we do not observe that small banks are more liquid than on average.

Chart 1 presents the evolution over the period 2003.1-2006.09 of the maximum and minimum product-specific interest rates charged or paid by individual banks, the inter-quartile range and the average product-specific interest rates across all banks. Due to the large number of instruments considered in this study, our comments focus on the most important banking products (in terms of outstanding amounts) for Belgian households and non-financial corporations. One important picture emerges from this chart: the Belgian banking sector seems to be characterized by important heterogeneities. Two main dimensions might be distinguished: (i) banks and (ii) products. First, as in other countries, we observe an important degree of dispersion in the level of interest rates across banks. The degree of heterogeneity seems to be higher for loans (with the exception of mortgage loans) than for deposits. For example, the difference between the maximum and minimum interest rates across banks for consumer loans (> 1 year and < 5 years) and for corporate loans (up to 1 million EUR, <1 year) is 8.94% and 7.64% respectively, while the inter-quartile range amounts to 1.28% and 1.03% respectively. This is consistent with a large heterogeneity in the debtor’s profile in these categories.

Table 4 provides some insights in the reasons for these differences by distinguishing banks according to their structural characteristics. Large banks apply on average lower interest rates on deposits and loans, the latter being in line with the results found by Bruggeman and Wouters (2001). In general, these differences tend to

be statistically significant. This phenomenon might reflect some kind of cross-subsidization between deposits and loans. An additional or alternative explanation relates to the fact that large banks have access to alternative financing means at a lower costs, and that they have of lower credit risk. This also applies to the customers of large banks, which, in general, tend to be larger, and therefore, might enjoy a better risk profile. Surprisingly, banks engaged in long-term relationships with their clients seem to charge on average much higher interest rates on loans and to pay lower interest rates on deposits to households. These conclusions are in line with the results obtained by Degryse and Van Cayseele (2000) for the Belgian market. Finally, more profitable banks - measured by the ratio of income over costs - tend to charge higher interest rates on loans and offer a lower remuneration on deposits.

Important differences also emerge in the interest rates across products. As in other European countries, interest rates on time deposits tend to be, on average, much higher than those on overnight and savings deposits (ECB, 2006). This could be put in relation with money demand elasticity respective to the motive under consideration: overnight deposits are essentially hold for transaction purposes, savings deposits illustrate rather the precautionary motive, while time deposits are mostly hold for investment purposes. Interest rates on consumer loans are also significantly higher than those on mortgage loans. Differences in collateral practices mostly explain these dissimilarities, although some loans for consumption purposes are also secured. These differences are also consistent with the existence of fixed costs in the credit activity or can also reflect some strategic considerations. Belgian banks might use mortgage loans as appeal-product in order to attract customers and provide them with other bank products (insurance, long-term savings). Considering corporate loans, Belgian banks charge in general higher interest rates on loans up to 1 million EUR than on loans over 1 million EUR of comparable maturity. Again, this is consistent with the existence of fixed costs in the credit activity. This probably also reflects the banks' assessment over the quality of the borrowers, since amounts over 1 million EUR are mostly granted to very large firms, which are in general more mature and less risky. These firms have generally access to alternative financing means (e.g. financial markets). Furthermore, such loans are mostly secured, implying lower credit risks. On top of that, there seems to exist a positive relationship between the level of interest

rates and the period of initial rate fixation, both for loans and deposits, reflecting most likely the upward sloping yield curve.

These stylized facts confirm the importance of heterogeneity across banks and products and thus, the importance of accounting for these dissimilarities when assessing the scope and the speed of the pass-through of monetary policy impulses.

5 Estimation results

In the first sub-section, we present the results of the long- and short-term pass-through for the different instrument categories considered. In sub-section 2, we analyze the different determinants of the pass-through; that is, we estimate whether there are cross-sectional differences in the way banks adjust their interest rates by using bank-specific and market structure variables. These results should nevertheless be interpreted with caution, insofar as our observation period is relative short. In addition, we only cover (incompletely) one cycle of interest rate changes (increases), which may be problematic in case of asymmetric reactions by banks to upward/downward movements of market rates. Finally, the short sample does not allow us to test for potential non-linearities in the adjustment speed.

5.1 The pass-trough

Table 5 presents the estimation results of the model consisting of equations (1') and (2) discussed in section 4.1 for the deposits (top panel) and the loans (bottom panel). The first and second columns report respectively the estimated coefficients of the long-term pass-through (α_1) and the p-value associated to the Wald test ($\alpha_1=1$), while the third and fourth columns refer to the estimated coefficients of the transmission parameter (δ) assuming a common speed of adjustment across banks and the p-value associated to the Wald test ($\delta=1$).

The reference value for the coefficient α_1 is 1; this corresponds to the situation in which banks entirely transmit the change in market rates to loan or deposit rates. With the exception of time deposits with an agreed maturity up to one year from households and of bank overdrafts for non-financial corporations, we reject the completeness hypothesis for all instrument categories, suggesting that retail interest rates exhibit an incomplete pass-through. Relatively similar results are obtained by

De Graeve *et al.* (2007), who reject the completeness hypothesis for 9 out of 13 products. However, our point estimates of the long-term pass-through coefficients obtained seem to be somewhat lower than the results found in most empirical works, and in particular, for the Belgian interest rate channel (De Graeve *et al.*, 2007). As mentioned previously, our results might be affected by the short sample period for MIR data, and should therefore be considered cautiously.

Looking at the different products, we find some heterogeneity across bank products on both the liabilities and assets' side, in line with previous studies. Overnight deposits exhibit the lowest long-term pass-through (0.37 for households and 0.46 for non-financial corporations), while the transmission of market interest rates for deposits seems to be nearly complete (0.92 for households' time deposits up to one year), which is in line with most empirical studies. These differences (measured across products for households or firms) are moreover statistically significant[22]. On the asset side, the long run pass-through seems to be broadly similar for mortgage loans and credit to enterprises of comparable maturity (U shape), although it is more complete for long-term loans to firms. For the latter, differences (measured between households and firms) are moreover statistically significant. Indeed, the long run adjustment tends to be more complete for short-term (0.83 for loans for house purchases and 0.78 for loans to non-financial corporations) and long-term instruments (0.60 for loans for house purchases and 0.80 for loans to non-financial corporations), while for intermediate maturity products, the pass-through is much lower (0.36 for loans for house purchases and 0.45 for loans to non-financial corporations).

Concerning consumer loans, results are quite difficult to interpret as the long-term pass-through ranges from -0.93 to 1.75, depending on the initial rate fixation period. One potential explanation is that, in contrast to the NRIR database, interest rates on loans for consumption purposes are rather heterogeneous, i.e. they do not differentiate for the debtor quality. Consumption loans include indeed several products characterized by different levels of risks. In 2006, the default rate on installment loans (mainly car loans) granted by Belgian MFIs was 12%, while this rate reached 18% for hire purchases and 6% for credit lines. In addition, they also comprise both collateralized and un-collateralized loans. These factors are particularly

[22] There is no overlapping between the confidence intervals of these product categories.

important determinants of these interest rates. Therefore, the MIR statistics on consumer loans reported each month by the banks are extremely heterogeneous, which may explain the results obtained in this study. In addition, according to major Belgian banks, the pricing of consumer loans differs somewhat from the other credit categories, since they generally charge a "base rate" - which tends to remain relatively fixed over time - plus a margin, which strongly depends on the debtor quality and/or the value of the collateral.

Turning to the short-term transmission parameter, we find somewhat less short-term interest rate stickiness than in the previous studies. On average, the transmission parameter for deposits amounts to 0.73, which implies that about 3/4 of the final adjustment, is realized after one month. For loans, the average transmission parameter is even larger (0.81). A possible explanation for the relatively high transmission parameters might be related to the properties of the MIR statistics. First, MIR statistics refer to interest rates actually agreed and not to advertised rates, as in other empirical studies (De Bondt, 2002, Weth, 2002, De Graeve *et al.*, 2007). We might indeed expect that banks change more frequently the effective interest rates on new agreements than the advertised rate, given the menu costs associated to the latter. An alternative explanation relates to the economic conditions, which were in place throughout the period covered by this study. After having left its interest rates unchanged for two years, the ECB has started in December 2005 to withdraw progressively the accommodative stance of its monetary policy by increasing its official interest rates from 2% in November 2005 to 3% in September 2006. During that period, the tightening of the ECB monetary policy has been relatively well anticipated by the markets; the predictability of ECB monetary policy and therefore, the low level of uncertainty regarding the direction of interest rate changes during the period under consideration might explain as well why MFIs have reacted relatively rapidly to changes in market conditions. Overall, these developments might explain the higher short-term adjustment found in the present study. Some Belgian banks have moreover confirmed that they adjust relatively frequently their conditions on new contracts to market interest rates (every day or every weeks), corroborating therefore the results obtained.

Yet, some differences exist across instrument categories, sectors and maturities. First, savings deposits present a considerable amount of interest rate sluggishness

(0.10). Although savings deposits represent an important share of households' financial assets given the fiscal advantage of this product in Belgium, the demand tends to be rather inelastic. A recent study[23] has indeed shown that while 72% of consumers are not satisfied with the conditions offered by the banks on their savings accounts, only 14% are looking for a better remuneration in other banks. Second, as most studies (see for instance De Graeve *et al.*, 2007 or Sørensen and Werner, 2006), the adjustment seems to be more rapid for loans to non-financial corporations. Indeed, the short-term adjustment parameter for loans instrument categories amounts on average to 0.95 for non-financial corporations, against 0.75 for households. In general, these differences are statistically significant. This might reflect the higher bargaining power of non-financial corporations.

To summarize, all these results seem to indicate that the adjustment of commercial interest rates to changes in market rates is relatively fast but incomplete in Belgium. However, results should be interpreted with caution, given the short time period covered by this study.

5.2 Heterogeneity in the pass-through

Besides the estimation of averages across banks of the long-term pass-through (α_1) and the transmission parameter (δ), we investigated whether the pricing behavior of Belgian banks is heterogeneous in the short-term, as a bulk of empirical studies have highlighted. On top of that, we follow Van Leuvensteijn *et al*. (2006) by studying the impact of the degree of market concentration on the long-term adjustment. To increase the number of observations and the efficiency of the estimation, we estimate jointly equations (1') and (2), with respectively equation (3) or equation (4), using on the one hand, pooled data for all deposits from households and non-financial corporations and on the other hand, pooled data for all loans to households and non-financial corporations.

The results are presented in Table 6. Panel A reports the results for the short-term adjustment speed. Several results emerge, which tend to be rather similar for both deposits and loans: market share, liquidity and long-term relationship are the only variables that exert a statistically significant (negative) impact on the speed at

[23] http://www.rabobank.be/fr/pers/tijd070106.asp

which banks adjust the retail interest rates following a change in market rates. This evidence is in line with other empirical studies (for instance, Neumark and Sharpe, 1992, for the United States; Weth, 2002 for Germany; Gambacorta, 2004, for Italy, Sørensen and Werner, 2006 for the euro area, De Graeve *et al*., 2007). Although these variables have a significant impact on the speed of adjustment, they differ in terms of the economic importance of this impact.

The strongest impact is observed for market share. Its impact on the speed of adjustment, measured by the difference between the speed of adjustment of the 95th and 5th percentile banks[24], is -0.08 for deposits and -0.13 for loans. These results tend to confirm the so-called market power hypothesis of Berger (1995) according to which the market power of banks affects negatively the speed at which they adjust their interest rates following a change in market rates.

As predicted by the bank lending channel, more liquid banks tend to react less rapidly to changes in market rates, as they are able to compensate monetary shocks more easily. These results are in line with the previous findings for the Belgian banking market (De Graeve *et al.*, 2007). Another result is that Belgian banks engaged in a long-term relationship with their clients tend to smooth interest rate changes on loans. However, these two variables have a milder impact than market share. Considering liquidity, the difference between the 75th and 25th percentile banks on the adjustment speed is -0.03 for deposits and -0.06 for loans. A difference of -0.04 on loans is observed for long-term relationship.

Finally, Panel B present the results regarding the impact of market share on the long-term pass-through. We also find, similarly to Van Leuvensteijn *et al*. (2006), an important effect of market share on the long-term pass-through. Banks with a larger market share adjust less completely their conditions on both deposits and loans. The impact is moreover more important than on the short-term adjustment parameter, insofar as the impact -measured by the difference between the 95th and 5th percentile banks - amounts to -0.35 for loans and -0.21 on deposits.

[24] For this bank-driven variable, we take the difference between the 95th and 5th percentile, given that it is strongly skewed to the right (see Table 3). For the other variables, we focus on the inter-quartile range.

These results should nevertheless be interpreted with the same caution as the results presented in section 5.1., as the caveats mentioned earlier could also affect the estimated impact of the different variables.

6 Conclusions

In this paper, we investigate the short- and long-term pass-through of market rates to micro retail interest rates for a large spectrum of retail banking activities in Belgium, using the MIR database. From a monetary policy point of view, it is crucial to understand the scope and the speed at which monetary impulses transmit to interest rates on loans and deposits, insofar as they affect the consumption, savings and investment decisions of economic agents. Regarding this issue, the MIR data set appears to be a very appropriate tool as it refers to the interest rates that are effectively charged to or received by the private sector. However, the still short observation period of the MIR data set may be considered as a drawback that needs to be taken into account when interpreting the econometric results.

Our results show that Belgian banks adjust relatively rapidly their interest rates to changes in the market rates, but that their reaction is only partial. In addition, we find significant heterogeneity across sectors, products and banks.

First, Belgium banks tend to price less competitively consumer-oriented loans both in the short and the long runs. However, there seems to be no statistically significant differences in the long-term pass-through for short-term loans to households and to non-financial corporations. Second, on the banks' liability side, interest rates offered on overnight deposits tend to react less completely than those on time and redeemable deposits do. Third, in terms of the speed of adjustment, savings deposits exhibit a much higher degree of interest rate stickiness than other kinds of deposits.

Finally, the pricing behavior of Belgian banks presents a significant degree of heterogeneity in the short-run, which mainly results from differences in market power and the bank lending channel. In line with the market-power hypothesis of Berger (1995), banks with a larger market share tend to react less rapidly and less completely to changes in market conditions. In addition, less liquid banks adjust faster their

interest rates on loans and deposits. Next, banks engaged in long-term relationships seem to smooth retail interest rates in the short-run.

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Appendix 1

Table 1: Reference market rates

MFI interest rate	Reference market rate
Deposits:	
Overnight	EONIA
Redeemable, up to 3 months notice	5 y bond yield (OLO)
Agreed maturity up to 1 year	12 months Belgian Treasury Certificate yield
Agreed maturity over 1 years and up to 2 years	2 y bond yield (OLO)
Agreed maturity over 2 years	5 y bond yield (OLO)
Loans:	
Bank overdraft	3 months Euribor
for consumption, floating rate and up to one year initial rate fixation	12 months Belgian Treasury Certificate yield
for consumption, with over one year and up to 5 years initial rate fixation	5 y bond yield (OLO)
for consumption, with over 5 years initial rate fixation	7 y bond yield (OLO)
for house purchases, with a floating rate and up to one year initial rate fixation	12 months Belgian Treasury Certificate yield
for house purchases, with over one year and up to 5 years initial rate fixation	5 y bond yield (OLO)
for house purchases, with over 5 years and up to 10 years initial rate fixation	10 y bond yield (OLO)
for house purchases, with over 10 years initial rate fixation	20 y bond yield (OLO)
to enterprises, with floating rate and up to one year initial rate fixation	12 months Belgian Treasury Certificate yield
to enterprises, with over one year and up to 5 years initial rate fixation	5 y bond yield (OLO)
to enterprises, with over 5 years initial rate fixation	7 y bond yield (OLO)

Table 2: Description of the explanatory variables

	VARIABLES	MEASUREMENT	EXPECTED IMPACT ON PASS-THROUGH
MACROECONOMIC VARIABLES	INFLATION	Belgian HICP (y-o-y monthly percentage changes)	
	ACTIVITY	NBB industrial confidence indicator	
BANK-SPECIFIC CHARACTERISTICS AND MARKET STRUCTURE VARIABLES	SIZE	total asset of each bank over the total asset of the banking system	+/-
	LIQUIDITY	cash and securities over total assets	-
	LONG-TERM RELATIONSHIP	long-term loans over total loans	-
	FINANCING	deposits over total liabilities	-
	RISK	bad loans over total loans	+/-
	MARKET SHARE	outstanding amount of banks' loans (deposits) over the total amount of the Belgian banking system in each specific market	-
	DIVERSIFICATION	interest income over total income	-
	PROFITABILITY	Income over total cost	+

Table 3: Distribution of the balance sheet indicators

	Size	Liquid.	Long-term rel.	Fin.	Risk	Market share (loans)	Market share (deposits)	Divers.	Profit.
Minimum	0.01	0.01	0.00	0.00	0.00	0.00	0.00	16.61	0.87
Maximum	38.89	1.00	1.00	95.83	8.00	28.67	33.64	97.22	1.59
Standard deviation	7.53	0.30	0.35	27.63	1.31	6.65	6.82	25.51	0.16
Percentile									
5%	0.02	0.02	0.02	0.00	0.00	0.00	0.00	18.91	0.93
25%	0.06	0.36	0.31	32.33	0.00	0.04	0.07	57.47	1.03
50%	0.29	0.48	0.72	53.85	0.12	0.25	0.35	75.49	1.06
75%	0.67	0.75	0.93	70.43	0.33	0.85	0.91	87.60	1.12
95%	16.58	0.95	1.00	88.98	0.88	18.23	16.68	96.29	1.45

Table 4: Descriptive statistics for major instrument categories

(MFI interest rates, 2003.01-2006.09)

Deposits															
	Overnight deposits (households)					Overnight deposits (non-fin corps)					Redeemable deposits up to 3 months notice				
	n	Mean	Stdev	Min	Max	n	Mean	Stdev	Min	Max	n	Mean	Stdev	Min	Max
Total	27	0.87	0.71	0.00	2.84	27	1.11	0.60	0.00	2.53	23	1.74	0.37	1.25	2.90
Large banks	4	0.75	0.18	0.51	0.92	4	0.94	0.26	0.67	1.30	4	1.52	0.04	1.49	1.57
Small banks	23	0.89	0.77	0.00	2.84	23	1.14	0.65	0.00	2.53	19	1.78	0.40	1.25	2.90
Riskier bank	14	1.15	0.80	0.00	2.84	14	1.32	0.65	0.00	2.53	12	1.80	0.42	1.25	2.90
Less risky bans	13	0.52	0.37	0.00	1.03	13	0.88	0.47	0.00	2.01	11	1.66	0.32	1.31	2.52
LT relationships	10	0.76	0.65	0.00	1.88	10	1.25	0.67	0.59	2.53	11	1.66	0.22	1.25	2.01
Few LT relationships	17	0.94	0.76	0.00	2.84	17	1.03	0.57	0.00	1.97	12	1.81	0.47	1.31	2.90
Profitable	13	0.77	0.65	0.00	1.95	12	1.01	0.58	0.00	1.97	10	1.81	0.35	1.31	2.52
Less profitable	14	0.97	0.78	0.02	2.84	15	1.19	0.63	0.00	2.53	13	1.68	0.40	1.25	2.90

Loans															
	Consumer loans with over one year and up to 5 years initial rate fixation					Loans for house purchases with over 5 years and up to 10 years initial rate fixation					Loans to non-fin. corps up to 1 million with floating rate and up to one year initial rate fixation				
	n	Mean	Stdev	Min	Max	n	Mean	Stdev	Min	Max	n	Mean	Stdev	Min	Max
Total	19	7.21	2.42	3.00	13.28	17	4.89	1.89	3.57	12.00	25	4.45	1.57	2.61	10.32
Large banks	4	6.38	0.48	5.77	6.77	4	4.27	0.20	3.99	4.47	4	3.84	0.18	3.58	3.96
Small banks	15	7.43	2.69	3.00	13.28	13	5.08	2.15	3.57	12.00	21	4.57	1.69	2.61	10.32
Riskier bank	9	7.22	2.57	4.57	13.28	10	5.14	2.47	3.57	12.00	13	4.89	1.95	3.01	10.32
Less risky bans	10	7.21	2.42	3.00	12.12	7	4.52	0.36	3.99	5.03	12	3.98	0.85	2.61	5.56
LT relationships	12	7.62	2.99	3.00	13.28	11	5.22	2.31	3.57	12.00	11	5.30	1.95	3.38	10.32
Few LT relationships	7	6.51	0.56	5.77	7.43	6	4.27	0.33	3.82	4.75	14	3.79	0.71	2.61	5.11
Profitable	8	7.74	3.56	3.00	13.28	5	6.14	3.32	4.31	12.00	10	5.40	2.21	2.61	10.32
Less profitable	11	6.83	1.15	5.64	8.99	12	4.36	0.43	3.57	5.03	15	4.28	0.99	2.97	6.20

Note : n = number of banks

Table 5: Estimates of the long-term pass-through and the short-term adjustment

Deposits				
	Long-term pass-through (α_1)	*Wald Test (p-values)*[1]	**Short-term adjustment (δ)**[2]	*Wald Test (p-values)*[1]
Households				
Overnight deposits	0.37	*0.00*	0.81	*0.00*
Deposits (Time)				
with an agreed maturity up to one year	0.92	*0.06*	0.64	*0.00*
with an agreed maturity over 1 year and up to two years	0.83	*0.00*	0.98	*0.19*
with an agreed maturity over two years	0.74	*0.00*	0.90	*0.00*
Redeemable deposits (savings)				
with an agreed maturity up to 3 months	0.70	*0.00*	0.10	*0.00*
Non-financial corporations				
Overnight deposits	0.46	*0.00*	0.76	*0.00*
Deposits				
with an agreed maturity up to one year	0.79	*0.00*	0.63	*0.00*
with an agreed maturity over 1 year and up to two years	N.A	*N.A*	*N.A*	*N.A*
with an agreed maturity over two years	0.62	*0.00*	0.97	*0.10*
Loans				
	Long-term pass-through (α_1)	*Wald Test (p-values)*[1]	**Short-term adjustment (δ)**[2]	*Wald Test (p-values)*[1]
Households				
Bank overdraft	0.40	*0.00*	0.82	*0.00*
For consumption				
floating rate and up to one year initial rate fixation	-0.93	*0.00*	0.50	*0.00*
over one year and up to five years initial rate fixation	1.75	*0.00*	0.65	*0.00*
over five years initial rate fixation	0.63	*0.00*	0.90	*0.01*
For house purchase				
floating rate and up to one year initial rate fixation	0.83	*0.00*	0.58	*0.00*
over one year and up to five years initial rate fixation	0.36	*0.00*	0.97	*0.03*
over 5 years and up to ten years initial rate fixation	0.57	*0.00*	0.76	*0.00*
over ten years initial rate fixation	0.60	*0.00*	0.79	*0.00*
Non-financial corporations				
Bank overdraft	0.78	*0.29*	0.92	*0.00*
Loans[3]				
floating rate and up to one year initial rate fixation	0.78	*0.00*	0.97	*0.00*
over one year and up to five years initial rate fixation	0.45	*0.00*	0.93	*0.00*
over five years initial rate fixation	0.80	*0.00*	0.95	*0.00*

[1] The Wald test consists of testing whether the long-term or the short-term pass-through coefficient is equal to 1. Therefore, if the p-value is below 0.05, we reject the null hypothesis.

[2] The coefficient corresponds to the proportion of the long-term pass-through which is realized after 1 month.

3 Corporate loans ≤ 1.000..000 EUR and > 1.000.000 EUR have been pooled by period of initial rate fixation.

Table 6: Impact of the explanatory variables
(Estimated coefficient and its p-value)

A. Heterogeneity in the short-term pass-through

	Deposits			Loans		
	Coef.	***p-values***	***75th-25th*** [1]	**Coef.**	***p-values***	***75th-25th*** [1]
Market share	-0.0056	0.00	-0.08[2]	-0.0092	0.00	-0.13[2]
(Market share)^2	0.0001	0.01		0.0002	0.00	
Risk	0.0012	0.83	0.00	0.0097	0.08	0.01
Risk^2	0.0000	0.83		-0.0003	0.22	
Liquidity	-0.0615	0.02	-0.03	-0.1227	0.00	-0.06
Profitability	0.0088	0.90	0.00	-0.0007	0.99	0.00
Financing	0.0008	0.02	0.03	0.0000	0.92	0.00
Diversification	-0.0001	0.84	0.00	0.0001	0.87	0.00
LT relationship				-0.0592	0.07	-0.04

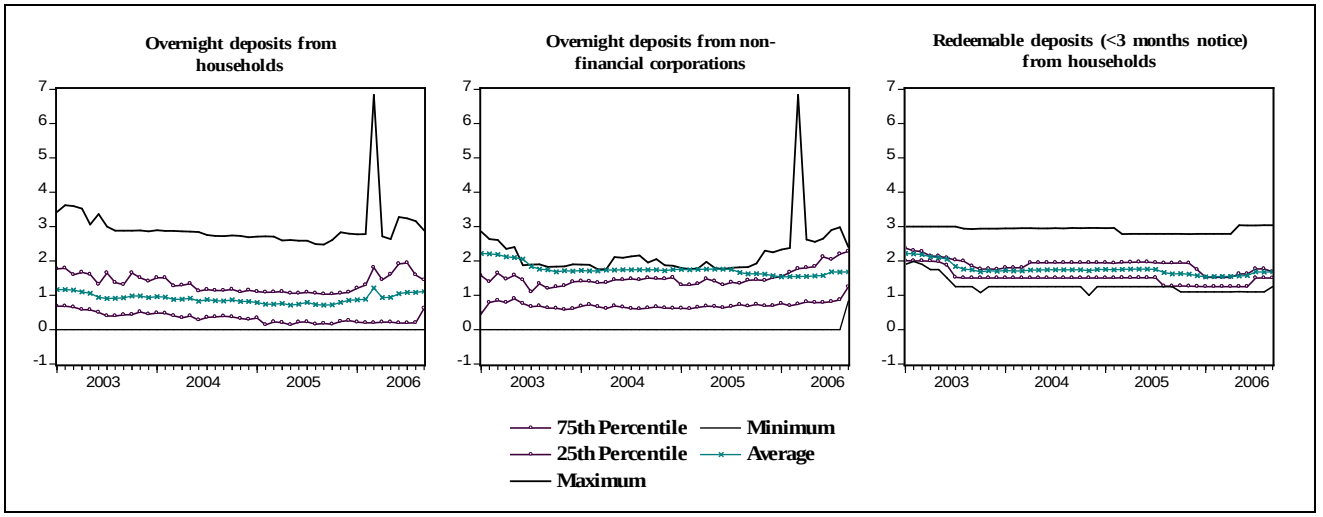
B. Heterogeneity in the long-term pass-through

	DEPOSITS			LOANS		
	Coef.	***p-values***	***75th-25th*** [1]	**Coef.**	***p-values***	***75th-25th*** [1]
Market share	-0.0151	0.00	-0.21[2]	-0.0233	0.00	-0.35[2]
(Market Share)^2	0.0002	0.00		0.0003	0.00	

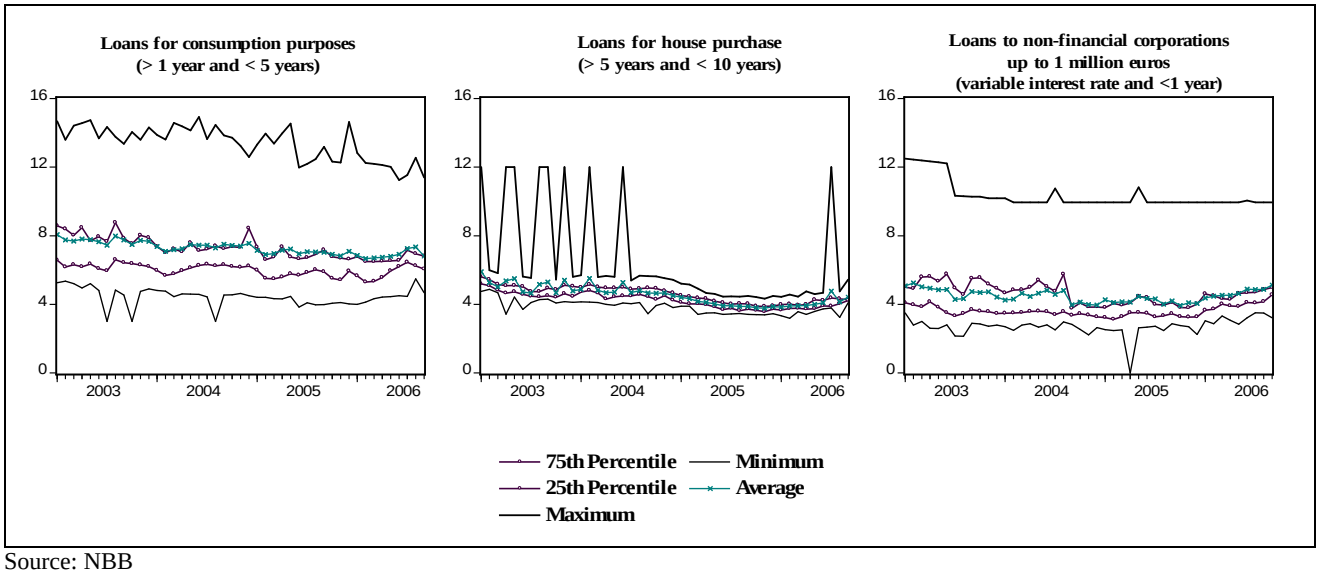
1. Difference between the speed of adjustment of the 75th and 25th percentile banks, neglecting the impact of the other characteristics.
2. Difference between the speed of adjustment of the 95th and 5th percentile banks, neglecting the impact of the other characteristics.

Chart 1: Summary statistics for major instruments categories

A. DEPOSITS



B. LOANS



Source: NBB