THE PASS-THROUGH OF MARKET INTEREST RATES TO BANK INTEREST RATES

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Abstract

The pass-through of market interest rates to the financial conditions of households and firms is an essential element in the monetary policy transmission mechanism. In this paper, we analyse how this transmission is playing out in the current hiking cycle in the euro area and in Spain, as compared to previous cycles. We find that the pass-through to the interest rates on retail time deposits is slower than in previous hiking cycles in both jurisdictions. Moreover, a slower pass-through is also observed for mortgages in Spain. We then show there is significant heterogeneity in this pass-through across euro area countries, especially for mortgages and retail time deposits. This heterogeneity is driven by both bank and country characteristics. More specifically, in the case of deposits, we find that almost half of the difference between the remuneration of retail time deposits in Spain and the euro area is driven by differences across banking sectors in the need to raise funds through deposits to supply credit.

Resumen

La traslación de los tipos de interés de mercado al coste de las nuevas operaciones bancarias de los hogares y de las empresas representa un elemento esencial en el mecanismo de transmisión de la política monetaria. En este documento analizamos cómo se está desarrollando esta transmisión en el actual ciclo de subidas de tipos de interés en la zona del euro y en España en comparación con episodios anteriores. Encontramos que la traslación a los tipos de interés de los depósitos a plazo minoristas está siendo más lenta que en el pasado en ambas jurisdicciones. Además, observamos una transmisión también más lenta para el caso de las hipotecas en España. A continuación, ilustramos que esta traslación está siendo heterogénea entre los países de la zona del euro, especialmente para las hipotecas y los depósitos a plazo de los hogares. Esta heterogeneidad está impulsada por las características idiosincrásicas de los bancos y del sector bancario de los países. Más concretamente, para el caso de los depósitos a plazo de los hogares, encontramos que casi la mitad de la diferencia entre su remuneración en España y en la zona del euro vendría determinada por las distintas necesidades del sector bancario de captar fondos a través de depósitos para ofrecer crédito.

Palabras clave: política monetaria, transmisión de tipos de interés, canal bancario, préstamos, depósitos, heterogeneidad.

Códigos JEL: E43, E47, E50, E51, E52, E58, E59, E65, G17, G21.

Contents

1 Introduction

At end-2021 the European Central Bank (ECB) started to unwind the accommodative stance of its monetary policy in order to mitigate the inflationary pressures stemming mainly from the increase in energy and other input costs. The monetary policy decisions taken since then have affected financing conditions in the euro area economies.

The pass-through of policy rates and of the expectations about their future path to economic agents' financial conditions is a key element of the monetary policy transmission mechanism.[1] In particular, bank-based transmission is especially relevant, given the important role played by credit institutions in financial intermediation, both in the euro area and in Spain. In a first stage, a rise in policy rates[2] is directly passed through to very short-term money market interest rates, whereas expectations of future rate increases, together with risk premia, drive medium and long-term interest rates. In a second stage, the tightening of bank funding conditions in money markets has an impact on financial conditions for households and firms through two channels. First, it affects the cost of lending to the extent that banks pass on their higher funding costs. Second, it exerts upward pressure on the remuneration of retail deposits, which further raises the cost of banks' liabilities.

In any event, the pass-through to financial conditions for households and firms can be expected to take place gradually and with some delay (of between six months and one year).[3] Furthermore, there are several factors that could lead to differences in the speed of transmission of the current ECB policy rate hiking cycle compared with previous episodes. First, the policy rate increases observed in recent months are unprecedented in terms of their intensity and speed and have been accompanied by other unconventional policy measures related to targeted longer-term refinancing operations[4] (TLTROs) and to the phasing-out of financial asset purchases.[5] Second, the macro-financial conditions surrounding the current monetary policy tightening process are different from those in past episodes, owing especially to the low interest rate environment at end-2021 following the long period of monetary expansion that began in 2014.

In this context, this paper analyses the pass-through of market interest rate increases to bank interest rates in the most recent period from two perspectives. First, the current pass-through is compared with that seen in past cycles in the euro area and Spain for both lending to households and firms and time deposits of households and firms. Second, differences across euro area countries in the speed and intensity of the

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1 For further details on the monetary policy transmission mechanism, see https://www.bde.es/wbe/en/areas-actuacion/politica-monetaria/preguntas-frecuentes/politica-monetaria-y-estabilidad-precios/como-actua-politica-monetaria.html.

2 ECB policy rates are the interest rates on the deposit facility, the marginal lending facility and the main refinancing operations.

3 See, for example, Lane (2022).

4 In October 2022, the ECB Governing Council decided to recalibrate the terms and conditions of the third series of TLTROs with a view to increasing the expected average cost of TLTRO funds.

5 For further details, see the monetary policy decisions published by the ECB.

current interest rate pass-through are documented and the potential drivers of this heterogeneity are analysed in the lending and deposit segments where these differences are most significant.[6]

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2 Analysis of the interest rate pass-through in the euro area and Spain from a historical perspective

The change in expectations about the future path of policy interest rates since end-2021 has given rise to an upward shift in the euro area risk-free interest rate curve.[7] Up to April 2023 (the latest available data for bank interest rates), the 1-year benchmark rate had risen by 404 basis points (bp) and the 10-year benchmark rate by 282 bp. In line with these developments, interbank market interest rates also increased, with 3-month, 1-year and 10-year rates rising by 375 percentage points (pp), 424 pp and 283 pp, respectively. These interest rates are used as a benchmark to establish the financing conditions applied by credit institutions. In particular, the 3-month EURIBOR is the benchmark rate used to determine the cost of short-term and variable-rate lending to firms, whereas the 1-year EURIBOR is the main benchmark rate for variable-rate mortgage loans in Spain, and the 10-year interbank rate[8] is the benchmark rate for fixed-rate loans to households and firms.

In this context, since January 2022 euro area credit institutions have been gradually passing through these interbank rate hikes to new lending and deposit rates for retail customers. It should be highlighted that the rise started from historically low levels, as a result of the long period of expansionary monetary policy that began in 2014 and preceded the current tightening cycle. Accordingly, in the euro area as a whole, the average cost of new lending to households for house purchase and to non-financial corporations (NFCs) increased by around 2 pp and 3 pp, respectively, from January 2022 to April 2023. Similar increases were seen in Spain (see Chart 1.1). Meanwhile, the average remuneration of new time deposits of households and firms in the euro area as a whole also rose by roughly 2 pp and 3 pp, respectively, compared with approximately 1 pp and 3 pp, respectively, in Spain (see Chart 1.2). As a result, by April 2023 interest rates on new bank transactions had exceeded the levels recorded in the run-up to the monetary expansion in 2014, except in the case of households' time deposits in Spain, which remained slightly below.

In any event, in order to assess the speed and intensity of the bank-based transmission of interest rate hikes to the economy, recent developments should be compared with those seen in the episode that began in 2005 (the last period of significant and long-lasting monetary policy tightening in the euro area). In particular, the comparative analysis consists of estimating how interest rates on new bank loans and deposits would have changed in the current episode based on the relationship between these rates and the market rates prevailing in the previous cycle and given the changes in market rates since January 2022.

To this end, the relationship between interest rates on new transactions and market rates is estimated for each lending and deposit segment analysed, for the euro area as
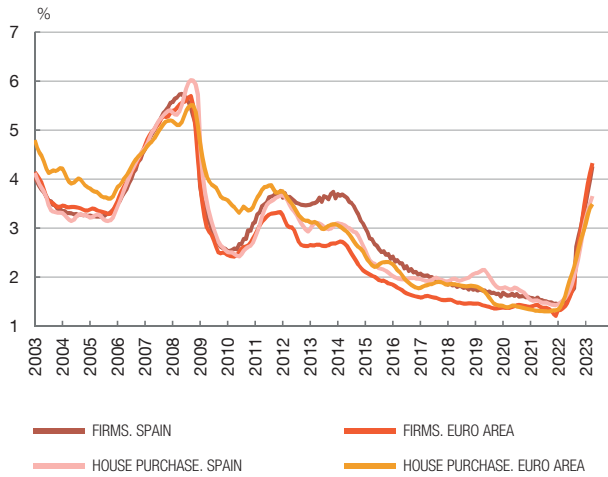
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7 The overnight risk-free interest rate is proxied by the euro short-term rate (€STR). For longer terms, the risk-free interest rate is proxied by the overnight index swap (OIS) rate. The increase in the latter is the result of the sharp rise in term premia, in addition to the change in expectations.

8 Since there is no 10-year EURIBOR benchmark rate, this variable is proxied by the fixed component of a 10-year interest rate swap where the variable component is the 6-month EURIBOR.
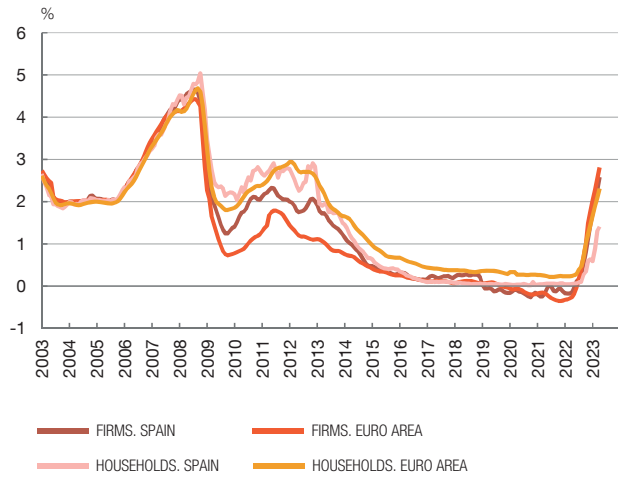
Chart 1

BANKS HAVE GRADUALLY PASSED ON MARKET INTEREST RATE HIKES TO INTEREST RATES ON NEW LOANS AND DEPOSITS, WHICH ARE ALREADY HIGHER IN MOST SEGMENTS THAN AT THE START OF THE EXPANSIONARY MONETARY CYCLE IN 2014

1 INTEREST RATE ON NEW LENDING (a)

2 INTEREST RATE ON NEW TIME DEPOSITS (a)

FIRMS. SPAIN
FIRMS. EURO AREA
HOUSE PURCHASE. SPAIN
HOUSE PURCHASE. EURO AREA

FIRMS. SPAIN
FIRMS. EURO AREA
HOUSEHOLDS. SPAIN
HOUSEHOLDS. EURO AREA

SOURCES: Banco de España, ECB and Refinitiv Datastream.

a Interest rates are narrowly defined effective rates (NDER), which exclude related charges, such as repayment insurance premia and fees, and are adjusted seasonally and for the irregular component.

a whole and for Spain. More specifically, an error-correction model is estimated for each segment and geographical area[9] using monthly data from January 2003 (the first available data for the time series of the interest rates applied by monetary financial institutions to euro area residents)[10] to August 2007.[11] The estimated coefficients are then used to project the changes in the bank interest rates for each segment since January 2022, based on the observed changes in the relevant market rate.[12] Thus, the observed changes in bank interest rates on loans and deposits can be compared with the estimated counterfactual changes that would have occurred if the pass-through had taken place at the same speed and with the same intensity as in 2003-2007.

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9 For each specification, the bank interest rate is included as the dependent variable and the market interest rate at the term that allows for a better in-sample fit as the explanatory variable. In short-term bank interest rate regressions, this rate is usually the 3-month or 12-month EURIBOR, whereas in long-term rate regressions it is normally the fixed component of a 2-year or 3-year interest rate swap in which the variable component is the 6-month EURIBOR. The error correction models are estimated in a single step, i.e. the co-integration relationship and the short-term dynamics are estimated simultaneously.

10 This information is collected individually by each euro area Member State in accordance with the rules contained in Banco de España Circular 1/2010, transposing Regulation (EU) No 1072/2013 of the ECB (ECB/2013/34).

11 In the period from January 2003 to August 2007, the co-integration relationship between bank and market interest rates remained stable, with an estimated long-term elasticity very close to one in most segments. From summer 2007, this relationship was influenced by other factors related to the global financial crisis, such as higher credit risk and strong competition in retail deposit-taking in view of the market-based funding difficulties experienced by some euro area credit institutions.

12 Both the co-integration relationship between new business interest rates and market rates and the short-term dynamics are taken into account to obtain the projected interest rates on new loans and deposits.

Chart 2 shows the results of this exercise for new loans in the euro area and in Spain. Based on these results, in the euro area, market interest rates are passing through to the cost of new loans to households for house purchase at a similar pace to past cycles (see Chart 2.1). This result is driven by the pass-through to the cost of loans with a rate fixation period of over one year, which account for the the bulk of loans for house purchase (more than 80% in 2022), since the pass-through to the cost of loans whose interest rate is to be reset in the next 12 months is taking place somewhat slower than in the past. In Spain, the pass-through in the current cycle is slower than in previous episodes in both segments.[13] Consequently, it is also more sluggish for total loans for house purchase (see Chart 2.2).

The pass-through to the cost of new loans to firms is taking place faster than in the past for the euro area as a whole (see Chart 2.3), owing to a swifter pass-through both in short-term loans or loans with interest rate reset within the next 12 months and in loans with longer interest rate fixation periods. However, in Spain, the pass-through is similar to past monetary policy tightening cycles (see Chart 2.4). This result is attributable to the changes observed in short-term loans or loans with interest rate reset within the next 12 months, which form the bulk of loans to firms (around 87% in 2022), whereas the pass-through to loans with a rate fixation period of over one year is slower than in the past.

The results of the exercise for new time deposits in the euro area and Spain are shown in Chart 3.[14] The estimates suggest that in the euro area the pass-through in the household segment has been slower to date than in the past (see Chart 3.1), driven by the pace observed both in deposits with an agreed maturity of up to one year and in those with longer maturities, although the largest difference is observed in the former. In Spain, the pass-through has also been slower in the current cycle than in the past (more markedly so than in the euro area) (see Chart 3.2), particularly for household deposits with an agreed maturity of up to one year. Meanwhile, the speed of the pass-through to firms' time deposits in the euro area is also somewhat lower than in past cycles (see Chart 3.3), driven by developments in deposits with an agreed maturity of up to one year, since the pass-through in deposits with longer maturities is similar to that in past cycles. In Spain, the pass-through is slower in both segments and, consequently, also in aggregate terms, albeit less so than in household deposits (see Chart 3.4). These results are in line with those obtained by Ferrer, Ganics, Molina and Serena (2023) for the average remuneration of the outstanding amount of deposits.[15]

13　The slow pass-through to the cost of new loans whose interest rate is to be reset in the next 12 months was in part the result of the narrowing of variable-rate mortgage spreads. Additionally, in Spain, Law 5/2019 of 15 March regulating real estate credit agreements might have caused a delay in the month in which the EURIBOR is taken as a benchmark (usually, the month preceding the mortgage agreement execution date), since a minimum period of ten calendar days must elapse between receiving the offer and signing the mortgage agreement.

14　The slow pass-through to the cost of new loans whose interest rate is to be reset in the next 12 months was in part the result of the narrowing of variable-rate mortgage spreads. Additionally, in Spain, Law 5/2019 of 15 March regulating real estate credit agreements, might have caused a delay in the month in which the EURIBOR is taken as a benchmark (usually, the month preceding the mortgage agreement execution date), since a minimum period of ten calendar days must elapse between receiving the offer and signing the mortgage agreement.

15　Unlike the analysis in this paper, which focuses on the cost of new loans and deposits, these authors analysed the average remuneration of the outstanding amount of deposits. Specifically, they use a multivariate SVAR model that includes the stock of deposits and their average interest rates, using monthly data covering the period 2003-2019. The analysis finds that in 2022 the pass-through from the EURIBOR to average deposit rates was more limited than would be expected based on the historical pattern captured by model results and that, consequently, the increase in bank deposit costs would have been weaker than expected.

Chart 2

COMPARED WITH THE PREVIOUS CYCLE, THE SPEED OF THE PASS-THROUGH IN THE LOANS FOR HOUSE PURCHASE SEGMENT IS SIMILAR IN THE EURO AREA AND SLOWER IN SPAIN, WHILE IN LENDING TO FIRMS IT IS FASTER IN THE EURO AREA AND SIMILAR IN SPAIN
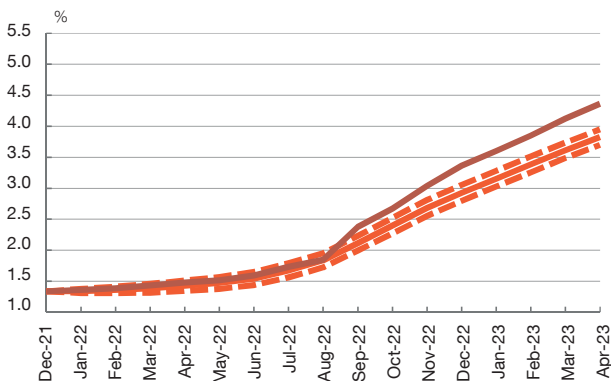
1 INTEREST RATE ON NEW LOANS TO HOUSEHOLDS FOR HOUSE PURCHASE IN THE EURO AREA (a)
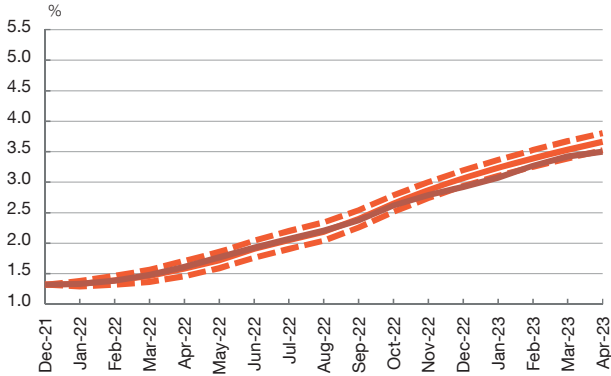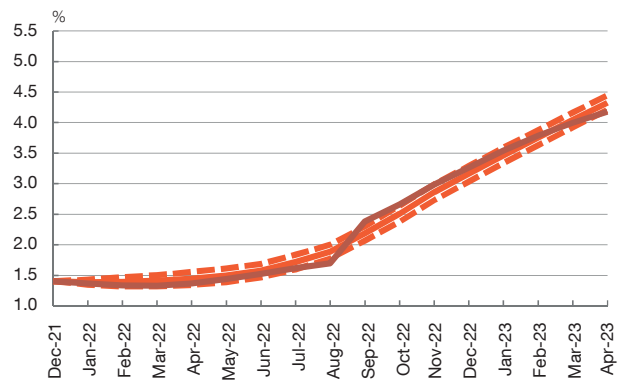
2 INTEREST RATE ON NEW LOANS TO HOUSEHOLDS FOR HOUSE PURCHASE IN SPAIN (a)
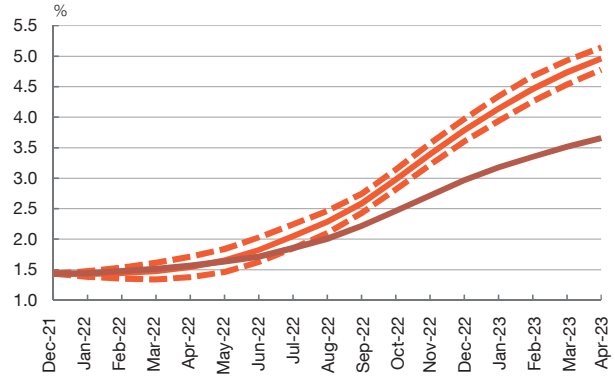
3 INTEREST RATE ON NEW LOANS TO NFCs IN THE EURO AREA (a)

4 INTEREST RATE ON NEW LOANS TO NFCs IN SPAIN (a)

- - - 95% CONFIDENCE INTERVAL   ——— ESTIMATED BASED ON THE PREVIOUS CYCLE (b)   ——— OBSERVED

SOURCES: Banco de España, ECB and Refinitiv Datastream.

a Interest rates are narrowly defined effective rates (NDER), which exclude related charges, such as repayment insurance premia and fees, and are adjusted seasonally and for the irregular component.
b Resulting bank interest rate if the interest rate rise in the current cycle had been passed through at the same speed as in the previous cycle in 2005, as estimated based on standard error-correction models. A model is estimated in each segment for short-term interest rates (up to one year) and long-term interest rates (more than one year), with the chart showing the synthetic interest rate weighted by the volume of new loans.

Two main factors could explain the slower pass-through to the remuneration of time deposits over the current cycle compared with past cycles. First, the lower funding needs of euro area credit institutions to support their lending activity, owing to the ample liquidity built up during the previous expansionary monetary policy period. Second, the fact that the remuneration of deposits was above market interest rates at the beginning of this cycle, reflecting banks' reluctance to take it to negative territory during the expansionary monetary policy phase (particularly in the household segment), which could lead credit institutions to delay any increase in deposit remuneration until the spread over market rates narrows.
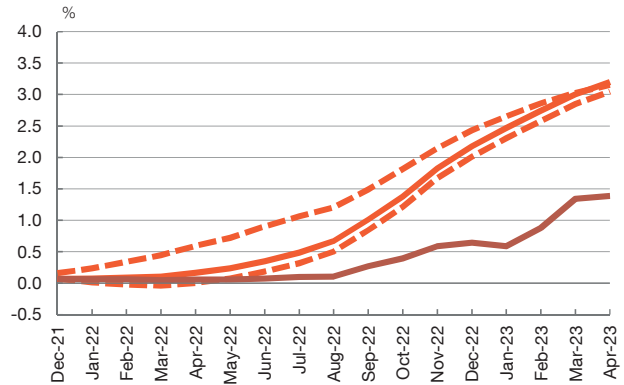
Chart 3

THE PASS-THROUGH TO THE REMUNERATION OF NEW TIME DEPOSITS OF HOUSEHOLDS AND FIRMS IS TAKING PLACE AT A SLOWER PACE BOTH IN THE EURO AREA AND, ESPECIALLY, IN SPAIN. THIS IS PARTICULARLY MARKED IN THE HOUSEHOLD SEGMENT IN SPAIN
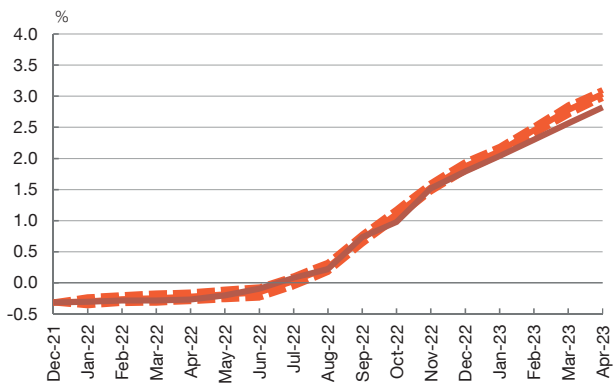
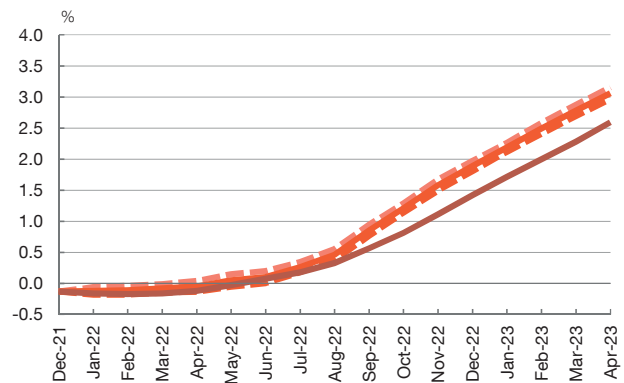1 INTEREST RATE ON HOUSEHOLDS' NEW TIME DEPOSITS IN THE EURO AREA (a)
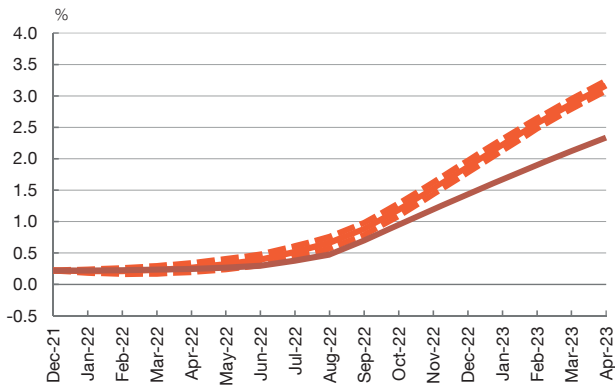
2 INTEREST RATE ON HOUSEHOLDS' NEW TIME DEPOSITS IN SPAIN (a)

3 INTEREST RATE ON FIRMS' NEW TIME DEPOSITS IN THE EURO AREA (a)

4 INTEREST RATES ON FIRMS' NEW TIME DEPOSITS IN SPAIN (a)

— — — 95% CONFIDENCE INTERVAL   ——— ESTIMATED BASED ON THE PREVIOUS CYCLE (b)   ——— OBSERVED

SOURCES: Banco de España, Banco Central Europeo and Refinitiv Datastream.

a Interest rates are narrowly defined effective rates (NDER), which exclude related charges, such as repayment insurance premia and fees, and are adjusted seasonally and for the irregular component.
b Resulting bank interest rate if the interest rate rise in the current cycle had been passed through at the same speed as in the previous cycle in 2005, as estimated based on standard error-correction models. A model is estimated in each segment for short-term interest rates (up to one year) and long-term interest rates (more than one year), with the chart showing the synthetic interest rate weighted by the volume of new deposits.

In any case, it should be borne in mind that these dynamics could mask different behaviours across countries which, in turn, would give rise to heterogeneity across jurisdictions in the sensitivity of economic activity to monetary policy decisions. Thus, the following section analyses the cross-country heterogeneity in the speed of monetary policy transmission for various lending segments in the current tightening episode, as well as the factors that could at least partly explain this heterogeneity.

3 Analysis of the heterogeneity in monetary policy transmission across euro area countries in the current cycle

Broadly speaking, there is a high degree of heterogeneity across the large euro area countries in the pass-through of market rates to the interest rates on new bank loans and deposits. First, in the loans for house purchase segment with interest rate reset after more than five years, the increase in mortgage costs from end-2021 to April 2023 was sharper in Germany and Italy than in France and Spain. This increase was approximately 59% and 75% of the rise in the benchmark market rate (20-year IRS)[16] in France and Spain, respectively, compared with 98% and 104% in Germany and Italy, respectively (see Chart 4). Second, in the case of short-term loans to NFCs and loans to NFCs with an interest rate reset period of up to one year, which make up the bulk of loans to firms, the cross-country heterogeneity in the pass-through of market rate hikes (in the 3-month EURIBOR) was less pronounced than for loans for house purchase. In particular, from December 2021 to April 2023, the increase in the cost of short-term loans to NFCs as a percentage of the rise in the 3-month EURIBOR ranged from 74% in France to 94% in Italy (see Chart 4). Third, a considerable degree of heterogeneity is observed in the remuneration of households' time deposits, with Spain recording the lowest increase among the four largest euro area countries. Specifically, the rise observed in Spain (136 bp from December 2021 to April 2023) was 73 bp lower than that observed in the euro area as a whole[17] and represents just 32% of the change in 12-month EURIBOR in the same period, compared with 57% in Italy, 56% in France and 53% in Germany (see Chart 4).

In view of the cross-country heterogeneity observed in the speed of transmission of benchmark interest rates to the cost of new mortgage loans and to the remuneration of households' time deposits over the current hiking cycle, we then analyse the extent to which these differences are due to bank-specific idiosyncratic factors or to differences in the structure of each country's banking sector.

First, a bank-level regression is estimated for the mortgage segment in which the dependent variable is the change from September to December 2022 in the average monthly interest rate on new mortgage loans with an interest rate reset period of more than five years relative to the average for the same period in 2021.[18, 19] Specifically, the sample used comprises approximately 100 euro area banks with data on mortgage loans with interest

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16 Since there is no 20-year EURIBOR benchmark rate, this variable is proxied by the fixed component of a 20-year interest rate swap where the variable component is the 6-month EURIBOR.

17 This difference decreased slightly from the 79 bp recorded in February 2023, the cut-off date for the Banco de España's *Annual Report 2022*.

18 Note that the dependent variable is not defined in terms of the mortgage rate spread over the benchmark rate, because this would not be meaningful for the regression, since it would be tantamount to subtracting a constant from all banks in the sample to the extent that the benchmark interest rate is the same for all of them. Furthermore, this analysis is not performed for short-term loans to firms given the low cross-country heterogeneity documented in the pass-through of market rates to the cost of loans in this segment.

19 A 3-month rolling average is used to smooth interest rate volatility in new loans and deposits. Moreover, the mortgage rate hike is calculated based on the difference with the same three months in the previous year to factor in any potential seasonal effects.

Chart 4

**IN SOME SEGMENTS THERE IS A HIGH DEGREE OF HETEROGENEITY ACROSS EURO AREA COUNTRIES
IN THE PASS-THROUGH OF MONETARY POLICY TO BANK INTEREST RATES (a)**

COST OF NEW TRANSACTIONS AND MARKET INTEREST RATE. CHANGE FROM DECEMBER 2021 TO APRIL 2023
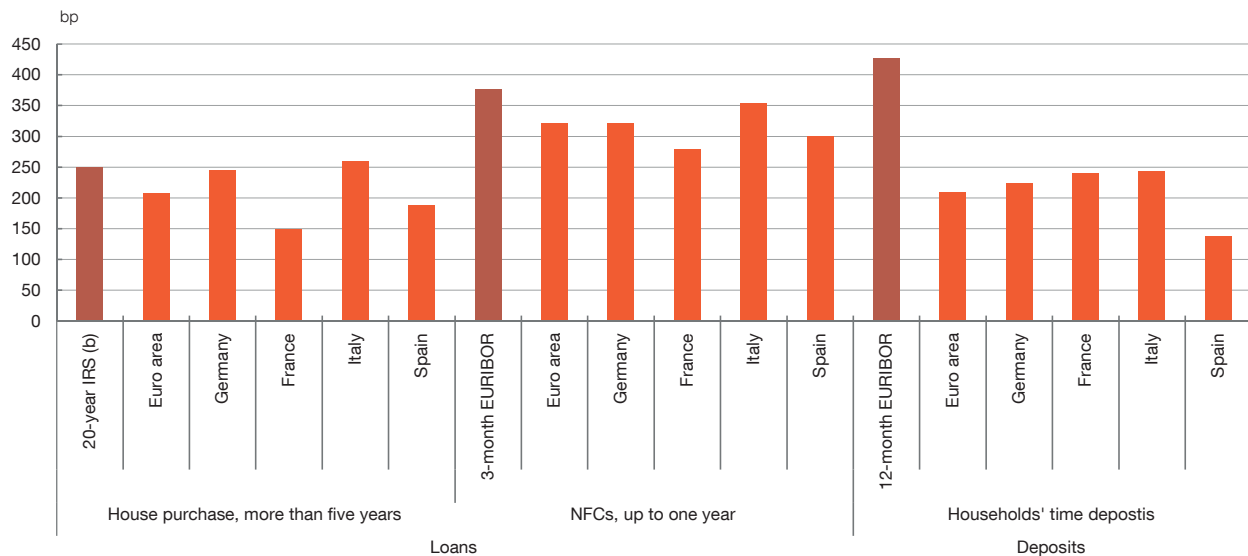
SOURCES: Banco de España, Banco Central Europeo and Refinitiv Datastream.

a Interest rates are narrowly-defined effective rates (NDER), which exclude related charges, such as repayment insurance premia and fees, and are adjusted seasonally and for the irregular component.
b 20-year interbank premium, proxied by the fixed component of a 20-year interest rate swap where the variable part is the 6-month EURIBOR.

rate reset after five years or more, since this is the segment with the greatest cross-country heterogeneity. The explanatory variables included in the regression refer both to bank-specific idiosyncrasies and to the characteristics of each country's banking sector.

Based on the findings of the analysis, the estimated coefficients associated with the bank-level explanatory variables are statistically significant, whereas those relating to the country-level explanatory variables are not (see Chart 5). This difference suggests that the different speeds of pass-through of wholesale market interest rates to mortgage rates depend mainly on bank-specific idiosyncrasies rather than the characteristics of each country's banking sector. In particular, banks whose total deposit remuneration had risen the least over the reference period and banks that were better capitalised passed through the increase in market interest rates to their mortgage rates to a lesser extent. The first variable is significant because deposits are the main source of funding for European banks (accounting for approximately 81% of the sample banks' liabilities); therefore, lower funding costs through deposits would lead to credit being offered at lower interest rates.[20] The significance of the second variable (the capital ratio) stems

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20 However, it should be noted that deposit interest rates could be determined together with lending rates and, therefore, the direction of causality between both variables is hard to establish. Also, given the lack of detailed information on the changes in each bank's funding cost, the change in deposit remuneration is used.

from the fact that better capitalised banks could benefit from lower funding costs in capital markets and, in addition, would have less need to maintain or increase their net interest income to build up capital organically.[21]

Second, a bank-level specification similar to that used for mortgage loans is considered to study the heterogeneity in the pass-through of market rates to interest rates on households' time deposits, which is estimated using the same sample of euro area banks, but taking as the dependent variable the change from September to December 2022 in the average monthly remuneration of time deposits with agreed maturity of less than two years relative to the average for the same period in 2021.[22]

Based on the findings of the analysis, in the case of households' deposits, banking sector characteristics at country level are statistically significant, unlike bank-specific idiosyncrasies. Accordingly, cross-country heterogeneity in the recent pass-through to the remuneration of deposits mainly owes to differences in the characteristics of each country's banking sector, rather than to differences in bank-specific characteristics. In particular, two relevant characteristics of national banking systems are identified: the need to raise funds through deposits in order to lend[23] and the degree of concentration[24] (see Chart 5). Thus, in jurisdictions with lower reliance on deposit funding to underpin lending, banks have raised interest rates on households' time deposits more moderately. Similarly, banks operating in countries with higher levels of bank concentration have increased deposit remuneration to a lesser extent.[25]

This last exercise makes it possible to break down the aforementioned 73-bp difference between the euro area and Spain in the rise in the remuneration of households' time deposits from December 2021 to April 2023. In particular, based on the coefficients estimated in the regression, approximately 44% of this difference (32 bp) would be explained by the banking systems' different needs to raise deposit-based funding in order to lend, whereas the differences in the degree of bank concentration would explain around 16% (12 bp). This lower contribution of bank concentration owes to the fact that the differences in the degree of concentration between euro area countries and Spain are small, based on the measure and the sample of banks used. Specifically, in Spain the share of total assets held by the five largest banks is only some 3 pp higher than the euro area average. In fact, Spain stands at the median of the distribution of this measure

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21 This evidence is consistent with Holton and Rodriguez d'Acri (2018) and Altavilla, Canova and Ciccarelli (2020). These authors find that both the capital ratio and the stability of the bank funding structure and access thereto have shaped the heterogeneity in the speed of monetary policy transmission in past benchmark interest rate hiking cycles.

22 Time deposits with an agreed maturity of up to two years account for more than 90% of total new time deposits from households for sample banks. In addition, although sight deposits represent the bulk of new deposits, the degree of cross-bank heterogeneity in these deposits is much lower than in time deposits.

23 For each country, banks' deposit-based funding needs to underpin lending are proxied using the ratio of the difference between the aggregate change in the stock of lending and the aggregate change in the stock of deposits between December 2021 and December 2022 relative to the country's GDP. Since this variable is obtained from the stock of lending and the stock of deposits rather than from new business, data for the last month of the year are used, rather than smoothing the last three months with a rolling average, as for interest rates and new loans and deposits.
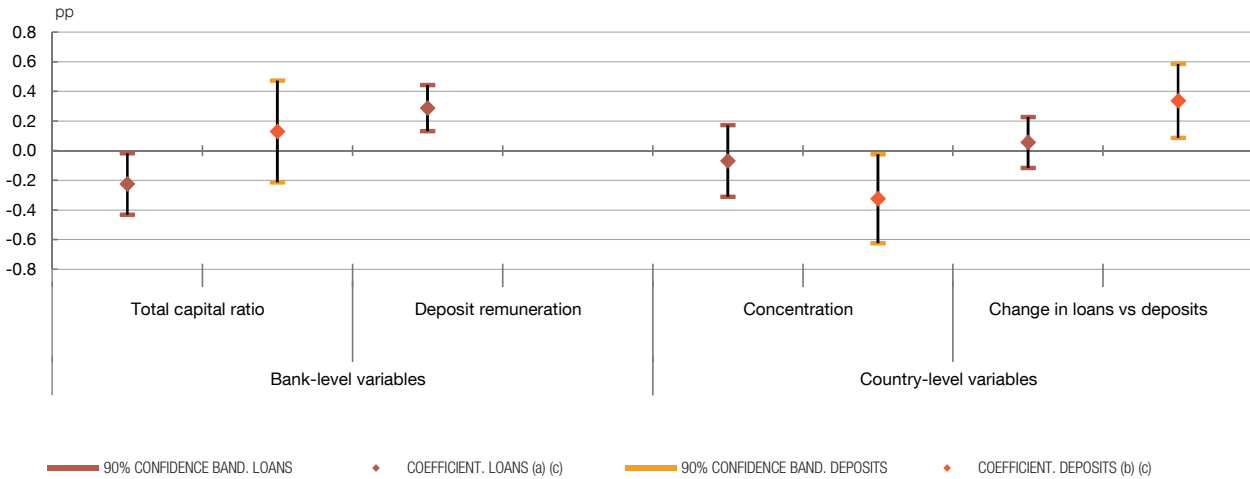
24 Bank concentration is proxied by total assets of the five largest banks operating in a country as a percentage of total assets of all the banks in that country. However, it is important to note that the bank concentration measure used here cannot be directly interpreted as a measure of the effective competition in each country's banking sector.

25 Leuvensteijn, Sørensen, Bikker and Rixtel (2013) find similar effects associated with banking competition on the monetary policy transmission to deposit remuneration in other rate hiking episodes.

Chart 5

THE HETEROGENEITY IN THE PASS-THROUGH TO INTEREST RATES ON MORTGAGES AND HOUSEHOLDS' TIME DEPOSITS STEMS FROM THE IDIOSYNCRATIC CHARACTERISTICS OF BOTH BANKS AND THE BANKING SECTORS OF THE DIFFERENT COUNTRIES

DETERMINANTS OF THE CHANGE IN INTEREST RATES ON NEW LOANS FOR HOUSE PURCHASE AND HOUSEHOLDS' TERM DEPOSITS

90% CONFIDENCE BAND. LOANS   ◆ COEFFICIENT. LOANS (a) (c)   90% CONFIDENCE BAND. DEPOSITS   ◆ COEFFICIENT. DEPOSITS (b) (c)

SOURCES: Banco de España, ECB and own calculations.

a Economic effect derived from a bank-level regression analysis in which the dependent variable is the change from September to December 2022 in the average monthly interest rate on new mortgage loans with an interest rate reset period of more than five years relative to the average for the same period in 2021.

b Economic effect derived from a bank-level regression analysis in which the dependent variable is the change from September to December 2022 in the average monthly remuneration on time deposits with agreed maturity of less than two years relative to the average for the same period in 2021.

c The economic effect is found by multiplying the estimated value of the coefficient (and its confidence bands) by the standard deviation of the distribution of the corresponding explanatory variable. Weighted least squares are used for the estimation, taking as weighting factor each bank's outstanding mortgage balance at December 2021 in the first regression, and each bank's outstanding balance of household time deposits at the same date in the second regression. Shown are the economic effects associated with the variables for which a significant effect is found in either of the two regressions. Deposit remuneration is found as the increase from September to December 2022 in the average monthly interest rate on all bank deposits relative to the average for the same period in 2021. Bank concentration is measured as the total assets of the five largest banks operating in a country as a proportion of the total assets of all banks in that country. The "Change in credit vs deposits" variable is defined as the increase in the stock of credit extended by all banks in a given country between December 2021 and December 2022 less the increase in the stock of deposits in the same period, as a proportion of the country's GDP. Both regression analyses use bank-level controls and a measure of each country's banking system liquidity, the effects of all of which are not statistically significant.

of concentration in the various euro area countries. However, Spain is one of the countries in the sample where the stock of bank lending grew less than the stock of deposits in the period from December 2021 to December 2022. This suggests that deposit-based funding needs to support lending are lower in Spain in relative terms. This would explain the relatively larger contribution of this variable to the difference in the increase in the remuneration of households' time deposits between the euro area and Spain. To conclude, it should be noted that although these results are robust to the specification used,[26] approximately 32% of the difference (around 20 bp) between the euro area and Spain cannot be explained in the regressions considered, suggesting that other important factors may have been omitted.

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26 Specifically, similar results are obtained when the effects associated with these characteristics are estimated based on a regression in which the average increase in deposit remuneration in each country is considered and only country-level explanatory variables are used. The findings of this multivariate regression analysis are also in line with the country-level univariate analysis by Ferrer, Ganics, Molina and Serena (2023), who assess the correlation between liquidity and concentration and remuneration of deposits.

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