



Banc Ceannais na hÉireann  
Central Bank of Ireland

Eurosystem

Economic Letter

# Transmission of monetary policy: Bank interest rate pass-through in Ireland and the euro area

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Vol 2023, No.3

# Transmission of monetary policy: Bank interest rate pass-through in Ireland and the euro area

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The pace of current monetary policy tightening has been unprecedented in the history of the Eurosystem. The key ECB interest rates started to increase in July 2022, the first rate rise in 11 years, and have increased sharply by 425 basis points since then. Monetary policy operates with long and variable lags, meaning these increases will take time to affect inflation. However, the first phase of transmission can already be seen in financial conditions, in particular in loan and deposit pricing by banks. In this Letter, we examine how banks' interest rates have responded to changes in the ECB's monetary policy rates. We address two key questions regarding this aspect of monetary policy "pass-through" in the euro area and Ireland. First, is there evidence that pass-through is different in this tightening cycle? Second, does pass-through in Ireland differ from other euro area countries? Based on our historical comparisons, we find that pass-through in the euro area is weaker now relative to previous cycles for some deposit products, stronger for new business lending and business term deposits, and the same for mortgages and outstanding business loans. For Ireland, we find evidence that, in this cycle, pass-through to new mortgage rates and to household overnight deposits, which represent the majority of Irish deposits, has been weaker than in other euro area countries.

## Introduction

Monetary policy is transmitted to the economy, and ultimately to inflation, through a number of channels. One channel is how changes in monetary policy rates affect financial conditions, including interest rates faced by the public on financial products. Changes in these rates influence the saving, investment and consumption decisions of firms and households and, through these, affect aggregate demand and inflation. Estimates suggest that it takes between 12 and 18 months for an increase in the monetary policy rate to affect output and inflation ([Lane, 2022](#)). Effects on financial conditions arise more quickly. To assess progress in achieving the inflation target, one key feature is measuring the strength of monetary policy transmission ([Lagarde, 2023](#)).

This *Letter* focuses on one aspect of monetary policy transmission to financial conditions: the strength of "pass-through" of changes in monetary policy rates to the interest rates on loans and deposits offered by banks to businesses and households. These interest rates are among the most important governing firm and household economic decisions in the euro area and Ireland. Banks, therefore, play an important role in the transmission of monetary policy. The effect of changes in monetary policy rates on interest rates set by commercial banks is known as the

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<sup>1</sup> Monetary Policy Division, Central Bank of Ireland. The views expressed in this Letter are solely those of the authors and do not necessarily reflect the views of the Central Bank of Ireland. We thank Jean Cassidy, Robert Kelly, Vasileios Madouros and Gillian Phelan for their comments.

*banking channel of monetary policy* (Lane, 2023). Assessing the strength of this banking channel is an important part of the overall assessment of whether the monetary policy stance is appropriate for achieving the inflation target.

The effect of changes in monetary policy rates on banks' interest rates can vary across products. Therefore, on the deposit side, we differentiate between overnight and term deposits for businesses and households. On the lending side, we differentiate between business and mortgage lending, both new and outstanding.<sup>2</sup> While interest rates on loans generally respond quickly to changes in monetary policy, interest rates on deposits, especially overnight deposits are typically slow to respond to changes in monetary policy (Lane 2023; Messer and Niepmann, 2023). Pass-through can be affected by a country's macroeconomic conditions, including government bond yields, the market structure of the banking system and range of alternative product options. It can also be affected by banks' characteristics, such as the quality and volume of their assets or their ability to access funding (Brissimis et al. 2014; Holton and Rodriguez d'Acri, 2015; Byrne and Kelly, 2019; Kho, 2023).

We begin our analysis by looking at the evidence of how bank interest rates have moved, in Ireland and the euro area, as the key ECB rates have increased. We then use statistical approaches to produce model-based estimates of pass-through that account for some important macroeconomic and financial factors. These allow us to ask two important questions. First, is there evidence that pass-through is different in this monetary policy tightening cycle? Second, is there evidence that pass-through in Ireland is different from pass-through in other euro area countries?

We find that euro area pass-through, since the euro's inception, is typically incomplete (i.e., commercial product rates do not move one for one with policy rates). The magnitude of pass-through also differs by the type of product. Pass-through is typically strongest to business loans and business term deposits. Pass-through is weaker to mortgage rates and weaker still to overnight deposit rates, especially for households. In this cycle, pass-through is weaker than previous experience for some deposit products (household term, business overnight and household overnight).

For Ireland, pass-through is typically stronger to outstanding business loans and outstanding mortgages, and weaker to overnight business deposits, than in other euro area countries. In the current monetary policy tightening cycle, we find evidence that pass-through in Ireland differs from euro area pass-through in some respects. So far, pass-through to new mortgage rates has been weaker, meaning these rates have not risen by as much as the increases in other European countries. Pass-through to household overnight deposits is also weaker in Ireland than in other countries. This is notable, as the vast majority of household deposits in Ireland are in overnight accounts.

Our model-based estimates of pass-through for this cycle should be interpreted as *early evidence* on these questions. Although pass-through to financial conditions can occur relatively quickly compared to some other channels of monetary policy transmission, the banking channel of monetary policy transmission is likely to strengthen in the coming months (Lane, 2023). Further

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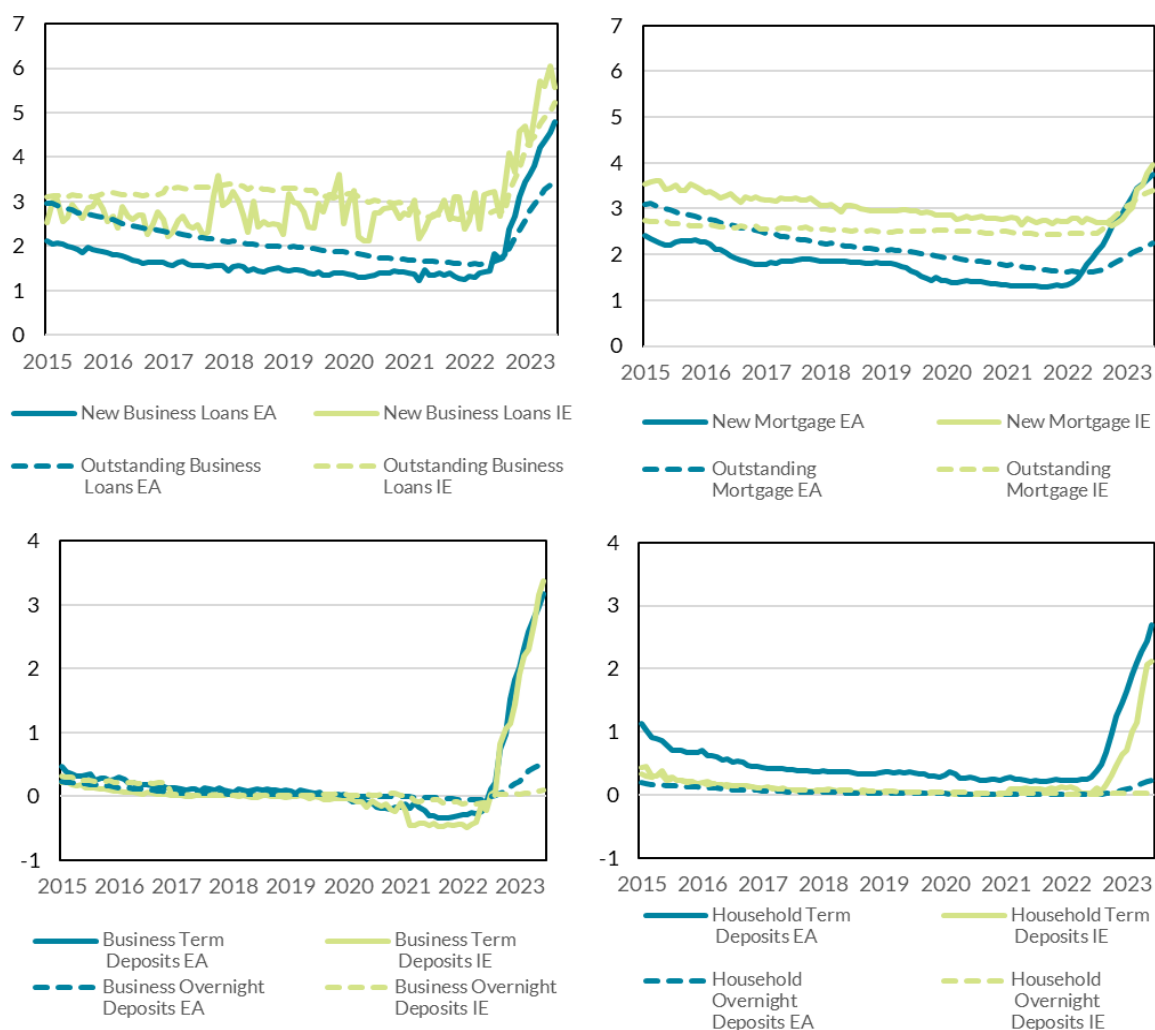
<sup>2</sup> Lending to households for other purposes, e.g., consumer loans, makes up a small share of new and outstanding lending to households (respectively, 13% and 12.4% over the past 12 months).

assessment of the strength of the pass-through will be possible in coming months as more data arrives. Such an analysis will also account for any changes in loan or deposit rates announced since June 2023, the last month for which we have data.

## Pass-through to loan and deposit rates: descriptive analysis

In response to the increases in the ECB’s key monetary policy rates, commercial banks<sup>3</sup> have increased the interest rates charged on loans and paid out on deposits. However, the extent to which banks have passed through the changes in the monetary policy rates varies across euro area countries and across loan and deposit products, as can be seen in Figure 1<sup>4</sup>.

Figure 1: Interest rates across product types; Ireland and euro area



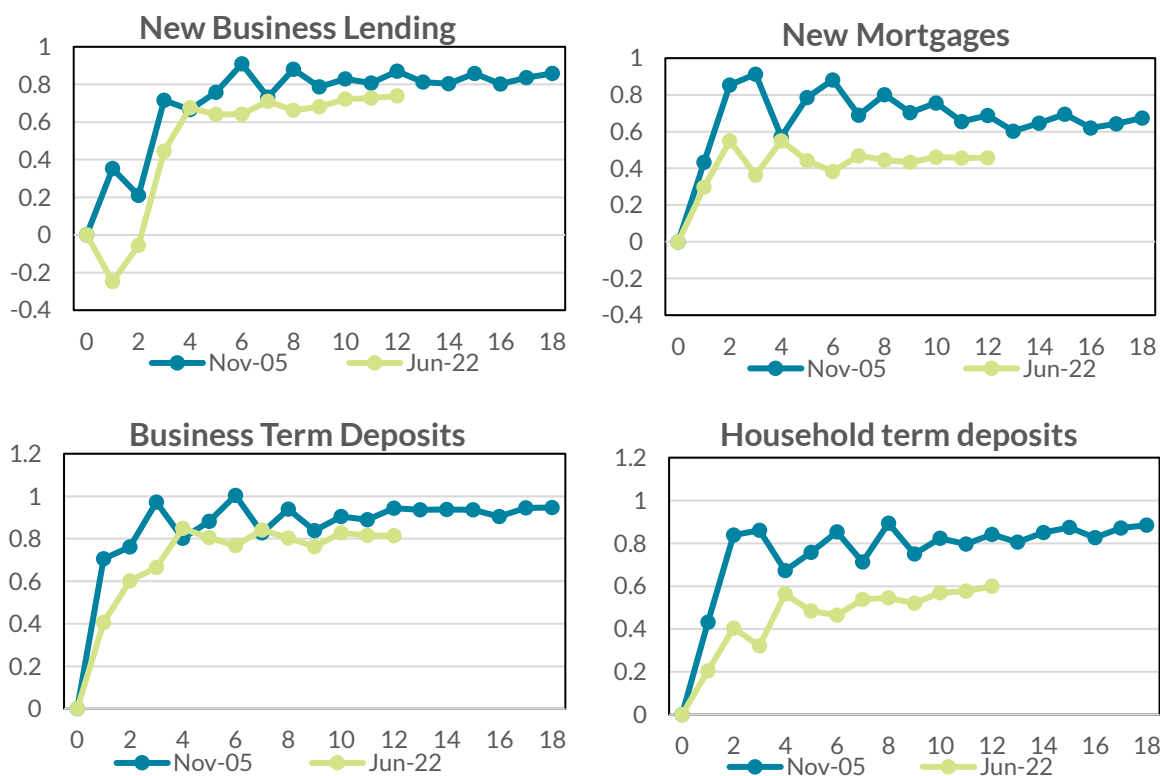
Note: these charts show the time series .of interest rates of loan and deposit products in both Ireland (green) and the euro area (blue), January 2015 to June 2023. “Term deposits” refers to deposits with agreed maturity.

<sup>3</sup> This *Letter* uses the ECB MFI Interest Rate statistics that exclusively comprise data on banks.

<sup>4</sup> Figure 1 shows how the levels of interest rates have changed in the recent cycle. However, this *Letter* is focused on how these rates have changed for a given change in monetary policy rates, i.e., assessing the strength of monetary policy pass-through. From Figure 1 it is also clear that there are differences in the levels of interest rates in Ireland versus the euro area. For instance, business loan rates and household mortgage rates have been higher in Ireland, on average, over the years shown.

Figure 1 shows interest rates have changed for both business and households in terms of both loans (both new and outstanding) and deposits (term and overnight), in Ireland and the euro area. While there is evidence of ongoing pass-through in these charts, there are also clear differences. Lending rates to businesses appear to have responded quite strongly in both Ireland and the euro area. Interest rates on outstanding mortgages in Ireland have risen by more than the euro area average. This is likely driven by a number of factors, including the share of Tracker mortgages in the Irish market and high shares of fixed mortgages in some other countries (notwithstanding the increase in fixed rate mortgage share in Ireland, see e.g., [Byrne et al., 2023](#)). New mortgage rates, by contrast, have risen by less than the euro area average.

Figure 2: Pass-through multipliers by product; euro area



Note: The horizontal axis shows the number of months since the tightening cycle began, from zero (the same month) to 18 months afterwards. In the current cycle, we are limited to a 12 month window.

At a headline level, in this monetary policy tightening cycle, the increases in interest rates on household and business term deposits have been similar in Ireland and the euro area. For Irish households, however, just 2% of deposits are held in term accounts meaning few households are in receipt of these higher rates.<sup>5</sup> Indeed, since the beginning of the monetary tightening cycle, the share of household deposits in term accounts has been virtually unchanged in Ireland. This means that interest rates on new term deposits reflect only a very small flow. By contrast, the

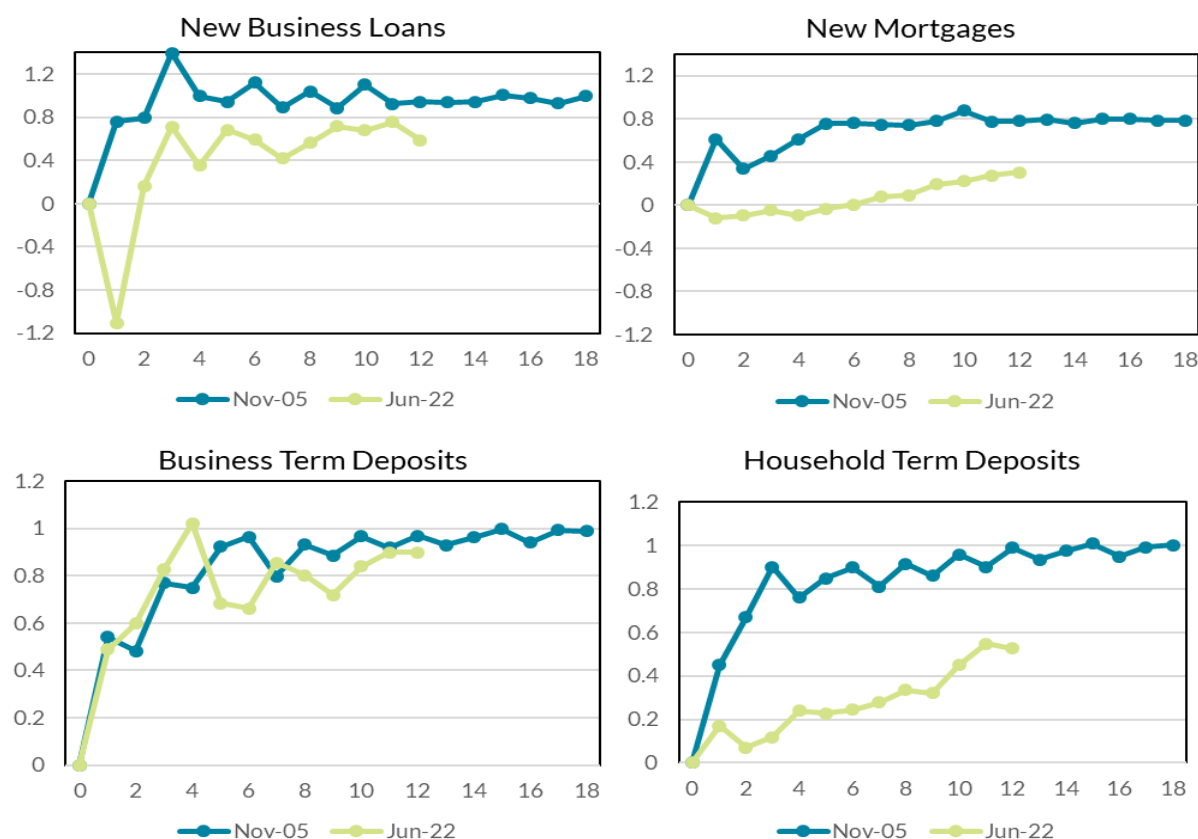
<sup>5</sup> The interest rates represent the rate *agreed* between the credit institution and its customer, and may differ from rates advertised by the credit institution. For example, the weighted average interest rate reported under the MIR statistics may be impacted by a relatively small number of high net worth counterparties.

share of euro area term deposits has increased by 5 percentage points since June 2022 to 21%<sup>6</sup> (see Appendix Figures 1A). Overall, the average interest rate received on all household deposits has increased by considerably less in Ireland than the euro area (see Appendix Figures 2A). This is due to a combination of both slower pass-through on overnight deposits and the fact that the higher pass-through on term deposits has been associated with limited new flows of term deposits in Ireland.

### How does pass-through in this tightening cycle compare to the past?

One key feature of pass-through is that it is a dynamic process: the changes in product rates play out over time rather than instantaneously (for example, it is unlikely that all financial institutions adjust interest rates on all products at the same time). When thinking about pass-through we must also account for the way in which monetary policy changes over time. Monetary policy decisions tend to happen in a cycle; for instance, the Governing Council of the ECB has raised the key interest rates nine times (a cumulative 425 basis points) since the beginning of the current hiking cycle in June 2022<sup>7</sup>.

Figure 3: Pass-through multipliers by product; Ireland



Note: The horizontal axis shows the number of months since the tightening cycle began, from zero (the same month) to 18 months afterwards. In the current cycle, we are limited to a 12 month window.

<sup>6</sup> This is based on data from the Balance Sheet Indicators statistics that are available via the ECB’s Statistical Data Warehouse. “Term deposits” refers to deposits with agreed maturity.

<sup>7</sup> We take June 2022 as the start of the cycle: the Governing Council announced that it would increase the key interest rates in the following month.

The previous tightening cycle, which began in November 2005, also featured nine rate increases. That cycle covered almost two years and the total increase in the key interest rates was 200 basis points. As a result, these two tightening cycles differ in both speed and size of change in monetary policy rates and we must account for this in making comparisons. We therefore express pass-through as the total change in product rates as a percentage of the total change in monetary policy rates over the same period. This is also known as a pass-through *multiplier*<sup>8</sup>. Figures 2 and 3 show the multiplier comparisons for the euro area and Ireland across different products.

Figure 2 shows that, for the euro area, the pass-through multiplier for new loans to business appears to be in line with the 2005 experience. The same is true for term deposits for businesses. Meanwhile, pass-through appears to be slower to new mortgage rates and new household term deposits, revealing a difference between business and household pass-through in this cycle. Calculating the pass-through to household overnight deposits for the euro area, we also find slower pass-through (see Appendix Figure 3A).

Figure 3 shows the pass-through multipliers for Ireland. We find broad evidence for slower pass-through in Ireland in this cycle, particularly to new mortgage lending rates and household deposits (term and overnight). Pass-through to business term deposits appears to be similar to the 2005 tightening cycle (see Appendix Figure 4A for additional products).

We can also use Figures 2 and 3 to compare current cycle pass-through between Ireland and the euro area.<sup>9</sup> Pass-through to new business lending rates and business term deposit rates is similar in Ireland and the euro area in this cycle. However, pass-through is significantly weaker for overnight business deposits.

For households, the pass-through multiplier for outstanding mortgage rates in Ireland is larger than in the euro area, but is smaller for new mortgage rates. Notably, the gap between the euro area and Irish multipliers for mortgage rates has narrowed considerably in recent months. Meanwhile, pass-through to household term deposits was initially weaker in Ireland, but after 12 months is in line with the euro area average, albeit recognising the limited flow into these products in Ireland. By contrast, pass-through to household overnight rates has been consistently weaker in Ireland than in the euro area.

## Pass-through to loan and deposit rates: model-based analysis

While Figures 2 and 3 are useful for comparing this cycle to the previous and for comparing Ireland and the euro area, we can use statistical approaches to take the analysis further. In this way, we can account for other important macroeconomic and financial factors that may affect pass-through, such as inflation, the state of the labour market and government bond yields. We can then statistically test whether pass-through is different in this cycle and whether pass-through in Ireland differs from peer countries in Europe.

As in the previous analysis, we define pass-through as the extent to which changes in monetary policy rates are reflected in changes in the interest rates on certain financial products available

<sup>8</sup> The multiplier representation is explained in more detail in the Appendix.

<sup>9</sup> Comparisons of current cycle pass-through for Ireland and the euro area are shown in Appendix Figure 5A.

to the public. Once again, we look at both loan rates and deposit rates, split by business and household lending but now we focus on the 12 original euro area countries for the period January 1999 to June 2023<sup>10</sup>.

We employ an approach known as Local Projections ([Jordà, 2005](#)) to perform our analysis. This technique allows us to measure the average effect of one unit change in the monetary policy rate on the interest rate for a given financial product, cumulatively, over the subsequent 18 months. Our estimates account for economic conditions and the negative monetary policy rates period.<sup>11</sup> Importantly, this approach allows us to capture the dynamic nature of pass-through.

Extending this approach allows us to examine whether pass-through at the euro area level has been changing specifically in this cycle, i.e., since June 2022. To do so, we create a dummy variable that takes the value 1 for the period since June 2022, and 0 otherwise. We interact this variable with the change in the monetary policy rate to test whether pass-through is different in this monetary policy cycle *so far*. It is important to note, however, that more adjustment in pass-through is likely to take place as the most recent rate increases occurred within weeks of publication<sup>12</sup>. It will be important for subsequent analysis to provide an assessment of how complete pass-through will be for this tightening cycle.

We can also examine how pass-through in Ireland differs from pass-through in other euro area countries. To do so, we transform our dataset by calculating the difference of each country's data from the Irish data. Now, our statistical approach will perform two tests. For each of the products, we can see whether pass-through in Ireland is on average different from the historical euro area pass-through. Then, by interacting the change in the monetary policy rate with the dummy variable for the current cycle, as described above, we can test whether Irish pass-through is different from the euro area in this cycle.

Due to data constraints, estimates of pass-through in the current cycle are limited to six months ahead. As such, these results should be viewed as *early evidence* on how pass-through has been taking place in this cycle. These early model-based results confirm the descriptive evidence presented earlier in the Letter.

As more data becomes available in coming months, it will be possible to give an assessment of pass-through at longer horizons than six months from a given change in monetary policy rate. It is not yet possible to answer whether pass-through in total will be less this cycle: pass-through to a product rate could be slower *so far* but increase later or it could remain lower throughout.

## Results

We start by producing estimates for euro area pass-through for each of the lending/deposit products and summarise these results, in multiplier form, in Table 1. These results show average

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<sup>10</sup> We limit our study to the 12 original members when looking at pass-through overall. We do this to ensure that there is a “balanced panel”, i.e., that the countries are always in the data over the whole time period. When looking at how Ireland differs from these peer countries, we express all the data for these countries in terms of their differences from the Irish data. This reduces the number of countries to 11.

<sup>11</sup> A full explanation of our empirical methodology is available in the Appendix.

<sup>12</sup> This is also true for any product pricing announcements that occurred after our latest data.



pass-through relationships between 1999 and 2022<sup>13</sup>. We provide results for 6, 12 and 18 months ahead: this allows us to see how pass-through dynamics evolve out over time. A number of findings are apparent. First, pass-through is not 100% for any product and differs by product. The largest pass-through multipliers are for business loans and business term deposit rates, while pass-through is typically much lower for overnight deposit rates, especially for households.

For mortgage rates, pass-through is typically only approximately half of the cumulative change in the monetary policy rates over the same horizon. We can see that pass-through to outstanding business rates grows over time, reaching a cumulative 87% by 18 months ahead. For some other products, like overnight deposits, the pass-through multiplier is roughly constant over all horizons. Meanwhile, other products, such as new business loan rates, show diminishing pass-through over time. Such diminishing pass-through for new lending products is likely to be linked to banks' commercial decisions around pricing which will aim to ensure that their products remain attractive to new and existing customers.

Table 1: Euro area pass-through multipliers, by horizon, 1999-2022 (pre-June 2022 tightening cycle)

	<i>Product</i>	<i>6 months</i>	<i>12 months</i>	<i>18 months</i>
Loans	Business loans; new	74%	65%	60%
	Mortgages; new	61%	52%	54%
	Business loans; outstanding	85%	86%	87%
	Mortgages; outstanding <sup>14</sup>	50%	55%	63%
Deposits	Business; term	81%	70%	71%
	Household; term	74%	56%	60%
	Business; overnight	39%	39%	38%
	Household; overnight	19%	18%	17%

Note: Multipliers by product on average for the period 1999-2022. The multipliers are the percentage of the total change in monetary policy rates over the same horizon. A value of 100% would be complete pass-through.

Our estimates are broadly aligned with previous research. In recent work, using a different statistical approach, [Messer and Niepmann \(2023\)](#) find that long run pass-through to overnight deposits is 38% for firms and 23% for households – figures that are in line with our own estimates. For term deposits, they estimate pass-through of 53% and 56% for businesses

<sup>13</sup> This sample also includes a period of substantial monetary policy easing. The estimated pass-through relationships treat easing and tightening symmetrically.

<sup>14</sup> We also re-estimate the pass-through multipliers using volume weights. For outstanding mortgages, there is a sizeable difference in the multipliers reflecting the fact that the two largest mortgage markets – France and Germany – have very high shares of long-term fixed rates. The weighted multipliers are 27% at 6 months, 34% at 12 months and 39% at 18 months. For other products, the differences are small.

and households respectively. While the figure for households is in line with our own work, our estimate for business term deposits is higher.<sup>15</sup>

On the lending side, our estimates are aligned with Central Bank of Ireland estimates used for stress testing. These suggest that typical pass-through to variable rate mortgages is 60% over the medium term (see [Byrne et al., 2023](#)). [McInerney \(2020\)](#) finds pass-through to business lending rates in Ireland is stronger than pass-through to mortgage rates. At the euro area level, [Illes et al. \(2019\)](#) find pass-through of between 56% and 92% for new business loans and between 67% and 96% for new mortgages.

Table 2: Comparison of pass-through in Ireland to the euro area and comparison of current euro area pass-through to historical pass-through

Product		Is euro area pass-through different in this cycle? (In which way?)	Ireland relative to peer countries	
			Is pass-through in Ireland different to peers on average? (In which way?)	Is pass-through in Ireland different to peers in this cycle? (In which way?)
Loans	Business loans; new	Yes (+)	No	No
	Mortgages; new	No	No	Yes (-)
	Business loans; outstanding	No	Yes (+)	No
	Mortgages; outstanding	No	Yes (+)	No
Deposits	Business; term	Yes (+)	No	No
	Household; term	Yes (-)	No	No
	Business; overnight	Yes (-)	Yes (-)	No
	Household; overnight	Yes (-)	No	Yes (-)

Note: Answers (yes/no) are based on statistical significance (please see Appendix for pass-through estimation details). We test statistical significance at the six month horizon. A positive sign (+) indicates pass-through is stronger, a negative sign (-) indicates pass-through is weaker.

We then turn to the question of whether pass-through in the euro area is different in this cycle. The first column of Table 2 summarises this for each of the eight products we study. We find mixed results across products: for new business loans, there is statistical evidence of stronger

<sup>15</sup> Work by [Sørensen and Werner \(2006\)](#) provides estimates for long run pass-through to overnight and term deposits without distinguishing between businesses and households. They find pass-through is 15% and 84% respectively. They estimate long-run pass-through to new mortgages of 116% and around 71% for new business loans.

pass-through in this cycle than in the past. However, there is no statistical evidence of different pass-through to mortgages, whether to new mortgage lending or to existing mortgages. There is also no evidence of different pass-through to outstanding business loans.

When looking at euro area deposits, we find statistical evidence for different pass-through for all products. Pass-through appears to be stronger this cycle for business term deposits. Pass-through to overnight deposits (whether business or household) and to household term deposits is weaker in this cycle.

The second column of Table 2 allows us to assess whether pass-through in Ireland is *typically* different to pass-through in peer European countries. We find evidence that on average pass-through is stronger in Ireland for outstanding business loans and outstanding mortgages, but is weaker to overnight business deposits. We find no statistical evidence of differences in pass-through for the other five products.

The final column of Table 2 allows us to examine how Ireland differs from European peer countries in this cycle. We find no evidence for different pass-through in Ireland for six of the eight products: the four business products, outstanding mortgages and household term deposits. We do find statistical evidence for different pass-through in Ireland to new mortgages and to household overnight deposits. The direction of the difference is negative: pass-through is weaker in Ireland for these products. This means that since the ECB started increase its monetary policy rates, the change in new mortgage rates and household overnight deposit rates has been smaller in Ireland than in peer countries.

It is also useful to look at these results in conjunction with the euro area results for this cycle. For example, while we find no evidence that pass-through to household term deposits in Ireland is different from pass-through in euro area peers in this cycle, the euro area pass-through is itself weaker in this cycle (Table 2). This means that Irish households are experiencing weaker pass-through to term deposit rates compared to historical norms. The same holds true for Irish businesses with overnight deposits. For household overnight deposits, euro area pass-through is weaker in this cycle and Irish pass-through is weaker than in the other European countries.

To summarise, we find that pass-through in the euro area is stronger to new business loans and to business term deposits, and that there is no evidence that Ireland is different from the euro area in this. For outstanding business loans and outstanding mortgages, neither euro area nor Irish pass-through is different this cycle. For new mortgages, Ireland is different from the euro area in that pass-through is weaker in this cycle. For household term and business overnight deposits, pass-through is weaker but Ireland does not differ from the euro area in this. For household overnight deposits pass-through is weaker in the euro area and even weaker in Ireland.

## Conclusion

Euro area monetary policy has tightened considerably over the past year in response to high inflation rates that are above the Governing Council's target. The changes in key interest rates are transmitted through a number of channels. We have focused in this *Letter* specifically on how they are passed through by banks to interest rates on loans and deposits. This pass-through affects the saving, investment and consumption decisions of households and businesses.

Looking at eight different loan and deposit products, for Ireland and the euro area, we document a number of findings. Over the history of the euro area, pass-through by banks is not 100% for any product and differs by the type of product. Pass-through is typically strongest to business loans and business term deposits. Pass-through is weaker to mortgage rates and weaker still to overnight deposit rates, especially for households.

We look for evidence on whether pass-through is different in this monetary policy tightening cycle. At the euro area level, pass-through is weaker for some products (household term deposits, business and household overnight deposits), while it is not different for others. We then test whether pass-through in Ireland is different from the euro area pass-through.

We find that pass-through in Ireland differs from pass-through in the euro area in some respects. Ireland has weaker pass-through to new mortgage rates in this cycle than in other European countries. This means that mortgage rates have not increased by as much in Ireland as they have in other countries. Current pass-through to overnight household deposit rates in Ireland is weaker than in other euro area countries, and euro area pass-through to overnight household deposit rates is itself weaker in this cycle thus far.

This *Letter* provides early evidence of differential pass-through in this monetary policy tightening cycle, for Ireland and for the euro area. A number of factors could explain this differential, e.g., excess liquidity, competition and bank health. As more data becomes available in coming months, it will be possible to give a longer-term assessment of pass-through. This would incorporate any changes in commercial banks' interest rates occurring since our latest data. We leave such an assessment for future research.

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## Appendix

### Empirical Methodology

This section provides detail on our empirical methodology, starting with estimating pass-through multipliers for the euro area.

$$y_{c,t+h} - y_{c,t-1} = \alpha_h + \beta_{1,h} \Delta i_t + \gamma X_{c,t} + \delta_c + \epsilon_{c,t+h}; h = \{0, \dots, H\} \quad (1)$$

$$IRF_{y,\Delta i}(h) = \beta_{1,h}; h = \{0, \dots, H\} \quad (2)$$

In equation (1), the dependent variable is the growth rate of a product rate,  $y_t$ , between time period  $t - 1$  and period  $t + h$ , which increases from 0 (the current time period) to the end point in the future,  $H$ . This is a panel regression over countries ( $c$ ) and includes a country fixed effect  $\delta_c$ . The equation includes a constant in each period ( $\alpha_h$ ).  $X_{c,t}$  is a vector of control variables including lags of core inflation, the change in the unemployment rate, a dummy variable for the effective lower bound period (July 2014 to June 2022), a cointegrating relationship if indicated

by cointegration tests, government bond yields and a lag of the dependent variable<sup>16</sup>. Optimal lag lengths are selected by information criterion.

The parameter of interest is  $\beta_{1,h}$ , the response of the dependent variable to a change in the interbank rate  $\Delta i_t$ . This allows us to measure the average response to an increase in the interbank rate for each product over the history of the euro. The dynamic response, over time, of the dependent variable is given by the Impulse Response Function in equation (2). Standard errors are clustered on country and are estimated via the wild bootstrap to account for the small number of clusters ([Roodman et al., 2019](#)). Confidence intervals are calculated at the 95% confidence level. The equation is estimated via Local Projections ([Jordà, 2005](#)), with the data covering January 1999 to May 2022, i.e., excluding the current monetary policy cycle.

$$m_y(h) = \frac{IRF_{y,\Delta i}(h)}{IRF_{\Delta i,\Delta i}(h)}; h = \{0, \dots, H\} \quad (3)$$

Equation (3) provides the pass-through *multiplier* for product  $y$ . The motivation for using multipliers is described in the main text. The multiplier scales the average response of product  $y$  to the change in interbank rate  $\Delta i_t$  by the average response of  $\Delta i_t$  to itself. The multiplier is specified in terms of leads, i.e., it provides the ratio of the IRFs at each lead  $h$ . It is expressed as a percentage.

$$y_{c,t+h} - y_{c,t-1} = \alpha_h + \beta_{1,h}\Delta i_t + \beta_{2,h}\mathbb{1}\{\text{latestcycle}\} \times \Delta i_t + \gamma X_{c,t} + \delta_c + \epsilon_{c,t+h}; h = \{0, \dots, H\} \quad (4)$$

$$IRF_{y,\Delta i | \text{latestcycle}}(h) = \beta_{2,h}; h = \{0, \dots, H\} \quad (5)$$

Equation (4) extends equation (1) by adding a dummy variable for the current monetary policy cycle. This takes a value of 1 between June 2022 and our latest observation in June 2023, and is 0 otherwise. The estimation sample is extended to June 2023. The parameter of interest in this equation is  $\beta_{2,h}$ ; this allows us to test whether the average response of the product rate to the change in interbank rate is different in this monetary policy cycle to the previous experience (as, again, represented by  $\beta_{1,h}$ ). The total response of the product rate to tightening in this cycle would be given by the sum of  $\beta_{1,h}$  and  $\beta_{2,h}$ . In estimating equation (4), we restrict our horizon to 6 months ahead ( $H = 6$ ) due to data constraints.

To examine whether pass-through is systematically different in Ireland to its peers (the other euro area countries), we start by transforming our data.

$$y_{c,t}^* = y_{IE,t} - y_{c,t} \quad (6)$$

This represents the difference, at each point in time  $t$ , of the Irish interest rate for a given product and the interest rate for that product in country  $c$ . If the Irish interest rate is higher, this will be a positive number. This transformation reduces our sample to 11 countries: the 11 other

<sup>16</sup> Stationarity is assessed using the test of [Pesaran \(2007\)](#) which is appropriate for panel data. We test for panel cointegration following [Westerlund \(2007\)](#). Where appropriate, we construct a panel cointegrating vector following [Chong, Jordà and Taylor \(2012\)](#).

original member countries of the euro, each expressed as their differences from Ireland. We also perform this transformation for the vector  $X_{c,t}^*$ : for example, the core inflation variable would now tell us the difference in the core inflation rate between Ireland and another country.

$$y_{c,t+h}^* - y_{c,t-1}^* = \alpha_h + \beta_{1,h} \Delta i_t + \beta_{2,h} \mathbf{1}\{\text{latestcycle}\} \times \Delta i_t + \gamma X_{c,t}^* + \delta_c + \epsilon_{c,t+h}; h = \{0, \dots, H\} \quad (7)$$

Equation (7) re-estimates equation (4) using our transformed data. The parameter  $\beta_{1,h}$  now provides us with a test of whether pass-through in Ireland is, on average, different from in the European peer countries. Meanwhile,  $\beta_{2,h}$  allows us to test whether pass-through in Ireland is different from the other countries *in the current cycle*.

## Data

Our primary data source is the ECB's Monetary Financial Institution interest rate statistics database (MIR). This provides country level data on volume-weighted average interest rates for a range of financial products provided by banks at a monthly frequency. We use data for the period January 1999 – June 2023, the latest date for which data is available. We focus on four products for firms and households separately: new lending rates, existing lending rates, term deposit rates and overnight deposit rates. We represent changes in monetary policy using the change in the interbank rate<sup>17</sup>. Our main analysis focuses on the 12 original euro area countries due to data availability.

It is important to note some features of the MIR statistics. They cover euro denominated new business agreed between a credit institution (bank) and its counterparties (households or non-financial corporations) resident in the euro area. The statistics for interest rates and business volumes are not split between counterparties resident in a particular country (e.g., Ireland) versus other euro area resident counterparties.

The interest rates represent the rate agreed between the credit institution and its counterparties, and may differ from rates advertised by the credit institution. For example, the weighted average interest rate reported under the MIR statistics may be impacted by a relatively small number of high net worth counterparties.

We represent countries' economic conditions with the unemployment rate and core inflation rate (i.e., inflation excluding volatile items such as energy and food). Both series are from Eurostat and are available at the country level on a monthly basis from 1999 onwards. Finally, data on government bond yields is from Datastream.

<sup>17</sup> We use the Euro Overnight Index Average (EONIA) when available. From 2019 onwards, we use the Euro Short Term Rate (€STR) with a margin of 8.5 basis points.

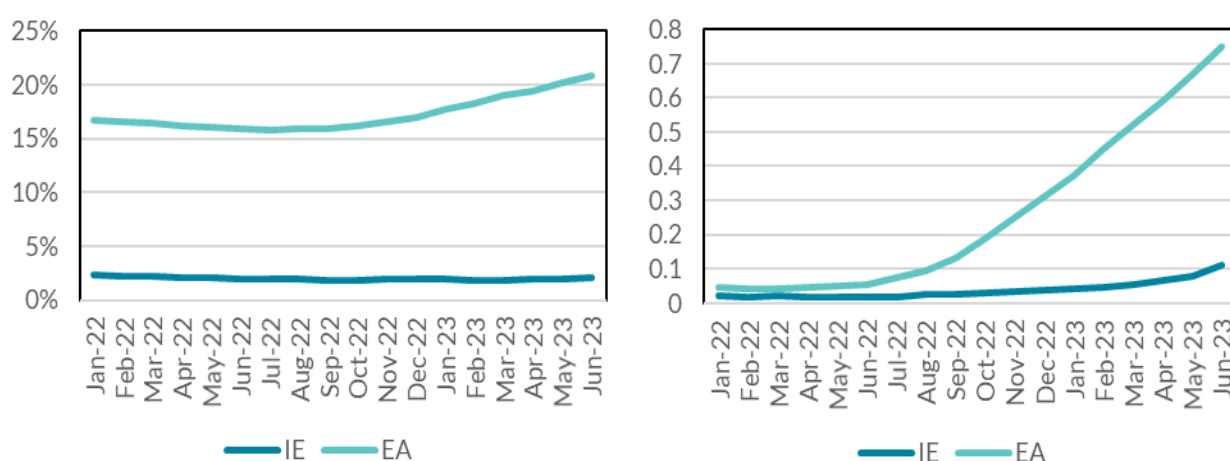


Table 1A: Data sources and availability

Product	Description	ECB code/ Source <sup>18</sup>	Dates available
New business lending	The interest rates charged to new customers for a loan including renegotiations.	SDW MIR	January 1999-June 2023
Outstanding lending	The interest rate charged on existing loans.	SDW MIR	January 2003- June 2023
Term deposit	The interest rate paid on new deposit accounts where a fixed interest is paid over an agreed period.	SDW MIR	January 1999-June 2023
Overnight deposits	The interest rate paid on a standard current account with instant access.	SDW MIR	January 1999-June 2023
Unemployment rate	Seasonally adjusted unemployment rate	Eurostat	January 1999- June 2023
Harmonised core inflation	Harmonised core inflation rate. Year on year %.	Eurostat	January 1999- June 2023
Government bond yield	Interest rate on 10 year government bond	Datastream	January 1999-June 2023

## Pass-through: an overview – additional charts

Figures 1A and 2A: Share of term deposits in euro area and Ireland, and weighted average interest rate on term and overnight deposits in the euro area and Ireland.<sup>19</sup>



<sup>18</sup> Data on Irish interest rates can be found on the [Retail interest rates](#) page of the Central Bank of Ireland website, see in particular Tables B.1.1 and B.2.1.

<sup>19</sup> Weightings to calculate weighted average interest rate are based on stock of overnight and term deposits.



Figure 3A: Pass-through multipliers, additional products (euro area)

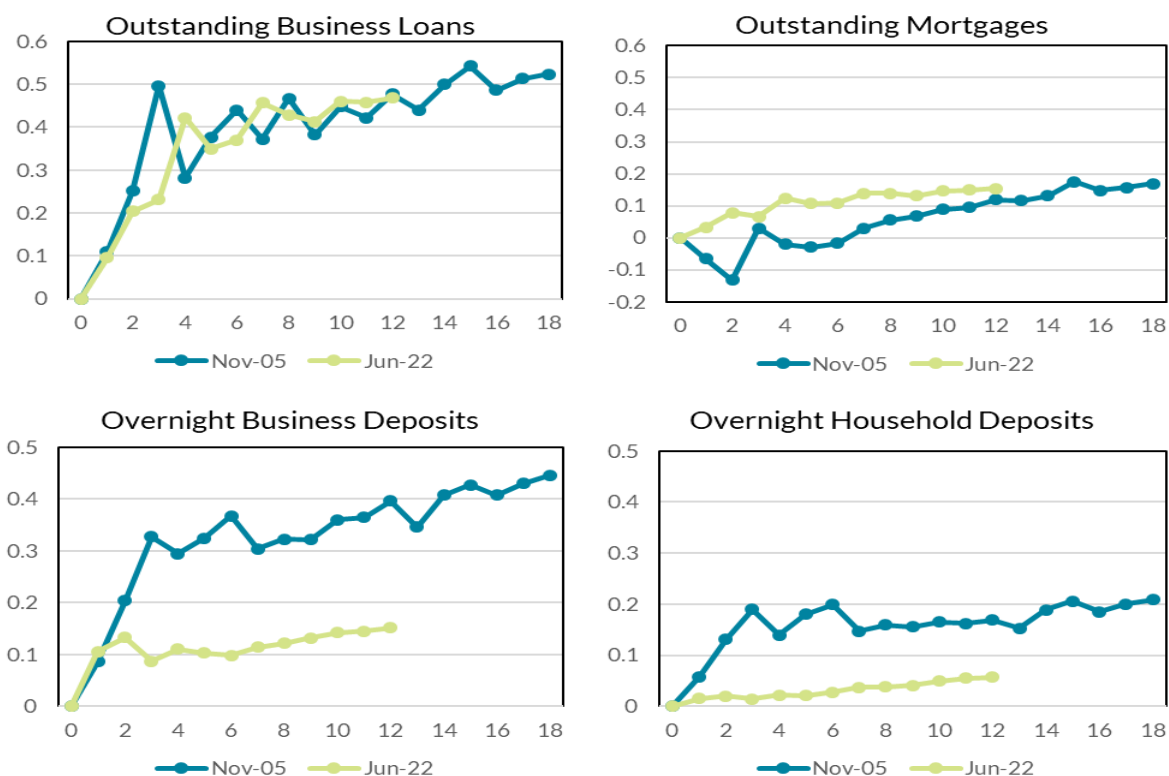
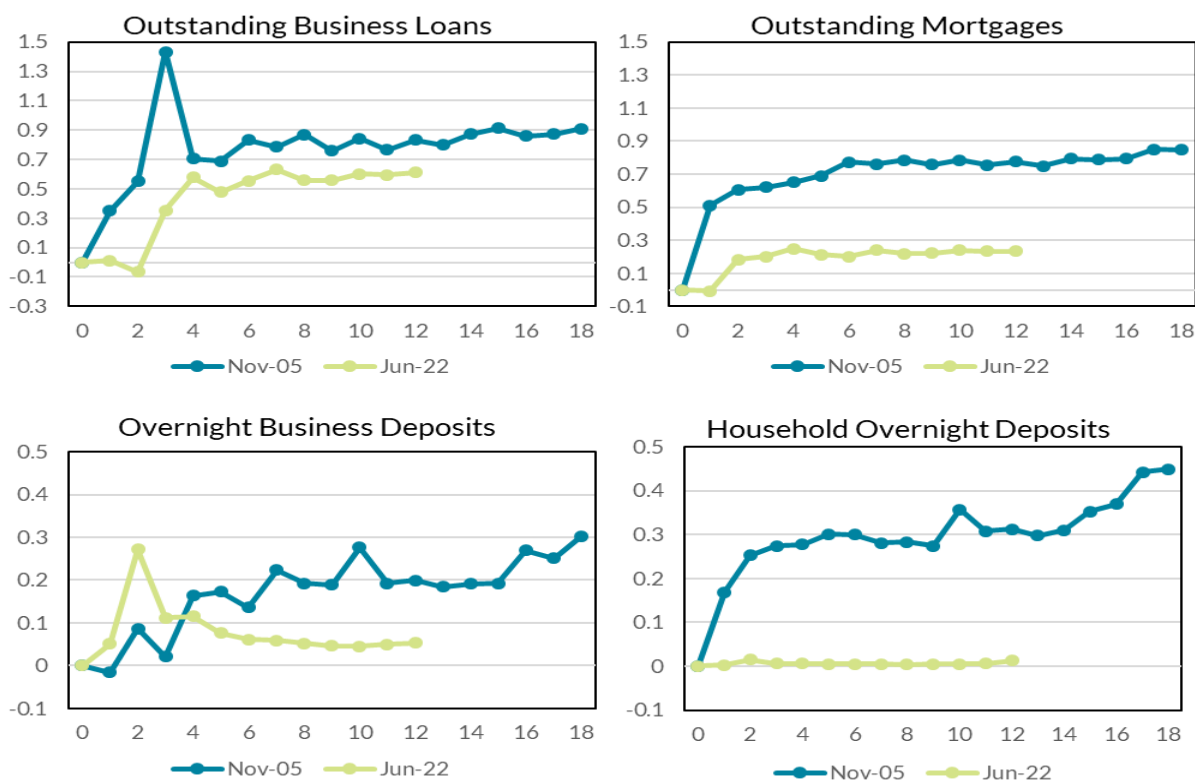


Figure 4A: Pass-through multipliers, additional products (Ireland)







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