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Credit and House Prices in the Irish Residential Market

Many countries experienced a residential credit bubble prior to the global financial crisis; however, by most criteria, the Irish residential and financial sector witnessed one of the most significant imbalances across contemporary western economies. The Irish property market had experienced a significant increase in activity as the economy was transformed during the Celtic Tiger era. However, hand in hand with the increase in housing demand came a major credit market liberalisation, which resulted in a substantial increase in mortgage credit. This, in turn, additionally fuelled the emerging house price bubble by 2005, resulting in the Irish financial sector being especially vulnerable to the global financial crisis of 2007/08 due to its substantial liabilities in the property market. A period of significant reform in credit availability followed, as evidenced by the adoption of the Central Bank of Ireland of macroprudential rules in early 2016. Now, 17 years after the crisis first impacted the Irish market and given the persistent increase observed in Irish house prices since 2012, it is prudent to examine the interrelationship between credit availability and house price movements to see how the residential and financial markets are evolving. This article uses a recently developed model of the Irish housing and credit sector to assess the contribution of changing credit standards to recent house price developments. The developments in the Irish market offer lessons for other EU member states.

The Irish housing and banking crash of 2008–2012 was one of the most substantial experienced by any western economy. On the heels of the rapidly growing economy from the early 1990s, there was a rapid increase in housing demand and, subsequently, activity levels in the Irish housing market. By 2005, both price and supply levels were rising sharply, and concomitantly mortgage credit levels were also rising significantly (McCarthy & McQuinn, 2017). A number of studies indicated the presence of a

dangerous link between house prices and mortgage credit (Fitzpatrick & McQuinn, 2007), and when the global financial crisis (GFC) emerged in 2007/08, the Irish financial system, which was particularly exposed to the bubble in the residential market, was especially vulnerable. The fortunes of the domestic financial sector and the state were intertwined via the guarantee of the Irish Government of the entire domestic banking sector in October 2008.¹ Subsequently, over the period 2008–2012, the Irish economy and financial sector experienced a profound downturn, culminating in Ireland entering a programme of support in October 2010 with the European Union, the European Central Bank and the International Monetary Fund (collectively known as the “Troika”). The costs of the crisis were substantial in terms of lost economic activity and the erosion of wealth: house prices fell by 54% in nominal terms between 2007 and 2012, net household wealth declined by 40% over the same period while unemployment, which had been averaging just over 4.5% between 2000 and 2007, quickly jumped to nearly 14% by early 2010.

The post-GFC period has been characterised by a significant overhaul of financial regulation at both a national

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¹ For more on the Irish Government guarantee, see Honohan et al. (2010).

and EU level. The Troika specified particular targets for deleveraging in the financial sector while the adoption by the Central Bank of Ireland of macroprudential measures in early 2016 saw upper limits set for loan-to-income and loan-to-value ratios as part of the domestic regulatory framework. However, notwithstanding the contraction in total lending by the Irish financial sector and the adoption of specific macroprudential measures, housing demand, in response to the general economic recovery, has recovered robustly post-2012 in the Irish market. At the same time, housing supply struggled significantly to respond; supply levels, which had averaged some 85,000 units between 2005 and 2007, fell away to just over 4,500 units by 2013 and failed to surpass 20,000 units until 2022. This can be compared with estimates of the structural demand for Irish housing (Bergin & Garcia-Rodriguez, 2020), which suggest that approximately 30,000 units a year are required just to meet the increase in demand due to trends in demography and household formation. Consequently, since 2012, house prices in nominal terms have increased by 126% while rent levels have increased by 108%.

This surge in house prices has given rise to some concern that part of the recent increase in prices may be unsustainable in nature or that it may be fuelled once again by a mortgage credit – house price spiral (OECD, 2017).² Therefore, given the profound difficulties experienced by the Irish financial sector and the related implications for the state, an examination of the interrelationship between mortgage credit and house prices is warranted. In this paper, we use a recently developed model of the Irish housing and financial sector, described in Egan et al. (2022), to characterise Irish house price movements over the period 1980–2023. We pay particular attention to the recent post-GFC recovery in house prices and assess whether changes in the credit market, in and of themselves, have had a significant impact on house prices. This new model resides within COSMO, the core structural model of the Irish economy (see Bergin & Egan, 2022). A significant number of studies have examined Irish house prices over the past 25 years (e.g. Roche, 1999, 2001; McQuinn & O'Reilly, 2008; Kelly & McQuinn, 2014; Cronin & McQuinn, 2021; Egan et al., 2023.).

The results of our analysis are sobering and suggest that the credit channel has once again in recent years become somewhat influential in impacting Irish house prices. The loan-to-income ratio on average, within the Irish mortgage market, is now back to multiples previously seen

only at the peak of the Celtic Tiger boom. Results from the econometric application indicate that exogenous movements in credit conditions have become quite notable since 2021 and are consequently now having an impact themselves on house prices. However, one crucial difference between the present and the Celtic Tiger period is that of scale. A significant number of mortgages were issued in the 2005–2007 period when credit conditions were loosened considerably, whereas fewer are available now. Nonetheless, this suggests that there is a growing cohort of mortgage holders in the Irish residential market who are taking out highly leveraged positions. A significant deterioration in economic fundamentals such as reduced income levels or higher mortgage rates could result in these households experiencing some difficulties in repaying their mortgages. At this point, the risk does not appear to be systemic in nature.

While our results are estimated in an Irish context, the implications are also of interest from a broader European perspective. After the global financial crisis of 2008, a number of European housing markets in addition to Ireland experienced significant corrections and a prolonged period of adjustment. Many homeowners in Spain and Greece also found themselves in negative equity with mortgage defaults and foreclosures surging. The recovery in markets was uneven across the continent; while countries like Germany and the Nordic nations saw a steady rebound and even growth in property prices, others struggled with high levels of bad debt and sluggish economic recovery. However, one of the economic legacies of the COVID-19 pandemic observed across countries is an acceleration in house price inflation. According to the IMF's Global House Price Index,³ of the over 60 countries participating in the survey, three-quarters witnessed increases in prices in 2020, with the trend continuing into 2021. Indeed, house prices increased by over 5% for 23 of the 60 countries. On a cross-country basis, house prices have not experienced such a sustained increase since the period preceding the GFC.

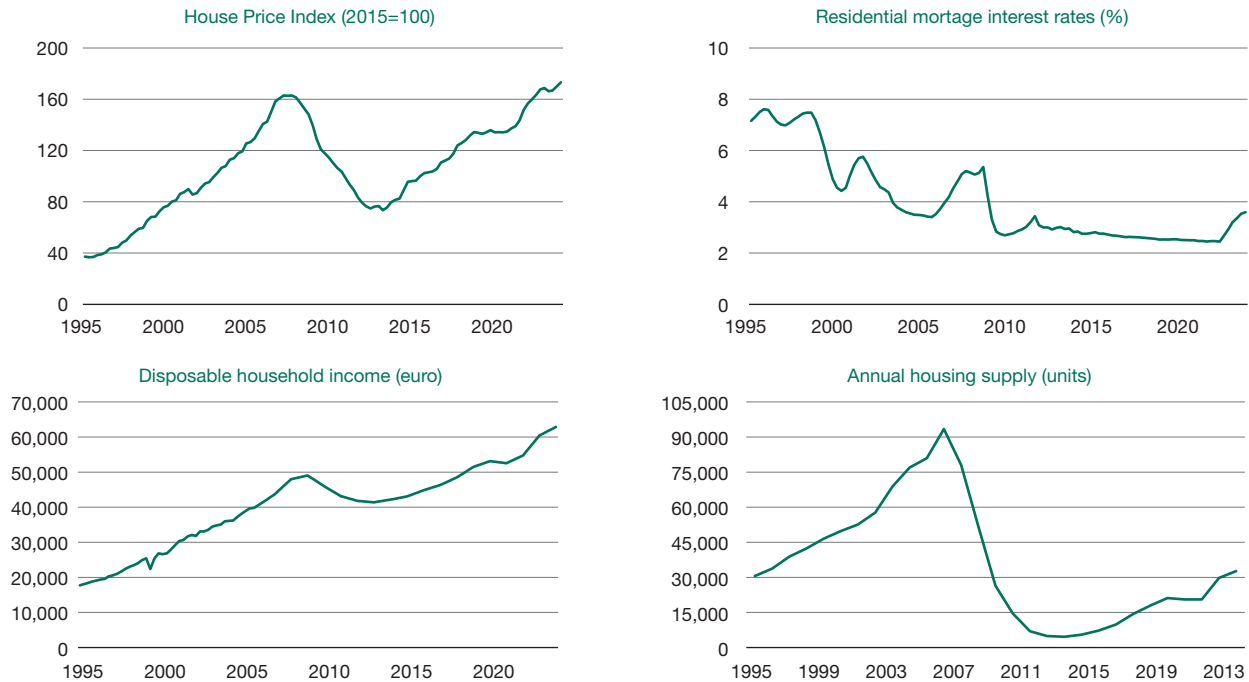
The Irish housing and mortgage market

Figure 1 plots Irish house prices and housing supply levels along with key macroeconomic data such as disposable household income and residential mortgage interest rates from 1995 to 2023. As can be seen, and, as noted by Cronin and McQuinn (2022), house prices over the period can be characterised by three distinct sub-periods: the Celtic Tiger period (1995–2007), the post-GFC period (2008–2012) and the recovery period (2013–2023). Income

² In its economic outlook for Ireland, OECD (2017) noted that “the sharp rise in prices and lending raises concerns that another bubble may be forming, and the authorities should stand ready to tighten prudential regulations if needed”.

³ <https://blogs.imf.org/2021/10/18/housing-prices-continue-to-soar-in-many-countries-around-the-world/>.

Figure 1
Irish housing market variables, 1995Q1-2023Q4



Source: Central Statistics Office.

levels followed a broadly similar trajectory, although without the same variability, while interest rates, apart from the 2005-2007 period, followed a distinct downward path. Clearly, the improvement in economic circumstances greatly influenced the increase observed in housing demand.

This combination of macroeconomic factors that influence housing demand can be neatly summarised via the affordability variable introduced by McQuinn and O'Reilly (2008). This approach assumes that the demand for housing is mainly a function of the amount that prospective house purchasers can borrow from financial institutions, and this, in turn, is dependent on current disposable income and the existing mortgage interest rate. The relationship between income levels, interest rates and the typical amount of a mortgage offered by a financial institution is generally based on the present value of an annuity. The annuity is the fraction ϕ of current disposable income pdr_t , which is determined endogenously within COSMO, that goes toward mortgage repayments and is discounted at the current mortgage interest rate, rmt_t for a horizon equal to the term of the mortgage τ . Thus, the amount that can be borrowed $afford_t$ is given by

$$afford_t = \phi pdr_t \left(1 - \frac{(1 + rmt_t)^{-\tau}}{rmt_t} \right) \quad (1)$$

This mimics the reality that people seek to maximise the amount they can borrow subject to the lending criteria of mortgage lending institutions. Figure 2 plots the affordability variable in the Irish mortgage market over the period 1995-2023. The substantial increase in the variable is evident over time, highlighting the role that changes in key fundamental, economic variables played in underpinning the movements in house prices for the period.

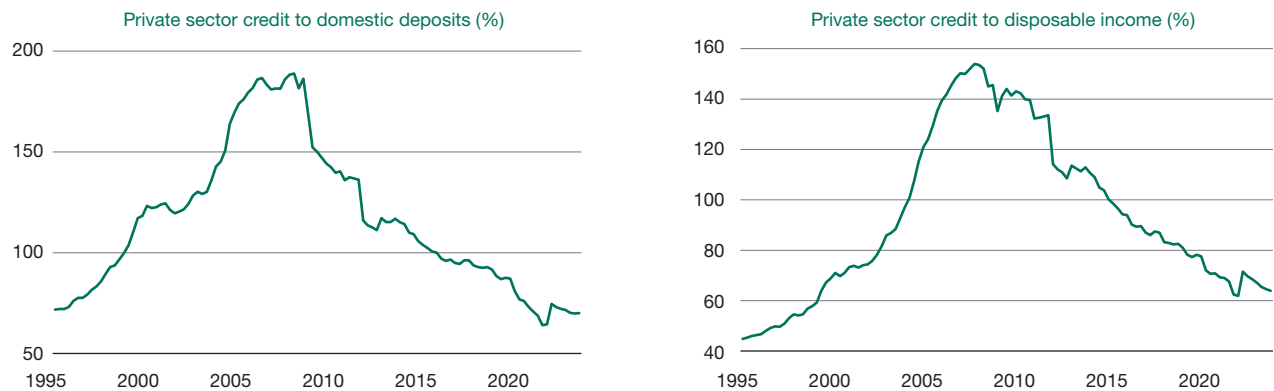
However, it was not just key economic variables that registered significant change over time. Credit conditions and the availability of mortgage credit also witnessed substantial variations over the period 1995-2023. This sharp

Figure 2
Affordability variable in the Irish mortgage market, 1995Q1-2023Q4



Source: Authors' own calculations.

Figure 3
Irish aggregate credit market variables, 1995Q1-2023Q3



Source: Central Bank of Ireland.

rise in credit reflected both deregulation and liberalisation in Ireland (see Kelly & Everett, 2004) and the Irish retail banks being able to access additional funds from abroad following the adoption of the euro. These developments were a feature of European intermediation more generally, with less regulation, financial innovation and cross-border lending occurring at that time (Le Leslé, 2012; McCarthy & McQuinn, 2017). These changes allowed European financial institutions with a surplus of funds to lend to those in deficit. Figure 3 plots two commonly used macroprudential credit measures aimed at capturing the sustainability of financial sector developments: the ratio of domestic credit to domestic deposit and the ratio of the same credit variable to overall economy-wide output.

A consequence of the reliance on overseas funding in Ireland was a rise in the ratio of private sector credit to the domestic retail deposit base, to close to 189% by 2008Q1 (the left-hand side of Figure 3). Using household disposable income as a proxy for overall output (given the well-known issues of using Irish GDP for that purpose),⁴ the right-hand side panel of Figure 3 shows the credit-to-output ratio experiencing a sharp increase through the mid-2000s, reaching a value of 153% in the third quarter of 2007. Both the increase in this ratio and the gap that emerged between retail loans and retail deposits left the Irish economy vulnerable to a change in international financial conditions. When such a change occurred in 2007/08, the vulnerabilities in the Irish financial system led to a steep downturn in economic and housing market performance.⁵ In the post-

GFC period, what is noticeable is that the recovery in the Irish economy occurred alongside little change in the value of outstanding mortgages and an ongoing reduction in the Irish retail banks' loans-to-deposits ratio. The ratio of private sector credit to total household disposable income also continued to decline through the end of 2023.

The specific manner in which increased credit levels impacted the Irish residential mortgage market can be gleaned from Figure 4, which plots the average loan-to-income ratio and the average loan-to-value ratio. McCarthy and McQuinn (2017), availing of detailed bank level loan data, noted the importance of changes in the loan-income ratio in the greater provision of mortgage credit in the Irish market. The figure shows that the ratio of the average loan amount to household disposable income increased to 4.7 in the last quarter of 2006 before falling considerably in the post-GFC era. In addition to regulatory reforms introduced at the EU level, the Central Bank of Ireland introduced its own macroprudential mortgage measures in 2016. These placed specific limits on loan-to-income and loan-to-value ratios in the Irish market. However, notwithstanding the presence of these limits, it is evident that since 2020 the loan-to-income ratio has been increasing somewhat and by the end of 2023 the average loan size was back to a rate of 4.6 times disposable income.

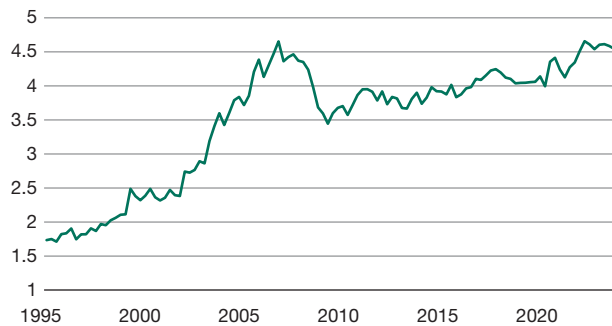
A model of house prices and mortgage credit

In terms of specifying a house price model, we adopt the model outlined in Egan et al. (2022). This is rooted in the standard approach in the literature, where the housing demand function is inverted and rearranged such that the dependent variable is the house price, as opposed to the quantity of housing. Similar applications are found in Peek and Wilcox (1991), Muellbauer and Murphy (1997), Meen (1996), Meen (2000), Cameron et al. (2006), Kelly and McQuinn

4 See Lane (2017), FitzGerald (2018, 2020) and Honohan (2021) for more on this.

5 Honohan (2010) takes the view that the scale of the Irish banking crisis in 2008 was principally owing to domestic determinants with policy failures on the part of the Irish retail banks and government contributing strongly.

Figure 4
Average loan-income ratio (average loan-to-income multiple), 1995Q1-2023Q4



Source: Authors' own calculations.

(2014) and Cronin and Quinn (2021). The model, which assumes that the demand for housing services is proportional to the housing stock, is usually derived in log-linear fashion. According to this equation, house prices are positively related to real income per capita and are negatively related to the per capita housing stock and the user cost of capital.

Following Egan et al. (2022), we also use the affordability variable outlined in equation (1) above. This is because, as noted in McQuinn and O'Reilly (2008), estimates of the standard inverted demand functions for housing often have a relatively small effect for either the nominal or real interest rate or the user cost of capital. This is a particularly important consideration if the model is to be used for assessing monetary policy simulations. Therefore, the affordability variable is used to capture both the income and interest rate effects together.

The link between house prices and credit has been noted in a wide variety of studies such as Tsatsaronis and Zhu (2004), Goodhart and Hofmann (2008), Cerutti et al. (2017), Duca et al. (2021) and in Irish-based approaches such as Kelly et al. (2011), McCarthy and McQuinn (2017), and Cronin and Quinn (2021). To allow for the impact of changing credit conditions in the model, we employ the approach in Duca et al. (2011), who address the issue in the US housing market. Namely, we first construct an *adjusted* loan-to-income, lti_t , series for the Irish housing market over the period. This is achieved in the same way as in Duca et al. (2011) by estimating the following regression:

$$lti_t = \beta_0 + \beta_1 \frac{afford_t}{pcd_t} + ltires_t \quad (2)$$

The residuals from the regression, $ltires_t$, can be considered as the exogenous shift in credit conditions in the Irish market, i.e. those changes in credit conditions which

Table 1
Summary of main variables used in the analysis, 1980Q1-2023Q4

Variable	Mean	Std. error	Minimum	Maximum
hp_t	€188,804	€112,843	€38,230	€400,165
lti_t	2.91	1.09	1.62	4.66
pcd_t	0.781	0.255	0.241	1.246
$afford_t$	€148,021	€107,210	€11,016	€330,042
$pop2544_t$	1,165,154	227,117	802,125	1,451,825
$tpop_t$	4,069,704	571,043	3,394,850	5,257,200
rmt_t	6.83	4.31	2.45	16.43
cap_t	1,845,117	156,293	1,650,000	2,056,924
pdr_t	€31,732	€17,341	€5,593	€62,286

Note: lti_t is measured in actual multiples, pcd_t is in index form, $pop2544_t$, $tpop_t$ and cap_t are in actual units and rmt_t is in interest rates.

Source: Authors' own calculations.

are not captured by the endogenous factors contained in $afford_t$. These residuals are then included in the house price equation to allow for the presence of changing credit conditions. The house price model also includes the stock of housing, cap_t , which evolves according to the standard perpetual inventory method:

$$cap_t = cap_{t-1} \times (1 - \psi) + hs_{t-1} \quad (3)$$

where ψ is the rate of obsolescence in the Irish housing market, and hs_t is the level of new dwelling completions. The stock of housing is included to allow for supply-side effects in the house price model and provides a link with the housing supply equation in the broader COSMO framework. The house price equation also includes a demographic variable. The long-run specification can therefore be written as:

$$\begin{aligned} \frac{hp_t}{pcd_t} = & \beta_0 + \beta_1 \frac{afford_t}{pcd_t} + \beta_2 ltires_t \\ & + \beta_3 \frac{pop2544_t}{tpop_t} + \beta_4 cap_t + \varepsilon_t \end{aligned} \quad (4)$$

where $afford$ is the affordability measure outlined in equation (1), $pop2544/tpop$ is the proportion of the population between the ages of 25 and 44, capturing the main house purchasing cohort, and cap is the measure of supply. All monetary variables are deflated by the personal consumption deflator (pcd_t). We would expect all variables to exhibit a positive sign with the exception of the supply of the housing variable.

Results

Table 1 presents summary statistics on all the relevant variables used in the analysis. It is evident that a number of

Table 2
Initial long-run regression results, 1980Q1-2023Q4

Dependent Variable	$\log(lti_t)$		$\log\left(\frac{hp_t}{pcd_t}\right)$	
	Estimate	t-Stat.	Estimate	t-Stat.
Constant	-5.358	-27.093	76.075	-11.489
$\log\left(\frac{afford_t}{pcd_t}\right)$	0.538	-32.181	0.986	-16.309
$\log(lti_{res_t})$			1.390	-13.329
$\log\left(\frac{pop2544_t}{tpop_t}\right)$			1.082	-5.051
$\log(cap_t)$			-5.137	-10.294
$\bar{R}^2$	0.855		0.885	
DW	0.086		0.191	

Note: N = 176 observations in both cases.

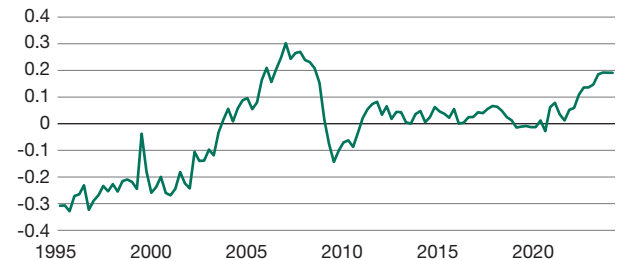
Source: Authors' own calculations.

the variables have witnessed significant variation over the period 1980-2023, particularly given the period of elevated growth in the Irish economy from the early 1990s onwards.

Long-run estimates of the loan-to-income (equation (2)) and house price (equation (4)) models are presented in Table 2. All variables are in logs so the coefficients may be interpreted as elasticities. The results from equation (2) are of particular interest given the importance of changing credit conditions. As is evident from the estimates, changes in key macroeconomic variables such as disposable income and mortgage interest rates, as captured by the affordability variable, have a significant impact on credit conditions. However, what is of particular interest is the role played by the residuals from equation (2), the unexplained change in credit conditions, or the exogenous shift in lending standards.

The results for the residuals are displayed in Figure 5. The substantial shift in credit conditions in the pre-GFC period

Figure 5
Residuals from loan-to-income regression, 1995Q1-2023Q4

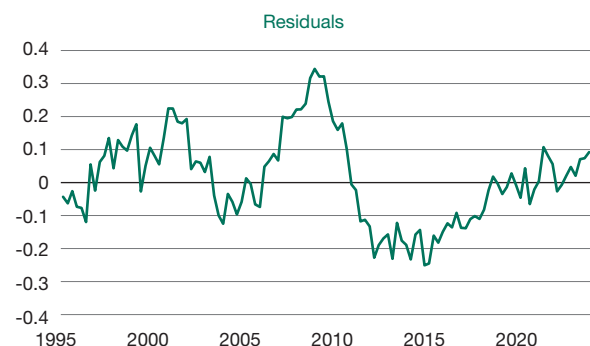
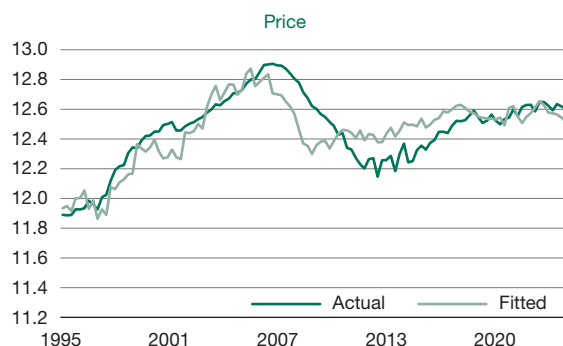


Source: Authors' own calculations.

is evident, with the residuals exceeding 20% from mid-2006 to early 2008. From 2009 onwards, the residuals displayed a significant downward trend and remained practically static between 2011 and 2021. Thereafter, they have increased somewhat through 2022 and 2023, suggesting that there is an exogenous shift in credit conditions over this period. Consequently, a growing portion of the increase in the actual loan-to-income ratio illustrated in Figure 4 from 2021 onwards is not explained by movements in macroeconomic variables such as income levels and interest rates.

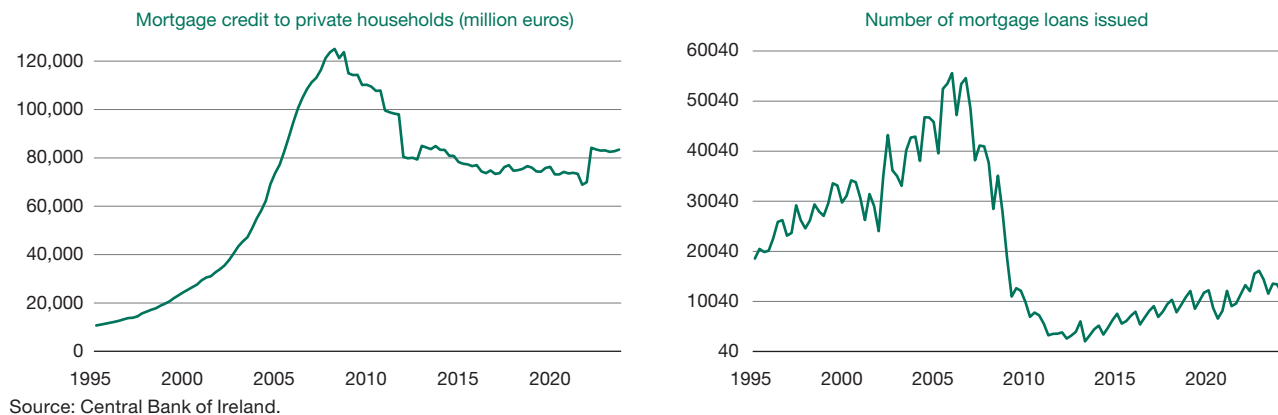
The subsequent effect of the change in credit conditions can be observed from the house price model in Table 2; the coefficient on the residuals from the loan-to-income model is a sizeable 1.4. Therefore, a significant increase in exogenously determined credit conditions has a non-trivial effect on house prices. The results for the house price model can be gleaned from Figure 6, which plots both the actual and fitted price from the model (on the left side) as well as the re-

Figure 6
House price model results, 1995Q1-2023Q3



Source: Central Statistics Office and authors' calculations.

Figure 7
Aggregate mortgage credit market variables, 1995Q1-2023Q3



sulting residuals (right side). From the residuals, it is evident that the recent increase in house prices is somewhat unexplained even when the exogenous shift in credit conditions is allowed for. The scale of the residuals at around 10% is still somewhat less than the 30% at the peak of the Celtic Tiger.

Overall, therefore, the results suggest that some of the recent increases in house prices may be due to an exogenous shift in credit conditions along the lines of what happened in the mid-2000s. This is despite the presence of the Central Bank's macroprudential framework that was introduced in 2016 and has placed specific limits on metrics such as loan-to-income and loan-to-value ratios.

It is important to place the scale of such a development in context. Figure 7, for example, plots both the total stock of mortgage credit issued to Irish households (on the left side) and the number of new mortgages issued (right side). It is clear that the number of mortgages and general level of credit is substantially lower now than what it was at the peak of the Celtic Tiger. However, it is evident that there are a certain number of households in the Irish residential market that have particularly elevated leveraged positions, which renders them especially vulnerable to a sudden sharp economic shock in terms of either income loss or interest rate increases.

In the interests of robustness, an alternative long-run estimator (FM-OLS) was used to estimate the house price regression. The estimated coefficients are broadly the same. For the corresponding short-run regression for the long-run house price model, general-to-specific Hendry (2000) approach is adopted. There is clear evidence of error-correction with the ECM_{t-1} variable having a coefficient value of -0.08. The residuals for the short-run model are, in general, well behaved.⁶

⁶ For more information, please contact the authors.

Concluding thoughts

The exceptional cost of the intertwined nature of credit conditions and house prices in an Irish context means that the relationship must be consistently evaluated, particularly from a financial stability perspective.⁷ Quite apart from the fiscal cost of the financial crash to the state, the associated impact on households in terms of mortgage arrears and negative equity as well as the knock-on implications for the domestic economy were substantial in nature.

It is evident that much of the increase observed in Irish house prices post-GFC can be attributed to economic factors such as the recovery in the economy or the absence of a significant response from the supply side of the housing market. However, over the past few years, it would appear that changes in credit standards are once again beginning to have an impact on residential prices. This is particularly evident via an exogenous change in lending standards since 2021. These results do suggest that it may have been linked to changes in the credit conditions by the Central Bank of Ireland, which eased its mortgage-based macroprudential measures in 2022. These changes included a movement of maximum loan-to-income ratios for first-time buyers from 3.5 to 4 times income as well as changes allowable to loan-to-value ratios for second and subsequent buyers from 80% to 90%. Enabling prospective house buyers to borrow more at a time when there was considerable savings already built up in the Irish economy due to COVID-19 has almost certainly put upward pressure on house prices.⁸

⁷ The latest estimated net cost to the Irish state of the bank stabilisation measures is in the region of €41.7 billion (Office of the Comptroller and Auditor General, 2019).

⁸ Fitzgerald et al., (2021) note that when European consumers were similarly rationed during the Second World War, excess savings were subsequently converted into physical assets in the housing market.

While there is not yet a systemic risk to the domestic financial system, it is important that this trend in changing credit conditions and the resulting impact on house prices be carefully monitored. With actual levels of housing supply in the Irish market somewhat below estimates of the structural demand for housing (Bergin & Garcia-Rodriguez, 2020), it is particularly important that any upward movements in house prices are not additionally fuelled by changes in credit conditions.

Our research has a number of broader implications for other European economies and for the relationship between housing markets and access to credit. Many small open economies like Ireland introduced stringent macroprudential measures into mortgage markets with the aim of breaking the pro-cyclical links between house prices and credit and building resilience in the banking sector. In recent years, the European Systemic Risk Board (2024) has noted that the increase in residential real estate risks in a number of countries due to high levels of household indebtedness. Our research is important as it directly shows the link between rising loan-to-income ratios and house prices and provides further evidence that maintaining strong and stable leverage ratios is important for financial stability. Indeed, the ESRB note that improving housing affordability, likely through supply side measures, is a critical way to break the link between higher leverage and higher house prices. A number of recent studies (OECD, 2021; Frayne et al., 2022) highlight the relatively low level of supply in the European residential market vis-a-vis the level of housing demand. Ensuring that borrower-based measures remain strong and well calibrated will be a critically important aspect of ensuring stable credit markets for other European economies, and, more globally, small open economies.

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