POLICY PAPER

Comparing Housing Market Dynamics in the Irish and UK Residential Markets

Wendy Disch
Central Bank of Ireland

Paul Egan
Economic and Social Research Institute

Kieran McQuinn
Economic and Social Research Institute

Eoin Kenny
Economic and Social Research Institute

Abstract: Given the sharp and persistent increase in both house prices and rents, the need to increase housing supply in the Irish market has become increasingly pressing over the last number of years. While a number of Government policy initiatives have been introduced, it is clear that actual levels of housing supply are still somewhat below the level of demand, with official Government targets suggesting a significant difference between the two. Given the difficulties experienced by the supply side of the domestic housing market, it is informative and interesting to contrast housing supply in the Irish market with that of Ireland's nearest housing markets; in particular, the Northern Irish, English, Scottish and Welsh markets. These markets share many of the characteristics of the Irish market in terms of planning and regulatory regimes as well as cultural preferences for certain property types compared with continental housing markets. In this paper we, therefore, build on previous work by Egan and McQuinn (2023a) to assess the relationship between house prices and supply levels across the different Irish and UK markets. This serves as an important benchmark by which to evaluate the performance of the supply side of the Irish residential market.

I INTRODUCTION

The Irish housing market has, in the post-Global Financial Crisis (GFC) era, been generally characterised as suffering from an acute shortage of housing supply. Actual supply levels, which had during the 2005–2007 period averaged nearly 85,000 units per annum, quickly fell away to a paltry level of 4,500 units in 2013. As noted in studies such as Cronin and McQuinn (2021; 2023) and Egan and McQuinn (2023a; 2023b), the Irish financial and construction sectors were particularly impacted by the GFC. This adverse impact on the supply side of the housing market coincided with the significant improvement and recovery in the general economy after the GFC. This recovery in economic and labour market conditions, particularly allied to the lower interest rate environment facilitated by monetary authorities after the financial crash led to a resurgence in Irish housing demand. With supply levels struggling to respond, Irish house prices and rent levels have since 2013 been persistently increasing resulting in acute affordability pressures in the Irish market (see Corrigan et al., 2019, for a detailed examination of affordability in the Irish mortgage market).

The shortage of housing supply relative to demand, although particularly pressing in the Irish case, is by no means specific to the domestic circumstance. A number of recent studies (OECD, 2021; Frayne *et al.*, 2022) highlight the relatively low level of supply in the European residential market vis- à-vis the level of housing demand. While a natural lag exists between housing supply and demand, it is clear that a substantial difference has emerged between the two across many European residential markets over the past ten to 15 years. Eiglsperger *et al.* (2022), for example, note that housing costs have been to the fore in recent euro area inflationary pressures. In the UK, housing supply levels are also deemed to be somewhat less than the level of demand, with Cheshire and Buyuklieva (2019), for example, contending that higher house prices can be explained by the relatively low levels of home building in the British market over the same period.

A continued shortage of housing supply relative to demand inevitably results in increased costs of housing with both prices and rents rising over time. Consequently, housing costs have been taking an increasing proportion of household income particularly vis-à-vis expenditure on items such as health and education. OECD (2022) notes that between 2005 and 2015, the share of household income spent on housing increased by 5 percentage points to 31 per cent of household income for middle-income households across most OECD countries.

Given the acute affordability pressures felt in the Irish market due to housing shortages, the Irish Government has announced a number of initiatives, which have the explicit purpose of significantly increasing the number of housing completions going forward. The key assumption underpinning the Government's approach is that increased housing supply will ultimately reduce the degree of house price inflation and hence housing costs in the economy. The main policy in that regard

is "Housing for All" published in 2021.[1] Given the particular difficulties experienced in the Irish case, a recent study, Egan and McQuinn (2023a), has examined the dynamics of house prices and supply. In particular, Egan and McQuinn (2023a) assess the impact of additional housing supply on housing prices in order to determine whether future increases in supply will temper periods of high housing price inflation. Further work (Lyons and Gnnewig-Mnert, 2024) examines the determinants of housing supply in Ireland over recent decades.

In this paper, building on Egan and McQuinn (2023b), we seek to benchmark the results for the Irish market by examining the dynamics between house prices and supply with comparator housing markets in Northern Ireland, Scotland, Wales and England. In particular, we draw on a recent detailed analysis of housing supply across the Irish, Northern Irish and other UK housing markets (Disch *et al.*, 2024), which examines differences and similarities across these housing markets. Disch *et al*. (2024) highlight that there are more similarities than differences across these markets, given similarities in planning and regulatory processes and cultural preferences in terms of property types, especially when compared with continental housing markets.

Firstly, we examine the long-term elasticities of housing supply to prices in the Irish, Northern Irish, English, Scottish and Welsh markets using the econometric frameworks applied for OECD countries outlined in studies such as Cavallari *et al*. (2019), Geng (2018) and Caldera and Johansson (2013). A quantification of housing supply responsiveness to prices may offer an insight on housing markets in Ireland, Northern Ireland and the rest of the UK. This has the potential to provide useful information for housing policy measures targeted at reducing home price volatility and affordability difficulties, such as those seen in recent years in both the Irish and Northern Irish markets. Secondly, we examine the relationship that changing levels of housing supply have had on prices across the five housing markets. Understanding the impact of housing supply on housing price inflation is a particularly important issue from a policymaker's perspective, as it is critical to accurately estimate the impact of extra supply on prices when determining whether future increases would temper inflationary pressures. Finally, we assess the impact of market specific characteristics on the relationship between housing supply, housing investment and prices. This will provide insight into any heterogeneity in relationship between supply and prices across housing markets.

The rest of the paper is laid out as follows: first the Irish and UK housing markets are discussed, with the relatively stronger performance of the Irish economy in recent years being noted. This is followed by an in-depth review of historical supply levels across the Irish and UK housing sectors. The empirical model used to assess the dynamics of house prices and supply is then presented

---

[1] See https://www.gov.ie/en/publication/ef5ec-housing-for-all-a-new-housing-plan-for-ireland/ for details.

and a subsequent section outlines the results of the analysis. A concluding section offers some final comments and policy proposals.

II THE IRISH AND UK HOUSING MARKETS

In assessing the performance of the different housing markets across Ireland and the UK, it is important initially to reflect on the relative economic performance particularly of Northern Ireland and Ireland. The housing market is but one component of an overall economy, and developments in a housing market are particularly impacted by general macroeconomic factors. Most of the housing literature (e.g. Duca *et al*., 2021; Cronin and McQuinn, 2021) specifies income levels and labour market developments, for example, as being central to housing demand in an economy. The Irish economy has experienced significant growth over the period 1995 to the present. The initial phase of the Celtic Tiger did give way to a mortgage credit-fuelled housing bubble, and as a result the Irish economy was especially susceptible to the Global Financial Crisis of 2007/08 (Cronin and McQuinn, 2023). Consequently, the Irish economy experienced a sharp downturn in activity from 2008 to 2012. However since then, as noted in FitzGerald (2023) and Kostarakos *et al*. (2023), the Irish economy has grown in a persistent and sustained manner and, unlike the pre-2007 era, the present growth performance appears to be more sustainable in nature.

The relative performance of the Irish and Northern Irish economies has been dealt with in some detail by McGuinness and Bergin (2020), who note that Northern Ireland's position as one of the poorest UK regions has altered little over the 2000 to 2014 period. They also show that income levels in Northern Ireland were approximately 50 per cent lower than those in the southern and eastern regions of Ireland where 76 per cent of the population live. McGuinness and Bergin (2020) also point out that alternative indicators of living standards are available which are consistent with the differences in per capita income levels. Finally, they note that in terms of future prospects, the annual average ten-year forecast (2020 to 2030) for Irish GDP growth is 2.6 per cent, which compares to 1.7 per cent for the UK, and 1.9 per cent for the OECD as a whole. While no forecasts are available for the Northern Ireland economy, McGuinness and Bergin (2020) conclude that it is reasonable to suggest that it is likely to grow somewhat slower than the UK average over the period. In more recent work, McGuinness and Bergin (2020) also show that productivity levels in Ireland exceeded those of Northern Ireland, with productivity per worker in Ireland approximately 40 per cent higher than in Northern Ireland.

This stark contrast in the overall economic performance between the economies of Ireland and Northern Ireland is an important factor as far as the relative performance of the housing markets is concerned. This is particularly evident in

terms of the different estimates of the structural demand for housing outlined in Disch *et al*. (2024). Along with population movements, income levels are a key element of this demand. Indeed, population movements[2] themselves are also a function of economic performance. Therefore, the contrasting economic performance of Ireland and Northern Ireland is one key difference in terms of the respective housing sectors.

It is important to note the differing degrees of policy autonomy across the different UK housing markets, with certain regions having greater local control than others. For example, since 1999, housing policy has been devolved to the Scottish Parliament in the case of Scotland, and to the Northern Ireland Assembly in Northern Ireland. In that respect, Scotland and Northern Ireland differ from the Welsh market in certain policy areas: they have specific definitions on affordable housing supply; they have specific schemes such as the Right to Buy scheme; on the security of tenure; and on requirements concerning the energy efficiency of housing.[3] Additionally, regulations can be put in place for a number of reasons such as to meet environmental targets, adhere to safety standards or even to maintain the aesthetics of neighbourhoods. Often, development plans may need to include assessments to judge their fiscal or environmental impacts and public hearings and legislative issues are not uncommon. Figures 1a and 1b present trends in house prices and residential investment across all five markets.

III HISTORICAL TRENDS IN HOUSING OUTPUT

Housing demand and supply in both Ireland and across the different regions in the UK have undergone similar developments over the past 40 years, although Ireland experienced a greater degree of volatility in key housing variables. In Ireland, the State played a large role in housing in the earlier part of the twentieth century. Social housing was a common source of housing supply but the existence of many supports as well as extensive tenant purchase programmes meant much of the Irish housing stock was owner-occupied housing, with owner occupation peaking at almost 80 per cent in the 1980s. In the UK, social housing actually made up a third of the housing supply in the 1970s. This was driven by large amounts of social housing being built in the aftermath of the Second World War. With the deregulation of the financial systems in both the UK and Ireland throughout the 1980s and 1990s, as well as the entrance of the Irish banking system into the European Monetary Union, credit became much more widely available. At a time when income levels in Ireland

---

[2] 'Population movements' in this context refers only to population trends. Other factors such as rates of household formation are not considered in the present study.
[3] Sources: Scottish Government Quarterly Housing Statistics on Affordable Housing Supply; Ministry of Housing, Communities and Local Government Live Tables on Affordable Housing (Table 1,000) in England; and Provision of Affordable Housing – Welsh Government.

Figure 1a: House Prices in Ireland, Northern Ireland, England, Scotland and Wales (€)
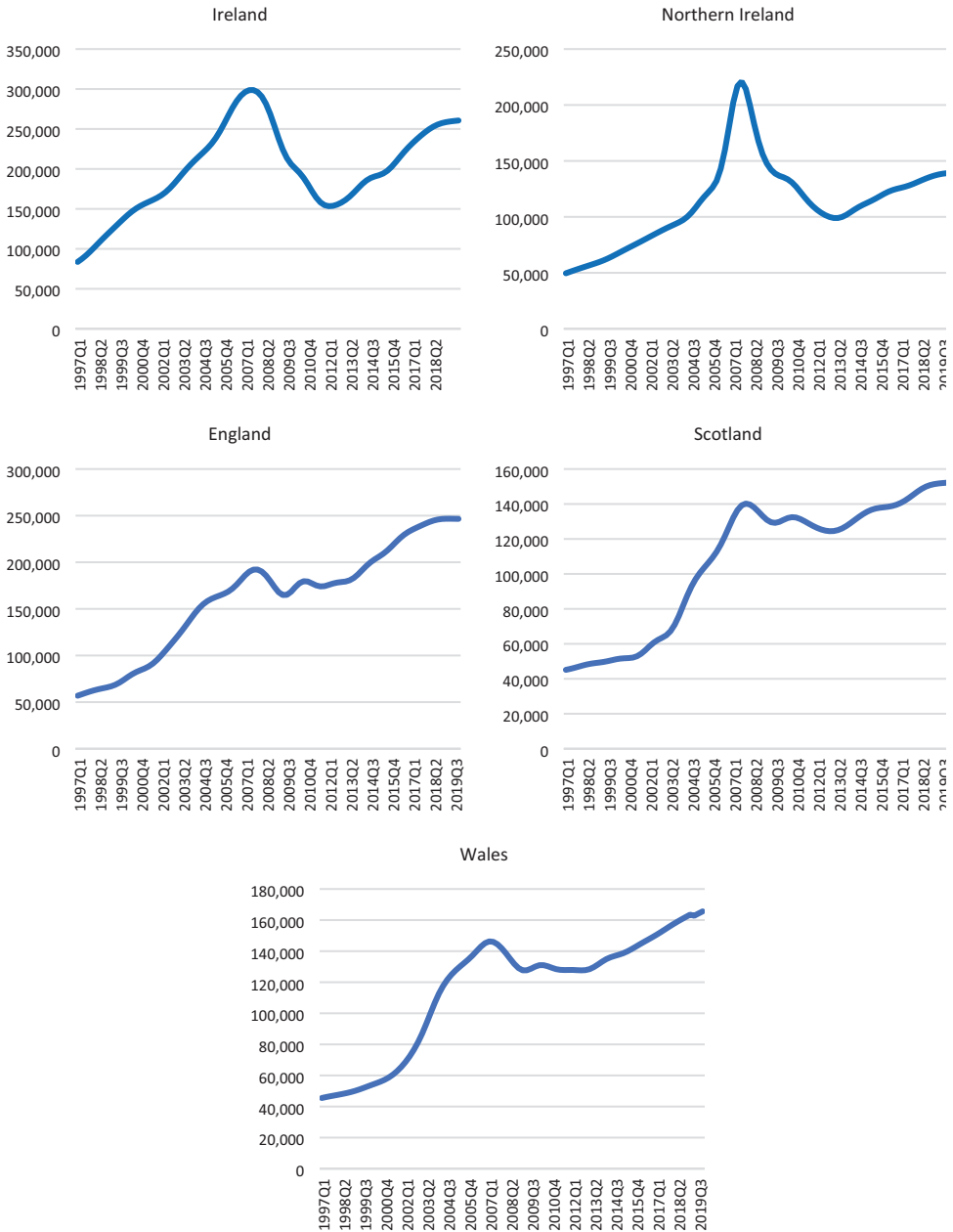
Source: Central Statistics Office and the Office of National Statistics

Figure 1b: Gross Capital Formation (Dwellings) in Ireland, Northern Ireland, England, Scotland and Wales (€)

Ireland

Northern Ireland

England

Scotland

Wales
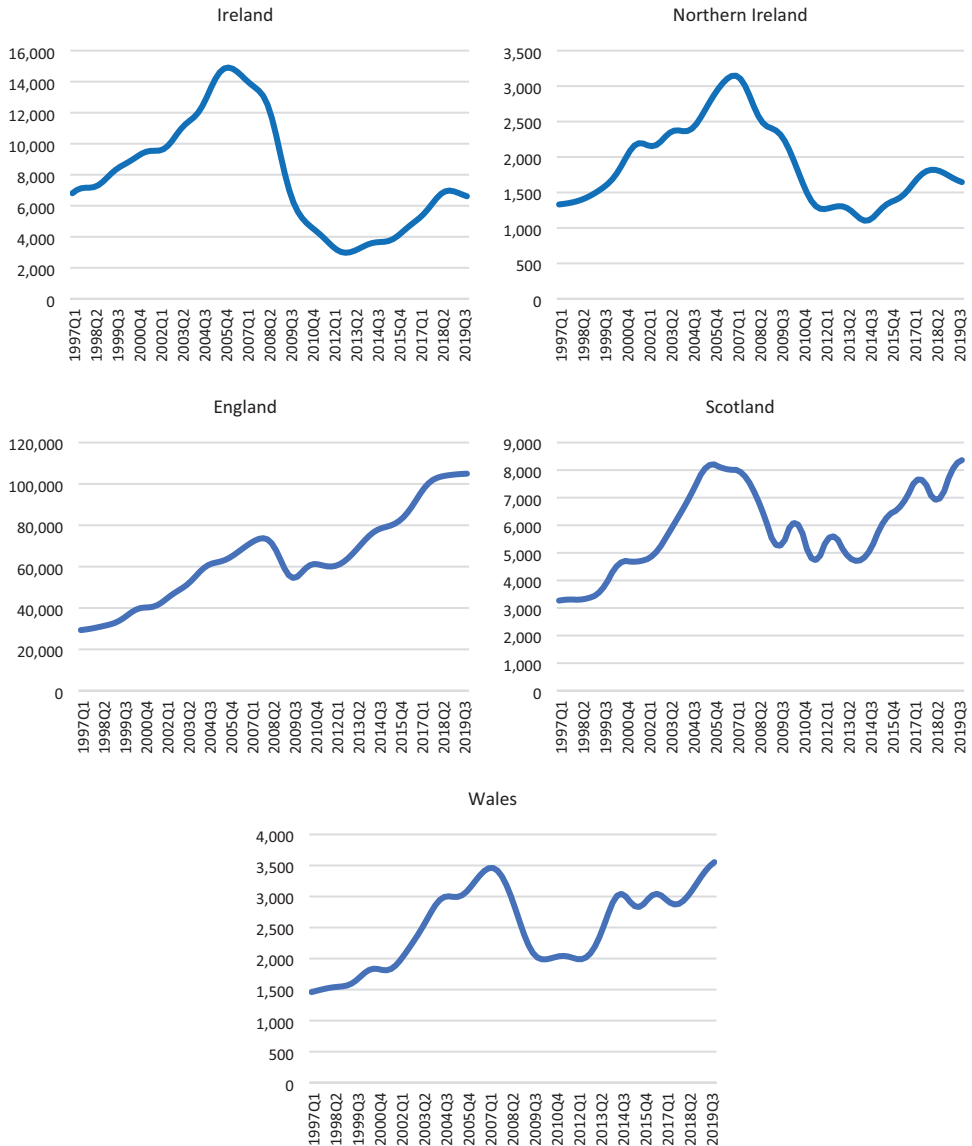
Source: Central Statistics Office and the Office of National Statistics.

and the UK were beginning to increase persistently, this, along with key demographic trends, led to the demand for housing to rise substantially in Ireland and the UK from the 1980s into the 2000s. These dynamics were more pronounced in Ireland, with the onset of the Celtic Tiger in the mid-1990s.

However, this expansion of bank lending from the early 2000s went hand-in-hand with a loosening of credit standards in both the UK and Ireland, but particularly in Ireland. When the Global Financial Crisis (GFC) of 2007/08 emerged, Irish financial institutions were particularly vulnerable given the rapid increase in the size of their balance sheets and the sharp increase in bank borrowing from foreign credit institutions as a means of increasing their lending in the domestic market (see McCarthy and McQuinn, 2017, for more on this). After the GFC, housing demand fell significantly as peoples' incomes came under significant pressure, with many mortgages actually falling into arrears. However since the GFC, after macroeconomic and macrofinancial conditions stabilised, demand in both the UK and Ireland has recovered strongly with house prices increasing accordingly.

Across both countries, the supply side of the housing market followed a similar dynamic prior to the GFC. The wide availability of credit in the late 1990s and early 2000s facilitated increased housing supply, particularly in Ireland. Continually increasing house prices from the mid-1990s onwards provided incentives for developers to increase supply and this was enabled by relatively loose credit conditions, where developers were able to access high levels of debt financing for projects as a percentage of the total spend. However, the GFC had a substantial impact on the supply side across both the Irish and UK markets. After the financial crash, new building halted almost entirely as house prices plummeted. By 2012, house building in Ireland had decreased by 90.9 per cent from the peak of the boom (Byrne, 2020).

The collapse in house building activity by the private sector in both the UK and Ireland came after a period when the public sector became less important in the provision of housing supply from the 1980s onwards. Therefore, after the GFC, a "perfect storm" encompassed the supply side of both the Irish and UK housing markets. The private sector was unable to produce sufficient levels of housing due to very difficult economic conditions and more stringent borrowing conditions in the wake of the ensuing recession after the financial crash, while public sector investment had been reduced considerably across the different British and Irish housing markets. As mentioned, this dynamic was particularly severe in Ireland.

With muted levels of output across housing markets, growing populations in both Ireland and the UK have led to higher levels of housing demand, with supply trying to catch up. This has been compounded in Ireland by the significant recovery in the general economy since the GFC. These levels of demand have seen elevated levels of homelessness, notwithstanding public policy measures in response. In Ireland, Census data from the CSO show there were 3,808 persons either sleeping

rough or in emergency accommodation[4] in 2011. This increased to 6,906 people in 2016, and in July 2023 there were 12,847 people in emergency accommodation. According to the Department for Communities' Homelessness Bulletins, homelessness in Northern Ireland has increased from 4,740 in 2014 to 8,531 in 2023. However, as has been noted by Develtere (2022), the measurement of homelessness is difficult and is often underreported due to squatters, persons sleeping rough and other categories of homeless people.

The economic recovery in the absence of a revival in residential activity has also seen housing costs rise. However, costs in Ireland and Northern Ireland are comparable when controlling for income levels. Bergin and McGuinness (2021) report that housing costs account for around 20 per cent of disposable income in both Northern Ireland and Ireland. Disch and Slaymaker (2023) examine this further and note that higher proportions of young people in Ireland live in the parental home, which would suggest that average costs are lower as they are split by a larger number of household members. However, given that the share of the population of people living in the parental home is small, it is concluded that housing costs as a proportion of income are similar across the two jurisdictions.

Therefore, housing markets across both Ireland and the different regions of the UK can be characterised by a boom-and-bust cycle, with the cycle being more extreme in the Irish case because of the greater volatility in Irish economic performance over the period 1995 to the present.

Figure 2 presents a summary of total housing supply per capita (per 1,000 of the population) across the Irish, Northern Irish, English, Welsh and Scottish markets for the period 1971 to 2021. We divide total housing supply by population to allow for the different scale of population across the different markets.

A number of interesting trends are apparent from Figure 2; firstly, housing supply per capita across all markets has been gradually declining since the early 1970s. This is somewhat obscured by the experience in the Irish market from the mid-1990s to 2008, when there was a substantial increase in housing supply during the Celtic Tiger era. Interestingly, of the UK housing markets it would appear that Northern Ireland experienced the most pronounced variability in terms of the increase and decrease of supply. The increase in housing supply in Northern Ireland in the late 1990s was similar in nature although different in scale to that happening in the Irish market. Over the period in question, the Scottish market, which has experienced a relative decline since the early 1970s, has sustained the most consistent level of supply, particularly during and after the GFC. In recent years, it is notable that housing supply per capita is very similar across the Irish, Northern Irish, Scottish and English markets, however Welsh housing supply appears to be low at present.

---

[4] This does not include those sleeping rough.

Figure 2: Total Housing Supply Per Capita (1,000): Northern Ireland, Ireland, England, Wales and Scotland
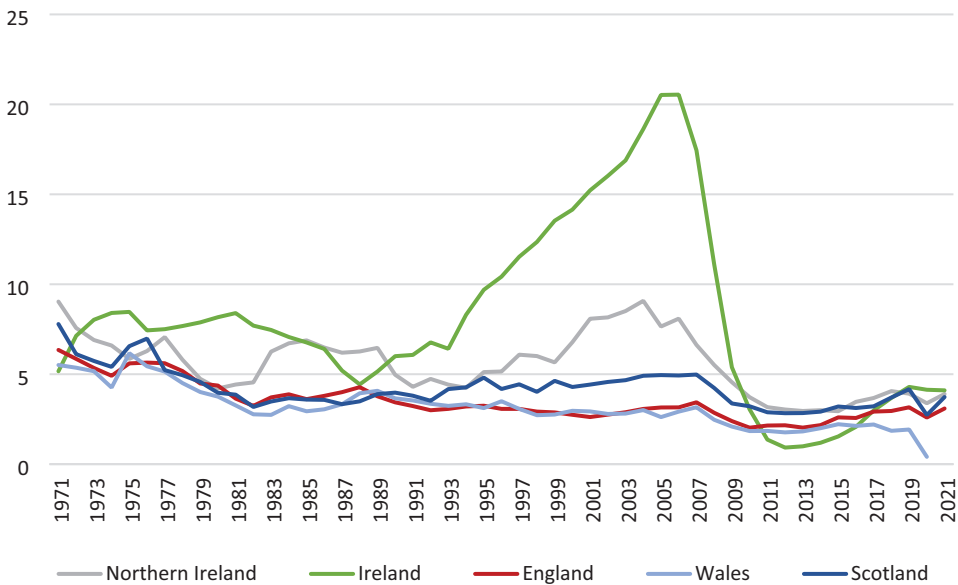
Source: Office of National Statistics and the Central Statistics Office.

Due to the lack of construction activity after the financial crash and subsequent recovery in housing demand, there has been significant house price inflation since the early 2010s, with many people in both countries now finding it difficult to enter homeownership due to high house prices and tighter credit conditions in terms of Loan-to-Value (LTV) and Loan-to-Income (LTI) ratios.

Declining homeownership is another issue that both Ireland and the UK have faced since the GFC. The financial crash highlighted that many households had taken out large amounts of debt that they could not then afford to service. Many homes were repossessed by banks and other financial institutions. Additionally the lower interest rates set by the European Central Bank (ECB), as well the Bank of England, in the aftermath of the GFC did not lead to increased homeownership, as many households were unable to pass the LTV and LTI ratio requirements.[5] The low interest rates and deleveraging of properties by banks offered an opportunity to larger investors and other financial institutions, who have now become major actors particularly in the Irish housing market, with some evidence that their presence is increasing in the Northern Irish market[6] and the rest of the UK.

[5] Census data from the CSO show that homeownership rates in Ireland have declined from 2011 to 2022, a period of historically low interest rates. Press Statement Census 2022 Results Profile 2 – Housing in Ireland – CSO – Central Statistics Office.
[6] See https://www.northernirelandchamber.com/member-news/investment-volumes-in-northern-ireland-real-estate-sector-doubled-in-2021-cbre/.

Declining homeownership, a depleted public housing stock, and the entrance of large investor landlords into the market have seen significant growth of the rental market, with these factors leading to substantial increases in demand in the rental sector. With a lack of significant new supply to meet this demand, rents have increased substantially in the Irish and UK markets. As noted above, the public housing stock across Ireland, Northern Ireland and the rest of the UK is at historically low levels. The amount of publicly provided housing (per capita) is shown in Figure 3. Again, it is clear that there has been a persistent decline in public housing per capita since the early 1970s with supply levels from this source in Northern Ireland and England experiencing a particularly protracted fall. The Irish market appears to have countered this declining trend from the mid-1990s until about 2003. After that period, however, Irish public housing per capita also declined sharply and was actually at the lowest level across the different markets for the period 2011 to 2016. In recent years, Irish and Scottish public housing output levels have increased. In the same period, construction from public sources has remained relatively constant in the Northern Irish and English markets, whereas public housing per capita has declined somewhat in the Welsh market. This decline in publicly provided housing has put particular pressure on the rental market as lower income households who would traditionally reside in social housing are now given subsidised rents instead. This has been an approach employed in Ireland, Northern Ireland, and the rest of the UK (Byrne and Norris, 2022).

Figure 3: Total Publicly Provided Housing Supply Per Capita (1,000): Northern Ireland, Ireland, England, Wales and Scotland
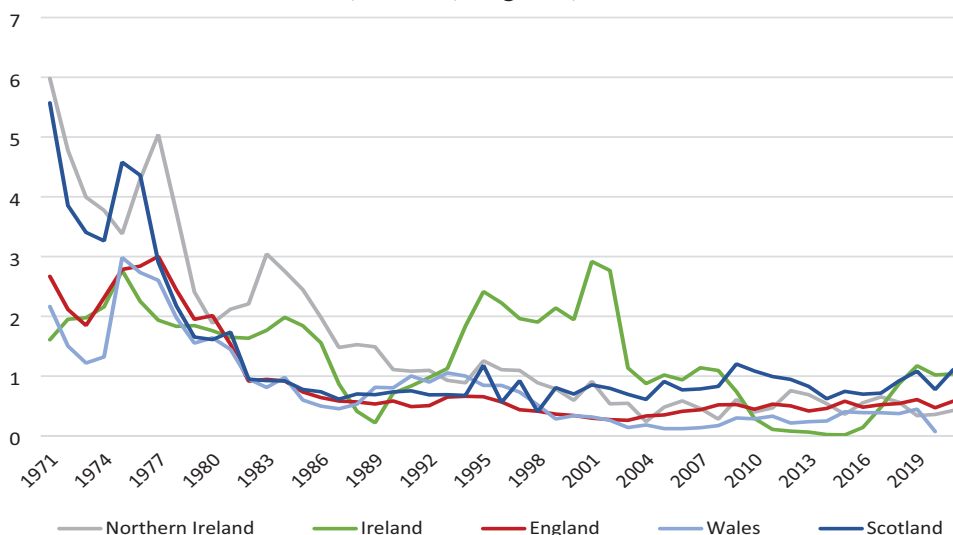
Source: Office of National Statistics and the Central Statistics Office.

From the graph it is clear that at the onset of the early 1970s, Northern Ireland and Scotland had the highest share of housing accounted for by public provision. The Irish housing market, by contrast, had the lowest proportion at that time. Over the full period of time, all markets have experienced a significant fall-off in housing that is publicly provided, however in recent years the proportion has increased particularly in Scotland and Ireland. The decline in government investment in housing post the Global Financial Crisis is not just specific to housing markets in Ireland and the UK. For example, OECD (2021) notes this trend across Western economies, and highlights the decline in government investment as one of the reasons for the increase observed across Western economies in house prices and rents.

IV METHODOLOGY AND DATA

4.1 Methodology

As noted by Cavallari *et al*. (2019), housing affordability is supported by supply that is sufficiently elastic to ensure that the economy can meet demand for housing in a timely way without experiencing significant price rises. The responsiveness of housing supply to changes in prices is a crucial factor in the functioning of housing markets. It determines the extent to which the housing market responds to demand shocks with increased construction or higher prices. This has potential implications for the evolution of key housing market outcomes such as housing prices and affordability (Caldera and Johansson, 2013). Given the central role that the lack of housing supply is having in Ireland, Northern Ireland and across the UK, this paper examines the relationship between house prices and the level of investment in housing as well as the relationship between the level of housing stock and house prices.

The empirical approach applied in this paper is based on the work of DiPasquale and Wheaton (1994) in which the dynamics of the housing market are estimated in a system involving a supply and demand equation. This supply side of this stock-flow model of the housing market can be described as:

$$S = I(X_1, P) + (1 - \vartheta)S_{t-1} \tag{1}$$

In Equation (1), housing stock S is linked to housing investment I such that, in the long run, the housing stock depreciates slowly at rate ϑ and expands gradually with new residential investment. Housing investment in turn depends on house prices P as well as several cost shifters such as material and labour costs, summarised in the vector of variables X_1. For estimation purposes, real residential investment is utilised as a proxy for housing stock change, and the cost of construction materials is used to proxy cost shifts. This gives the following

equation in which real residential investment is modelled as a function of house prices and construction costs:

$$I_t = \beta_0 + \beta_1 HP_t + \beta_2 CCOST_t \tag{2}$$

Equation (2) suggests that residential investment, I_t, will be driven by real house prices HP_t, with higher prices leading to a greater level of investment. This increase in residential investment is due to the profitability of house building by developers. On the other hand, an increase in construction costs, $\beta_2 CCOST_t$, disincentivises investors to replace existing housing stock.

On the demand side, DiPasquale and Wheaton's (1994) equation can be written as:

$$D(X_2, P, U) = S \tag{3}$$

where the demand for housing D depends on exogenous variables X_2 (which includes factors such as demographic characteristics and real permanent income), the price of real housing P and the user cost of financing that price, U. Equation (3) assumes that prices clear the market to bring demand in line with the available supply. By inverting and log-linearising Equation (3), we get a specification of the price equation expressed as:

$$HP_t = \beta_0 + \beta_1 S_t + \beta_2 INC_t + \beta_3 IR_t \tag{4}$$

In the above equation, house prices $HP_{i,t}$ are determined by the stock of houses S_t, the level of personal income INC_t and by the cost of credit measured by the real interest rate in levels IR_t.

Following similar studies for OECD countries such as Hüfner and Lundsgaard (2007) and Rae and van den Noord (2006), the price and investment equations described in Equations (2) and (4) are estimated in an error correction framework. We employ the two-step estimation procedure outlined in Engle Granger (1987). The process involves first estimating a cointegration equation to establish the long-run equilibrium relationship followed by an estimation of the short-run dynamics. For the purposes of this paper, the second step is more of a validation step to verify that adjustment does indeed happen to the long-term equilibrium relationship. The other estimated coefficients in the short-run equations are of lesser interest, given the focus on the long-run performance of the market, as opposed to where the emphasis would be if the objective were to produce short-term house price forecasts (Cavallari *et al.*, 2019). However, we also present the result of the short-run estimations in order to enrich the evaluation of our results.

The long-run and short-run relationships for each of the markets are estimated separately in the following system of equations where hp_t is the real house price,

s_t is the level of housing stock, inc_t is personal income, ir_t is the cost of credit, i_t is residential investment and $ccost_t$ is a measure of construction costs. The long-run relationships can be written as Equations (5) and (6):[7]

$$hp_t = \beta_0 + \beta_1 s_t + \beta_2 inc_t + \beta_3 ir_t + ect_t^{hp} \tag{5}$$
$$i_t = \alpha_0 + \alpha_1 hp_{t-1} + \beta_2\, ccost_{t-1} + ect_t^i \tag{6}$$

The main coefficients of interest in Equations (5) and (6) are the β_1 and α_1 coefficients which will represent the response of house prices to a change in supply and the response of investment to a change in house prices respectively.

Having estimated the long-run relationships, the residuals from Equations (5) and (6) (ect_t^{hp} and ect_t^i) are included as the error correction terms in Equations (7) and (8), and explain the short run dynamics of both prices and residential investment across the five markets:

$$\Delta hp_t = \Phi_0 + \Phi_1\, ect_{t-1}^{hp} + \Phi_2 \Delta s_{t-1} + \Phi_3 \Delta inc_{t-1} + \varepsilon_t \tag{7}$$
$$\Delta i_t = \theta_0 + \theta_1 ect_{t-1}^i + \theta_2 \Delta hp_{t-1} + \theta_3 \Delta ccost_{t-1} + z_t \tag{8}$$

The coefficients Φ_1 and θ_1 measure the speed of adjustment to the long-term equilibrium in house prices and residential investment. We expect both of these coefficients to be negative. With regard to Equation (7), disequilibrium in prices in previous periods will adjust back to equilibrium over the next periods. In Equation (8) disequilibrium in investment in the previous period should have a positive effect on investment in the next period.

As pointed out by Cavallari *et al.* (2019), the recent housing literature has relied on simultaneous equation models to jointly estimate the parameters of this equilibrium relationship in a system of equations estimated simultaneously, using seemingly unrelated regressions (SUR), with studies such as Geng (2018) and Caldera and Johansson (2013) applying the technique across a number of OECD countries. With this in mind, we estimate all four equations – that is the long run Equations (5) and (6) and short run Equation (7) and Equation (8) – for both house prices and residential investment jointly using a SUR. This enables us to take contemporaneous serial correlations and heteroskedasticity into account in the error terms between equations.

4.2 Data
The data for Irish house prices, residential investment and income are all obtained from the CSO, while the data on interest rates are sourced from the Central Bank

---

[7] In line with Caldera and Johansson (2013) and Cavallari *et al.* (2019) both construction costs and real house prices enter lagged in the equation to reflect the nature of the construction industry, where there is typically a lag between price signals and investment in housing, and to avoid potential endogeneity

of Ireland. For the level of housing stock, this is compiled using the new dwelling completions data provided by the CSO as well as data from the Department of Housing, Local Government and Heritage (DHLGH). For the measure of Irish construction costs, we apply the construction cost index produced by the DHLGH up to 2016, after which the series was discontinued. From 2016 onwards, it is calculated using a simple model regressing this building cost series on three wholesale price indices (cement, fabricated metal and precast concrete), and forecasting a value post-2016 on the basis of the fitted value from the model. For Northern Ireland, England, Scotland and Wales, the majority of the data are sourced from the Office of National Statistics (ONS). This is with the exception of the interest rate which is sourced from the Bank of England, and the measure of construction costs which is sourced from the Building Cost Information Service (BCIS). To ensure that each of the five regions has consistent and comparable measures for all key variables, the data are converted from an annual to quarterly frequency using an interpolation technique. This is a necessary step due to the fact that quarterly data, while being available for the UK region as a whole, are not available for all UK regions. For each variable, a quarterly series was created using cubic spline interpolation. This "low to high" frequency interpolation technique has been applied in other cross-country studies on house price and investment dynamics (see for example Rahal, 2016). While this means that the results presented in the next section should be treated with caution, as a robustness check we estimate the long-run equations in both the original annual and interpolated quarterly data and the significance, magnitude and sign of the key coefficients are broadly similar.[8] Finally, all the data are estimated up to the end 2019 to avoid any distortions to the variables due to COVID-19.[9]

V RESULTS AND DISCUSSION

The first step in the estimation process involves applying a standard Augmented Dickey Fuller (ADF) test for the presence of unit roots. This is applied to confirm the order of integration of the series involved in the estimation of the long-run relationships. The optimal lag length is chosen by both the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) for robustness. The results of the ADF tests, which are presented in the Appendix (Table A.1), suggest that the long-run relationships we examine in this paper are integrated of order one according to one or both of the tests applied – ADF using AIC or SIC.

---

[8] The long-run estimation using annual data can be found in Appendix A2.
[9] Figures (1a) and (1b) plot the historic series of the key variables of interest – house prices and residential investment.

Next, we estimate the long-run price elasticity of new housing supply in isolation where new supply is proxied by residential investments. In other words, we are examining β_1 the coefficient in the supply side-equation, Equation (5). The results of the estimated coefficients across the five housing markets can be seen in Table 1. The results show that all elasticities are significant at the 1 per cent level, and range in values from 0.51 (England) to 2.5 (Ireland), while Northern Ireland is shown to have an elasticity of just below unity at 0.99. This result suggests that the level of response of housing supply to changes in the level of prices is most flexible in the Irish housing market, followed by the Northern Irish market, while England has a much more rigid supply response to a change in price. The significant variation in the responsiveness of housing supply to price changes has implications for the various housing markets, both positive and negative. As pointed out by Caldera and Johansson (2013), a responsive housing supply is important to avoid bottlenecks in different segments of the market in response to an increase in housing demand. However, the flip side is that in flexible-supply countries, housing investment adjusts more rapidly to large changes in demand. This contributes to more cyclical swings in economic growth.

In terms of the short-run estimations, all markets have the expected significant negative sign on the error correction term, with the exception of the Northern Irish market, while the variation in the magnitude of the error correction terms is relatively small ranging from –0.02 in Wales to –0.05 in Ireland. The adjustment terms suggests that 20 per cent, 16 per cent, 12 per cent and 8 per cent of the difference between the actual and the equilibrium level of residential investment is closed within a year in Ireland, Scotland, England and Wales respectively.[10]

Having looked at the price elasticity of supply, Table 2 examines the reaction of prices to a change in the level of supply. Understanding the impact of housing supply on housing price inflation is a particularly important issue from a policymaker's perspective and a fundamental question that has arisen is whether increased housing supply may help to mitigate house price inflation. With regard to the long-run estimations, as with the price elasticity estimations, the results seem to suggest a degree of heterogeneity across the five housing markets in Ireland, Northern Ireland, England, Scotland and Wales with regard to the response of house prices to changes in the level of dwelling stock. It is also important to highlight that both Northern Ireland and Wales have a positive and significant coefficient on s_t. The effect of population on house prices, which is not taken into account in the equation due to the strong correlation between population and dwelling stock, may be the cause of this counterintuitive result. In line with similar studies in the area which have encountered such an issue (see Caldera and Johansson, 2013), a robustness check is carried out by including population divided by the dwelling stock in the house price equation. This gives a negative and significant coefficient

---

[10] Note the error correction estimates are based on quarterly data.

Table 1: Long and Short Run Estimations of Residential Investment

Long-Run Investment Equation
Dependent Variable: Log of Residential Investment

	Ireland	*Northern Ireland*	*England*	*Scotland*	*Wales*
hp_t	2.25**	0.99***	0.51***	0.64***	0.73***
	(0.61)	(0.04)	(0.03)	(0.06)	(0.06)
$bcost_t$	–2.18***	–0.53***	0.74***	0.17**	0.07
	(0.06)	(0.04)	(0.04)	(0.08)	(0.05)
Constant	–7.39***	–1.27***	0.77***	0.12	–1.25***
	(0.66)	(0.41)	(0.24)	(0.44)	(0.34)
Observations	92	92	92	92	92

Short Run Investment Equation
Dependent Variable: Δ Log of Residential Investment

	Ireland	*Northern Ireland*	*England*	*Scotland*	*Wales*
Δhp_{t-1}	1.42***	0.39***	0.90***	0.99***	1.12**
	(0.06)	(0.06)	(0.05)	(0.19)	(0.04)
$\Delta bcast_{t-1}$	0.01	0.17	–0.02	0.02	0.04
	(0.01)	(0.20)	(0.06)	(0.01)	(0.20)
ECT_{t-1}	–0.06***	0.02	–0.04***	–0.05***	–0.05***
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
Observations	91	91	91	91	91
Estimation Period	1997Q1- 2019Q4	1997Q1- 2019Q4	1997Q1- 2019Q4	1997Q1- 2019Q4	1997Q1- 2019Q4

Source: Authors' calculations.
Notes: ***, ** and * denote significance at the 1, 5 and 10 per cent level respectively. Standard errors are in parentheses.

for both Northern Ireland and Wales, while the long-run price elasticities of new housing supply are close to the original estimations.

Of the remaining three markets, the coefficients on s_t are all statistically significant and possessing the expected negative sign; Scottish house prices would appear to be the most responsive with a coefficient of –1.4, while Ireland has the lowest impact with a coefficient of –0.9. Interestingly, in terms of the sale of houses and house prices, the Scottish market is somewhat different to the other markets in that most properties are sold through a 'blind bidding' system. That means the seller will ask for offers over or around a minimum price. Interested buyers give sealed

bids and suggest a timescale for moving in. The highest bidder gets the sale and is informed on the same day. This is arguably a more efficient manner for determining prices than in other markets.

Table 2: Long and Short Run Estimations of House Prices

Long-Run Investment Equation
Dependent Variable: Log of Real House Prices

	Ireland	Northern Ireland	England	Scotland	Wales
s_t	−0.89***	2.33***	−1.11***	−1.44***	6.14***
	(0.23)	(0.62)	(0.20)	(0.48)	(0.23)
inc_t	1.07***	0.39	4.43***	3.14***	1.29***
	(0.08)	(0.23)	(0.11)	(0.19)	(0.06)
ir_t	−0.01***	0.01	−0.01**	−0.01	0.01
	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)
Constant	14.94***	−23.68***	−14.14***	0.97	−87.93***
	(2.78)	(6.89)	(2.76)	(5.05)	(3.43)
Observations	92	92	92	92	92

Short-Run Investment Equation
Dependent Variable: Δ Log of Real House Prices

	Ireland	Northern Ireland	England	Scotland	Wales
Δs_{t-1}	7.75***	4.98***	−6.11***	15.99***	9.18***
	(0.64)	(5.43)	(1.58)	(1.66)	(2.17)
Δinc_{t-1}	1.11***	0.26	2.10***	1.32***	0.13**
	(0.09)	(0.37)	(0.14)	(0.15)	(0.05)
Δir_{t-1}	−0.01***	0.02***	0.01***	0.01***	0.03
	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)
ECT_{t-1}	−0.10***	−0.01	−0.03**	−0.04***	0.05***
	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)
Observations	91	91	91	91	91
Estimation Period	1997Q1-2019Q4	1997Q1-2019Q4	1997Q1-2019Q4	1997Q1-2019Q4	1997Q1-2019Q4

Source: Authors' calculations.
Notes: ***, ** and * denote significance at the 1, 5 and 10 per cent level respectively. Standard errors are in parentheses.

Looking at the short-run estimates, once again Northern Ireland does not have a significant error correction coefficient. For the remaining four regions, there is a range of significant and negative coefficients of –0.02 (Scotland) to –0.12 (Wales) suggesting that 40 per cent, 16 per cent and 8 per cent of the difference between the actual and the equilibrium level of house prices is closed within a year in Wales, England and Scotland respectively.

Overall the results of the long-run estimations across Ireland, Northern Ireland, England, Scotland and Wales would suggest a significant degree of heterogeneity across the dynamics of the respective housing markets. On the residential investment side, there is a significant degree of variation in the response to changes in prices, with Ireland having by far the strongest response and England possessing the weakest. While on one hand it means that investment will respond strongly to changes in demand, it also suggests that the supply in the Irish market is more susceptible to cyclical changes to demand. With regard to the impact of changing supply to the level of housing stock, Ireland was found to have a more subdued response than that witnessed in the English and Scottish markets. With regard to the short-run estimation, Ireland has the quickest speed of adjustment to shocks than all of the other markers both on the demand and supply side, however the difference is not large. Finally, Northern Ireland is unique in that it is the only market not to have a significant or negative error correction term in either the price or investment equation, which suggests no adjustment at all. As discussed by Caldera and Johansson (2013), there are a number of reasons for such results including data-related issues as well as a lack of competition in the construction industry.

VI CONCLUSIONS

The empirical findings presented in this paper have yielded some interesting results particularly in terms of the dynamics of the different housing markets. First, the results of the estimation show that there are some significant differences between Ireland and Northern Ireland's housing markets in terms of the relationship between housing investment, supply and prices. The estimations showed that Ireland has a much stronger long-run price elasticity of housing supply. This suggests that investment in the Irish housing market responds more strongly to an increase in house prices than in Northern Ireland, England, Scotland and Wales. These results may be impacted by the substantial increase in housing supply in the Irish market prior to 2007. This was enabled by the significant increase in credit provided at the time. While on one hand it means that investment will respond strongly to changes in demand, it also suggests that the supply in the Irish market is more susceptible to cyclical changes in demand. Interestingly, the response in Northern Ireland appears to be higher than in England, Scotland and Wales.

In terms of the reaction of house prices to the level of housing stock, Irish house prices have a significant negative relationship with supply, suggesting an increase in dwelling completions will have a deflationary impact on house prices. The impact is weaker than its UK counterparts in the English and Scottish markets, however. With regard to the short-run estimation, Ireland has a quicker speed of adjustment to shocks than all of the other markets both on the demand and supply side; however the difference is not large.

It is evident based on the estimates that the Irish housing market is particularly sensitive to price signals, especially in the context of investment levels. As a result, activity in the Irish market is characterised by significant fluctuations. This would suggest that Government policy in the market should seek to reduce this degree of cyclicality. Recent increases in the role of the State in addressing housing supply issues is welcome in that regard, but continued scrutiny, for example, of the planning process and the provision of development land is required to ensure the more effective and efficient delivery of housing supply is achieved over the medium term.

REFERENCES

Bergin, A. and S. McGuinness, 2021. "Who is Better off? Measuring Cross-border Differences in Living Standards, Opportunities and Quality of Life on the Island of Ireland", *Irish Studies in International Affairs*, 32, 143-160.

Byrne M., 2020. "Generation Rent and the Financialization of Housing: A Comparative Exploration of the Growth of the Private Rental Sector in Ireland, the UK and Spain", 35 *Housing Studies*, 743.

Byrne M. and M. Norris, 2022. "Housing Market Financialization, Neoliberalism and Everyday Retrenchment of Social Housing", 54, *Environment and Planning A: Economy and Space,* 182.

Caldera, A. and A. Johansson, 2013. "The Price Responsiveness of Housing Supply in OECD Countries", *Journal of Housing Economics*, 22(3), 231-249.

Cavallari, M.C., B. Cournède and E. Özsöğüt, 2019. "How Responsive are Housing Markets in the OECD? National Level Estimates", OECD Economics Department Working Papers 1589.

Cheshire P. and B. Buyuklieva, 2019. "Homes on the Right Tracks Greening the Green Belt to Solve the Housing Crisis". Centre for Cities. Available online at: https://www.centreforcities.org/wp-content/uploads/2019/09/Homes-on-the-Right-Tracks-Greening-the-Green-Belt.pdf.

Corrigan E., D. Foley, K. McQuinn, C. O'Toole and R. Slaymaker, 2019. "Exploring Affordability in the Irish Housing Market", *The Economic and Social Review*, Vol. 50, pp. 119–157, No 1, Spring.

Cronin D. and K. McQuinn, 2021. "House Prices and the Credit-Driven Household Demand Channel: The Case of the Irish Economy", *Credit and Capital Markets*, Vol. 54, Issue 2, pp. 199-221.

Cronin D. and K. McQuinn, 2023. "Household Consumption and the Housing Net Worth Channel in Ireland", *The Economic and Social Review*, Vol. 54, No. 2 Summer, pp. 125-147, 2023.

Develtere, P., 2022. "Data Collection Systems and Homelessness in the EU – An Overview", *European Journal of Homelessness*, *16*(2).

DiPasquale, D. and W. Wheaton, 1994. "Housing Market Dynamics and the Future of Housing Prices", *Journal of Urban Economics*, 35(1), 1-27.

Disch, W. and R. Slaymaker, 2023. *Housing Affordability: Ireland in a Cross-country Context*. Economic and Social Research Institute (ESRI) Research Series.

Disch W., P. Egan, E. Kenny and K. McQuinn, 2024. *Contrasting Housing Supply in Ireland, Northern Ireland and the Rest of the United Kingdom*, The Economic and Social Research Institute, Research Series No. 175, January.

Duca, V.J., J. Muellbauer and A. Murphy, 2021. "What Drives House Price Cycles? International Experience and Policy Issues", *Journal of Economic Literature, American Economic Association*, Vol. 59(3). pp. 773-864, September.

Eiglsperger M., R. Arioli, B. Goldhammer, E. Goncalves and O. Kouvavas, 2022. "Owner-occupied Housing and Inflation Measurement". European Central Bank (ECB) Economic Bulletin, Issue 1/2022.

Egan P. and K. McQuinn, 2023a. "Regime Switching and the Responsiveness of Prices to Supply: The Case of the Irish Housing Market", 87, *The Quarterly Review of Economics and Finance,* 82.

Egan P. and K. McQuinn, 2023b. "Interest Rate Pass-through in Euro Area Mortgage Markets: The Long Shadow of the Great Financial Crisis", *CESifo Economic Studies*, Vol. 69, Issue 4, December, pp. 234-248.

Engle, R.F. and C.W. Granger, 1987. "Co-Integration and Error Correction: Representation, Estimation, and Testing", *Econometrica: Journal of the Econometric Society*, 55, 251-276

FitzGerald J., 2023. "Understanding the Irish Economy", Special Article, ESRI *Quarterly Economic Commentary*, Summer.

Frayne, C., A. Szczypińska, B. Vašíček and S. Zeugner, 2022. "Housing Market Developments in the Euro Area: Focus on Housing Affordability", European Commission Discussion Paper 171, September.

Geng, N., 2018. "Fundamental Drivers of House Prices in Advanced Economies". IMF Working Paper, WP/18/164.

Hüfner F. and J. Lundsgaard, 2007. "The Swedish Housing Market: Better Allocation via Less Regulation", OECD Economics Department Working Papers 559, OECD Publishing.

Kostarakos I., K. McQuinn and P. Varthilitis, 2023. "The Role of Intangible Investment In Ireland: A Growth Accounting Perspective", *Review of Income and Wealth*. Available online: https://onlinelibrary.wiley.com/doi/10.1111/roiw.12651.

Lyons R. and M. Gnnewig-Mnert, 2024. "Housing prices, costs, and policy: The housing supply equation in Ireland since 1970". Available online: https://onlinelibrary.wiley.com/doi/10.1111/1540-6229.12491?af=R.

McCarthy Y. and K. McQuinn, 2017. "Credit Conditions in a Boom and Bust Property Market: Insights For Macro-prudential Policy", *The Quarterly Review of Economics and Finance*, Vol. 64, pp. 171-182, May, 2017.

McGuinness, S. and A. Bergin, 2020. "The Political Economy of a Northern Ireland Border Poll", *Cambridge Journal of Economics*, Oxford University Press, Vol. 44(4) pp. 781-812.

OECD, 2021. *Brick by Brick: Building Better Housing Policies*. OECD publishing, Paris. https://doi.org/10.1787/b453b043-en.

OECD, 2022. *Housing Costs Over Income,* Paris. https://www.oecd.org/els/family/HC1-2-Housing-costs-over-income.pdf.

Rae D. and P. Van den Noord, 2007. "Ireland's Housing Boom: What has Driven it and Have Prices Overshot?" OECD Working Paper No. 492.

Rahal C., 2016. "Housing Markets and Unconventional Monetary Policy", *Journal of Housing Economics*, Vol. 32, June 2016, Pages 67-80.

APPENDIX

Table A.1: Augmented Dickey-Fuller Tests

Akaike information criterion (AIC)

	Ireland		Northern Ireland		England		Scotland		Wales	
	Level	*1st Diff*	*Level*	*1st Diff*	*Level*	*1st Diff*	*Level*	*1st Diff*	*Level*	*1st Diff*
hp_t	−1.202	−3.104**	−1.404	−3.411**	−1.483	−2.715*	−1.223	−2.632*	−2.165	−2.742**
i_t	−1.502	−3.638***	−2.236	−2.956**	−0.169	−4.015***	−0.561	−2.854**	−0.956	−3.42**
s_t	−0.925	−2.097	−1.416	−4.345***	−0.929	−3.134**	−2.622	−4.142***	−2.454	−1.453
inc_t	−0.434	−2.932**	0.185	−4.002***	−2.565	−3.545**	−2.822*	−3.652***	−1.998	−4.397***
$bcost_t$	−1.611	−2.349	−2.262	−1.796	−2.262	−1.796	−2.262	−1.796	−2.262	−1.796
ir_t	−2.552	−6.899***	−0.430	−4.128***	−0.430	−4.128***	−0.430	−4.128***	−0.430	−4.128***

Schwartz information criterion (SIC)

	Ireland		Northern Ireland		England		Scotland		Wales	
	Level	*1st Diff*	*Level*	*1st Diff*	*Level*	*1st Diff*	*Level*	*1st Diff*	*Level*	*1st Diff*
hp_t	−1.202	−3.104**	−1.404	−3.411**	−1.483	−2.715*	−1.223	−2.632*	−2.165	−2.742**
i_t	−2.17	−2.72*	−2.236	−2.956**	−0.169	−4.015***	−0.561	−5.089***	−0.956	−3.420**
s_t	−0.334	−3.152**	−1.416	−4.345***	−0.93	−4.322***	−2.607	−4.142***	−2.752*	−1.453
inc_t	−0.434	−2.932**	−0.511	−5.183***	−2.565	−3.545***	−2.601	−3.652***	−1.915	−4.397***
$bcost_t$	−2.349	−3.799***	−2.262	−3.174**	−2.262	−3.174**	−2.262	−3.174**	−2.262	−3.174**
ir_t	−2.553	−6.899***	−1.149	−8.714***	−1.149	−8.714***	−1.149	−8.714***	−1.149	−8.714***

Source: Authors' calculations.
Notes: ***, ** and * denote significance at the 1, 5 and 10 per cent level respectively. Standard errors are in parentheses.

Table A.2: Annual Long-Run Estimations

Long-Run Investment Equation
Dependent Variable: Log of Residential Investment

	Ireland	*Northern Ireland*	*England*	*Scotland*	*Wales*
hp_t	2.20**	0.76***	0.32***	0.23***	0.42***
	(0.11)	(0.08)	(0.08)	(0.09)	(0.10)
$bcost_t$	−2.21***	−0.53***	0.98***	0.56**	0.41***
	(0.19)	(0.04)	(0.11)	(0.20)	(0.16)
Constant	−6.64***	1.34***	1.87***	2.92	0.60
	(1.24)	(1.11)	(0.57)	(1.13)	(0.86)

Long-Run Investment Equation
Dependent Variable: Log of Real House Prices

	Ireland	*Northern Ireland*	*England*	*Scotland*	*Wales*
s_t	−1.36***	1.91***	−1.22***	−1.26***	7.10***
	(0.56)	(1.70)	(0.55)	(0.48)	(0.60)
inc_t	1.18***	0.24	4.51***	2.93***	1.32***(
	(0.20)	(0.63)	(0.26)	(0.48)	0.12)
ir_t	−0.01***	−0.01	−0.01**	−0.01	0.01
	0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	19.41***	−16.41	−13.25***	0.40	−101.77***
	(7.06)	(19.06)	(7.78)	(14.45)	(8.88)
Observations	23	23	23	23	23
Total system	225	225	225	225	225
Estimation Period	1997-2019	1997-2019	1997-2019	1997-2019	1997-2019

Source: Authors' calculations.
Notes: ***, ** and * denote significance at the 1, 5 and 10 per cent level respectively. Standard errors are in parentheses.