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Price expectations, distressed mortgage markets and the housing wealth effect

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Abstract

The life-cycle theory of consumption draws a well-established distinction between the implications for consumption of changes in wealth perceived to be of a "transitory" as opposed to a "permanent" nature. In this paper, using a unique combination of regulatory and survey micro-data, we examine the importance of the life-cycle theory, in estimating housing wealth effects for the Irish mortgage market. In the aftermath of the recent financial crisis, this market has experienced substantial levels of house price declines and negative equity. Thus, house price expectations are likely to be of major importance in influencing housing wealth effects. Our results suggest that mortgaged Irish households exhibit a relatively large wealth effect out of housing when compared with other countries and, in accordance with the life-cycle theory, households' price expectations are influential in determining the consumption response to shocks.

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Non-technical summary

In this paper we estimate the effect of changes in housing wealth on consumption for a representative sample of mortgaged Irish households, placing a particular emphasis on the role of house price expectations in this relationship. The Irish market is of specific interest owing to the acutely, turbulent nature of housing developments post-2007. Irish house price growth was, between 1995 and 2007, the largest across the OECD. However, by 2012, prices, in nominal terms, had fallen by nearly 55 per cent. Additionally, over the period 2004 - 2006, when prices were at or near their peak, nearly 340,000 mortgages were approved vis-à-vis an outstanding national stock of 800,000. Thus, many Irish mortgages are relatively new and, consequently, quite vulnerable to emerging difficulties in residential markets. Thus, house price expectations are likely to be of major importance in influencing housing wealth effects.

In estimating the wealth effect, we avail of two unique micro-data sources. The first is mortgage loan-level data gathered on a regular basis for three main Irish financial institutions and consists of information on individual mortgage amounts, house prices at point of loan origination and mortgage repayment history. This is supplemented by information from a representative household survey conducted in 2012/2013 on the mortgage books of the same institutions. In particular, details such as the actual consumption, income, expenditure, savings and employment status of these households are recorded. Survey respondents are also asked about their future expectations of house price movements.

Our results suggest that Irish mortgaged households exhibit a relatively large wealth effect out of housing when compared with other countries and households' price expectations appear to be influential in determining their consumption response to shocks. This result particularly holds in the case of those mortgaged households experiencing negative equity.

1 Introduction

Heightened levels of uncertainty have significant implications for consumer behaviour; the life cycle theory of consumption draws a well-established distinction between the implications of changes in income/wealth perceived to be of a "transitory" as opposed to a "permanent" nature. Households' expectations of future developments have always been central to their consumption decisions, however, these expectations are to the fore, at present, given the recent turbulence in international housing markets. Many countries, across the OECD, experienced persistent house price increases in the run-up to the 2007 financial crisis, only for prices to fall sharply in the same markets thereafter. With certain markets still experiencing price declines, some households have arguably never faced more uncertainty in this regard. These expectations are likely to be influenced by the difficulties many mortgaged households have experienced subsequent to the crisis with escalating levels of negative equity being a particular concern.

In this paper we estimate housing wealth effects for a representative sample of mortgaged Irish households, placing a particular emphasis on the role of house price expectations. The Irish market is of specific interest owing to the acutely, turbulent nature of housing developments post-2007. Irish house price growth was, between 1995 and 2007, the largest across the OECD. However, by 2012, prices, in nominal terms, had fallen by nearly 55 per cent. Additionally, over the period 2004 - 2006, when prices were at or near their peak, nearly 340,000 mortgages were approved vis-à-vis an outstanding national stock of 800,000. Thus, many Irish mortgages are relatively new and, consequently, quite vulnerable to emerging difficulties in residential markets.

In estimating the wealth effect, we avail of two unique micro-data sources. The first is mortgage loan-level data gathered on a regular basis for the three main Irish financial institutions and consists of information on individual mortgage amounts, house prices at point of loan origination and mortgage repayment history.[1] This is supplemented by information from a representative household survey conducted in 2012/2013 on the mortgage books of the same institutions.[2] In particular, details such as the actual consumption, income, expenditure, savings and employment status of these households are recorded.

In light of the disparate nature of crisis-related effects, the availability of survey data makes it clearly advantageous to examine the relationship between consumption and wealth from a microeconomic, household perspective.[3] For example, a characteristic of the survey used here is that it includes detailed information on households' expectations of future economic developments and, more specifically, of developments in the housing market. The use of households' subjective expectations has become an increasingly popular means of deciphering between current economic conditions that are perceived to be permanent as

[1] These are Allied Irish Bank (AIB), Bank of Ireland (BOI) and Irish Life and Permanent (ILP). In mid-2012 these institutions accounted for approximately 75 per cent of mortgage credit in the Irish market.

[2] This survey was conducted between May 2012 and February 2013, and was designed to be representative of the mortgage book of the three institutions AIB, BOI and ILP.

[3] See Campbell and Cocco (2007) for a detailed discussion of the merits of estimating wealth effects with micro level data.

opposed to transitory.

Negative equity is a particular concern in the Irish market at present. Given the substantial fall in Irish house prices, estimates suggest that almost 400,000 Irish properties are now in negative equity. The prevalence and scale of negative equity provides an additional, compelling reason for the precise estimate of property-related wealth effects; certain proposals to alleviate the Irish mortgage crisis have included the prospect of significant debt relief for distressed borrowers. Clearly, the economy wide benefit of such a move requires an accurate evaluation of the wealth impact on consumption. Additionally, the impact of negative equity on consumption is tied to the concept of credit constraints, where the former may well be acting as a proxy for the latter. Therefore, we also use survey questions to assess the potential impact of credit constraints on Irish consumption decisions.

Our results suggest that Irish mortgaged households exhibit a relatively large wealth effect out of housing when compared with other countries and, in accordance with the life-cycle theory of consumption, households' price expectations appear to be influential in determining the consumption response to shocks. This result particularly holds in the case of those mortgaged households experiencing negative equity.

The rest of this paper is structured as follows; in the next section we examine the international literature on the range of wealth effects across countries. We then discuss the Irish housing market and the unique data sources used for the current analysis. The empirical results are then presented and finally, some conclusions are offered.

2 What previous research suggests

While there have been many aggregate level studies of consumption and wealth effects, the greater availability of survey data has resulted in a small but increasing number of micro-level applications in the area.[4] For example, Englehardt (1996), Flavin and Yamashita (2002) and Sheiner (1995) consider the impact of housing shocks on savings and asset allocation, while Attanasio and Weber (1994) examine whether greater financial liberalisation and the house price boom experienced in the UK throughout the 1980s explained the increase in consumption. Bostic, Gabriel and Painter (2009) estimate, in the case of US households, that consumption spending is more sensitive to changes in housing rather than financial wealth. Campbell and Cocco (2007) assess the response of UK household consumption to house price changes and find the house price effect to be most significant for older homeowners, whereas for young renters the house price effect on consumption is negligible.

In a European context, Paiella (2007) finds a relatively large wealth effect for Italian households with respect to financial wealth, while Guiso, Paiella and Visco (2005) find that the wealth effect for Italian homeowners due to increases in house prices is comparable to that in other countries. In looking at consumption

[4] For a comprehensive literature review see Muellbauer (2007).

and wealth effects for Spanish households, Bover (2005) observes a significant and strong housing effect for prime-age adults with an insignificant financial wealth effect. Bover (2005) also notes that many household estimates of the wealth effect may be downward biased due to measurement error associated with household wealth. Using micro-data from the Luxembourg Wealth Study (LWS), Sierminska and Takhtamanova (2007) find significant differences in the wealth effect across age groups within different countries.[5] In particular, they find a strong wealth effect for older households in Canada and middle-aged groups in Finland and Italy.

Addressing the aftermath of the financial crisis, Christelis, Georgarakos and Jappelli (2011) use US survey data to examine the impact of the associated wealth and unemployment shocks. They distinguish between temporary and permanent wealth effects by splitting the sample between those who think that the market will recover in a years time and those who don't. They find a greater financial wealth effect than that of housing. Other studies which also look at wealth effects of the recent crisis include both Hurd and Rowhedder (2010a) and Hurd and Rowhedder (2010b). These studies respectively find that between 2008 and 2010, up to 40 per cent of American households were affected by issues such as unemployment, negative equity, mortgage arrears or foreclosure. They also find that older households have experienced substantial losses in wealth levels.

Other recent studies focussing on post crisis wealth losses include Bricker, Bucks, Kennickell, Mach and Moore (2011) and Petev, Pistaferri and Saporta (2011). In the former, significant disparities are noted across household wealth levels between 2007 and 2009, with changes in asset values rather than changes in the ownership of the assets being the contributing factor to the observed differences. Petev et al. (2011) find that the consumption patterns of the relatively wealthier US households fell more than the less wealthy over the 2007 - 2009 period. Again using micro data, Arrondel, Savignac and Tracol (2011) document the degree to which French households adjusted their consumption during the 2008/09 crisis. They also emphasise the role of expectations and a related confidence channel on consumption plans.

3 The Irish housing and mortgage market

Housing has traditionally constituted a significant portion of Irish households' asset holdings. While historical reasons can be offered for the Irish obsession with *bricks and mortar*, in the main its predominant status reflects, partly due to capital controls, the lack of diversity in household portfolios. For many, until recently, the only realistic alternative asset to housing was a domestic bank deposit. In Figure 1, the total stock of Irish housing and financial assets is plotted for the period 2002 - 2012. Over the period, both the significant increase and subsequent decline in the value of housing is readily apparent.

The 1990s heralded profound changes in both the Irish economy and housing market. The emergence

[5] For more information on the LWS, see http://www.lisproject.org/lws.htm.

of the so-called *Celtic Tiger* in the mid-1990s occurred after a decade of negligible economic growth and high average unemployment rates. The change in Irish economic fortunes thereafter was truly substantial. Sustained economic growth saw the total number of people employed in the country surge by almost 50 per cent, while the accompanying increase in income levels was coupled with a stable, low interest rate environment. Figure 2 presents key Irish macroeconomic variables, including changes in aggregate consumption, over the period 1990 to 2011, while Table 1 traces changes in the main indicators of Irish housing activity over the same period.

The combination of continuing income growth and benign monetary conditions (formalised by Ireland's entry into the single European currency in 1999), contributed to a major house price boom, which, in later years, prompted a significant increase in housing supply. In an international context, the performance of the Irish housing market between 1995 and 2007 was exceptional; real Irish house prices grew by nearly 9 per cent per annum - the next highest country growth rate in the OECD was 7.6 per cent. Housing supply, which escalated markedly post-2000, averaged 84,000 units between 2004 and 2006 comparing with just over 225,000 units built for the same period in the UK despite a fourteen-fold population differential.

Given the increases in both prices and activity levels, the housing market, had, by 2007, assumed a disproportionate importance vis-à-vis the overall economy. The number of persons directly employed in construction doubled between 1997 and 2007 to constitute 13.3 per cent of the total workforce. Owing to the transaction based nature of the Irish taxation system, the contribution of the housing sector to the national exchequer became substantial over the same period. Stamp duty and capital gains taxes alone accounted for just over 13 per cent of all tax revenue in 2007 (and 15 per cent in 2006), as compared with 4 per cent in 1996.

Inevitably, the increase in activity in the residential property market substantially heightened the property exposure amongst leading Irish financial institutions. Almost 40 per cent of the total stock of Irish mortgages was issued between 2004 and 2007, when house prices were at their highest. Much of this lending was increasingly funded by the ability of Irish credit institutions to borrow abroad. Consequently, total private sector credit, with property constituting an increasing proportion, as a percentage of GDP, increased from 65 per cent in 1995 to 100 per cent in 2000 and up to over 200 per cent in 2008. This growing divergence between total lending and domestic deposits rendered Irish institutions particularly vulnerable post the crisis.

The scale of difficulties in the Irish mortgage market is now quite sizeable. Central Bank of Ireland estimates, based on earlier work by Duffy (2010), suggest that between 40 to 50 per cent of the total stock of Irish mortgages was, at end-2012, in negative equity. At end-March 2013, 12.3 per cent of private residential mortgage accounts were in arrears over 90 days with a further 6 per cent of mortgage accounts in arrears of less than 90 days. The equivalent 90+ days past due figures in March 2012 and 2010 were 9.9 and 4.1 per cent respectively. Given the number of households in less than 90 days arrears and those

already restructured, about one fifth of Irish mortgages are presently in some form of distress.[6]

Thus, what emerges is a mortgage market experiencing a number of related pressures; liquidity constraints due to the growing mortgage arrears situation, substantial levels of negative equity and the possibility of credit constraints owing to the significant deleveraging underway in the Irish financial sector.

4 Overview of data

Two sources of data are used in this paper. The first is a loan-level dataset collected by the Central Bank of Ireland as part of a Prudential Capital Assessment Review exercise, which assesses the potential capital requirements of the Irish banks under various stress scenarios. The dataset includes a snapshot of the entire residential mortgage books of three Irish banks at June 2012. At 75 per cent, these banks account for the majority of the Irish mortgage market.[7] The loan level dataset incorporates a broad array of information for each loan, including borrower and mortgage details from the point of loan origination as well as information on the value of the property on which the mortgage is secured. Table 10 in the Appendix provides an overview of the contents of the dataset.[8]

However, as with most loan-level datasets, credit institutions rarely update this type of data with current economic information on individual borrowers. Given the extent of economic change experienced in Ireland in recent years, this information may have changed substantially since loan origination. Therefore, to complement the loan level data, the Central Bank of Ireland commissioned a custom designed household survey to capture the current economic circumstances of mortgagees in Ireland. This survey is the second source of information used in the current study.

The mortgage holders' survey was conducted by IPSOS MRBI on behalf of the Central Bank of Ireland. The survey, which is representative of the entire mortgage books of the three banks in the loan-level dataset, was administered to over 2,000 households all of whom are included in the loan-level dataset. Crucially, each individual's survey responses can be linked back to their corresponding mortgage information in the loan-level dataset, where the respondent gave permission for this linking to take place.[9] This is important as it ensures that the values, for example, for house prices and mortgage loan amounts included in the data are the actual levels reported by the financial institution as opposed to those "recalled" by the survey participant. The survey itself was conducted over the period May 2012 to February 2013 with 97 questions, in total, being asked of participating households. The questions can be summarised along the following lines:

[6] Over 10 per cent of mortgage accounts have been classified as restructured by Irish financial institutions. Forbearance techniques include a switch to an interest only mortgage; a reduction in the payment amount; a temporary deferral of payment; extending the term of the mortgage; and capitalising arrears amounts and related interest.

[7] The three banks are: Allied Irish Bank, Bank of Ireland, and Permanent TSB.

[8] Further information on the loan level dataset is available in Kennedy and McIndoe-Calder (2011).

[9] The majority of the sample (88 per cent) gave permission for this linking to take place.

(1) Mortgage background, including questions on the contributors to the mortgage repayment, the current educational and employment characteristics of such contributors and unemployment details where relevant.

(2) Income and finance, including detailed questions on household income, its composition and recent changes, details on expenditure and questions on household financial distress.

(3) Residential investment properties and other financial holdings, details of institutions where borrowings and savings are held, on credit applications and outcomes, and future expectations.

(4) Questions on the mortgage arrears resolution process (MARP) and the degree and nature of contact with the mortgage lender.[10]

To capture household consumption, respondents were presented with the following question:

> *Thinking of total household spending on all goods and services, but excluding mortgage and other debt repayments, how much would you say that your household spends in an average month? Please include spending on groceries, household utilities, clothing and footwear, travel expenses, childcare expenses, socialising, etc.*

Table 2 provides an overview of the characteristics of the sample used in this study. We focus on the portion of the sample that allowed their survey responses to be linked to their loan-level data, so the sample size at this stage is 1,777. Among the sample, the largest portion of respondents are in the 35 to 44 year age group. The majority of respondents are married (83 per cent), employed (85 per cent) and are relatively well educated, with over 40 per cent of respondents having a third level degree or higher. In terms of household composition, the average household in the sample comprises three persons (usually two adults and one child).

Table 2 also shows average values of key financial variables used in the current study. The median annual gross income among the sample is €55,000 while the median annual level of spending on goods and services is €15,300. The average house price at June 2012 among the sample was just over €180,000 while the average mortgage outstanding was approximately €144,000. The final panel in Table 2 shows that 39 per cent of the sample was in a position of negative equity in mid-2012 while 19.8 per cent of the sample had outstanding arrears on their property. Finally, in 57 per cent of cases, respondents reported having some level of savings or investments available to them.[11]

[10] The Central Bank of Ireland introduced the MARP in February 2009 and updated it in February 2010. The purpose of this process is to provide a framework that lenders must use when dealing with borrowers in arrears or facing arrears with their mortgage.

[11] See the Appendix for further details on the calculations of these variables.

5 Empirical approach

5.1 Baseline model

Our baseline model, typical in the literature, is a reduced-form specification relaying household consumption to the household's current house price, income levels and a series of household demographic, labour market and educational attainment controls. The model, which is estimated cross-sectionally, can be summarised as follows, where lower case denotes logs:

$$c_i = \beta_0 + \beta_1 h_i + \beta_2 y_i + \Sigma_{j=3}^{n} \beta_j \phi_{i,j} + \epsilon_i. \tag{1}$$

c_i is household $i's$ annual consumption on all goods and services (excluding mortgage and other debt repayments), h_i is the current house price for household i, y_i is annual household income and $\phi_{i,j}$ are household specific socio-economic and demographic controls. Table 3 provides a full overview of the independent variables used in the model.

The house price level for each household is calculated by taking the reported house purchase price in the loan level data (at the point of loan origination) and then "forecasting" the data forward to the present using official regional house price data.[12]

To control for the effect of debt burdens on consumption, we include two dummy variables indicating if the household has a second mortgage or unsecured lending. We also include a mortgage repayment-to-income ratio (MRTI) for each household. This variable, which was originally presented in McCarthy and McQuinn (2011), can be regarded as a household liquidity indicator, particularly at a time when many Irish households are experiencing mortgage repayment difficulties.

Table 4 presents the results of the initial estimation. While it is common in the literature to use the marginal propensity to consume (MPC) as the standard indicator of the wealth effect, we take, as our point of comparison, the estimated elasticity (the coefficient from the log-log regression). Evaluating the relative impact of wealth effects via the MPC, particularly across countries, is complicated by the size of the accompanying consumption-to-wealth ratio. For example, in an Irish context, this ratio is quite low owing to the relatively high level of Irish house prices.[13] Thus, the MPC can be relatively low in a country if housing is quite expensive.

At 0.11, the estimated elasticity for the Irish market is quite high by international standards.[14] Sierminska and Takhtamanova (2007) comment on the relatively high estimates of 0.123 and 0.135 for Canada and Italy respectively, so the Irish result would appear to be at the high end of the international spectrum. This is not altogether surprising given the traditional role played by housing amongst Irish householders'

[12] Full details of this exercise are available in the Appendix.
[13] Gan (2010) makes a similar point in the case of Hong Kong.
[14] This implies that a 10 per cent increase in house prices results in a 1.1 per cent increase in consumption.

balance sheets. Furthermore, it is not uncommon for financial innovation in countries which have experienced substantial housing booms to increasingly facilitate collateral based lending. Lydon and O'Hanlon (2012) present evidence which suggests that the significant increase in equity release borrowing in the Irish market since 2000 may have fed into greater consumption of durable goods.

The remaining results in Table 4 conform with *a priori* expectations; consumption is larger amongst the older cohorts of the sample, for those households where the head of household is employed and among relatively larger households. Similarly, higher income leads to higher consumption.[15] Interestingly, having unsecured lending or a second mortgage appears to exert a positive and significant effect on consumption. The coefficient on the MRTI variable is positive, suggesting that higher debt burdens have a positive impact on consumption. This result, however, is not significant. In the next section, we examine the effect of the current state of the Irish mortgage market on the housing wealth effect in some detail.

5.2 Mortgage market uncertainty

The life-cycle theory of consumption suggests that a household's consumption behaviour should only be affected by changes in key economic variables perceived to be of a permanent rather than temporary nature. In the current context, this means that consumption should only respond to changes in income or wealth that are perceived to be permanent. We now explore this issue for, arguably, the most volatile variable impacting on the Irish mortgage market at present; house price movements. Figure 3 plots both the level and volatility of Irish house prices from 1990 to 2012.[16] From the chart it is clear that households are currently confronted both by a period of persistent downward house price movements and greater volatility in these movements. This growing uncertainty is likely to have marked implications for households' expectations of future housing developments.

Following Manski (2004), Christelis, Georgarakos and Jappelli (2011), use households' subjective expectations, measured through their response to particular survey questions, as a means of characterising their attitudes to the distribution of future shocks. They examine households' expectations about the short-term future of the stock market to see whether the financial losses experienced during the financial crisis are considered to be permanent or temporary. Consequently, they expect financial wealth losses to have a larger impact on consumption for households who perceive the stock market decline to be permanent, compared to those who believe that stock prices will recover quite quickly. They find evidence in support of their hypothesis, showing that individuals, who perceived their wealth changes to be permanent, adjusted their consumption spending much more than those who viewed the changes to be temporary.

In a similar vein, we now assess the implications for housing wealth effects on consumption of changes

[15] We also try replacing the log income variable with the log of income after the mortgage repayment. The results are essentially unchanged from those presented here.

[16] Volatility is captured using an 8 quarter rolling standard deviation.

in house prices that are perceived to be permanent versus those that are perceived to be temporary. We employ responses to the following survey question:

> *What is your expectation of house price movements over the next one to two years? Will they (a) continue to fall / (b) stay the same / (c) begin to increase?*

As discussed earlier, Irish house prices have fallen substantially since their peak in 2007. If an individual believes that house prices will remain at their current level in coming years, they should answer (b) to the question above. In other words, they view recent changes in house prices to be of a permanent nature. If, on the other hand, they believe that house prices will recover in coming years (i.e. they answer (c) to the above question), then this implies that they do not view the current level of house prices to be permanent. Similarly, if they expect house prices to continue to fall, then they do not view the current level of house prices to be permanent. With this in mind, we split our sample into two groups capturing (1) those who believe recent changes in house prices are permanent and (2) those who feel that house prices will continue to change in coming years (answering (a) or (c) to question). The results are shown in Tables 5 and 6.

In line with previous research, we find a strong role for expectations in our consumption regressions. The housing wealth effect for those who believe that house prices have stabilised is larger than the baseline case and is highly significant. However, for those who believe that house prices will change in the future, the wealth effect is much smaller and insignificant. Therefore, as the life-cycle theory suggests, in the Irish case, the different outlooks for house price movements appear to be highly important in households' consumption responses to house price shocks.

We now examine the implications of these price expectations for those households experiencing negative equity. As many households secured their mortgage in the Irish market at a time when house prices were substantially overvalued, the subsequent correction in prices has led to a sizeable cohort of mortgaged households experiencing this phenomenon.[17] Central Bank of Ireland estimates, based on earlier work by Duffy (2010), suggest that between 40 to 50 per cent of the total stock of Irish mortgages was, at end-2012, in negative equity. Clearly, house price expectations are likely to be especially important in this case. To assess this, we focus only on those households experiencing negative equity and examine the implications for the housing wealth effect. The results are shown in Table 7.

The first column of Table 7 shows the results of the baseline regression for the group of households in negative equity. The coefficient size on the house price variable is similar to the baseline result for the entire sample. In this case, however, the coefficient is not significant. This suggests that household consumption is invariant to housing wealth gains if the household is in negative equity. However, the results in the second and third columns shed further light on this finding. At this stage we split the group of negative

[17] Honohan (2010) summarises many of these studies.

equity households into those who perceive house price levels as permanent and those who perceive them as temporary and subject to further change. As with the entire sample results, again, the importance of the permanent versus temporary distinction appears to hold. In particular, the housing wealth effect for those in negative equity and who believe recent price movements are of a permanent nature is quite large vis-à-vis the general sample, and the result is significant at the 5 per cent level. In the case of those who view house price developments as temporary, on the other hand, the housing wealth effect is insignificant.

From a policy perspective the results are quite informative. While a relatively large and significant wealth effect suggests that developments in the housing market can have an influential role in overall Irish economic activity, it is clear, particularly, for those households in negative equity, that house price increases have to be perceived as being permanent in nature for the wealth effect to be realised. Given the recent turbulent nature of house price movements, this may take some time to occur.

5.3 Ancillary robustness checks

Much of the recent literature on consumption and wealth effects (cited earlier) assesses the importance of both housing and financial wealth in household consumption. In the Irish case, it is important to note that housing wealth has tended to assume a majority share of households' wealth portfolios, thereby making it an important consideration in consumption and wealth assessments. In Figure 1 (shown earlier) we saw that housing wealth accounted for over two thirds of total household wealth in 2007. Despite the sharp reduction in house prices in recent years, housing wealth still accounts for 50 per cent of total household wealth.

In terms of financial wealth, while we do not have information on these holdings for Irish mortgaged households, we can control for this effect by combining a number of questions in the survey to determine whether a household regularly saves and/or invests in financial products ($save - invest$).[18] When we include this additional variable in the model (Table 8), we still find a large and statistically significant effect of housing wealth on household consumption.

A further consideration in assessing the implications of wealth for household consumption relates to credit constraints. In the Irish case, given the significant deleveraging currently underway in the financial system, the prospect of credit constraints amongst Irish households is a distinct possibility.[19] While a few studies have discussed the implications of credit constraints amongst households for wealth effects (see Gan (2010) and Campbell and Cocco (2007) for example), we test one theory advanced by Ortalo-Magné and Rady (2006) and Lustig and Van Nieuwerburgh (2006). Both studies contend that an increase in

[18] Specifically, we generate a dummy variable that captures people who save regularly, receive any income from savings or investments, or who report that they have savings or investments that they can use in financial difficulties.

[19] The official memorandum of understanding between the Irish authorities and the IMF, EU Commission and ECB (commonly referred to as the 'Troika') in November 2010 required the main Irish financial institutions to reduce their loan-to-deposit ratios from 180 to 122.5 per cent by December 2013.

house prices may result in an increase in consumption, not because of a “direct” wealth effect, but because it enables borrowing constrained households to smooth consumption over the life cycle.

We explicitly test this hypothesis by using information on recent credit applications in our survey data. Specifically, respondents are asked: (1) if they applied for credit in the past three years; (2) about the outcome of any such applications; and (3) if they considered applying for credit but, fearing rejection, decided not to apply. This latter question could capture cases where past credit applications have been rejected. We split our sample into two groups - credit constrained and non-constrained - and re-estimate the baseline regression. The results are presented in Table 9.

The first column in Table 9 shows the results for those individuals who either had a credit application rejected in the past three years or who did not apply for credit because they feared rejection. The results show that an increase in housing wealth has a strong and highly significant effect on household consumption. The second column shows the results for those individuals who are not credit-constrained - they did not apply for credit in the past three years, or they applied and had their application accepted. Among this group, the housing wealth effect is still large and significant at the 1 per cent level. If housing wealth effects were the result of credit constraints, then one would expect a much smaller or insignificant housing wealth effect among this latter group. Overall, therefore, in an Irish context it would appear that the impact of house prices on consumption is not the result of those households experiencing some form of credit constraints.

6 Conclusions

At present many economies are still struggling to emerge from the aftermath of the 2007/08 financial crisis. For some of these countries, the origin of much of the difficulty lay in the interaction between the housing market and the real economy. After a prolonged period of growth, house price levels inevitably began to deviate significantly from what fundamental values based on economic variables suggested. In certain distressed markets, the subsequent decline in prices has given rise to substantial levels of negative equity and a downturn in overall economic activity has contributed to a growing mortgage arrears problem.

In that context, as countries seek to emerge from these difficulties, understanding the link between variables such as consumption and investment and house prices has, arguably, never been more important. Accurately assessing these relationships is essential in the design of efficient and effective policy responses. This paper uses two unique data sources to address this issue for the Irish mortgage market - a market, presently, experiencing considerable distress. The presence of questions eliciting subjective expectations amongst households is a particular advantage of micro-level survey data as it provides an additional means of distinguishing between movements in key variables perceived to be of a permanent or temporary nature.

Our results indicate a significant consumption response amongst Irish households to house prices, particularly when compared with comparable type estimates from other jurisdictions. The life cycle hypothesis would appear to be quite important in the Irish market, with price movements perceived to be of a permanent nature particularly significant. This finding is further borne out for those households experiencing negative equity. The significance of this latter result underscores the need for Irish house prices to move to an era of positive and sustainable growth.

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A Creation of Variables from Loan-Level Dataset

The analysis in this paper relies, in part, on variables that are generated from the loan-level data (described previously). Here we detail precisely how these variables are calculated.

A.1 Current house price

The loan-level dataset includes the value of the house for which the original mortgage was taken out as well as the valuation date. The current house price (P_t) is calculated as follows:

$$P_t = P_0 \times \frac{\overline{P}_t}{\overline{P}_0} \tag{2}$$

where P_0 is the latest valuation of the property, and $\frac{\overline{P}_t}{\overline{P}_0}$ is the change in the average value of 'similar' properties between *t=0* and *t=t*.

For loans originating from 2003 onwards, we use the CSO property price index to calculate the change in house prices over time. We match 'similar' properties on the basis of region (Dublin and non-Dublin) and type (house, apartment, other). For loans originating prior to 2003 we use the ptsb/ESRI house price index, which has a similar geographic breakdown as the CSO price index, but not a similar breakdown by property type. We therefore apply the ptsb/ESRI price index changes to all house-types.

A.2 Equity or Current Loan-to-Value Ratio

To capture housing equity for each property in the sample we need two pieces of information: the current value of the property (described above) and the loan outstanding on the property. In terms of the latter, we add up the current balance outstanding on all loans secured on the same property to derive a total property debt figure. The LTV ratio is then calculated as follows:

$$LTV_t = \frac{Debt_t}{P_t} \tag{3}$$

Those households with an LTV ratio of greater than 100 are deemed to be in negative equity, while those with an LTV ratio of less than or equal to 100 are deemed to have positive equity in their property.

Table 1: Summary of Irish Residential Mortgage Market Statistics: 1990 - 2012

Variable	Unit	1990	1995	2000	2005	2007	2012
Outstanding Level of Residential Lending	€ million	6,563	11,938	32,546	94,259	123,002	84,973
Total Value of Mortgages Issued	€ million	1,492	2,666	9,004	27,753	24,064	3,412
Average Mortgage Issued	€	42,856	54,094	111,355	231,206	271,154	184,113
Total Number of Mortgages Issued		34,812	49,288	80,856	120,037	88,747	18,532
House Prices	€	65,541	77,994	169,191	276,221	322,634	227,376
Housing Supply		19,539	30,575	49,812	80,957	78,027	8,428

Note: For all data except the outstanding level of residential lending, the observation for 2012 is quarter 2.

Table 2: Demographic and economic characteristics of the sample, % of respondents unless otherwise stated

Variable		%
Age Group (years)	18-34	14.6
	35-44	39.9
	45-54	29.8
	55-64	12.6
	65+	2.7
Marital Status	Married / Couple	83.3
	Widowed/Separated	6.1
	Single	10.5
Work Status	Employed	84.5
	Unemployed	6.1
	Inactive	9.2
Education Status	Low	13.1
	Medium	43.6
	High	42.5
Household Composition	1 Adult, 0 kids	9.4
	2 Adults, 0 kids	16.0
	3+ Adults, 0 kids	7.4
	1+ Adults, with kids	60.0
	Undefined	7.2
Median Financial Data (€)	Income	55,000
	Consumption	15,300
	Current House Price	181,428
	Mortgage Outstanding	144,554
Negative Equity	% of Group	39.0
Any Arrears	% of Group	19.8
Has Savings/Investments	% of Group	56.7

Note: Where group totals do not equal 100%, the residual is accounted for by "don't know" or "refused" responses. Sample size is 1,837 except in the case of the current house price and negative equity; the sample sizes here are 1,808 and 1,795 respectively.

Table 3: Independent Variables

Variable	Description
h_i	Logged house price (at June 2012) for household i.
y_i	Logged gross annual income for household i.
$male$	Dummy variable indicating that the survey respondent is male.
$married$	Dummy variable indicating that the survey respondent is married.
$HHsize$	Continuous variable indicating the number of people in the household.
$age-1834$	Omitted category - captures survey respondents who are aged between 18 and 34 years.
$age-3544$	Dummy variable indicating that the survey respondent is aged between 35 and 44 years.
$age-4554$	Dummy variable indicating that the survey respondent is aged between 45 and 54 years.
$age-5564$	Dummy variable indicating that the survey respondent is aged between 55 and 64 years.
$age-65+$	Dummy variable indicating that the survey respondent is aged 65 years or more.
$edu-low$	Omitted category - captures survey respondents with a low level of education (lower second level or less).
$edu-med$	Dummy variable indicating that the survey respondent has a medium level of education (upper second level and non-degree).
$edu-high$	Dummy variable indicating that the survey respondent has a high level of education (third level degree or above).
$unemployed$	Omitted category - captures respondents who are unemployed.
$employed$	Dummy variable indicating that the survey respondent is employed.
$retired/inactive$	Dummy variable indicating that the survey respondent is retired or inactive (student, stay at home parent, etc.).
$mrti$	Log of the mortgage-repayment-to-income ratio for household i.
$other$	Dummy variable indicating that the household has a second mortgage.
$unsecure$	Dummy variable indicating that the household has unsecured debt.

Table 4: Baseline consumption regression

Variable	Coefficient	Standard Error
$constant$	3.829***	0.446
h_i	0.113***	0.036
y_i	0.319***	0.031
Controls		
$male$	-0.017	0.029
$married$	0.068	0.045
$HHsize$	0.122***	0.013
$age-3544$	0.076*	0.041
$age-4554$	0.099**	0.044
$age-5564$	0.095*	0.055
$age-65+$	0.127	0.102
$edu-med$	0.079*	0.045
$edu-high$	0.040	0.049
$employed$	0.163***	0.060
$retired/inactive$	0.060	0.075
$mrti$	0.027	0.021
$other$	0.024**	0.010
$unsecure$	0.055**	0.028
N	1,405	
F-stat	38.93	
Prob>F	0.0000	
Adj. R^2	0.3018	

Note: *** Significant at 1 per cent level; ** Significant at 5 per cent level; * Significant at 10 per cent level.

Table 5: Consumption regression, sub-group who expect house prices to change

Variable	Coefficient	Standard Error
$constant$	4.165***	0.645
h_i	0.032	0.050
y_i	0.379***	0.047
Controls		
$male$	-0.021	0.040
$married$	0.082	0.065
$HHsize$	0.126***	0.019
$age-3544$	0.024	0.056
$age-4554$	0.038	0.061
$age-5564$	-0.020	0.075
$age-65+$	0.228	0.146
$edu-med$	0.106*	0.065
$edu-high$	0.037	0.070
$employed$	0.132	0.086
$retired/inactive$	0.077	0.104
$mrti$	0.052	0.036
$other$	0.023*	0.013
$unsecure$	0.041	0.040
N	671	
F-stat	21.89	
Prob>F	0.0000	
Adj. R^2	0.3328	

Note: *** Significant at 1 per cent level; ** Significant at 5 per cent level; * Significant at 10 per cent level.

Table 6: Consumption regression, sub-group who expect house prices to remain the same

Variable	Coefficient	Standard Error
$constant$	3.430***	0.669
h_i	0.195***	0.055
y_i	0.268***	0.047
Controls		
$male$	-0.002	0.044
$married$	0.037	0.067
$HHsize$	0.120***	0.020
$age-3544$	0.113*	0.065
$age-4554$	0.145**	0.068
$age-5564$	0.259***	0.087
$age-65+$	0.024	0.160
$edu-med$	0.028	0.069
$edu-high$	0.037	0.074
$employed$	0.172*	0.094
$retired/inactive$	0.059	0.119
$mrti$	0.008	0.028
$other$	0.017	0.017
$unsecure$	0.036	0.042
N	655	
F-stat	15.32	
Prob>F	0.0000	
Adj. R^2	0.2595	

Note: *** Significant at 1 per cent level; ** Significant at 5 per cent level; * Significant at 10 per cent level.

Table 7: Consumption regression, sub-group in negative equity

Variable	(1) Full Sub-Group Coef.	Std. Error	(2) Expect HP Change Coef.	Std. Error	(3) Expect No HP Change Coef.	Std. Error
$constant$	3.246***	0.828	3.997***	1.135	1.918	1.367
h_i	0.086	0.078	-0.089	0.110	0.269**	0.130
y_i	0.395***	0.065	0.520***	0.089	0.316***	0.104
Controls						
$male$	0.008	0.048	0.021	0.064	-0.046	0.080
$married$	0.090	0.076	0.160	0.101	0.025	0.126
$HHsize$	0.119***	0.023	0.101***	0.031	0.131***	0.037
$age-3544$	0.072	0.055	0.035	0.072	0.107	0.091
$age-4554$	-0.002	0.075	-0.017	0.098	0.010	0.131
$age-5564$	0.011	0.129	0.109	0.224	0.221	0.185
$age-65+$	0.239	0.223	0.475	0.301	0.318	0.417
$edu-med$	0.054	0.103	-0.051	0.133	0.114	0.182
$edu-high$	-0.028	0.105	-0.172	0.135	0.089	0.183
$employed$	0.097	0.010	0.021	0.129	0.224	0.179
$retired/inactive$	-0.060	0.133	0.051	0.166	-0.045	0.248
$mrti$	0.087	0.058	0.149*	0.078	0.019	0.095
$other$	0.028*	0.015	0.023	0.017	0.026	0.028
$unsecure$	0.053	0.048	0.100	0.069	0.003	0.077
N	506		255		222	
F-stat	14.54		9.66		5.65	
Prob>F	0.0000		0.0000		0.0000	
Adj. R^2	0.3002		0.3529		0.2518	

Note: *** Significant at 1 per cent level; ** Significant at 5 per cent level; * Significant at 10 per cent level.

Table 8: Consumption regression
(Control for savings and investments)

Variable	Coefficient	Standard Error
$constant$	3.841***	0.449
h_i	0.113***	0.036
y_i	0.317***	0.032
Controls		
$saves - invests$	0.007	0.030
$male$	-0.017	0.029
$married$	0.068	0.045
$HHsize$	0.123***	0.013
$age - 3544$	0.075*	0.042
$age - 4554$	0.099**	0.044
$age - 5564$	0.095*	0.055
$age - 65+$	0.128	0.103
$edu - med$	0.079*	0.045
$edu - high$	0.040	0.049
$employed$	0.161***	0.061
$retired/inactive$	0.058	0.075
$mrti$	0.027	0.021
$other$	0.024**	0.010
$unsecure$	0.055**	0.028
N	1,405	
F-stat	36.62	
Prob>F	0.0000	
Adj. R^2	0.3013	

Note: *** Significant at 1 per cent level; ** Significant at 5 per cent level; * Significant at 10 per cent level.

Table 9: Consumption regression, accounting for credit constraints

Variable	Credit Constrained Coefficient	Credit Constrained Standard Error	Not Credit Constrained Coefficient	Not Credit Constrained Standard Error
$constant$	3.032***	1.111	3.857***	0.492
h_i	0.219***	0.088	0.101***	0.039
y_i	0.283***	0.071	0.326***	0.036
Controls				
$male$	-0.026	0.072	-0.014	0.031
$married$	0.092	0.113	0.062	0.049
$HHsize$	0.136***	0.034	0.121***	0.015
$age-3544$	-0.053	0.099	0.097**	0.046
$age-4554$	-0.178*	0.108	0.144***	0.048
$age-5564$	-0.051	0.134	0.121*	0.061
$age-65+$	0.358	0.256	0.087	0.113
$edu-med$	0.027	0.093	0.089*	0.051
$edu-high$	0.017	0.102	0.050	0.055
$employed$	0.170	0.123	0.164**	0.070
$retired/inactive$	-0.051	0.151	0.089	0.086
$mrti$	0.028	0.037	0.029	0.025
$other$	0.033**	0.016	0.014	0.013
$unsecure$	0.043	0.081	0.057*	0.031
N	206		1,199	
F-stat	7.56		32.16	
Prob>F	0.0000		0.0000	
Adj. R^2	0.3524		0.2939	

Note: *** Significant at 1 per cent level; ** Significant at 5 per cent level; * Significant at 10 per cent level.

Table 10: Appendix Table: Loan-Level Data Fields / Information Content

Unit Identifier	Borrower	Property	Loan	Interest Rate	Performance
Bank Borrower Property Loan	Borrower Type (FTB, BTL, etc.) Income Income Verified Credit Quality	Geographic Location Property Type New or Existing Original Valuation (and date) Original LTV Construction Year	Origination Date Original Loan Balance Current Loan Balance Loan Term Loan Purpose Current Repayment Payment Type Interest Rate Info. Performance Info.	Current Interest Rate Interest Rate Type Interest Rate Margin Rate Revision Date	Arrears Balance (Dec-2010) Arrears Balance for Past 12 months Collection Status Modification / Forbearance Flag

Notes: The above fields are not always populated in full.

Figure 1

Select Irish household balance sheet items: 2002 - 2012

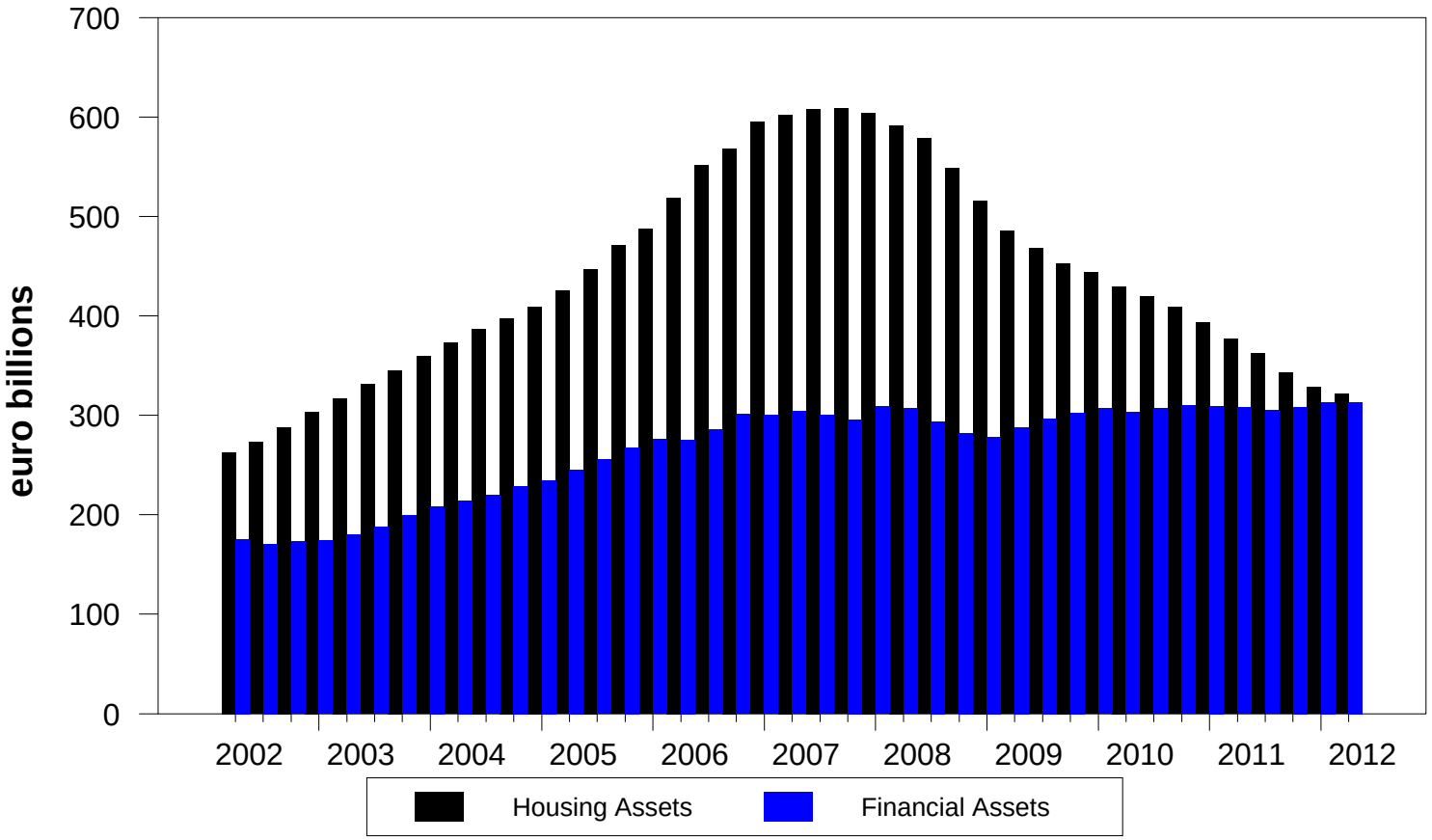

Figure 2

Select Irish macroeconomic variables: 1990 - 2011

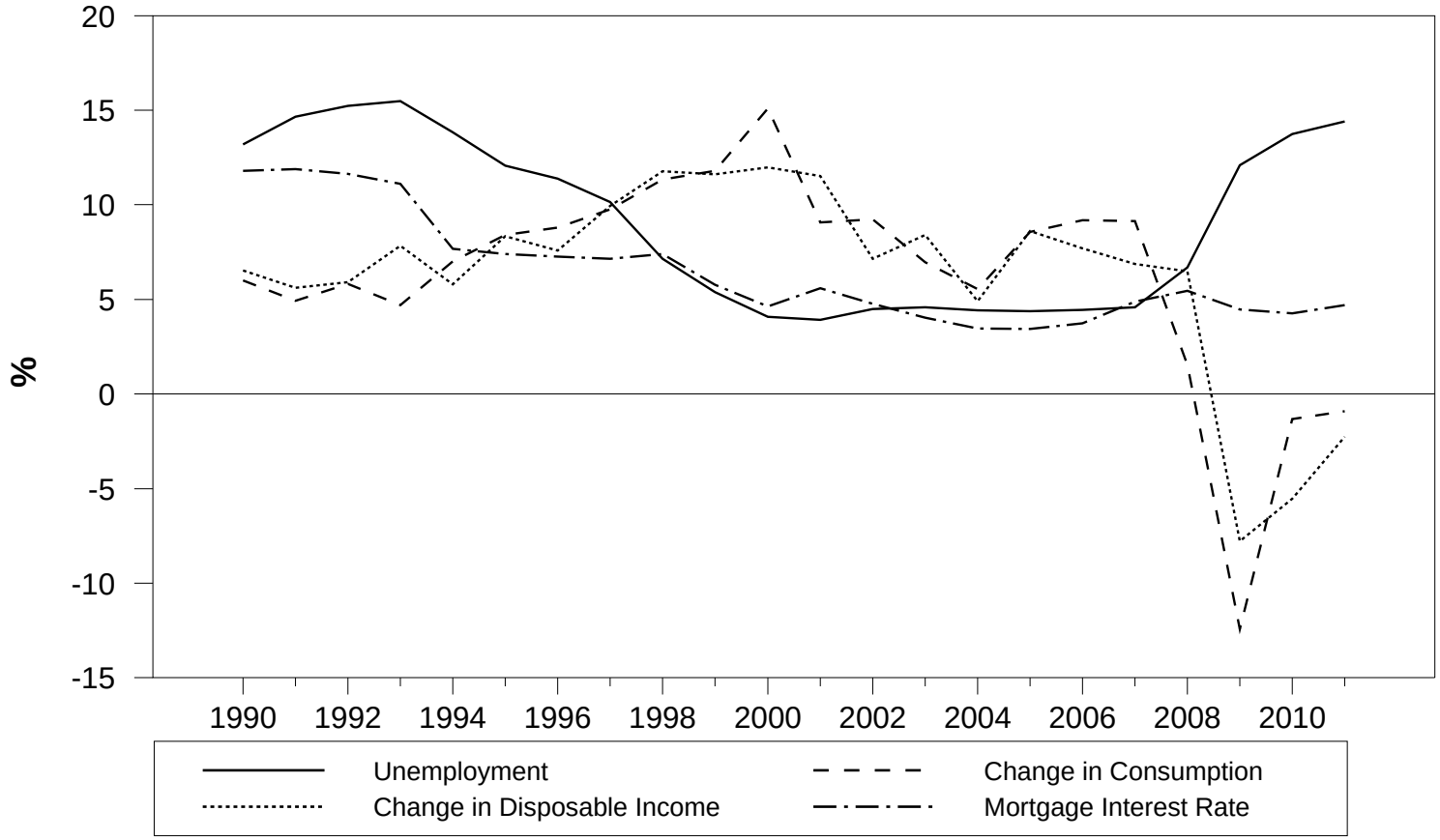

Figure 3

Irish nominal house price level and volatility: 1990 - 2012