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Housing Equity Withdrawal, Property Bubbles and Consumption

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Abstract

At the peak of the Irish property boom in the first decade of the 2000s, housing equity withdrawal, or "top-up" loans, accounted for one-third of residential mortgage loans issued. This collateral-based lending was typically issued at a significant discount to other forms of personal lending, often at tracker rates. Following the collapse of the Irish housing market, the value of top-up loans issued in 2011 was down 97 percent from 2006 - the peak year for this form of lending. This paper draws out some of the trends in housing equity withdrawal over the last decade, both in terms of the extent of lending that occurred and the reasons for borrowers taking out such loans. From a domestic demand perspective, the concern would be the extent to which this form of borrowing fed into domestic consumption and the longer-terms implications for Irish economic growth. In this context we show that equity withdrawal trends are strongly positively correlated with a number of demand measures, mainly related to spending on durables.

Non Technical Summary

At the peak of the housing boom during the last decade over one-third of loans, accounting for 15 per cent of mortgage balances drawn-down, were housing equity withdrawal. This represented some €5.5 billion of credit per annum at the peak of the housing boom (2006). Trends in housing equity withdrawal activity tend to follow overall housing market trends. Following the collapse in Irish house prices, which have fallen by 50 per cent since 2007, housing equity withdrawal loans in 2011 were down 97 per cent from their 2006 peak to just €195 million of top-up loans drawn-down.

This paper analyses housing equity withdrawal trends in Ireland, both in terms of who withdrew equity and why, and its impact on the domestic economy. The main findings are as follows:

1. The propensity for housing equity withdrawal is highest amongst younger households. However, the average loan size for younger households is smaller (€50,000), when compared with older households (€63,000). There is also a greater propensity for equity withdrawal where the head of the household works in Financial Services, the Public Sector or Construction.

2. The average equity withdrawal loan is significantly higher for self-employed individuals (€70,000) when compared with employees (€53,000). This could be evidence of these borrowers using housing equity for funding a business.

3. Over 90 per cent of housing equity withdrawal is re-invested in property. The majority of this (66 per cent) was used for repair, maintenance and upgrading of the same property, with the the remainder used for investing in other properties, including holiday homes.

4. Over the last decade, the main direct effect of housing equity withdrawal was to provide a further boost to an already booming construction sector. One of the main findings from the econometric analysis is that, controlling for both affordability and cost constraints, equity withdrawal had a large a significant impact on residential construction output over the last decade.

5. In line with evidence from other countries, the results from a series of time series regressions also indicate a significant role for equity withdrawal in explaining trends in the consumption of large-scale consumer durables such as furniture and motor sales.

1 Introduction

In most developed countries housing wealth represents the largest share of net worth on the household balance sheet. In Ireland, the housing boom and bust over the last decade led to a rapid rise and fall in the value of housing assets. Between 2002 and 2007, the value of housing assets increased by almost 150 per cent. With the bursting of the property bubble this has declined by 41 per cent, wiping almost €250 billion off the nominal value of Irish housing assets (Central Bank of Ireland, 2012). In this context, an analysis of the links between housing equity, borrowing and spending is of critical importance for understanding how domestic demand might evolve in the future.

In this paper we provide an overview of one aspect of the relationship between housing wealth and aggregate demand: home equity withdrawal. We summarise the level of borrowing that occurred, the terms and conditions of such borrowing and the reasons for home equity withdrawal. During the housing boom, an increasing number of homeowners withdrew housing equity on the back of rapidly rising asset values. At the peak of the boom, in 2005-2006, one-third of mortgages drawn-down were top-up loans, accounting for 15 per cent, or €5.5 billion, of lending per annum. Coincident with the collapse in the housing market, the value of top-up loans was down 97 per cent from 2006, to just €195 million in 2011.

We analyse equity withdrawal behaviour from the late 1990s up until the end of the 2010. This period covers the build-up to the housing boom, the peak years (2005 to 2007) and the subsequent decline which, at the time of writing, is still ongoing. This paper builds on earlier work by Hogan and O'Sullivan (2007), which looks at the relationship between housing wealth and consumption up to 2005. Hogan and O'Sullivan conclude that "the marginal propensity to consume out of housing wealth is essentially zero." (p. 47). This conclusion contrasts with the results from our own analysis, which shows that housing equity withdrawal plays a significant role in explaining various types of economic activity, most notably residential construction and motor and furniture sales.

A key contribution of this paper is to use micro data collected at the time of loan origination to gain a better understanding of the reasons for home equity withdrawal. The results from this analysis show that the reasons for home equity withdrawal in Ireland are remarkably similar to those observed in other countries. The vast majority of home equity withdrawal (66 per cent) was re-invested in the *same* property, via home improvement or repair. The next largest proportion (25 per cent) was used to invest in other properties, including holiday homes and buy-to-let property. The potential for housing equity to part-finance an additional property is of particular interest in the case of Ireland where intergenerational transfers of housing wealth (parents funding their children's house deposits) and buy-to-let property investment became an increasingly common feature of the

Irish property market during the property boom.

The remainder of this paper is outlined as follows. Section 2 provides some background on the interaction between the Irish housing market and the real economy. Section 3 describes the data and presents some stylised facts relating to housing equity withdrawal in Ireland. Section 4 discusses Irish trends in the context of the international literature on housing equity withdrawal on the real economy. Section 5 concludes.

2　Housing market developments and the real economy

As noted in Gerlach (2012), changes in the fortunes of the housing market can have far-reaching consequences for the health of the economy. The closer the linkages between the housing market and economic activity, the more far reaching these effects. Between 1999 and 2008, Irish house prices grew by over 250 per cent in nominal terms, contributing to the six-fold credit expansion which occurred over the same period.

Since the bursting of the property bubble in 2007, Irish house prices have declined by almost 50 per cent. Kennedy and McQuinn (2012) note that the scale of the collapse in Irish house prices is similar to that observed in other OECD countries, such as Japan, albeit over a much shorter time-span. The collapse in housing market activity is illustrated in Figure 1, taken from the Kennedy and McQuinn paper, which shows loan volumes down by over 90 per cent from the peak of the housing boom. Top-up loans have fallen by 97 per cent since 2006.[1]

Addison-Smyth *et al.* (2008) highlight some of the direct linkages between the housing market and economic activity: between 1998 and 2008, the number of persons directly employed in construction more than doubled such that at the peak about 13 per cent of the work force was directly employed in this area. There were also significant exchequer benefits associated with a rapidly expanding housing market: Stamp duty and capital gains accounted for 15 per cent of all tax revenue in 2006, compared with just 4 per cent in 1996.

The direct employment and exchequer effects arising from a housing boom are the more easily measured aspects of the relationship between housing and economic activity. However, precise mechanism whereby housing market activity and housing wealth impact on consumption and other measures of domestic demand is difficult to isolate empirically, as we discuss in Section 4. Claessens *et al.* (2008) find that prolonged house price declines have a significant impact on output, investment, credit and consumption. For Ireland they find that the unemployment effect arising from a housing

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[1]A top-up loan is defined as "a further mortgage advance to an existing borrower which is issued to finance expenditure other than house purchase" (Irish Banking Federation, 2011).

bust has a long lag of up to two years after house price declines bottom-out.

Figure 1: Mortgage market activity 2005 - 2011 (Kennedy and McQuinn, 2012)
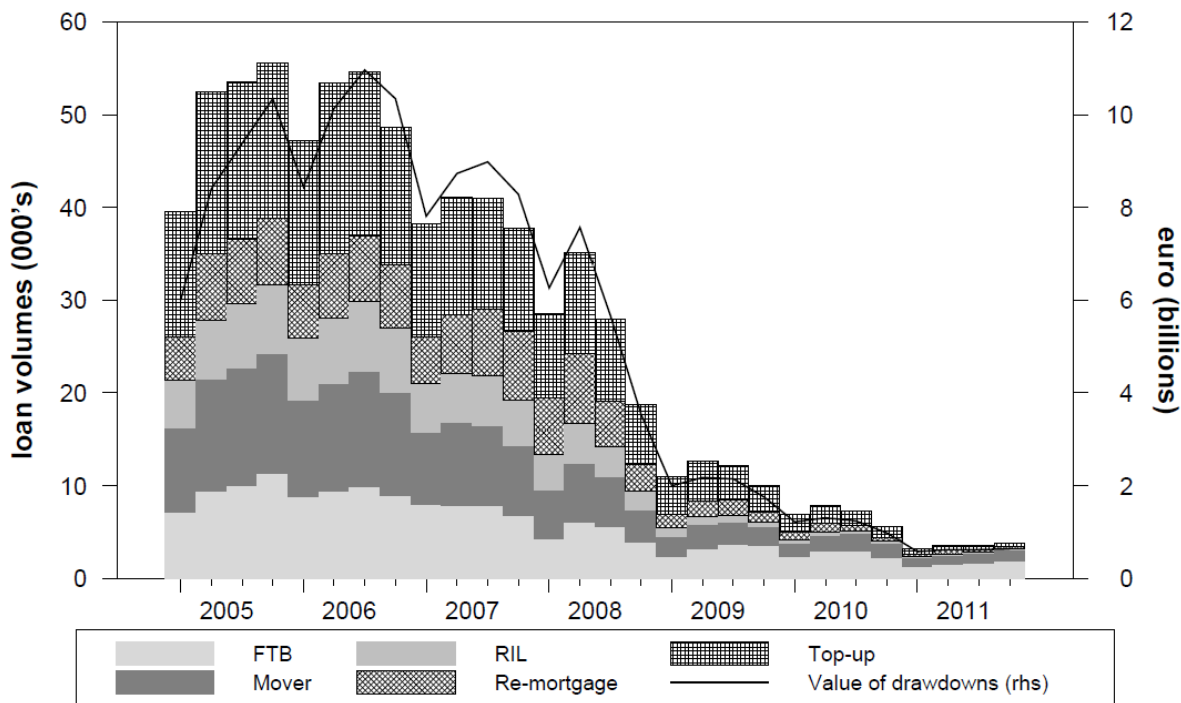
The use of housing equity as collateral is one of the main channels whereby house prices can impact on aggregate demand (Gerlach, 2010). Figure 2 shows the evolution of aggregate housing equity over the period 1996 to 2011, calculated as the gross value of housing assets less the total outstanding stock of residential mortgage debt.[2] Housing equity increased steadily from the mid-1990s, growing broadly in-line with house prices to peak at just under €500 billion in 2007. Since then, housing equity has returned to levels last seen in the early 2000s. The second chart in Figure 2 shows the value of home equity withdrawal as a percentage of the gross value of all housing assets, i.e. both owner occupier and rented housing. The measure of equity withdrawal used for this chart

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[2]Data on the gross value of housing assets from 2002 onwards is taken from the Central Bank of Ireland *Quarterly Financial Accounts*. Estimates prior to this point use housing stock figures from the CSO and the Department of the Environment and house price changes from the Permanent TSB/ESRI house price index. The gross value of residential mortgage debt is taken from the Central Bank of Ireland *Money and Banking Statistics*.

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is mortgage "top-ups" only. As discussed in the data section, we do not have data to observe equity withdrawal implicit in housing transactions or switching mortgage provider. Using this measure, we find that at the peak of the housing boom, just over 1 per cent of housing equity was withdrawn annually.

Figure 2: Housing equity and housing equity withdrawal trends
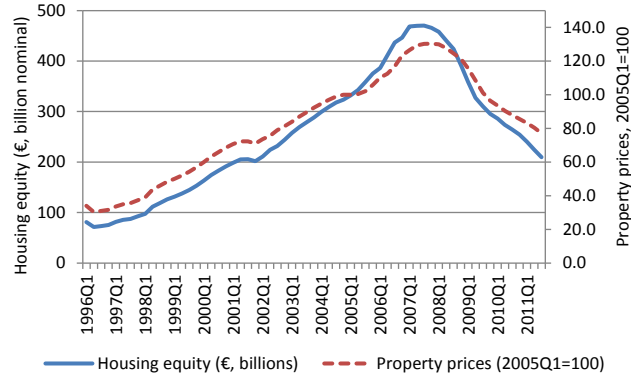
Source: Central Bank of Ireland Quarterly Financial Accounts, Central Bank of Ireland Calculations, and PTSB/ESRI house price index

Notes: Housing equity is defined as the gross value of housing assets, less the value of credit secured against housing.

Equity withdrawal as a percentage of gross housing wealth
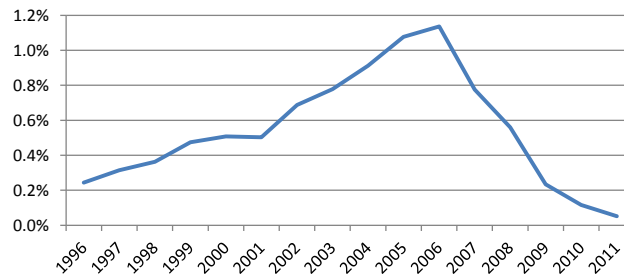
Source: Equity withdrawal trends from 2005 onwards is 'Top-up' data from the Irish Banking Federation. Prior to 2005 it is equity withdrawal as calculated from the Central Bank of Ireland loan-level data base, aggregated up to the market using market share information.

Notes: Gross housing wealth from 2002 onwards from the Central Bank of Ireland Quarter Financial Accounts. Prior to this it is a Central Bank estimate using estimates of the housing stock from DoE and the Census and house price changes from PTSB/ESRI

The impact of equity withdrawal on aggregate demand can be significantly greater if it enables

previously credit-constrained households to obtain finance; see Benito (2009) and Assenmacher-Wesche and Gerlach (2008). The booming domestic property market saw a number of foreign, mainly UK lenders enter the Irish market. At the same time, previously smaller market players sought to increase their market share. These developments contributed to increased competition in new lending throughout the period of the property boom. Figure 3 shows the HHI measure of market concentration for the Irish mortgage market. Since the housing crash, a number of foreign and domestic lenders have exited the market, contributing to a significant increase in market concentration.

Figure 3: HHI measure of market concentration
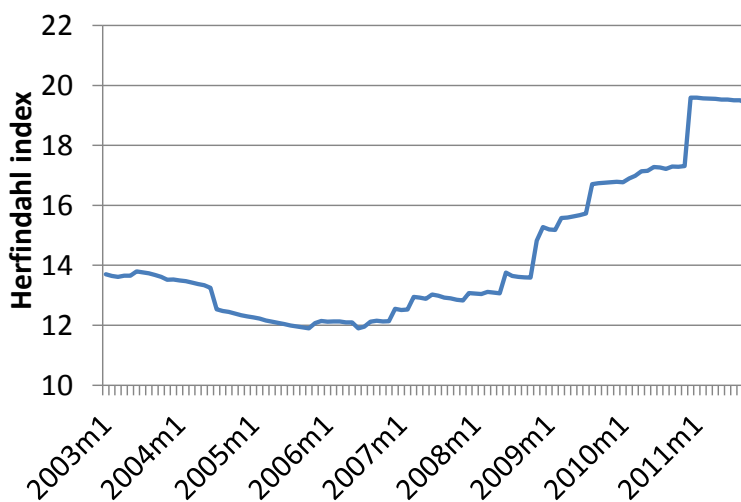
Source: Goggin *et al.* (2012)

Another, often overlooked, aspect of the Irish housing boom during the last decade is the substantial increase in buy-to-let property investment that occurred during this period. Prior to the 2000s less than 5 per cent of outstanding mortgage debt was for buy-to-let or 'small-scale' investor loans. This share increased substantially during the mid-2000s, such that 29 per cent of originating balances during 2006 and 2007 were classed as buy-to-let loans.[3] As we show below, an increasingly common trend during the property boom was for owner-occupiers to extract equity from their

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[3]The sums involved here are worth quoting in full: at the end of 2010, the FMP credit institutions had some €42 billion of loans which originated in 2006-07. Of these, €12 billion was lending for buy-to-let purposes.

primary residences for the express purpose of investing in buy-to-let property.

3 Irish equity withdrawal trends

This section summarises trends in housing equity withdrawal in Ireland over the last decade. We begin by defining exactly what we mean by housing equity withdrawal. Drawing on Klyuev and Mills (2006), housing equity withdrawal can occur by:

- re-mortgaging or refinancing an existing mortgage with a higher principal, including taking out a second mortgage on an existing property;

- moving to a new house, but taking out a higher mortgage than is necessary such that net liabilities are unaffected;

- trading down to a lower value house but decreasing the level of secured debt by a smaller amount than the difference in value; and

- selling a house to move into rental accommodation, subject to there being positive equity in the property prior to sale.

For reasons of data availability, the focus of our analysis in this paper is the first type of equity withdrawal above, and second loans in particular. One important caveat here is that we are unable to track the home equity withdrawal that could have occurred when borrowers re-mortgaged properties and folded the old loan into a new loan. This includes switching mortgage provider. We need loan-to-value ratios both pre- and post-remortgaging in order to establish the degree of equity withdrawal implicit in these transactions, and this data is not available. The Irish Banking Federation (IBF) mortgage data shows that 14 per cent of loans during 2005 to 2011 were re-mortgages (IBF, 2011).

3.1 Data used in the analysis

The micro data on equity household equity withdrawal in this paper comes from two sources. The first source is the monthly loan transaction data collected by the CSO for the purposes of its *Residential Property Price Index*. This dates back to 2005 and further information on the raw data is provided in O'Hanlon (2011). All of the loan and borrower characteristics in this database are as at the loan origination date.

The second source is loan-level data collected by the Central Bank of Ireland (CBI) the Financial Measures Programme (FMP, Central Bank of Ireland, 2011), as described in Kennedy and

McIndoe Calder (2011). The data is similar to the CSO data in that it provides loan and borrower-characteristics at loan origination. It also provides up-to-date current information on the loan characteristics and loan performance (i.e. arrears status). The CBI dataset contains information on over 570,000 loans, originating from 1996 onwards. Of these, 194,000 (34 per cent) are classed as equity release loans. The degree of market coverage differs between the CBI and the CSO data, as the former is only for the four FMP institutions (Bank of Ireland, Allied Irish Bank, EBS and Irish Permanent), whereas the CSO dataset includes information on mortgage drawdowns by eight of the main mortgage lenders.

There is not a 100 per cent overlap in borrower and loan characteristics in the two datasets, therefore combining them allows us to present a more complete picture of housing equity withdrawal trends over time. One advantage of the Central Bank data is that it anonymously identifies individual borrowers and properties. This allows us to analyse the extent to which home equity withdrawal was used to part finance other property investment (i.e. buy-to-let) during the boom period. The transactions based data contains limited information on household characteristics, and certainly not enough to replicate the structural modeling approach in Ebner (2010) for example. Rather, as we describe in Section 4, our general approach is compare aggregate equity withdrawal trends with trends in key consumption variables over time.

Aggregate measures of the total volume and value of equity release are obtained from the IBF mortgage data as these are more complete than both the CBI and CSO data. A high percentage loans classified in the CSO data as "Further Advance/Top-up/Equity Release with no associated property acquisition" are surprisingly large, 27 per cent are over €100,000 and 11 per cent are over €200,000. Furthermore, there are a not insignificant number of very small value loans, 3 per cent of the total being under 10,000. It is likely that at least some of these loans are erroneously classified and require further investigation and perhaps reclassification. Discussions with mortgage lending institutions in this regard are ongoing and pending satisfactory resolution, analysis of Equity Release loans with no associated property acquisition will focus on those of values falling between 15,000 and 150,000. There are just under 100,000 of these loans accounting for 73 per cent the total reported.

The analysis of the trends in the following sections is presented under four headings: (i) the level of borrowing that occurred; (ii) the terms and conditions attached to equity withdrawal loans; (iii) the characteristics of borrowers; and (iv) reasons for home equity withdrawal.

3.2 Home equity withdrawal trends

Table 1 shows the volume and value of equity withdrawal draw-downs in the IBF data set. We use the definition of a "top-up" loan, that is "a further mortgage advance to an existing borrower which is issued to finance expenditure other than house purchase" (IBF, 2011), as the measure of equity withdrawal. At the peak of the property boom (2004-2007) equity release account for around one-third of loans. In value terms, equity withdrawal in the form of top-up loans accounted for 14 per cent of the value of loans drawn-down.

Table 1: "Top-up" loan drawdowns - IBF Data

	Volume *(% all loans)*	Value (€m) *(% total value)*
2005	64,821 *(32)*	4,717 *(14)*
2006	66,598 *(33)*	6,039 *(15)*
2007	47,967 *(30)*	4,684 *(14)*
2008	35,315 *(32)*	3,253 *(14)*
2009	14,947 *(33)*	1,123 *(14)*
2010	6,631 *(24)*	493 *(10)*
2011	2,005 *(14)*	195 *(8)*
Total	238,284 *(31)*	20,504 *(14)*

Source: Irish Banking Federation Mortgage Market Profile

We use the IBF mortgage data and CSO data on the number of owner-occupier households to estimate the proportion of owner-occupier households withdrawing equity in each year. Figure 4 shows that equity withdrawal in the form of mortgage top-ups peaked at 6 per cent of owner-occupier households in 2005 and 2006. Since then, the proportion has fallen to just 0.2 per cent in 2011. If all remortgages are counted as equity withdrawal, which may not be the case, the proportion peaks at 9 per cent in 2006. Benito (2009) estimates that between 4 and 10 per cent of UK households withdrew equity from their homes between 1995 and 2004, which is close to the figures observed for Ireland.

Figure 4: Propensity to withdraw equity and amount withdrawn

% Owner-occupier households withdrawing equity

% HH withdrawing equity (Top-up loans only)

% HH withdrawing equity (Top-up loans plus remortgages)
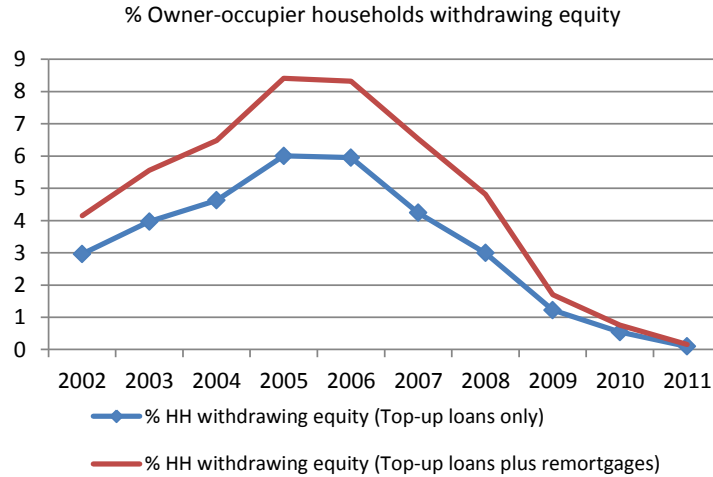
Source: CBI and IBF equity release data. QNHS for household numbers

Figure 5 uses the loan-level data to show equity withdrawal trends by three categories of loan size: less than €15,000, €15,000 to €150,000 and greater than €150,000. Unless otherwise stated, all figures quoted here are in nominal terms. While the majority equity withdrawal (over 70 per cent) is in the middle category, throughout the period of the property boom the larger category grew steadily to account for almost one-quarter of equity release loans at the peak. This increase in larger loans drives the trend in the overall average loan size. The average loan peaked at €113,000 in 2007, but fell to €61,000 by 2010. For the mid-sized loan category (€15,000 to €150,000), the average loan size remained within the €50,000 to €60,000 range for the entire period.

Benito (2009) estimates the average amount of equity withdrawn for UK homeowners at around €30,000 in 2003 – i.e. half the average equity withdrawal loan drawn down in Ireland. There may be several reasons for the difference in the average loan size, for example, the reasons for home equity withdrawal may differ between Ireland and the UK. Benito (2009) also shows that at the peak of the property market, mortgage equity withdrawal in the UK was equivalent to 8.9 per cent of post-tax household income. Using the IBF figures for mortgage top-ups only, the same figure for Ireland in 2006 was 6 per cent. As noted above, some re-mortgages will also include an element of equity release. We do not, however, have the data to estimate the scale of any such equity release. If we count the sum-total of *all* remortgages in the IBF data as equity, then the ratio increases from 6 to

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12 per cent of post-tax household income. The true figure lies somewhere within this range.
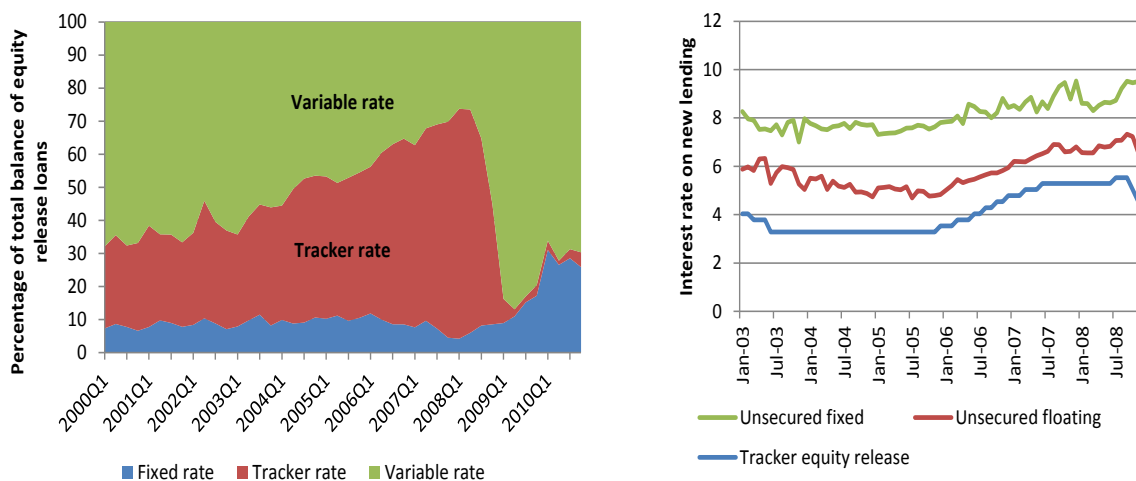
Figure 5: Loan size
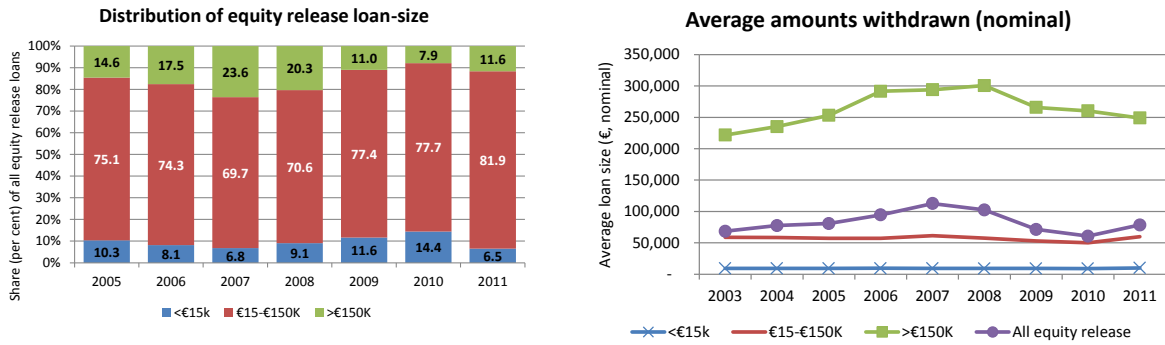
Source: (a) CSO loan-level data; (b) CBI loan-level data to 2005, CSO data thereafter.

3.3   Interest rates on equity release lending

Housing equity can be used as collateral to obtain a secured loan on more favourable terms than an unsecured loan. For the UK in 2008, Hellebrandt *et al.* (2009) observe a margin of over 4 percentage points on the interest rate for secured versus unsecured personal loans. The increase in the total value of equity release borrowing in the last decade coincided with an increase in tracker-type mortgages, which track the ECB base rate at a set margin, usually between 1 and 1.5 per cent.

Figure 6 shows the *interest rate type* for equity release loans at end 2010, by year of origination since 2000. The rapid rise in tracker-rate loans for equity release is evident from the figure. Tracker rate loans grew to account for almost 70 per cent of equity release loans by the end of 2007. What is equally stark about the trends in Figure 6 is the collapse in tracker lending from 2009 onwards. In 2009 and 2010 equity release lending at tracker rates accounted for just 3 per cent of such lending. In terms of the stock of equity release loans at the end of 2010, 43 per cent were tracker, 47 per cent variable and 10 per cent were fixed rate loans.

Figure 6: Interest rates on equity release borrowing

Using the loan-level data, we estimate the average margin over the ECB base rate for tracker rate loans was around 1.3 per cent during the period 2008 to 2010. Applying this margin to the base rate over time, we can compare the rates for new equity release tracker lending with the rates for consumer lending collected by the Central Bank of Ireland. The trends from 2003 to 2008 are shown in Figure 6. Equity release lending is priced at a considerably lower rate than unsecured personal lending. The margin is between 2 and 4 per cent, depending on whether the unsecured lending is on a variable or a fixed rate.

3.4   Characteristics of borrowers

The life-cycle model of consumption and saving predicts that younger households wishing to borrow against rising incomes will be the group most likely to withdraw housing equity (see Browning and Crossley, 2000). Figure 7 shows equity withdrawal trends by age-group, for loans between €15,000 to €150,000. The proportion of owner-occupier households withdrawing equity is highest for the younger age-groups, at 5 to 6 per cent of owner-occupiers in the 20 to 39 years age-bracket. The probability of equity withdrawal is decreasing in age, although the range of probabilities becomes

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compressed as the overall level of equity withdrawal activity declines. While not within the scope of this paper, it is worth noting that the income and wealth expectations surrounding the life-cycle decisions taken by younger borrowers at the peak of the boom may not be realised in the medium term, with potentially permanent implications for consumption over their lifetime.

Figure 7: Equity withdrawal by age-group
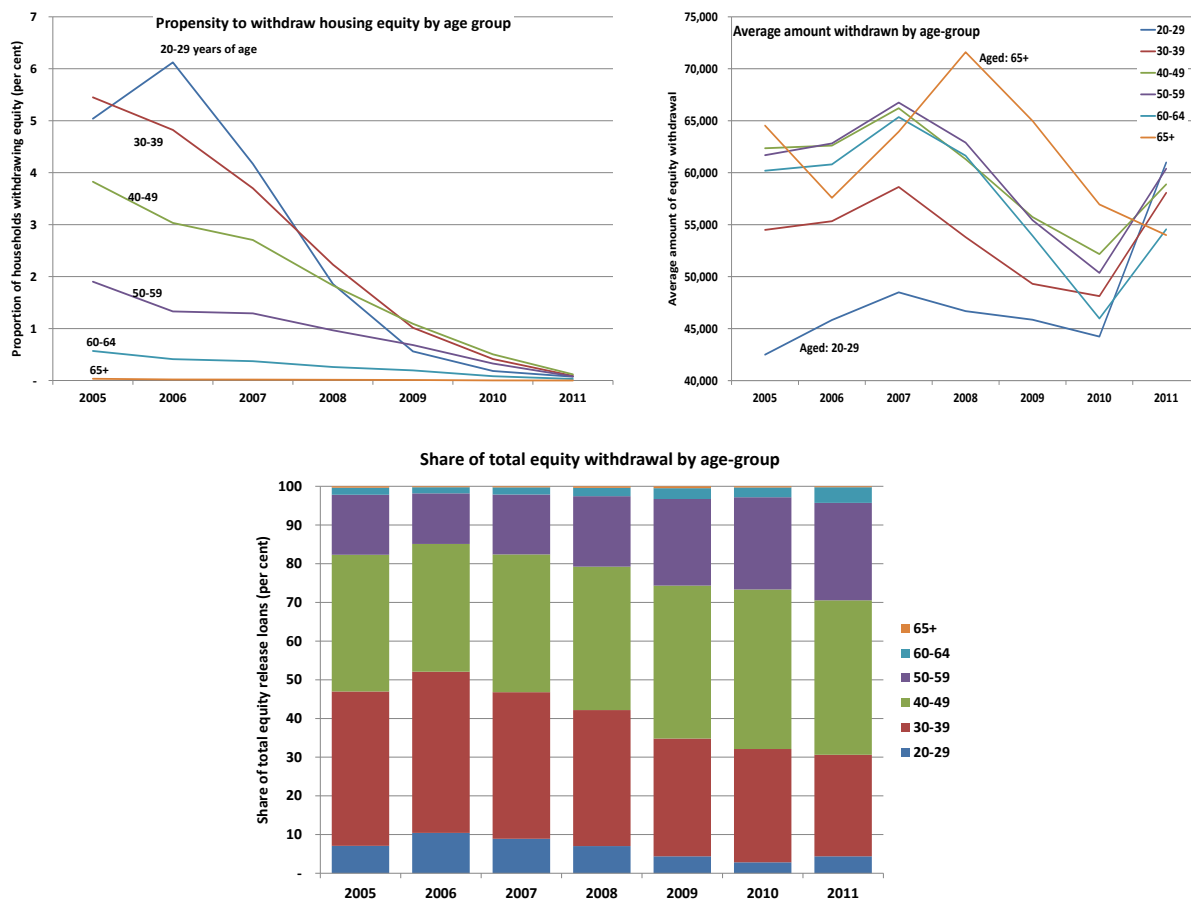
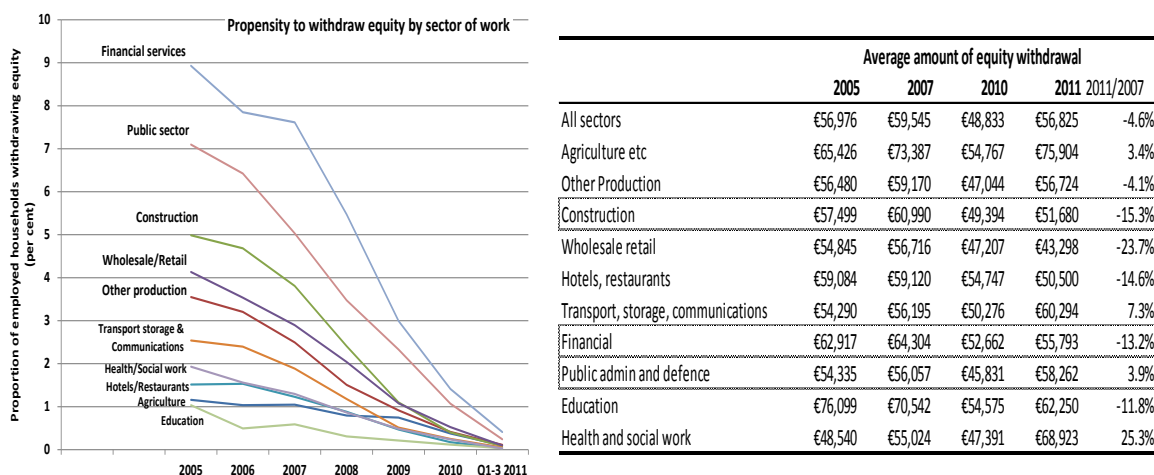*Source:* CSO and CBI calculations, restricted to loans €15,000 - €150,000

While the propensity for equity release is higher amongst young owner-occupier households, the average amount of equity withdrawn is significantly lower when compared with other age-groups.

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For example, the peak values (2006-07) are €50,000 to €57,000 for borrowers aged under 39 years, whereas as other groups are in excess of €65,000. This may simply reflect relatively lower levels of equity accumulated, or different reasons for equity withdrawal in the first place. Figure 7 also shows the share of total equity release borrowing by age-group. The decline in asset prices is reflected in the rapid fall in the share of equity release accounted for by younger cohorts ($<$ 40 years of age). Having accounted for 50 per cent of borrowing in 2006-07, the share fell to 30 per cent by 2011, with older borrowers ($>$50 years of age) making up much of the difference.

The loan-level data also records the sector of work of the primary borrower based on the NACE classification.[4] Figure 8 shows the propensity for equity withdrawal was highest where the main borrower was working in the Financial Services sector. This may reflect the fact that heads of households working in this sector might have easier access to credit. In 2005, almost 9 per cent of owner occupier households working in this sector withdrew equity from their homes, withdrawing just under €63,000 on average. As the decline in the property market began to take hold both the propensity to withdraw equity and the average amount withdrawn also declined. In 2011, there was a surprise increase in the average amount of equity withdrawal. This is particularly evident in those sectors where the *propensity* to withdraw equity was historically lower, such as Agriculture, Public Administration and Defence and Health and Social Work. It is difficult to identify the exact reasons for this increase and future analysis will show if the trend persists in the longer term.

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[4]NACE is a Statistical Classification of Economic Activities developed in the European Community. It is the standard classification of industrial activity used by the CSO. Further information is available on the CSO website.

Figure 8: Equity release by sector of work

	Average amount of equity withdrawal				
	2005	2007	2010	2011	2011/2007
All sectors	€56,976	€59,545	€48,833	€56,825	-4.6%
Agriculture etc	€65,426	€73,387	€54,767	€75,904	3.4%
Other Production	€56,480	€59,170	€47,044	€56,724	-4.1%
Construction	€57,499	€60,990	€49,394	€51,680	-15.3%
Wholesale retail	€54,845	€56,716	€47,207	€43,298	-23.7%
Hotels, restaurants	€59,084	€59,120	€54,747	€50,500	-14.6%
Transport, storage, communications	€54,290	€56,195	€50,276	€60,294	7.3%
Financial	€62,917	€64,304	€52,662	€55,793	-13.2%
Public admin and defence	€54,335	€56,057	€45,831	€58,262	3.9%
Education	€76,099	€70,542	€54,575	€62,250	-11.8%
Health and social work	€48,540	€55,024	€47,391	€68,923	25.3%

Source: CSO and CBI calculations. Loan-size €15,000-€150,000

Gross household income at time of loan origination is recorded in the Central Bank data. Figure 9 shows the trend in real gross household income from 1995 to 2010. [5] With the exception of 2001, from the mid-1990s, there was a steady decline in the incomes of households withdrawing equity, falling from €98,000 to €70,000 (2011 prices). This may reflect looser credit standards or merely the large increase in property prices during this period which resulted in the accumulation of significant housing equity amongst younger cohorts.

Figure 9 also shows the loan-to-value ratios (LTV, total property debt) at origination and indexed to 2010 house prices and balances. The indexed LTV figure indicates that the LTV at end 2010 for most borrowers that withdrew equity during the boom is significantly higher than at loan origination.

Finally in this section, we look at the economic status of the main borrower. Unsurprisingly, almost all are in some form of employment, with 80 per cent of borrowers classified as employees and 18.4 per cent as self-employed over the entire period. The final chart in Figure 9 shows that owner-occupier households where the head of household is self-employed withdraw significantly more on

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[5]We restrict the comparison to loans where the original loan term was greater than or equal to 15 years. This is because the Central Bank data is a snap-shot as at end-2010 and loans originating in the past and maturing before this date will not appear in the sample.

average over the period. The largest difference is in 2008, when the average home equity withdrawal loan was one-third higher when compared with employees (€70,000 versus €53,000). This difference could point to a number of factors, for example the use of housing equity as an additional source of firm-financing, or even the use of housing equity as financial buffer when the recession began to hit.

Figure 9: Equity release, income and economic status
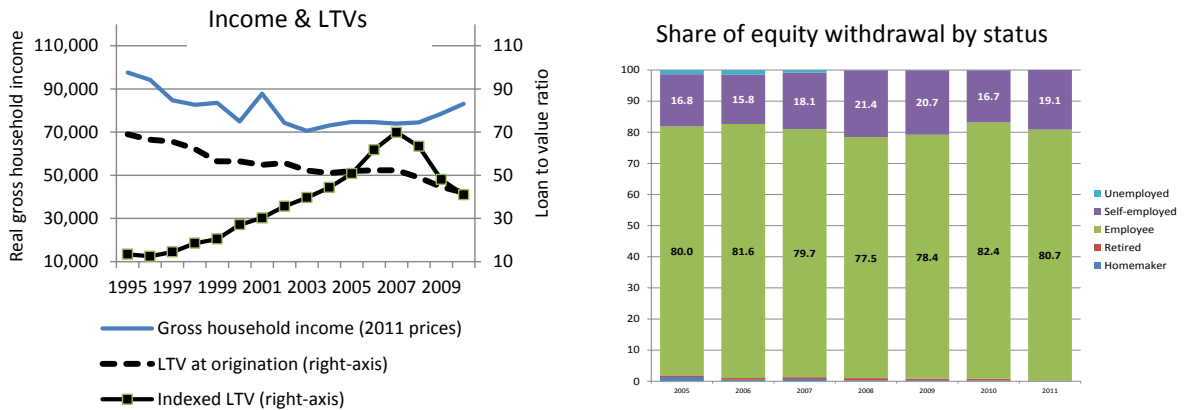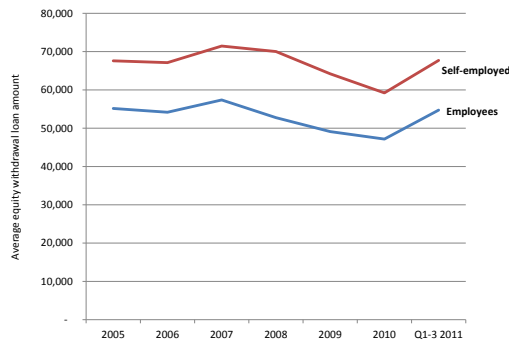
Source: CSO and CBI calculations, restricted to loans €15,000 - €150,000

3.5 Reasons for equity withdrawal - evidence from the loan data

It is important to analyse the reasons for home equity withdrawal as it adds to our understanding of the relationship between economic activity and this form of collateral-based lending. Drawing on the existing literature, the reasons for home equity withdrawal can be grouped under three broad headings:

1. Durables consumption - for younger households in particular, consistent with the life-cycle model of consumption;

2. Housing investment, including home improvement - either in the same property or in other properties; and

3. Home equity as a capital buffer - accumulated housing equity can used as a buffer against an adverse financial shock or as a source of capital when liquidity constraints are binding, for example, for business owners or the self-employed

For a sample of 52,000 owner-occupier equity release loans in one bank, borrowers provided information on the "purpose" of the loan at loan origination.[6] It is important to point out that this is self-reported, and there is no evidence of lenders subsequently verifying the information provided. Figure 10 shows the percentage of drawn-down balances accounted for by the five main loan purpose categories since 2000. Over the entire period, two-thirds of borrowers report the purpose of the equity release loan as "Home Improvement", similar to UK trends in Benito (2009). Just over a quarter of loans are described as being for either "Investment Property" (15 per cent) or a "Holiday home" (11 per cent). The average loan size for the latter (Figure 9) is significantly higher, peaking at over €120,000 in 2008.

Two other categories of loan purpose are reported: "Education" and "Short-term debt". Interestingly, the use of equity release for "Short-term" debt purposes grew significantly in 2009 and 2010, which could be indicative of the use of housing equity as a financial buffer. The loan size averages at €46,000 and €53,000 for "Education" and "Short-term debt" loans respectively over the 2000 - 2010 period.

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[6]As part of the 2012 Financial Measures Programme, loan purpose information has been provided by *all* lenders. A comparison with the data used in this note shows a similar overall pattern for the use of housing equity withdrawal loans.

Figure 10: Purpose of home equity withdrawal
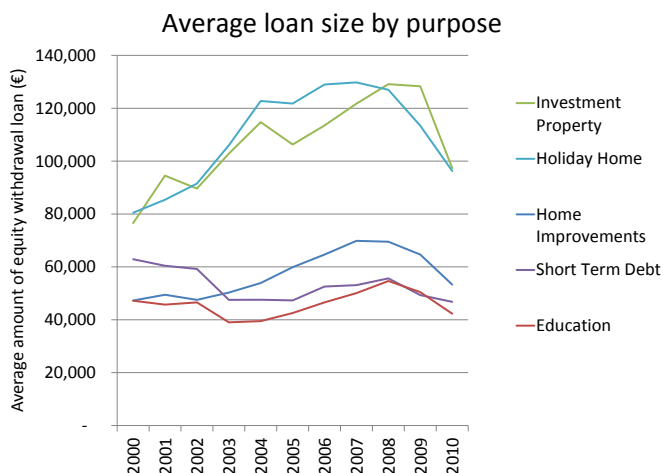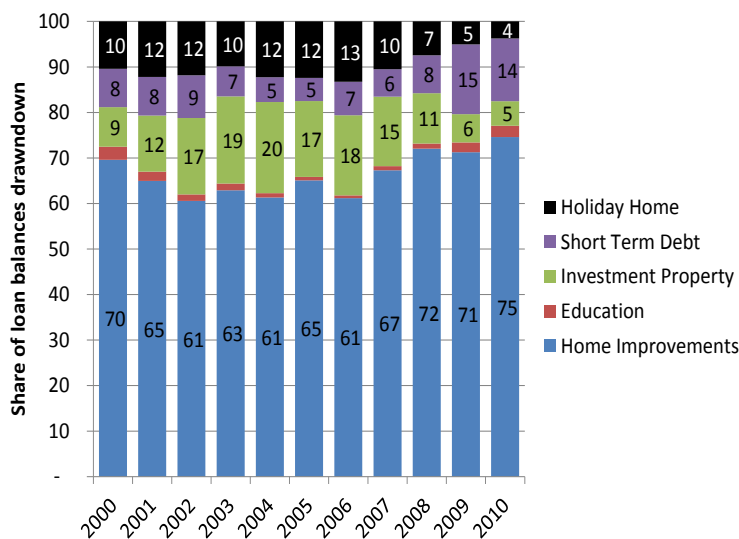
Source: CSO and CBI calculations, restricted to loans €15,000 - €150,000

As noted above, the loan purpose information is self-reported and not audited by the lender, either ex-ante or ex-post. It is possible that the "Home Improvement" category may also be picking up borrowing for other purposes, including consumption of durable and non-durable goods. However, it is not possible to check this with the current data set.

3.5.1 Equity release for property investment

According to the reported loan-purpose data, 15 per cent of equity withdrawal draw-downs are used for other property investment, excluding holiday homes. We use the borrower IDs in the loan data to analyse the impact that equity withdrawal has on the probability of a borrower subsequently investing in a buy-to-let property. The analysis is restricted to other borrowing *within the same bank*, as the data does not allow us to identify borrowing from other lenders.

Table 2 summarises the loan balances used in this analysis. We are interested in those borrowers who already have an owner-occupier mortgage with one bank, and subsequently take out a buy-to-let mortgage on a different property with the *same* bank. This group, highlighted in the table below, accounts for 3 per cent of owner-occupier loans in the sample.

Table 2: Owner-Occupier borrowers with BTLs (Dec 2010)

	Number of borrowers (%)	Balance €billion (%)
Owner-occupier - total	250,950 (100%)	€42.0 (100%)
Have a BTL loan from same lender	**8,005 (3.2%)**	**€1.9 (5%)**

Source: CBI loan-level data for three out of the four PCAR credit institutions.

The question we ask is as follows: how does equity withdrawal against an existing owner-occupier property affect the probability of the borrower taking out a BTL mortgage with the same lender? We estimate a probit regression where the dependent variable is equal to one if an existing owner-occupier borrower has a BTL loan with the same lender, or zero otherwise (i.e. the row highlighted in the table above). The regression includes a dummy variable equal to one if the borrower has withdrawn equity from their owner-occupied property in the preceding twelve months. To control for the fact that equity withdrawal for property investment are likely to be larger (see Figure 10), we interact this with a dummy variable equal to one if the equity withdrawal loan amount exceeds €100,000. The results, shown in Table 3, indicate a strong correlation between equity withdrawal and subsequent buy-to-let borrowing, particularly for larger loan sizes, where the marginal effect (7 per cent) is both large and statistically significant. The regression includes controls for income at origination (+), current loan balance (+) and loan term remaining (-); the latter is included as a proxy for the age of the borrower, which is not directly observed.

Table 3: Probability of an owner-occupier having BTL loan with same bank

Dependent variable =1 if OO with BTL	Marginal effects
Equity release[a]	0.00908***
	(0.00130)
Equity release $*$ €100k[a]	0.0704***
	(0.00387)
Current OO loan balance (Dec 2010)	0.0117***
	(0.000486)
Real gross household income at origination	0.0105***
	(0.000510)
Mortgage term remaining (months)	-6.92e-05***
	(4.01e-06)
Observations	250,590
Pseudo R-squared	0.0708

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(a) Marginal effects are for a discreet change in the dummy variable from 0 to 1

Looking across all equity withdrawal borrowers we observe that 9 per cent of loan draw-downs loans are followed by a buy-to-let purchase in the subsequent twelve months, which is is lower than the 15 per cent figure from the reported loan purpose data. Part of the difference is explained by the fact that we can only observe equity withdrawal and subsequent buy-to-let loans from the *same* lender, whereas the 15 per cent figure would include buy-to-let loans from *any* lender. The main conclusion from this analysis is that while it is difficult to pin down a precise figure, it is clear that a substantial proportion of equity release borrowing in recent years was associated with other property investment.

4 The impact of housing equity withdrawal on the economy

We begin with an brief overview of the literature on housing equity and consumption. We then present the results from a series of econometric models which show how housing equity withdrawal affected the Irish economy.

4.1 Literature on housing wealth, borrowing and consumption

The literature on how changes in housing wealth affect the economy can be broadly divided into two strands. The first considers the extent to which changes in house prices affect consumption - effectively measuring the marginal propensity to consuming out of housing wealth. Ebner (2010) calls this the *direct wealth effect*. The second strand looks at the *mechanisms* whereby changes in housing wealth are actually transmitted to the real economy. The main focus of this literature is the *collateral effect* (Ebner, 2010), or housing equity withdrawal. Another way to think about collateral effects is in terms of the financial accelerator model in Bernanke and Gertler (1995) and Aoki *et al.* (2004), where increasing house prices can increase consumption via the effect on both the amount and the terms of credit available to households.

In the context of house price cycles, several papers have sought to quantify the relationship between housing wealth and consumption, for example Herrala (2010, Finland) and Bostic *et al.* (2009). The latter paper reports significant housing wealth effects for the US, with elasticities of 6 cents in the dollar, although these are by no means the largest estimates for the US. Mishkin (2007) points out that the Federal Reserve Board Macroeconometric models incorporate a marginal propensity to consume (MPC) out of housing wealth of 3.75 cents in the dollar - the same MPC used for stock market wealth.

Mishkin (2007) looks at the relationship between housing equity withdrawal and the macro-economy and finds that the impact of equity withdrawal is also a function of the role of monetary policy channels and different types of financial innovation. In a wide-ranging, cross-country study (which includes Ireland) Case *et al.* (2005) use panel data to estimate the marginal propensity to consume out of stock market and housing wealth. Excluding the United States, they estimate a housing wealth effect of around 0.14. The effects for the United States are considerably smaller, at around 0.04. Aron *et al.* (2010) also estimate consumption functions with housing wealth effects for the UK, Japan and the US. They find a marginal propensity to consume out of housing wealth of between 0.03 and 0.04 for the UK and the US. They also find that the MPC has been drifting upwards over-time, which is attributed to credit market liberalisation effects and other forms of financial innovation. In this paper we do not delve into the role of financial innovation or other supply-side factors in explaining home equity withdrawal, as in Bernanke and Gertler (1995). Although the changes in the market structure throughout the period (see Figure 3) would lead us to believe that this was a potentially important factor. Furthermore, as shown in McCarthy and McQuinn (2012), changes in credit standards and leverage ratios have played a significant role in the credit expansion and contraction in Ireland over the last decade.

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Several papers have looked at the wider economic impact of equity withdrawal. Klyeuv and Mills (2006) analyse, amongst other things, the extent to which housing wealth has been responsible for the decline in US savings rates over the last 30 years, and thereby impacting on consumption. Using a measure of housing net worth, they find a negative relationship between housing net worth and the savings rate.

At a a micro level, Benito (2009) and Ebner (2010) use panel data to analyse the decision to extract home equity in the UK and Netherlands. Both papers estimate the equity withdrawal decision in a latent variable framework. In the UK it appears that transactors, i.e. buying or selling a property, are *less* likely to withdraw equity, whereas for the Netherlands the average loan amount is around 30 per cent higher for this group when compared with non-transactors. In line with the evidence for Ireland, the research also finds strong life-cycle effects, with equity withdrawal higher amongst younger home-owners, as well as evidence of the use of equity withdrawal as a financial buffer. Benito also examines the relationship between durable consumption spending and equity withdrawal in a Tobit model. He finds evidence of increased durables spending amongst credit constrained households that withdraw equity.

4.2 Evidence of the impact of housing equity withdrawal on the Irish Economy

From a macroeconomic perspective, it is important to understand the extent to which housing equity withdrawal impacts on the overall economy. The general approach we adopt in this section is to aggregate-up from the loan-level data to generate a time-series ofequity withdrawal, and examine how changes in this series affect changes in a number of key aggregates, such as measures of retail sales and construction output. An important difference versus the Benito (2009) and Ebner (2010) studies on equity withdrawal and consumption is that here we are unable to link the decision to withdraw equity to subsequent consumption behaviour at the individual level. This is the primary reason for carrying out the analysis at an aggregate level.

We use the Central Bank loan level data to construct a measure of the total value of equity withdrawal by owner-occupier households on a monthly basis from 1996 onwards. There are two important caveats with this data. Firstly, the loan-level data is available for the FMP credit institutions only, and therefore represent only around 70 per cent of the overall market for new mortgage lending during this period. Secondly, the loan data is drawn from a snap-shot of the books of the FMP credit institutions as at end-2010. This introduces a potential selection problem whereby loans originating in the past but maturing before this date are unobserved. It is not possible to gauge the

extent of the selection issue, however we would note that the average loan term for on equity release loans is in excess of 20 years throughout the time period, as shown in Figure 11.

Figure 11 shows the evolution of the equity withdrawal series over time. There is a five-fold increase in the nominal value of equity release drawdowns in the ten-year period to 2006. This is driven by a combination of an increasing propensity to withdraw equity - prevalent in the late 1990s and the period between 2007 and 2009 in particular - and an increase in the value of housing equity itself associated with booming house prices. The equity withdrawal series displays a strong seasonal pattern, with values peaking in the third an fourth quarters of each year. The analysis that follows uses a seasonally adjusted series, deflated by the consumer price index (CPI).

Figure 11: Aggregate equity withdrawal trends
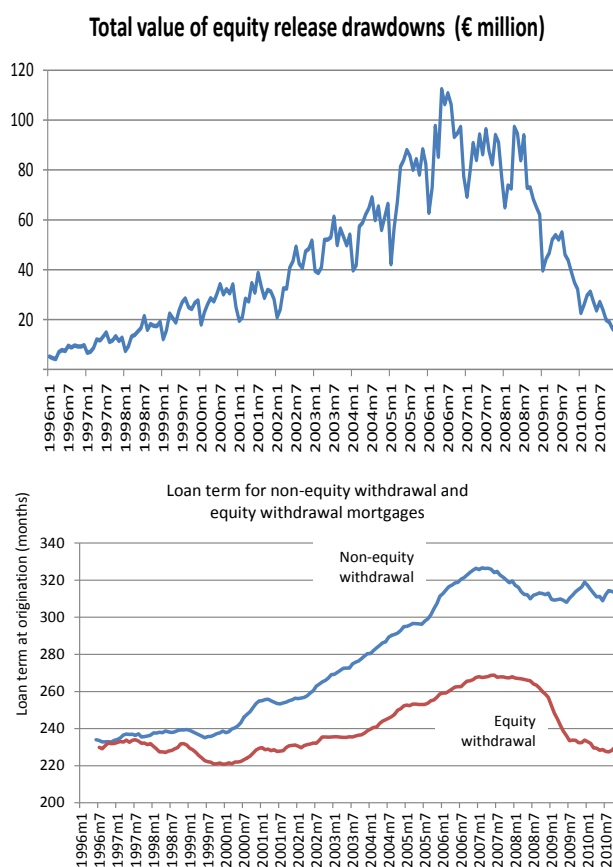
Source: Central Bank of Ireland, loan data for FMP credit institutions.
Notes: Owner-occupier loans between €15,000 - €150,000.

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4.2.1 Equity withdrawal and residential construction output

The loan-purpose information described in section 3.5 showed that over 90 per cent of equity withdrawal was reinvested in property. Therefore, one prior is that the main direct impact of equity withdrawal is likely to be in the construction sector. Figure 12 shows that there is a strong correlation between residential construction output and equity withdrawal over time. The equity release series is the log of the series in Figure 11, seasonally adjusted and deflated by CPI.

Figure 12: Equity withdrawal and residential construction output
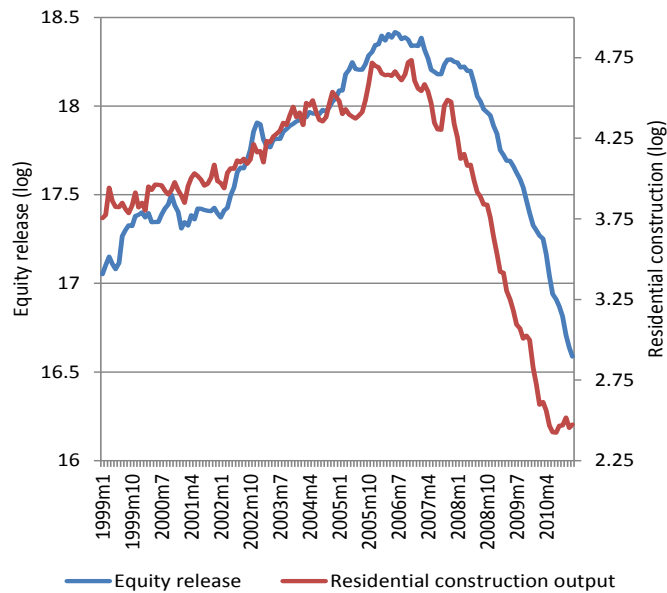
Source: CSO residential construction output, CBI equity release
Notes: All data real, seasonally adjusted, logs

In their analysis of the structural determinants of housing demand, Addison-Smyth *et al.* (2008) show that both affordability and construction costs are key determinants of output in the housing sector. We therefore estimate a regression model, with residential construction output as the dependent variable, which includes a measure of equity release and controls for affordability and construction costs. The latter is the CSO house building cost index, deflated by CPI. The affordability measure is defined as the ratio of monthly mortgage payments to gross household income: an increase represents a drop in affordability. The average income measure is taken directly from the loan-level data, where gross household income is recorded at loan origination. The monthly

payment measure is calculated using an annuity formula, where the term and balance inputs are averages from the loan data and the variable rate is taken from the Central Bank of Ireland monthly interest rate statistics. The evolution of this series is shown in Figure 13 at the end of the paper.

The results from estimating a long-run regression by OLS are shown in Table 4. The coefficient on the equity release variable is large (1.16) and statistically significant, indicating a strong correlation between equity release and residential construction activity. The coefficient on the cost measure (-2.26) is also significant and has the expected sign: as building costs rise, residential construction output falls. The affordability measure is insignificant in this specification.

Table 4: Long-run model: determinants of residential construction output

	Coefficient (standard error)
Equitywithdrawal	1.160***
	(0.0433)
Affordability	0.275
	(0.2006)
Cost	-2.262***
	(1.282)
Constant	-2.506**
	(1.282)
R-squared	0.82
Data	1996 - 2010, monthly
Observations	180

*** p<0.01, ** p<0.05, * p<0.1

The residential construction and equity release series are both non-stationary, as confirmed by the results from Dickey-Fuller tests shown in Table 8 at the end of the paper. An examination of the residuals from the long-run relationship and the results from Dickey-Fuller test (Figure 14) indicates that the variables are cointegrated. We therefore estimate the following error-correction model:

$$\triangle C_{i,t} \quad = \quad \lambda(C_{i,t-1} - \alpha_0 - \beta_1 E_{t-1} - \beta_2 A_{t-1} - \beta_3 K_{t-1}) + \theta_1 \triangle E_{i,t} + \theta_2 \triangle A_{i,t} + \theta_3 \triangle K_{i,t} \quad (1)$$

Where C, E, A and K are residential construction output, equity withdrawal, affordability and cost respectively; λ is the error correction term. The results are shown in Table 5 and the residuals from this model are shown in Figure 15 at the end of the paper. Both the short-run (0.849) and long-run

(1.341) coefficents on equity withdrawal are statistically significant at the 1 per cent level in the single equation error correction model. These coefficients, which can be interpreted as elasticities, confirm the results from the long-run model: changes in equity release appear to have a large and long-lasting effect on residential construction output. The affordability measure is negative and significant in both the long- and the short-run, indicating a strong correlation with construction output. As with the long-run model in Table 4, changes in building costs have a significant impact on construction output. Following equation 1, the error correction term λ is the coefficient on the lag of the undifferenced dependent variable.

Table 5: Single Equation Error Correction Model: residential construction

	Coefficient
	(standard error)
ΔEquity withdrawal (t) [θ_1]	0.849***
	(0.1241)
ΔAffordability (t-1) [θ_2]	-0.647**
	(-0.3374)
ΔAffordability (t-2) [θ_{21}]	0.352
	(0.3361)
ΔCost (t) [θ_3]	-3.106***
	(-1.2512)
Error correction term [λ]	-0.2134***
	(-0.0474)
Equity withdrawal (t-1) [β_1]	1.341***
	(0.1758)
Affordability (t-1) [β_2]	-1.228
	(-0.5199)
Cost (t-1) [β_1]	-4.630***
	(-1.2424)
Constant	0.822
	(6.1879)
Durbin-Watson	2.69
Data	1996m1:2010m12
Observations	177

*** p<0.01, ** p<0.05, * p<0.1

Model estimated non-linearly to provide efficient estimates of the long-run parameters β_1 and β_2 .

4.2.2 Equity withdrawal and retail sales

The existing literature on housing equity withdrawal shows that, outside of home-improvements, consumption of durable goods is one of the next most common uses of equity withdrawal. In this section, we look at how changes in the equity withdrawal series impact on various consumption measures. The only comparable monthly series on consumption to match the equity release series is retail sales data from the Central Statistics Office. In this section use monthly sales volume data for motors, furniture, electrical goods and household equipment. Figure 16 at the end of the paper shows historical data for each of these series.

Table 6 shows the results from the long-run model where each of the four categories of retail sales are regressed on equity release and income. The regression also includes a dummy variable *SSIA* equal to one for the period June 2006 to April 2007. The *SSIA*, or *Special Savings Incentive Account*, was a Government-sponsored multi-year savings scheme launched in May 2001 and maturing between June 2006 and April 2007. The scheme had the potential to significantly increase consumer spending for a certain period and we therefore include a dummy variable for this effect.[7] Looking across the models, we see that coefficient on equity release is positive and statistically significant in all four specifications. The largest effect is in motor and furniture sales where the coefficient is equal to 0.337 and 0.250 respectively. With the exception of motor sales, income also has a positive impact on consumption in each of these categories.

Table 6: Long-run model: retail sales

VARIABLES	Motor	Furniture	Electrical	Hhold equip.
Equity withdrawal	0.337***	0.250***	0.0483***	0.0821***
	(0.0203)	(0.0156)	(0.0134)	(0.0121)
Income	-0.430***	0.0758**	1.145***	0.544***
	(0.0483)	(0.0371)	(0.0321)	(0.0278)
SSIA (d)	0.0661*	0.0812***	-0.0208	0.0572***
	(0.0372)	(0.0286)	(0.0247)	(0.0188)
Constant	2.825***	-0.673***	-7.728***	-2.338***
	(0.323)	(0.249)	(0.215)	(0.304)
Observations	180	180	180	132
R-squared	0.667	0.825	0.952	0.837

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

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[7]For further information on SSIAs and potential consumption effects see CSO (2005).

Similar to the estimation approach for residential construction, we test for a cointegrating relationship between the retail sales series and equity release. The test statistics from a Dicky-Fuller test on the residuals from the long-run model indicate that an error correction model is appropriate (results shown in Figure 16). The results from estimating a single equation error correction model SE-ECM are shown in Table 7. The SSIA variable is dropped from the error correction model as it is insignificant in this specification. The estimated parameters are as in the SE-ECM specified in equation (1) above, with the *Income* taking the place of the exogenous variables *Affordability* and *Cost* from the residential construction model. The coefficient on the lag of the undifferenced dependent variable is the estimated error correction term, λ, which shows the speed at which retail sales return to the equilibrium level as estimated by the long-run model.

Table 7: Single Equation Error Correction Model: retail sales

	Motors	Furniture	Electrical	Hhold equip.
ΔEquity withdrawal (t) $[\theta_1]$	0.182***	0.115***	0.084***	0.1303***
	(0.0434)	(0.0363)	(0.0263)	(0.0260)
ΔIncome (t-1) $[\theta_2]$	4.333***	1.663	1.073	1.886***
	(1.4114)	(1.1705)	(0.8472)	(0.655)
Error correction term $[[\lambda]$	-0.2633***	-0.224***	-0.149***	-0.1661***
	(-0.0488)	(-0.0474)	(0.0405)	(-0.0459)
Eq. withdrawal (t-1) $[\beta_1]$	0.220***	0.2653***	-0.002	(0.0044)
	(0.0569)	(0.0542)	(-0.0615)	(0.0527)
Income (t-1) $[\beta_2]$	-0.0999	0.058	1.245***	0.686***
	(-0.1498)	(0.1432)	(0.1606)	(0.1134)
Constant	1.523	-0.793	-7.829	-2.394***
	(0.8198)	(-0.7950)	(-0.8688)	0.9381
Durbin-Watson	2.45	2.53	2.53	2.36
Data	1996m1:2010m12	1996m1:2010m12	1996m1:2010m12	2000m1:2010m12
Observations	179	179	179	131

*** p<0.01, ** p<0.05, * p<0.1

Model estimated non-linearly to provide efficient estimates of the long-run parameters β_1 and β_2 .

The results from the error correction model of retail sales show strong short-run effects from changes in equity withdrawal for all four types of consumption. The short-run coefficients ranges from 0.084 for electrical goods to 0.182 for motor sales. Longer-term, the impact of changes in equity release for Electrical Sales and Household Equipment fades, and the income effect dominates

for these types of consumption. However, for both motors and furniture we continue to observe positive, significant and large long-run elasticities for changes in equity withdrawal. The coefficients imply that a 10 per cent change in equity withdrawal leads to a 2.2 per cent (motors) to 2.6 per cent (furniture) change in consumption. These effects are large, when one considers the fall in equity release in the last three years, as documented in the first half of this paper.

5   Conclusion

Using micro data on loan draw-downs, this paper examines housing equity withdrawal trends in Ireland in recent years. Equity release loans accounted for approximately 31 per cent of mortgage related loans (in volume terms) and 14 per cent of loans drawn down between 2005 and 2011. In absolute terms the *total value* of equity release borrowing increased in line with the housing boom throughout the late 1990s and up to 2007. We show that somewhere between 6 and 9 per cent of owner-occupier households withdrew equity at the peak of the property boom, with the vast bulk of loans being within the €15,000 to €150,000 bracket. The period of the property boom also saw an increasing number of equity withdrawal loans exceeding €150,000, such that in 2007 they accounted for almost one-quarter of all loans drawn down. By any international comparison this is a large figure and it helped to drive the *average* loan in 2007 to just over €113,000. This figure had fallen to €60,000 by 2010. The presence of a substantial minority of large outlier loans in the sample has the potential to distort the trends. When these loans are excluded (around one-quarter of balances), equity withdrawal trends in Ireland look very similar to those observed in the UK, for example.

We show that, in line with the predictions of the life-cycle model, equity withdrawal borrowers are likely to be younger households that want to borrow against rising incomes. An important challenge from a macro-economic perspective is the extent to which income expectations at the time of the loan origination might not be realised in the medium-term.

Using self-reported loan-purpose data, we show that, in line with the international evidence, around two-thirds of equity withdrawal was used for home improvement purposes. The property boom also saw an increasing number of owner-occupier households withdraw equity to invest in other properties, both buy-to-let (15 per cent of equity release balances) and holiday homes (11 per cent). Controlling for income and other personal characteristics, equity withdrawal borrowers are 7 per cent more likely to take out a buy-to-let loan with the same lender when compared with non-equity release borrowers. This is against a sample mean of just 3 per cent.

We show that equity withdrawal was strongly positively correlated trends in residential construction output between 1996 and 2010. It also affected certain types of consumption, such as car

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sales, furniture sales and sales of electrical goods and household equipment. These effects, which are remain even after controlling for income. For some categories, such as motor sales and furniture sales, the effects of changes in equity release spending appear to be longer-lived.

It is important to point out that for a significant portion of the period we look at, Ireland underwent a substantial and unprecedented property boom. The re-investment of the majority of equity withdrawal in property is consistent with this pattern. Therefore, extrapolation to more 'normal' economic times should be undertaken with caution. From a domestic demand perspective, the collateralisablity of housing wealth via equity release represents an important credit channel which appears to affect certain types of consumption and economic activity. A decline in house prices therefore has the potential to depress demand in the short-term for those who are "long housing" (Buiter, 2010), i.e. both older borrowers and borrowers with substantial negative equity. This effect may be offset in the longer-term as younger (yet-to-be) house-owners acquire housing assets at lower prices than might otherwise have been the case.

References

[1] Addison-Smyth, Diarmaid, McQuinn, Kieran and O' Reilly, Gerard (2008). "Estimating the Structural Demand for Irish Housing," Research Technical Papers 1/RT/08, Central Bank of Ireland.

[2] Aoki, K., Proudman, J. and G. Vlieghe (2004). "House prices, consumption, and monetary policy: a financial accelerator approach," Journal of Financial Intermediation, Elsevier, vol. 13(4), pages 414-435, October.,

[3] Aron, Janine, Muellbauer, John and Murphy, Anthony, (2006). "Housing wealth, credit conditions and consumption," MPRA Paper 24485, University Library of Munich, Germany.

[4] Benito, A. (2009). "Who Withdraws Housing Equity and Why?," Economica, London School of Economics and Political Science, vol. 76(301), pages 51-70, 02.

[5] Benito A. and J. Power (2004) "Housing equity and consumption: insights from the Survey of English Housing". Bank of England Quarterly Bulletin, Autumn 2004.

[6] Bernanke B. and M. Gertler (1995). "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," Journal of Economic Perspectives, vol. 9 (no. 40, pp. 27-28.

[7] Blanchflower, David G and Oswald, Andrew J, (1998). "What Makes an Entrepreneur?," Journal of Labor Economics, University of Chicago Press, vol. 16(1), pages 26-60, January.

[8] Bostic, Raphael, Gabriel, Stuart and Painter, Gary, (2009). "Housing wealth, financial wealth, and consumption: New evidence from micro data," Regional Science and Urban Economics, Elsevier, vol. 39(1), pages 79-89, January.

[9] Browning, Martin and Thomas F. Crossley (2000). "The Life Cycle Model of Consumption and Saving," Social and Economic Dimensions of an Aging Population Research Papers 28, McMaster University.

[10] Buiter, Willem H., (2010). "Housing wealth isn't wealth," Economics - The Open-Access, Open-Assessment E-Journal, Kiel Institute for the World Economy, vol. 4(22), pages 1-29.

[11] Case K.E., Quigley J.M. and R.J. Shiller (2005), "Comparing wealth effects: The stock market versus the housing market", Advances in Macroeconomics Vol 5, Issue 1 Article 1.

[12] Central Bank of Ireland (2011). "The Financial Measures Programme Report", March 2011.

[13] Central Bank of Ireland (2012). "Quarterly Financial Accounts for Ireland Q3 2011", 14 February 2012.

[14] Central Bank of Ireland (2012b). "Macro-Financial Review", March 2012.

[15] Central Statistics Office (2011). "Residential Property Price Index", November 2011.

[16] Central Statistics Office (2005). "Quarterly National Household Survey: Special Saving Incentive Accounts (SSIAs) Quarter 4 2005".

[17] Claessens, S. M. Ayhan Kose and M. E. Terrones, (2008). "What Happens During Recessions, Crunches and Busts". IMF Working Paper WP/08/274.

[18] Ebner, A. (2010). "A micro view on home equity withdrawal and its determinants. Evidence from Dutch households," Discussion Papers in Economics 11309, University of Munich, Department of Economics.

[19] Gerlach, S. (2012). "Housing Markets and Financial Stability". Speech by Deputy Governor Stefan Gerlach at the National University of Ireland, Galway conference on *Contemporary Housing Issues in a Changing Europe*. 20 April 2012.

[20] Gerlach, S. and K. Assenmacher-Wesche (2010). "Financial Structure and the Impact of Monetary Policy on Property Prices". *Mimeo.*.

[21] Katrin Assenmacher-Wesche and Stefan Gerlach, (2008). "Financial Structure and the Impact of Monetary Policy on Asset Prices," CFS Working Paper Series 2008/30, Center for Financial Studies.

[22] Goggin, J., Holton, S., Kelly, J., Lydon, R. and K. McQuinn (2012). "The financial crisis and the pricing of interest rates in the Irish mortgage market: 2003-2011". Central Bank of Ireland Research Technical Paper 1/RT/12.

[23] Hellebrandt, T., Kawar, S. and M. Waldron (2009), "The Economics and Estimation of Negative Equity", Bank of England, Quarterly Bulletin

[24] Herrala, Risto, (2010). "Credit constraints and durable consumption," Research Discussion Papers 15/2010, Bank of Finland.

[25] Hogan, V. and P. O'Sullivan, (2007). "Consumption and House Prices in Ireland," Special Article in the ESRI Quarterly Economic Commentary, Autumn 2007.

[26] Irish Banking Federation (2011). "Mortgage Market Profile Q3 2011," November 2011.

[27] Kennedy, G. and T. McIndoe Calder (2011). "The Irish Mortgage Market: Stylised Facts, Negative Equity and Arrears", Conference Paper for: The Irish Mortgage Market in Context, Central Bank of Ireland 13th October 2011.

[28] Kennedy, G. and K. McQuinn (2012) "Why are Irish House Prices Still Falling". Central Bank of Ireland *Economic Letters* series Vol. 2012, No. 5.

[29] Klyuev, V. & Paul S. Mills, (2006). "Is Housing Wealth an 'ATM'? The Relationship Between Household Wealth, Home Equity Withdrawal, and Saving Rates," IMF Working Papers 06/162, International Monetary Fund.

[30] McCarthy, Y. and K. McQuinn (2011). "Decomposing Irish house price movements: 2000 - 2010". Central Bank of Ireland Research Technical Paper 1/RT/08, March 2008.

[31] Miles, David, (1992). "Housing markets, consumption and financial liberalisation in the major economies," European Economic Review, Elsevier, vol. 36(5), pages 1093-1127, June.

[32] Mishkin, Frederic S. (2007). "Housing and the monetary transmission mechanism," Finance and Economics Discussion Series 2007-40, Board of Governors of the Federal Reserve System (U.S.).

[33] O'Hanlon, Niall, (2011). "Constructing a National House Price Index for Ireland," Journal of the Statistical and Social Inquiry Society of Ireland, Vol. XL

Table 8: Augmented Dickey-Fuller Unit Root Tests

|	Null hypothesis	Test Statistic	5% critical value	N (lags)
Equity Release	Series contains a unit root	2.302	-3.440, do not reject null	176 (3)
Residential Constuction	Series contains a unit root	1.122	-4.015, do not reject null	176 (3)
Motor Sales	Series contains a unit root	-1.517	-3.439, do not reject null	185 (3)
Furniture Sales	Series contains a unit root	-0.383	-3.439, do not reject null	185 (3)
Electrical Sales	Series contains a unit root	-1.079	-3.439, do not reject null	185 (3)
Houshold Equipment*	Series contains a unit root	-0.792	-3.445, do not reject null	137 (3)

Notes: Monthly data from 1996 - 2010, except (*) which is available from 2000 onwards.
All variables real, logged and seasonally adjusted.

Figure 13: Affordability Index
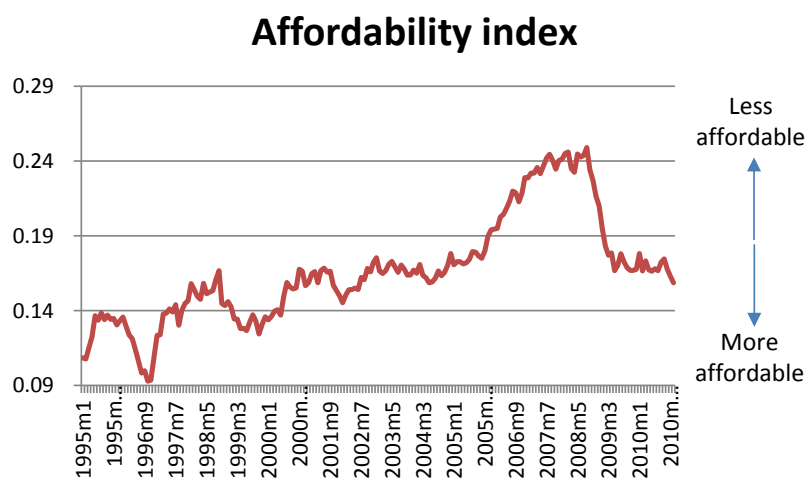
Source: Central Bank of Ireland calculations

Figure 14: Residuals from bivariate long-run residential construction regression
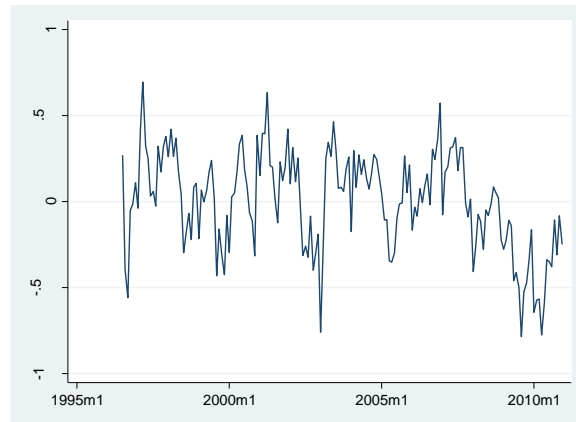
Source: Central Bank of Ireland

|	Interpolated Dickey-Fuller		
Test-statistic Z(t)	1% critical value	5% critical value	10% critical value
–5.550	–3.486	–2.885	–2.575
Observations	173	=>Reject Null, i.e. H0: Series contains a unit root	

Figure 15: Residuals from SEECM residential construction model

Residuals from SEECM Residential Construction model
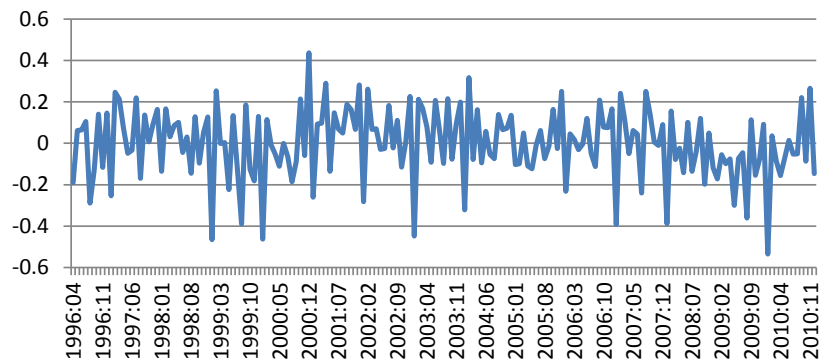
Source: Central Bank of Ireland calculations

Figure 16: Monthly retail sales, real and seasonally adjusted

Motor

Furniture

Electrical goods

Household equipment
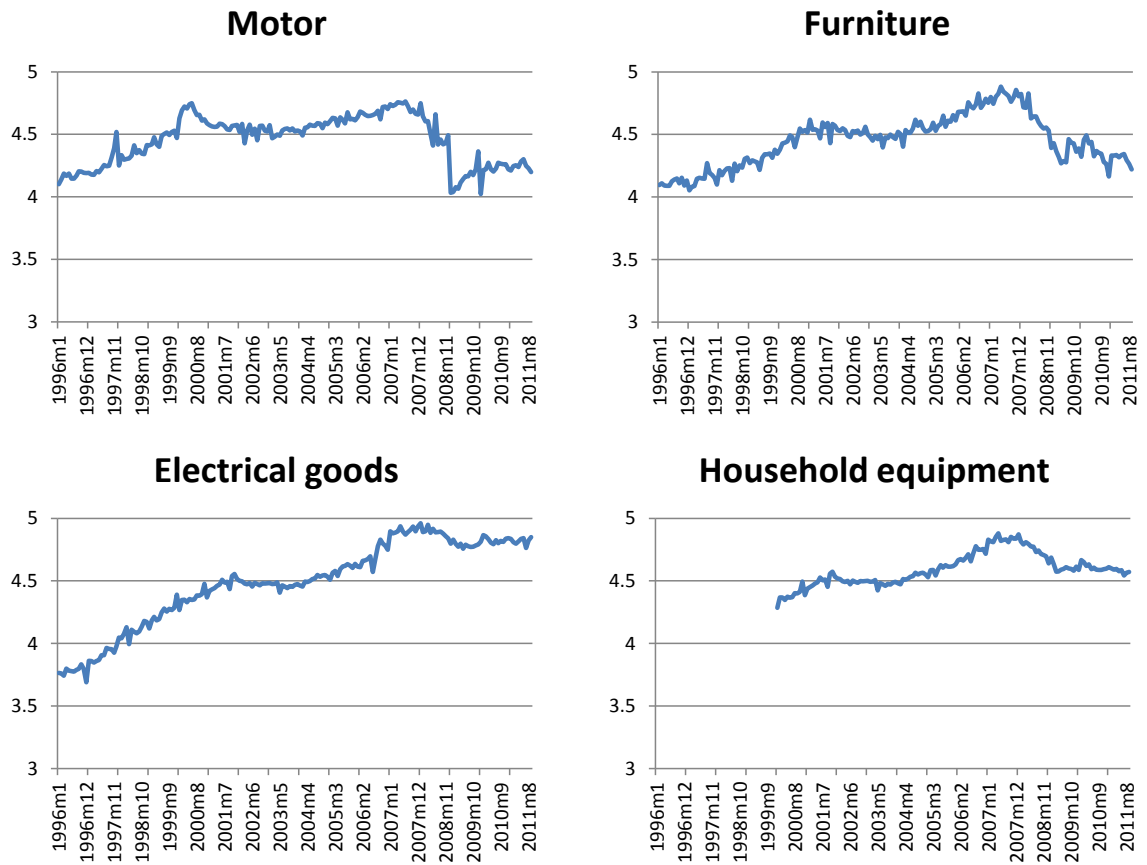
Source: Central Statistics Office

Dickey-Fuller tests on residuals from long-run model (retail sales as function of equity release only)				
	Test-statistic Z(t)	1% critical value	5% critical value	10% critical value
Motor sales	-3.96	-2.59	-1.95	-1.615
Furniture sales	-4.66	-2.59	-1.95	-1.615
Electrical goods	-3.90	-2.59	-1.95	-1.615
Household Equip.	-3.15	-2.59	-1.95	-1.612