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The Irish Mortgage Market: Stylised Facts, Negative Equity and Arrears

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Abstract

This paper uses loan-level data from the residential mortgage books of four Irish credit institutions, as at December 2010. The focus of the paper, is to provide an overview of the structure and condition of these housing loan books. This includes a description of borrower categories, interest rate profiles, repayment structures, property types, arrears accruals and the regional distributions of these loan and borrower characteristics across Ireland. Because it is possible to secure more than one loan on an individual house, we distinguish the number of properties underlying the residential mortgage book. Additionally we combine the data with house price data in order to generate estimates on the amount of housing equity in the Irish mortgage market. We focus on the properties in negative equity, in particular. Our findings suggest that approximately 31 per cent of mortgaged properties, representing over 47 per cent of the mortgage books' outstanding loan balances were in negative equity at the end of 2010. Of the mortgaged properties in negative equity, 8 per cent had also accrued more than three months worth of arrears on their mortgage loans.

JEL classification: G01, G12, G21, R11, R12, R21, R31.
Keywords: Credit, Asset Pricing, Banks, Mortgages, Regional Economic Activity, Size and Spatial Distributions of Regional Economic Activity, Housing Demand, Housing Supply and Markets.

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Non Technical Summary

In early 2011 loan loss assessments under conservative, base and stressed case scenarios were carried out on the loan books of four Irish credit institutions. The results of which were used in the Prudential Capital Assessment Review (PCAR II) exercise to calculate the level of capital required to stabilise the Irish banking sector. Along with details of the future deleveraging of the Irish banks, these were published in the Financial Measures Programme (FMP), in March 2011. This analysis was facilitated by the disclosure of the financial institutions' loan books. Detailed loan-level data, as of 31 December 2010, was gathered on the credit portfolios of the four institutions involved, covering residential mortgages, corporate, small and medium enterprise (SME), corporate real estate (CRE) and non-mortgage consumer lending.

The focus of this paper, is to provide an overview of the structure and condition of the mortgage loan books of the four credit institutions assessed in the 2011 Financial Measures Programme (FMP). This analysis includes an examination of borrower categories, interest rate profiles, repayment structures, property types, arrears accruals and the regional distributions of these loan and borrower characteristics across Ireland. Because it is possible to secure more than one loan on an individual property, a particular effort is made to distinguish the number of properties underlying the residential mortgage book. Additionally we combine the data with house price data in order to generate estimates on the amount of housing equity in the Irish mortgage market. We focus on the properties in negative equity, in particular. Our findings include the following stylised facts.

The mortgage loans are concentrated in a relatively small geographic area, with a small area in Leinster (Dublin and the Mid-East) accounting for almost half of the outstanding balance in the data. With regards buyer categories, while first-time buyers (FTBs) and Movers dominate the market, a sizeable proportion of buy-to-let (BTL) mortgages are also observed. The prominence of interest only (IO) loan contracts amongst loans that originated at the height of the housing boom may be an indicator of vulnerability amongst this group, while the popularity of these contracts amongst investment buyers is also a cause for concern. To this end, we highlight the number of borrowers already on IO contracts and variable or tracker interest rates, the increase in the proportion of original loan to value (LTV) ratios of over 1 on mortgage loans originating between 2004-2008 and the increase in loan terms over the same time period. Together these factors describe the vulnerability of a large swathe of borrowers to interest rate movements and the limitations they may face with regards potential lender forbearance should they face affordability difficulties given income or other shocks going forward.

The data contains approximately 74,000 loans in arrears at the end of 2010, associated with 63,000 properties. Of these, 24,011 properties have at least three months worth of repayments outstanding on their mortgages. Unsurprisingly, the largest cohorts of borrower types (FTB- and Mover-principal and interest (P&I) borrowers) account for the majority of the 90DPD arrears balance (58 per cent). However, they are in general better performing, with less than five per cent of their mortgaged properties associated with loans which are in 90DPD, than the groups which make up a smaller section of the mortgage book and whose repayments are on an interest only basis. For

example, BTL-IO borrowers have the highest arrears balance per property (€2,100)[1] of all borrower groups. This is of particular concern as these borrowers are the third largest borrower group in the data, accounting for 12 per cent of all outstanding balances. Similarly, borrowers located in the Midlands and Border regions are experiencing relatively high levels of mortgage distress. This may be associated with factors including, but not limited to, relatively high property vacancy and/or unemployment rates.

Using published house price indices along with the house price valuations in the loan-level data we estimated the level of housing equity within the dataset. Approximately 31 per cent of mortgaged properties, or 47 per cent of the value of outstanding loans, are found to be in negative equity at the end of 2010. Negative equity is more prevalent amongst FTBs and BTL borrowers, many of whom purchased properties during a period of high house prices with high LTV ratios and/or interest only contracts. We also show that a significant amount of positive equity remains on the FMP institutions' books and carry out some sensitivity analysis on this equity using a larger house price fall at the end of 2010 than official figures show. Furthermore, we find that while Dublin is home to the largest number of borrowers simultaneously in negative equity and arrears distress, proportionally a greater cohort of householders outside of Dublin, such as the Midlands and Border, are facing both negative equity and are in arrears distress on their mortgage loans.

[1] Refers to all loans in the data in arrears of any level.

1 Introduction

In early 2011 loan loss assessments under conservative, base and stressed case scenarios were carried out by BlackRock Solutions on the loan books of four Irish credit institutions.[2] The results of which were used in the Prudential Capital Assessment Review (PCAR II) exercise to calculate the level of capital required to stablise the Irish banking sector. Together with details of the future deleveraging of the Irish banks, these were published in the Financial Measures Programme (FMP), in March 2011. As part of the process, detailed loan level data covering residential mortgages, corporate, SME, CRE and non-mortgage consumer lending was gathered on the credit portfolios of the institutions involved.

The focus of this paper and a topic of considerable interest given the high number of mortgage borrowers in arrears on their loans, is the condition of the residential mortgage books. Loan and borrower characteristics, as well as arrears data are all examined in detail. The regional distribution of the data is also considered. Because it is possible to secure more than one loan on an individual property, a particular effort is made to distinguish the number of properties underlying the residential mortgage book. There is also a focus on the 'distressed' Irish mortgage holders identified in the data.[3]

By mid 2011, Irish house prices were almost 43 per cent below their peak levels of early 2007.[4] The growth in Irish houses prices over the decade ending 2006/7, together with explanations of the reasons for the growth, in the initial years at least, have been well documented.[5] The present number of outstanding mortgages in the country is approximately 800,000, with over 483,000 of these mortgage loans approved during the years 2004 - 2008 (DoECLG, 2011). As a result, a large proportion of the current outstanding stock of mortgage loans was granted at a time of historically high and rising property prices. These price increases ultimately proved unsustainable (International Monetary Fund, 2003; Rae and van den Noord, 2006; Kelly, 2007). Further, the decline in house prices since 2007 has been abrupt and has coincided with large reductions in economic growth and employment. For example, the employment contraction which ensued due to the financial crisis and property market collapse has left many households with mortgage repayments which are difficult to meet. Indeed, the scale of the growing mortgage distress problem is evident from the latest mortgage arrears and repossession statistics issued by the Central Bank of Ireland (CBI), which show that the number of mortgages with 90 days or more of unpaid loan balances[6] continues to rise steadily, from over 3.3 per cent of all Primary Dwelling Home (PDH) accounts in 2009Q3 to approximately 55,800 at the end of 2011Q2 (7.2 per cent).

The substantial fall in residential house prices since 2007/8 has meant that a number of house-

[2] The FMP institutions are Allied Irish Bank (AIB), Bank of Ireland (BoI), The Educational Building Society (EBS) and Irish Life and Permanent (IL&P).

[3] Where distress is defined as non-performing mortgages, i.e. those with outstanding arrears balances.

[4] See Central Statistics Office (CSO) Residential Property Price Index, July 2011 (Central Statistics Office, 2011c).

[5] Among the most common explanations put forward are economic and employment growth; rising disposable incomes; favourable population; demographic and household formation trends; low interest rates; the liberalisation of the residential mortgage market and the relatively easy access to credit, see for example, Fitzpatrick and McQuinn (2007), International Monetary Fund (2004) and Roche (2003).

[6] This is the Basel II definition of default, in relation to days past due.

holds find themselves owing more on their mortgage than their properties are worth, i.e. these borrowers hold mortgages that are in 'negative equity'. Although far from ideal, holding a mortgage in negative equity is not necessarily an issue for those who can continue to meet their mortgage obligations.[7] Instead, in Ireland,[8] it is borrowers who face employment and other income shocks who are most at risk of going into arrears on their mortgage repayments as their ability to pay becomes impaired (Lydon and McCarthy, Forthcoming). This leads to a rise in arrears figures and ultimately increased numbers of defaults.

With this in mind, the timely provision of the loan-level data offers a valuable opportunity to inform analysis of the Irish mortgage market and the level of arrears distress and negative equity amongst borrowers. Moreover, it can be used to inform micro and macro prudential regulation, with a view to improving financial stability outcomes going forward.

Specifically, it is possible to carry out a detailed characterisation of borrower and loan attributes, estimate the scale of both positive and negative housing equity in Ireland and examine the interaction between mortgages in negative equity and those with arrears balances. Thus, the loan-level data can be used to explore the structure and performance of a large swathe of Ireland's residential mortgage loans. And so the main contributions of this paper are threefold;

1. to present a detailed characterisation of the Irish mortgage market;
2. to estimate a precise profile of (negative) equity in the Irish mortgage market; and
3. to examine how the loan-level data might be used to arrive at a greater understanding of the interaction between delinquent mortgage loans and the scale of equity in the properties securing these loans.

The paper is structured as follows: Section 2 describes the information available in the loan level dataset and the initial cleaning to which the raw data were subjected. A set of summary statistics and stylised facts are provided in Section 3. The arrears profile of the mortgage data is examined in Section 4. The issue of (negative) equity, its relevance and estimation are discussed in Section 5 while 5.5 outlines the joint incidence of arrears and (negative) equity in order to gauge the extent to which Irish borrowers are both distressed and in negative equity. The final section (6) suggests avenues along which future work may proceed and draws conclusions on the work presented here.

2 The Data

In this section we motivate and describe the loan-level data in relation to other available information on the Irish housing market. We also detail the borrower, property and loan characteristics of interest to the current paper and discuss the cleaning carried out on the data prior to its analysis. Finally,

[7] There may be some exceptions, for example, if the mortgage holder wishes to move house, because it has become unsuitable for the purpose required (raising a family), or they are offered a job in another part of the country, etc.

[8] These factors may differ by country, for example, Ludwig and Slok (2002).

we outline the two primary dimensions, i.e., loan- and property-level, on which we examine the data in the remainder of the paper.

2.1 Irish Housing Market Data

Statistics from the PTSB/ESRI, the Department of the Environment, Community and Local Government (DoECLG), the Irish Banking Federation (IBF) and the Central Bank of Ireland (CBI) have, to date, been the primary data sources used for analysis of the Irish housing market.[9] However, a commonly noted issue with these data sources are their aggregate nature, i.e., the limited availability of individual loan-level data, and the fact that the coverage, methods of collection and methodology of calculation can vary substantially, depending on the source.

More recently, responses to the Survey of Income and Living Conditions (SILC) have been used to analyse the Irish housing market. The survey is administered on an annual basis by the CSO and collects comprehensive data on income and living conditions across different household types. In general, the information collected is used in deriving indicators of poverty, deprivation and social exclusion, however, McCarthy and McQuinn (Forthcoming) and Kelly, McCarthy, and McQuinn (2011) demonstrate how SILC data can be used to examine issues relating to housing and mortgage debt. There are, however, some important drawbacks to the SILC. Scale is perhaps the most relevant, the SILC survey is based on approximately 5,200 households, of which, about a quarter have an outstanding mortgage. Timeliness is another issue, there is a lag of close to one year between the collection of the survey and the time the data becomes available. The absence of information on the purposes of mortgage loans, including investment properties (BTLs), second homes, or holiday homes as well as details of subsequent 'top-up', re-mortgage or home improvement loans (or equity release) is another downside of the SILC.

The loan-level data used in this paper overcomes many of these issues, providing a rare insight into the nature and growth of activity in the Irish housing market throughout the house price and credit 'boom' years and their aftermath. It is a micro level dataset which is made-up of 689,250[10] individual loans taken from the residential mortgage books of the four FMP institutions as of 31 December 2010. The data contains information on the loans both at a point in time (31 December 2010) and also some information gathered at their origination. This 'snapshot' information aspect of the data needs to be kept in mind when interpreting the analysis that follows.

For each loan there are approximately 50 separate data fields which provide information on the borrower, loan terms, characteristics of the properties, interest rate information, performance of the loan, level of arrears and borrower, property and loan identification codes. The principle categories and fields available are presented in Table 1, this is by no means an exhaustive list, but rather highlights the fields used in this paper's analysis. For example the $Property\ Identifier$

[9] The statistics available from these sources include: house prices (from PTSB/ESRI); house prices, number and value of approvals, average loan terms, LTV ratios, type of properties purchased, status of borrowers and properties, completions, registrations, planning permissions, etc. (from the DoECLG); new mortgage approvals (the IBF) and residential mortgage credit and interest rates (CBI).

[10] Numbers and values of aggregate loans and properties are generally rounded to three significant digits for the remainder of the paper.

variable makes it possible to establish the value of all loans and loan arrears secured against each property in the sample.[11] Together, the *Loan Purpose*, *FTB Flag* and *BTL Flag* variables identify the purpose, or borrower type, of each loan. For example, this variable identifies mortgage loans taken out by FTB, Mover, i.e. a home owner trading up or down, equity release (ER)[12] or buy-to-let (BTL)[13] borrowers.[14] *Loan Origination Date* and *Original Loan Balance* identify when each loan was drawn down and the amount of money borrowed to fund the house purchase, while *Outstanding Balance Due* records the outstanding balance due at the end of 2010. Thus, although the data is a snapshot taken at a relatively recent point in time, it contains a rich seam of historic mortgage data, particularly for those mortgages obtained between the mid 1990's and 2010.[15]

In a distressed market situation, it is the distribution across the population of mortgage holders which is of interest, particularly the characteristics of those in the 'tails' of the distribution. The following variables facilitate this characterisation. For example, *Payment Type* refers to whether both the loan's principle and the interest are being repaid (P&I) or whether only the interest is being repaid (IO).[16] Whether the latter refers to the original conditions of the loan or has been introduced subsequent to the loan being drawn down, as a form of forbearance, can also be identified. The *Geographic Location*, to county level;[17] whether the property was *New or Existing* when the loan originated; and the *Property Type*, namely apartment, terrace, semi-detached or detached, can also be observed along with the property's price when the loan was taken out, *Original Valuation*, and the date at which the valuation was carried out, *Original Valuation Date*.[18] Regarding the current *Interest Rate Type* it is possible to identify whether the mortgage has either a fixed interest rate,[19] or tracks the European Central Bank (ECB) policy rate (tracker) or varies with bank-determined interest rates. Finally, the *Arrears Balance* on each loan in the data can also be determined.

[11] This is not a geog-identifier variable, but rather a bank specific property identifier. This means that it is not possible to identify property cross-collateralisation between the banks.

[12] Including 'switcher' loans, where these are identified.

[13] BTLs include loans taken out on investment properties, properties for rent and holiday homes.

[14] Data quality differences across institutions resulted in some judgement being employed in assigning borrowers to particular buyer categories, i.e., where borrowers fell into two different categories simultaneously. For example, where one borrower was simultaneously classified as both a FTB and a BTL borrower we prioritised the BTL category. Primary loans for each property were then identified, i.e., by loan origination date (earliest). These primary loans were classified as either FTB or Mover mortgages with all subsequent loans treated as equity release mortgages.

[15] There is also some useful information available on a smaller group of loans originated during the 1980's and late 1970's.

[16] Mortgages in the Irish market are structured to repay both the principal borrowed as well as interest on this principal. However, periods of paying interest only are used both as part of the original loan structure, i.e., typically for a short period of time at the start of a mortgage loan and often for BTL borrowers intending to sell their properties on quickly, and as a type of forbearance on distressed or delinquent loans.

[17] For the purpose of this paper we have grouped counties into their NUTS3 regions. Cavan, Donegal, Leitrim, Louth, Monaghan and Sligo make up the Border region; Dublin is made up of properties within the city and county; Kildare, Meath and Wicklow make up the Mid-East; Clare and Limerick account for the Mid-West; Laois, Longford, Offaly and Westmeath comprise the Midland; Carlow, Kilkenny, Tipperary, Waterford and Wexford make up the South-East; Cork and Kerry the South-West and Galway, Mayo and Roscommon the West. Although, for the purposes of the NUTS3 classification, North Tipperary falls into the Mid-West and South Tipperary the South East, for the purposes of this paper, Tipperary is included in the South-East.

[18] In some instances details are also provided on updates made to property values to coincide with the origination of a subsequent loan on the property, e.g., in the case of any equity release.

[19] These mortgages usually have a fixed rate of interest for a short period of time (2-5 years) after which the borrower and lender renegotiate a new fixed rate going forward or the borrower moves to a variable rate of interest on the remainder of the mortgage.

Table 1: *Subset of the Loan-Level Data Fields*

Category	Loan ID	Borrower Information	Loan Information
Fields	Bank Identifier	Loan Purpose	Loan Origination Date
	Borrower Identifier	FTB Flag	Original Loan Balance
	Property Identifier	BTL Flag	Duration of Loan Terms
		Income Verified	Monthly Payment Due
		Borrower Credit Quality	Outstanding Balance Du
			Payment Type
Category	**Property Information**	**Interest Rate Information**	**Performance Information**
Fields	Geographic Location	Current Interest Rate	Arrears Balance
	New or Existing	Interest Rate Type	Arrears Balance 1-12 Months ago
	Property Type	Current Interest Rate Margin	Loan Modification/Forebearance Flag
	Original Valuation	Interest Rate Revisionary Date	
	Original Valuation Date		
	Original LTV		

Source: Loan-level Data (December, 2010).

2.2 Data Cleaning

In general, the data quality both between and within each institution's return, is good. There are, however, some issues, for example missing values. In an attempt to overcome these issues it was necessary to carry out some data cleaning which is described below.

Where variables, key to at least basic analysis of each loan in the data were missing, for example, $Property\,Identifier$, $Original\,Valuation$, $Original\,Valuation\,Date$ and $Geographic\,Location$ these loans were dropped. Also, as mortgages located outside the state are not examined in this paper, the loans secured on properties located in other jurisdictions, i.e., the UK and USA were also omitted.[20]

Table 2 shows that following this 'cleaning' process, the details of 88 per cent of the original number of loans, with an outstanding balance of just under €87 billion, as at December 2010, remain in the dataset. It is also important to note here, that while the fields required to establish the value, location and loan date of each loan are populated satisfactorily in our sample, in some circumstances a small percentage of the data for other characteristics of individual loans, such as buyer type, property type, loan purpose etc. are missing. Where this situation arises it will be highlighted and explained.

Nevertheless, it is on this cleaned subset of loans that the analysis presented below is based. This sample represents a substantial portion of the country's total outstanding residential loans, indeed Central Bank of Ireland (2011b) shows that at the end of December 2010 786,164 mortgage loans remained outstanding in Ireland, these were worth approximately €117 billion. It must be noted that this CBI figure does not include BTL loans. For comparison, the loan-level figures, net of the BTL market segment, constitute 521,000 loans valued at €68 billion, i.e., approximately 60 per cent of the national figure at the end of 2010. Further, although the four FMP institutions comprise a large proportion of the overall mortgage market in Ireland, it is not expected that the data examined here are necessarily representative of the non-FMP institutions.

[20]To the extent that this data may be of importance to other analyses, details on the observations that have been removed from the data at this early stage are available.

Table 2: *Data Cleaning*

Cleaning Process	Number of Loans	Value of Loans, €
All Loans, pre-cleaning	688,156	97,240,000,000
Property Identifier, missing	10,094	1,372,000,000
Loans located outside of Ireland	747	57,300,000
Loans not denominated in EUR	5	800,000
Highest & lowest 0.25 percentile of house prices	4,748	2,259,300,000
Original Valuation, missing	35,044	3,811,000,000
Original Valuation Date, missing	15,413	1,020,000,000
Geographic Location, missing	18,628	2,091,300,000
Total Loans excluded	84,780	10,611,700,000
Remaining Loans	603,376	86,628,300,000
Remaining Properties	475,136	86,628,300,000

Source: Loan-level Data (December, 2010).

2.3 Number of Unique Properties, Loan Origination and Property Location

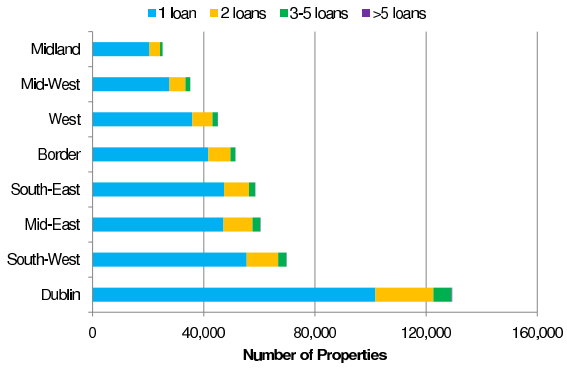
The mortgage market's characteristics including mortgages in arrears and/or those in negative equity, can be examined at either the loan, property or borrower level. While all three levels of analysis provide useful insights, it is the loan- and property-level analyses that we focus on here. Thus, the loan-level analysis facilitates a characterisation of loan attributes, both are required when examining mortgage distress (arrears accruals) and the property-level analysis is most useful when exploring negative equity. This is motivated by the fact that when a credit institution initiates foreclosure proceedings, the asset against which one or several loans are secured is non-divisible, i.e. part of the asset cannot be repossessed in order to realise the arrears balance on a subset of all the loans secured against the property.

With this in mind, the loan-level data shows that 21 per cent of the loans in the sample were obtained on properties against which at least one other loan was already secured. This shows that second homes, investment properties and equity release products, to fund home improvements, education, etc, were an attractive option for many Irish households. Several factors enabled householders to access the equity which had built up in their homes through various equity release products offered by financial institutions. The first of these factors was the increasingly liberalised Irish mortgage market. The second was the strong growth in house prices from the mid-1990s onwards. And the third was the role of the available credit risk infrastructure, for example, banks may be unable to identify a borrower's total outstanding debt where this is held across several credit institutions and where comprehensive national credit registers are not available.

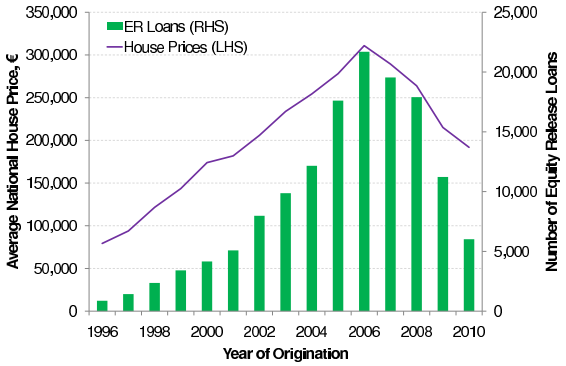
Using the unique property identifier it is possible to establish the number of loans secured against each property. For example, there are 475,000 unique property codes in our sample this means that on average there are 1.28 loans per FTB and/or Mover property, 1.12 loans on each BTL property

Figure 1: *Properties with Multiple Loans*

(a) Number of Loans Per Property



(b) House Price Growth and Number of Equity Release Mortgage Loans



Source: Loan-level Data (December, 2010), Permanent TSB/ESRI (2011).

and 1.39 loans on each property where the primary loan is an equity release product.[21]

Figure 1a illustrates the regional location and number of properties with multiple loans, of which there are 97,800. The vast majority of these properties, 78 per cent, act as collateral for one extra loan, while a further 16 per cent have two subsequent loans in addition to the original mortgage loan. Remarkably the figures show that 622 properties in the sample have at least 6 loans secured against them, with six properties being used as security for 10 or more loans. With over 27,600 cases, Dublin accounts for the majority of multiple-loan-properties. However, proportionally, with 22 per cent of that region's outstanding loans on a second or subsequent loan, Dublin's experience is similar to that of the other regions. Outside of Dublin multiple loans on a property account for between 19 per cent, in the Border counties, and 22 per cent, in the Mid-East (dominated by the 'commuter counties') and Mid-West (including Cork), of all loans per region. The prevalence of equity release loans is greatest in 2006 at almost 23,000 loans, although there are over 10,000 loans still outstanding from loans originating in each year between 2004 and 2009. The increase in equity release loans correlates highly with the growth in house price in the mid-2000s (see Figure 1b).

In this section we have established the advantages of using the loan-level data over other available data sources in analysing the Irish housing market. We have outlined some of the key variables to be used in the analysis to follow and have established a clean dataset that can be examined at either loan- or property level. We have also described the interaction between the loan- and property level analyses and described the regional distribution of housing loans and mortgaged properties across the country.

[21] This disaggregation can also be carried out for borrowers with multiple loans, for example, see Table A1a in the appendix.

3 Loan, Property and Borrower Characteristics

In this section we describe the categories of borrowers, repayment structures, interest rate profiles and arrears balances of the loan-level data. Mortgage origination, property location and property characteristics are also examined. Due to the relatively small number of surviving loans from the years prior to 1994, most of the summary statistics begin with loans originating from 1994 onwards[22] and focus on the number of mortgage loans, the number of mortgaged properties and the outstanding balance on the mortgage loans. For reference, Table 4 lists the aggregate figures by loan, property and outstanding balance relating to the distributions of the major borrower and loan characteristics described below.

3.1 Loans: Number, Outstanding Balance and Location

The number of mortgages still outstanding in the loan-level data, and the corresponding outstanding balance of these, by year of origination is shown in Figure 2a. In general, the trend in the number of mortgages originated in each year (left hand axis) mirrors that of the value of mortgages still outstanding (right hand axis), peaking at just over €18 billion and accounting for almost 98,000 individual loans in 2006. The data clearly demonstrates the widely noted expansion of activity in the property sector and the large increase in credit growth between the early and mid 2000s (for example, Kelly, McCarthy, and McQuinn (2011)). This is in contrast to the contraction in mortgage credit which has subsequently occurred. Although 2006 was the peak year in terms of lending activity, the average current outstanding balance for loans orginating in 2007 (€197,000) and 2008 (€187,000) exceeds that of 2006 (€185,000). Furthermore, while the numbers of loans issued decreased after 2006, the average size of these loans continued to increase in 2007, before declining in 2008, 2009 and 2010.[23]

Unsurprisingly, Dublin accounts for the highest number of loans originating each year, i.e., 27 per cent of all loans nationally are located there. However, proportionally, the dominance of the capital waned a little in recent years, with its share of loans dropping from an annual average of 38 per cent of loans originating in the 1990's to just over 27 per cent in the decade from 2000. On the other hand, the South-East and Border regions in particular, have experienced a corresponding proportional increase in their average annual share of loans over the two decades.[24]

Figure 2b plots the regional distribution of the number and outstanding balance of mortgage loans against regional population shares from the 2011 Census. In general the regional shares, in terms of both number of mortgages and outstanding balance, match population shares well (falling

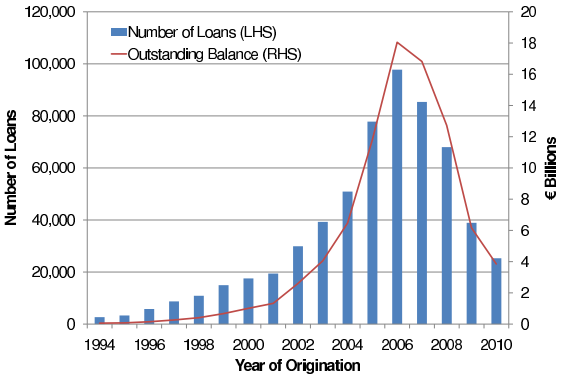
[22]The year 1994 was chosen as it predates the generally accepted beginning of the housing boom in 1995/1996. In addition, this is also the first year with at least 1,500 annual observations, and at least 100 annual observations in each of the eight NUTS3 regions into which the loan book has been divided. It is hoped that a minimum of 100 observations per region per year goes some way to alleviating the potential for small numbers of observations to drive the results described in this paper.

[23]The average size of the original mortgage loans in the data range from €208,000 in 2006 to €214,000 in 2007 and down to €201,000 in 2008.

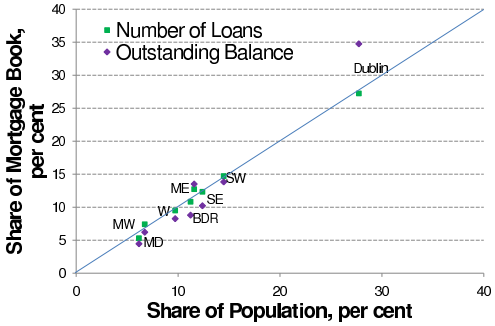
[24]On average the Border region accounts for 7 per cent of annual loans originating in the 1990's rising to 10 per cent in the following decade. The corresponding figures for the South East are 9 per cent and 12 per cent, respectively.

Figure 2: *Loan-Level Data - Number, Outstanding Balance & Location*

(a) Year of Origination



(b) Location - Population and Loan Shares



Source: Loan-level Data (December, 2010) and Central Statistics Office (2011a).

close to the 45 degree line). However, in Dublin the value of outstanding mortgages is significantly higher than that region's share of the population might suggest. This correlates with the fact that house price rises seen in Dublin over the past decade were higher than the national average (Permanent TSB/ESRI, 2011), with implications for the average loan size in Dublin in comparison to other areas. For example, Dublin accounts for 35 per cent of the country's loan-value but only 27 per cent of all loans. In addition, almost half the outstanding balance of the loan book is concentrated in a relatively small geographical area within Leinster, if the three counties of the Mid-East (14 per cent) are taken into account. Further, the average outstanding balance on loans in the capital at €181,000 far exceeds the National average of €144,000 and the next highest regional figure of €150,000 in the Mid-East.[25] On the other hand, the outstanding balance of mortgage loans in the Border, South-East and Midlands falls below what would be predicted by those regions' population shares. This may also correlate with relative price movements in these areas.[26]

3.2 Borrower Categories, Repayment Profile and Interest Rates

In order to analyse both the potential impact of interest rate changes and the potential for lenders to apply forbearance to the loans of those borrowers experiencing mortgage repayment difficulties, it is important to identify the borrower categories, loan repayment terms and interest rate types that the mortgages in the data are subject to.

[25]The region with the lowest average outstanding loan figure is the Mid-West with €119,100.

[26]Regional house price indices (HPIs) are not available in Ireland, however, Central Statistics Office (2011c) does give some evidence of these regional patterns using, for example, Dublin and non-Dublin HPIs.

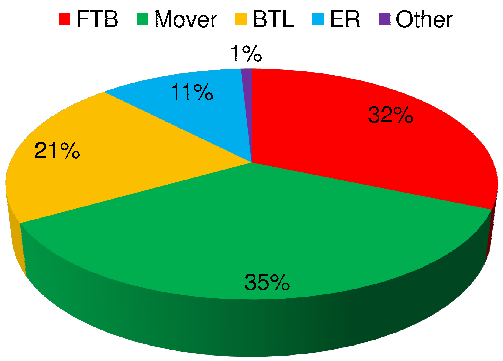
3.2.1 Borrower Categories

In the data it is possible to identify the purpose or borrower-type for each loan. The principal borrower groups by number of loans are:

1. Movers, 207,000;
2. First-time buyers (FTBs), 164,000;
3. Equity release, 142,000; and
4. Buy-to-lets (BTLs), 82,600.[27]

Figure 3 details the portion of the data's outstanding balance made up by the different buyer categories. With a 35 per cent share, those who secured a mortgage in order to move home are the largest category by both number of loans and outstanding balance, followed by FTBs with 32 per cent of the total outstanding balance. Whereas equity release loans account for 24 per cent of the loan-level data these loans account for just 10 per cent of the outstanding balance at the end of 2010. Typically these loans were for home improvements, deposits on investment properties or holiday homes etc. As such they were smaller than the mortgages secured to fund a property purchase and so have a smaller amount owing in general.

Figure 3: *Loan Purpose - Outstanding Balance*



Source: Loan-level Data (December 2010).

The distribution of loans between buyers by year of origination sees a significant increase in the number of BTL mortgages issued after 2003. For example, in each year between 1994 and 2003 BTL mortgages accounted for, on average, 6 per cent of all loans in the data, between 2004 and 2008 this rose to 17 per cent. This reflects the increase in property purchases for rental and/or investment purposes that was a feature of the market in Ireland for much of the past decade. The average outstanding loan balance for BTL borrowers is higher than that of Mover or FTB borrowers. For

[27] A further 7,000 do not have borrower category information identified in the data.

example, on average the outstanding balance on BTL loans that originated between 2004 and 2008 is €244,000 whereas for Movers and FTBs over the same period, the average outstanding balance is €179,000 and €207,000, respectively. This is driven, in part, by the high numbers of BTL loans initially issued on an IO basis, see below.

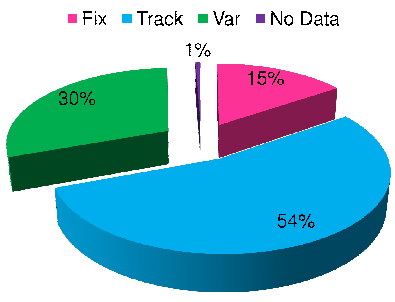
3.2.2 Interest Rate

In terms of outstanding mortgage balance, 54 per cent is made up of loans subject to tracker interest rates, 30 per cent is accounted for by variable interest rates and 15 per cent by fixed interest rate contracts (Figure 4a).[28] The dominance of tracker-rate mortgages is to be expected given that 85 per cent of all tracker mortgages were issued between 2004 and 2008 when house prices were at elevated levels. At a time of relatively low ECB policy rates, the attraction of tracker rate mortgages for the borrowers who hold them is clear. However, these products carry adverse profitability considerations for the Irish financial institutions who hold them, given that their funding costs have increased significantly since 2008.

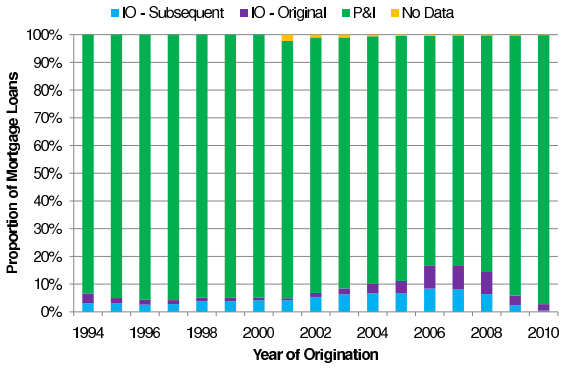
The contraction in mortgage lending, the removal of tracker rate mortgage products by Irish financial institutions and the decline in house prices over recent years, have coincided with an increase in the share of fixed rate mortgages issued, particularly in 2009 (30 per cent) and 2010 (50 per cent).[29] Given the present uncertainty in the economy concerning affordability generally, this development may reflect an attempt by borrowers to insulate themselves against the possibility of interest rate movements in the coming years.

Figure 4: *Interest Rate and Payment Types - Outstanding Balance*

(a) Interest Rates



(b) Repayment Profile



Source: Loan-level Data (December, 2010).

[28] There are over 3,000 loans in the data which do not indicate an interest rate type.
[29] Although these shares are based on low numbers of issued mortgages.

3.2.3 Repayment Profile

Overall, approximately 68,000 of the outstanding loans in the sample, with an outstanding balance of €16.7 billion, are on interest only (IO) terms. However, the repayment profile of a loan is subject to change over its lifetime, i.e., a loan which starts off on IO terms will, at some stage, change to repayment of both principal and interest (P&I)[30] alternatively, for example, in cases where a distressed borrower is granted forbearance, the reverse may occur. Where a mortgage is identified as IO at the end of 2010, the original terms of the contract are checked to verify whether it began as a P&I loan but has subsequently switched to IO repayments only.

Identifying the factors behind the mortgages with IO payment arrangements is a crucial part of the analysis of this characteristic. For example, perhaps the surge in the relative popularity of mortgages issued with initial periods of IO repayments between 2003 and 2007 was due to mortgage market innovation which allowed borrowers to benefit from reduced monthly repayments over the first, usually five, years of the life of the mortgages (Doyle, 2009). That is, IO mortgages may have been issued in the expectation of improved borrower circumstances in the medium term, i.e., income levels, which would improve the affordability of their repayments as the initial IO repayment arrangements were replaced by P&I repayment terms. Alternatively, perhaps borrowers experiencing difficulty meeting mortgage repayments in recent years have been offered forbearance by their lender whereby they switch from repaying both the principal and interest to only the interest on their loans which results in lower, more affordable repayments. For example, official mortgage arrears statistics (Central Bank of Ireland, 2011a) show the extent of forbearance on PDH mortgages. However, the lack of borrower specific information, i.e. income, makes these reasons difficult to prove empirically at present. The loan-level data allows us to verify whether loans originated on IO terms, or switched to these terms later, perhaps as a result of arrears distress, some time after the mortgage was issued.[31]

Figure 4b maps the arrangement of IO and P&I repayment types by year of origination, across mortgages on the loan books of the four FMP institutions. P&I contracts are by far the most common across all years (Figure 4b). Nonetheless, there is steady growth in the share of borrowers with IO contracts, particularly on mortgages written between 2003 and 2007. Indeed, 22 per cent of the outstanding mortgage balance in the data is accounted for by IO loans that originated in these years. The IO contracts are split into those which were originally written on these terms (purple bars) and those which were subsequently changed from P&I to IO (blue bars).

In fact, the loan-level data show that 48 per cent of the 54,000 IO loans secured between 2004 and 2008 originated as such. This implies that the remainder, including 19,000 loans issued between 2006 and 2008, had the original terms of their mortgages altered subsequent to the loan's issuance.

Of the 68,000 loans being repaid on IO terms at the end of 2010, BTL mortgages account for the highest proportion of both those that originated on IO repayment terms (21,000 or 70 per cent) and those that switched to these terms some time after the loan was issued (13,000 or 35 per cent). Of

[30] This is true as the principal must also be paid at some point during the lifetime of the mortgage.

[31] Loans originating as IO are identified where current and original loan balances are similar, taking arrears balances into account. Other common forms of forbearance include term extensions, repayment holidays or interest rate reductions.

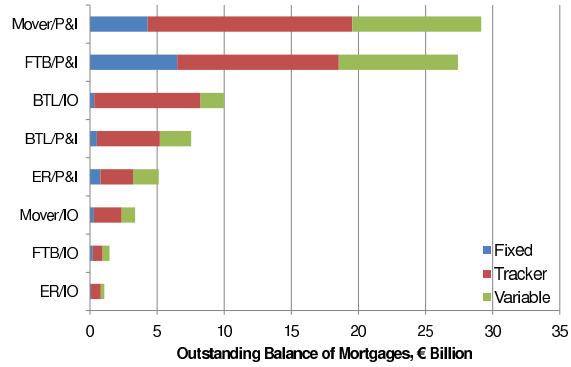
the mortgages that switched to IO terms, rather than being issued on IO terms, Movers and FTBs account for 28 per cent and 14 per cent, respectively. This is an increase of 3.12 and 4.67 times the number of these borrowers whose loans originated on IO terms.

3.2.4 Intersection of Buyer, Repayment and Interest Rate Types

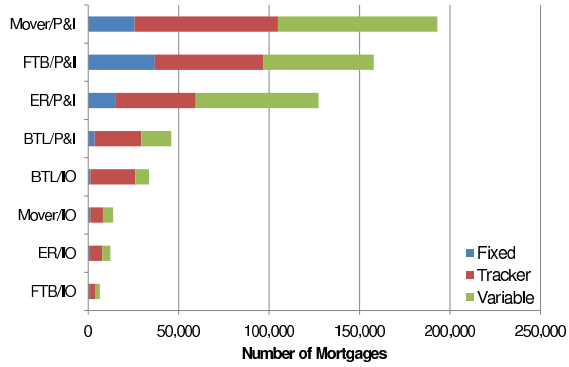
A greater understanding of the structure of the aggregate mortgage book can be established by examining the intersection of the categories examined in isolation above. For example, borrowers potentially vulnerable to interest rate increases or those with loan contracts that limit the menu of available forbearance options can be identified. Figure 5 groups borrowers by type and repayment profile and indicates the share of mortgages within these categories by interest rate type. The vast bulk of the mortgage data is made up of Movers and FTBs on P&I contracts, i.e., 66 per cent of the outstanding balance (Figure 5a). Within these groups approximately three quarters of the FTBs are on variable or tracker interest rates that make them susceptible to interest rate movements. The corresponding figure for Movers on P&I contracts is 85 per cent.

Figure 5: *Intersection of Buyer, Repayment and Interest Rate Types*

(a) Outstanding Balance of Mortgages



(b) Number of Mortgages



Source: Loan-level Data (December, 2010).
Note: interest only (IO), principal and interest (P&I).

Throughout the house price and credit boom, credit institutions introduced a number of IO products aimed at residential investors (Doyle, 2009). The consequences of these initiatives are also evident in Figure 5b. Of the 80,000 BTL mortgages for which repayment information is available it is possible to identify 34,000 mortgages, or 5.6 per cent of the total, which are written up on an IO basis. Indeed, over 51 per cent of outstanding IO mortgages were drawn down for BTL purposes. In terms of outstanding balance, BTL-IO loans constitute a larger portion, 11.6 per cent or almost €10 billion, than suggested by their share of all loans in the data. Across the data, tracker and variable interest rate loans account for 85 per cent of all loans, however, for BTL-IO borrowers this figure is over 96 per cent. There is also potential for mortgage distress among these borrowers, given the BTL-IO market segment's exposure to interest rate risk. For completeness it should be noted that

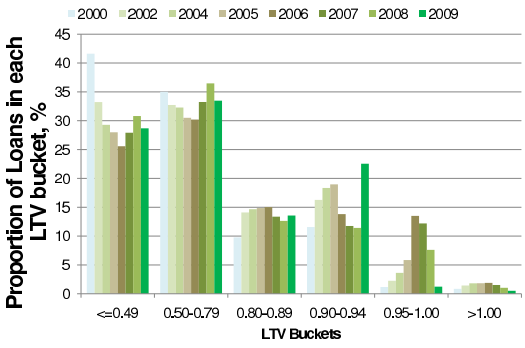
the outstanding balance on Mover and FTB IO mortgages is €3.2 and €1.3 billion respectively.

3.3 Loan to Value Ratios and Loan Terms

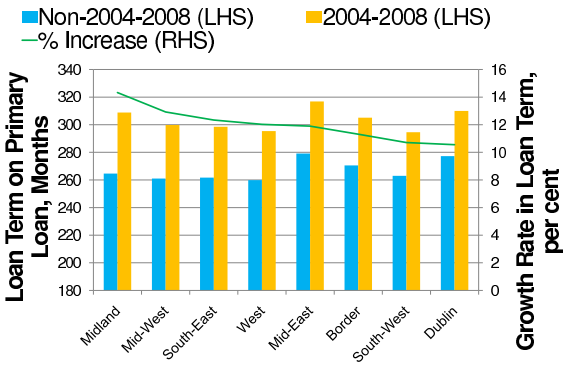
Figure 6a examines original loan to value (LTV) ratios, i.e., the LTV ratio on origination of the mortgage loan. The distribution of mortgages with original LTV ratios of under 0.80 shifts from 77 per cent in 2000 to just 56 per cent in 2006. Although just 2 per cent of outstanding mortgages from 2000 had LTV ratios of over 0.94, for 2006 loans this had increased to 15 per cent. This change in the distribution of LTV ratios reflects the bank-led competition for mortgage market share through the introduction of higher LTV mortgages from 2003 onwards (Honohan, 2010). While this may have allowed increasing numbers of borrowers to enter the housing market, high LTV ratios during periods of high house prices leaves borrowers with low housing equity buffers should house prices begin to fall. This, in turn, reduces the options for loan forbearance should borrowers fall into arrears distress.

Figure 6: *Loan Term and Original Loan to Value Ratio*

(a) Original Loan to Value Ratios



(b) Repayment



Source: Loan-level Data (December, 2010).

Loans originating between 2004 and 2008 had loan terms 12 per cent higher, on average, than those issued outside of this time period (Figure 6b). Although this increase was most pronounced, at 14 per cent, in the Midlands it was greater than 10 per cent, on average, in all regions. The average loan term in the data on mortgages originating between 2004 and 2008 is 26 years, with over 73,000 mortgages with loan terms of 35 or more years. This is an additional constraint on borrowers seeking forbearance and is a further example of the type of mortgage market innovations introduced over this time period.

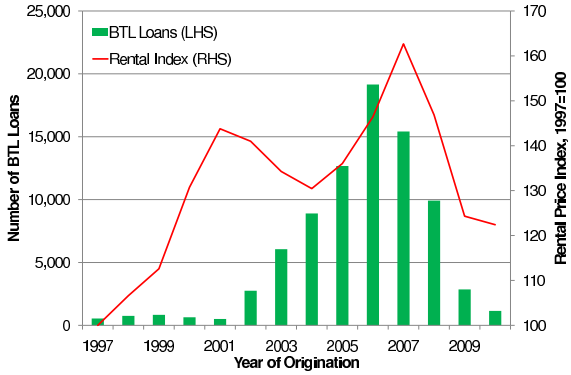
3.4 Property Type

The data provides details on the type and year of construction of the properties used to secure home loans, investment loans and equity release loans (see Figures A2a and A2b in the appendix). This information is also useful in describing the nature of the relationship between property-type and buyer-group, specifically whether certain buyers tend to opt for particular properties. For example, nationally, 71 per cent of FTBs' loans are secured against a detached or semi-detached property. However, this varies regionally from just 38 per cent in Dublin to 88 per cent in the Midlands. This could be a result of both the dominance of detached and semi-detached properties where there is less population density, i.e., outside of Dublin, and the relative affordability of terraced houses and apartments, in comparison to other property types, in Dublin at the height of the house price boom.

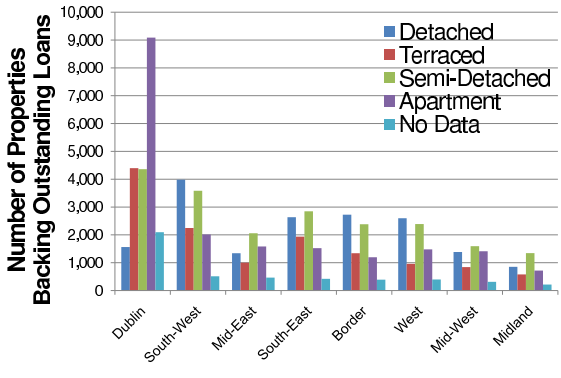
Figure 7 explores the dynamics and housing preferences of the BTL borrowers, the primary loans of which are secured on 16 per cent of all properties in the sample. Figure 7a shows that there was not a substantial increase in the number of BTL borrowers entering the market to coincide with the upturn in rental prices which occurred in the late 1990s.[32] However, in the early 2000s, at a time when the rental index was actually falling, the number of BTL loans began to rise steadily. This trend continued, reaching a peak of c. 20,000 BTL loans in 2006, as the decline in rents reversed and the increase in house prices continued, unabated, during the middle years of the decade. Both rental prices and numbers of new BTL mortgages fell sharply from 2007 onwards. There is a relatively even split between the property types BTL borrowers have tended to opt for across the regions (Figure 7b). The exception is Dublin, where apartments account for 46 per cent of the properties on which the primary loan is a BTL. The prevalence of apartments amongst Dublin based BTL borrowers, given the sharper than average decline in the price of these units in the capital, may have implications for mortgage distress in this market segment going forward.

Figure 7: *BTL Mortgages*

(a) Rental Index



(b) Property Type Location



Source: Loan-level Data (December, 2010) and Central Statistics Office (2010).

[32] This may have been due to supply-side constraints.

In this section we have described the composition of the loan-level data, including the key borrower, loan and property characteristics. We have also analysed information regarding property location and type. Unsurprisingly, we have shown that borrowers moving house and FTBs are the dominant buyer categories, while variable and tracker rate mortgages are the foremost class of interest rates. However, we have also established that the average original balance in the data is higher on loans originating in the year after the house price peak than those originating in 2006 and that the value of almost half of the outstanding mortgages is concentrated in Dublin and the commuter-belt, despite this geographic area accounting for just 40 per cent of both the loans in the data and the national population. Finally, we identify several loan characteristics, for example, repayment and interest rate types, LTVs and loan terms, which tend to be altered during the forbearance process for borrowers facing affordability problems given, for example, income shocks, interest rates increases and increased taxation. To this end, we highlight the number of borrowers already on IO contracts and variable or tracker interest rates, the increase in the proportion of original LTV ratios of over 0.95 from 2004-2008 and the increase in loan terms over the same time period. Finally, the number of mortgages associated with BTL-IO borrowers in the data is noted.

4 Loan Arrears

This section describes the arrears profile of residential mortgage loans in the loan-level data at the end of 2010. Specifically we explore the relative arrears levels of particular segments of the mortgage market taking into account the interest rate and repayment characteristics of these loans.

An obvious signal that a mortgage borrower is in distress is when their loan is in arrears. This situation will arise where the borrower is unable to make the monthly repayments on one, or any, of the loans they have secured against a property. The typical process is that once in arrears the bank may move to sell the asset in order to realise the outstanding balance on the loan(s). Usually, however, foreclosure is only pursued when the level of arrears breaches some level, for example the equivalent 90, 180 or 360 days of repayments, i.e., 3, 6 or 12 months.[33] While all loans with an outstanding arrears balance are examined here, we focus particularly on those mortgages which have arrears balances corresponding to at least 3 months of loan repayments (90 days-past-due (90DPD)), the Basel definition of loan default (Basel Committee on Banking Supervision, 2006).

Table 5 details the mortgage loans which are in arrears in the loan-level data. At the end of 2010 over 74,000 loans in the data exhibited some level of arrears, these are secured on 63,000 properties. The mortgages owing on properties securing loans in arrears account for almost 15 per cent of the outstanding balance, of the FMP institutions' mortgage books. In addition, 24,011 households are in the more serious situation of being at least 90DPD, with an accumulated €360 million in arrears repayments by 2010Q4. The large number of properties with at least some accrued arrears raises concerns as to the future performance of these loans, and is an indication that the

[33]Stricter conditions in relation to credit institutions moving on loans in arrears were introduced by the Irish government and the CBI (through the Code of Conduct on Mortgage Arrears (CCMA)) in 2010. These measures mean that credit institutions must go through an agreed process, including a moratorium, preventing foreclosure on the family home of those in arrears for a period of 12 months or less (Central Bank of Ireland, 2010).

number of loans going into 90DPD arrears may be set to grow in the future, a situation which needs to be monitored on an ongoing basis. For example, work by McGuinness (Forthcoming), Lydon and McCarthy (Forthcoming) and Kelly (Forthcoming) examine the profile of arrears, the associated loan characteristics and factors leading to arrears distress over time in the Irish mortgage market and the future probability of default figures for these loans, respectively. In addition, figures are presented in this paper which detail the extent to which 90DPD arrears and negative equity, an indicator of additional borrower distress,[34] co-exist.

Figure 8a investigates the breakdown of the 90DPD total arrears balance (€360 million) in terms of the buyer and repayment type. In the chart, the size of the coloured disks indicates the relative weighting of each buyer-repayment-class, in terms of the total outstanding balance of the mortgages in loan-level data (€87 billion).[35] Together P&I and IO Movers account for 38 per cent of the total arrears balance of borrowers in 90DPD,[36] whilst the equivalent FTB and BTL borrowers account for 26 per cent and 25 per cent, respectively. The proportion of the properties associated with each group in 90DPD arrears is indicated on the X axis. The share of distressed Mover, FTB and BTL borrowers who are repaying both P&I components of their loans is relatively low, between 4 and 6 per cent. Meanwhile, the proportion of borrowers in these categories repaying interest only and also more than 90 days in arrears is markedly higher. Over 7 per cent of properties where the primary loan is a BTL-IO are more than 90DPD on their total mortgage commitments, while the figure for FTB-IOs is even higher at 13 per cent.

Indeed the proportion of borrowers contracted to pay only the interest on their mortgages that are at least 90DPD is high across all borrower-types. We find that for two thirds of the properties in 90DPD and on IO repayment terms, the original mortgage was *not* issued on these terms, i.e., 87 per cent of FTB-IO borrowers in 90DPD, 81 per cent of Mover-IO borrowers in 90DPD and 50 per cent of BTL-IO borrowers in 90DPD may have already received forbearance, in the form of repayment restructuring, on their mortgages.[37] For P&I borrowers in arrears, forbearance in the form of an adjustment in the terms of their loan(s) to IO repayments may be possible. Borrowers already on IO repayment contracts are obviously precluded from this type of forbearance, however, other forms of forbearance may still be available to them, for example, term extensions.

It is unsurprising that the largest number of properties associated with loans in arrears of at least 90 days in the data are located in Dublin (22 per cent). Dublin has the largest number of both properties and loans. However, proportionally, the number of properties acting as security for loans in arrears in the region is smaller than its share of the total number of mortgages might suggest (Figure 8b). Similarly, the South-West has a relatively low level of properties associated with loans in 90DPD, i.e., 11 per cent of the total, despite accounting for 15 per cent of all the properties in the data. In the Midlands, Border and Mid-East, however, more properties have mortgages which are are at least 90DPD (8 per cent, 14 per cent and 15 per cent, respectively) than would be expected

[34] In general, borrowers in arrears *and* negative equity have limited options for forbearance on their loans.

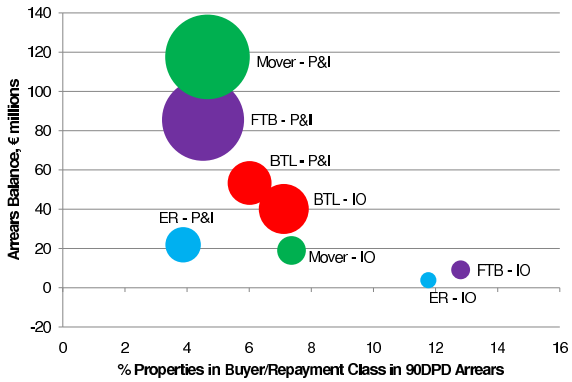
[35] I.e. where the primary mortgage on a property is taken out by a borrower in this buyer-repayment class.

[36] Movers on P&I contracts account for €118 million and Movers on IO contracts account for €19 million of the €360 million in outstanding arrears balances for those borrowers who are at least 90DPD.

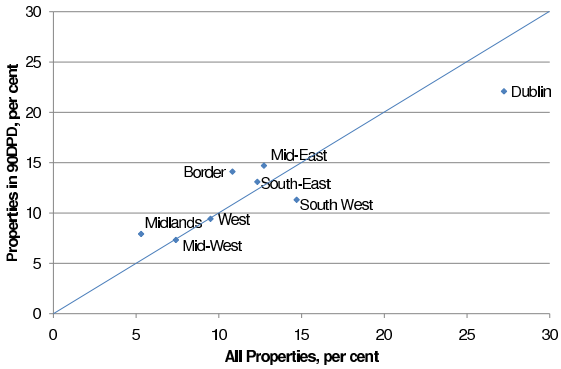
[37] These proportions relate to 700 FTB-IO borrowers in 90DPD, 740 Mover-IO borrowers in 90DPD and 1,100 BTL-IO borrowers in 90DPD.

Figure 8: *Relative Market Size, Incidence of Arrears, Arrears Balance and Geographic Distribution of Borrowers in 90DPD*

(a) Market Size, Arrears Incidence and Arrears Balance



(b) Regional Distribution of Properties in 90DPD



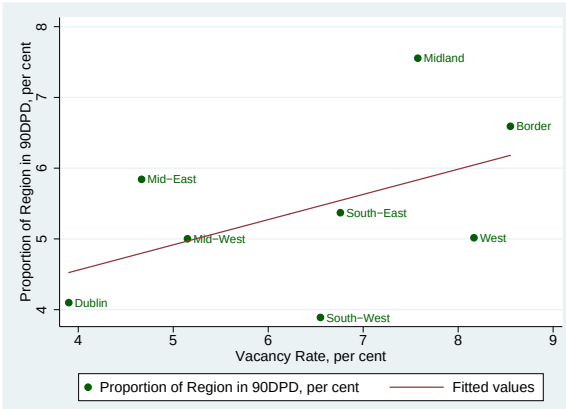
Source: Loan-level Data (December, 2010).

by their relative share of properties (5 per cent, 11 per cent and 13 per cent, respectively).

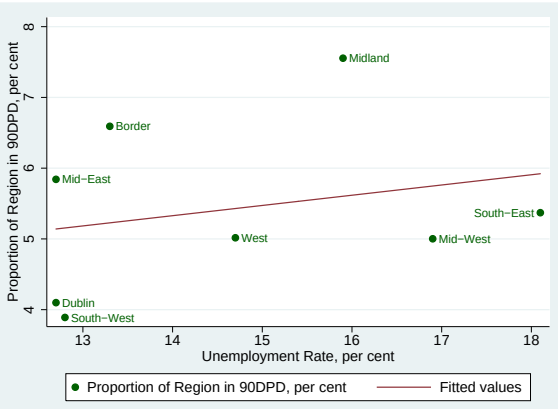
Several factors may be associated with changes in the levels of mortgage arrears over time and across regions in Ireland. For example, property vacancy rates and income shocks (i.e., labour earnings) may affect the ability of BTL borrowers to rent their properties and general mortgage affordability, respectively. Examining the effects of these and other factors potentially associated with mortgage arrears distress is beyond the remit of the current paper. However, Figure 9 indicates that in the data increased levels of mortgage distress are associated both with higher contemporaneous vacancy (Figure 9a) and unemployment rates (Figure 9b), at least at the regional level.

Figure 9: *Arrears and Unemployment Rates*

(a) Arrears and Vacancy Rates



(b) Arrears and Unemployment Rates



Source: Loan-level Data (December, 2010), Sherry FitzGerald (2011) and Central Statistics Office (2011b).

The main observations made in this section include, that the data contains approximately 74,000 loans in arrears at the end of 2010, associated with 63,000 properties. Of these, 24,011 properties have at least three months worth of repayments outstanding on their mortgages. Unsurprisingly, the largest cohorts of borrower types (FTB- and Mover-P&I borrowers) account for the majority of the 90DPD arrears balance (58 per cent), they are in general better performing, with less than five per cent of their mortgaged properties in 90DPD, than the groups which make up a smaller section of the mortgage book and whose repayments are on an interest only basis. For example, BTL-IO borrowers have the highest arrears balance per property (€2,100) of all borrower groups, this is of particular concern as these borrowers are the third largest borrower group in the data, accounting for 12 per cent of all outstanding balances. Similarly, borrowers located in the Midlands, Border and Mid-East regions are experiencing relatively high levels of mortgage distress. This may be associated with factors including, but not limited to, relatively high property vacancy and/or unemployment rates.

5 Housing Equity

A mortgage is said to be in negative equity when a decline in the value of the house against which the loan is secured exceeds the combined buffer of:[38]

1. the initial equity in the house (determined by the original LTV ratio);
2. the equity built up in the property due to any house price appreciation that occurred after the mortgage drawdown; and
3. any reduction in the principle due to repayments made since the loan's origination.[39]

Since the collapse in Irish house prices from late 2006, a significant percentage of outstanding Irish mortgages are considered to be currently in negative equity (Duffy, 2010; Lyons, 2010). Not only will negative equity have an impact on the financial position of the individual householder, it may be important because of its potential influence on wider economic considerations such as consumption. However, establishing these linkages is challenging and seems to be dependent on the countries and time periods considered (Ludwig and Slok, 2002).

Negative equity can also have implications for the stability of a country's financial system if it is correlated with mortgage distress. CBI statistics show that just over 51 per cent (€141 billion) of the four FMP institutions' mortgage loan books are comprised of residential mortgages. Irish mortgages make up about 70 per cent (€98 billion) of these, or 36 per cent of total loans.[40] Trying to determine the scope of potentially large impairments on the Irish banks' balance sheets was a motivating factor behind the extensive 2011 bank-recapitalisation announced in the FMP.[41]

[38] For example, Ellis (2008); Hellebrandt, Kawar, and Waldron (2009).

[39] I.e. negative equity exists when the current market value of a property falls below the outstanding balance of the mortgage used to secure it.

[40] Data as at 31st December 2010 (Central Bank of Ireland, 2011a).

[41] As were concerns relating to the ability and willingness of the banks to undertake further lending given anticipated additional impairments.

In the presence of high levels of mortgage debt and a collapse in house prices, a focus on mortgage holders in negative equity is to be expected. However, the extent of *positive* housing equity may also be of importance. Positive equity describes the value by which properties underlying the aggregate mortgage book exceed the current level of outstanding mortgage debt. For example, despite the steep property price declines in Ireland, we show that the majority of borrowers in the loan-level data have some positive equity remaining in their properties at the end of 2010. This is due to several factors including, originally low LTV ratios, significant principal repayment or having purchased the property at a time when the original price was below its current value. This buffer offers some protection to both the lender and borrower should the mortgage become delinquent and the property sold.

5.1 Calculating Housing Equity in the Irish Mortgage Market

The presence, or otherwise, of negative equity is determined by the difference between a property's current market value and the outstanding value of the mortgage securing it, otherwise known as the current LTV. Current LTVs of over 100 per cent signify that a loan is in negative equity whereas a ratio below this threshold indicates that the borrower retains a degree of positive equity in their home. Until recently, the absence of comprehensive, loan-level data on original house prices and valuation dates has frustrated efforts to estimate the value of Irish housing equity for mortgaged households precisely.[42] However, as it provides details of both, the loan-level data helps overcome this issue.

We calculate the amount of equity in a property by applying the change in house prices,[43] as measured by the PTSB/ESRI house price index (PTSB/ESRI-HPI),[44] to the original house price value and then comparing this estimated current house price to the outstanding mortgage on the property.

The process is complicated somewhat by the fact that multiple loans have been taken out on some properties. Should these loans, and the properties on which they are secured, be recorded separately, there is a danger of double counting, as the loans could be treated as being on two separate properties.[45] This would introduce downward bias in the negative equity estimates. Alternatively, if the property value is omitted in the information for a subsequent loan, this could lead to the erroneous omission of this observation because of lack of data, even though an original valuation exists at the time of the first loan.[46] To overcome these issues we decided, for the purposes of this paper, that the HPI would be applied to the maximum recorded house value. In this way, it is hoped

[42] Duffy (2010) and Lyons (2010) have estimated negative equity using alternate methodologies.

[43] That is, the fall in house prices that has occurred between the property's valuation date and the end of 2010.

[44] As the most widely used house price index (HPI) since the mid 1990's, the estimates are calculated using the PTSB/ESRI index.

[45] The value of the property could be counted twice against an initial mortgage and a top up, where as in reality it would be the value of the house when the top up was originated which is relevant.

[46] The loan-level data were extracted based on the available information within the institutions subject to the FMP. In some cases institutions record the value of the underlying property securing the subsequent loan as its value when the original mortgage loan was originated. In other cases an up to date valuation of the property and the equity which has accumulated since origination are included in the data.

that the accuracy of the estimates are improved.[47] Similarly, in order to accurately calculate the degree of negative equity on a house, it is important to ensure that the outstanding balances on each loan secured against a particular property are amalgamated and netted-off against the property's estimated value at the end of 2010. As a result, the focus of the remainder of the paper is on the number of properties in the loan-level data (475,000) and their total outstanding balance, rather than the number of loans.

5.2 Estimates of Negative Equity

The value of each of the 475,000 individual properties in the loan-level data at the end of 2010 was estimated using the PTSB/ESRI average national HPI, which at that point was down 38 per cent from its 2006Q4 peak. Next, the difference between these estimates and the outstanding balance of the loan(s) secured on them was calculated. Accordingly, the figures suggest that approximately 145,400 of the properties, against which loans are secured in the loan books, with an outstanding balance of €41 billion (representing 175,000 loans) were in negative equity at 2010Q4. This represents 31 per cent of the sample's properties, and 47 per cent of their outstanding balances.[48]

The total outstanding balance of these mortgages exceeds the amount of equity they represent by €8.3 billion (Figure 10a). The vast majority (88 per cent) of the original loans on these properties were written between 2004 and 2008, with over 51 per cent taken out in either 2006 or 2007. Furthermore, these loans account for 62 per cent of the of the aggregate negative equity figure. There are also substantial differences in the average size of negative equity per household, depending on the year the mortgage was originated, i.e., the 2007 figure (€72,000) is more than twice that of the 2004 figure (€34,000). Cumulatively, 29 per cent of the loans, by volume (47 per cent by loan-value), from our sample are associated with properties in negative equity. This is to be expected given the large house price declines to the end of 2010 and the high number of properties purchased when prices were at their peak, between 2005 and 2008.

In Section 3.3, Figure 6a provides a breakdown of original loan values by LTV-bucket across a number of years. Figure 10b, however, illustrates the breakdown of current[49] LTV ratios, by LTV-bucket across loans originated in the past decade. The difference between the original and current LTV ratios reflects both house price movements and repayments (if any) of the loan's principle between loan origination and the end of 2010. There is clear evidence of a bimodal distribution in the data on current LTV ratios. On average over 41 per cent of loans originating between 2004 and 2008 have a current LTV ratio of below 0.80. This is in contrast to 42 per cent of loans originating in the same period with a current LTV of over 1. The 17 per cent of loans with a current LTV ratio of between 0.80 and 1 are vulnerable, in terms of negative equity, to further house price falls, should these occur.

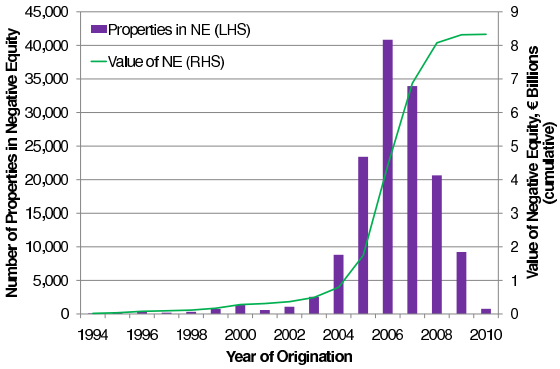
[47] This is because more often than not the index will be applied to more recent valuations, rather than the older original valuations. It is also hoped that this method will incorporate the value of any home improvements undertaken between loans. In many cases, however, the maximum value is also the original value as the institutions have not updated the figure when a new loan is written, here this original valuation is used.

[48] The breakdown of these figures by region can be seen in Table 6.

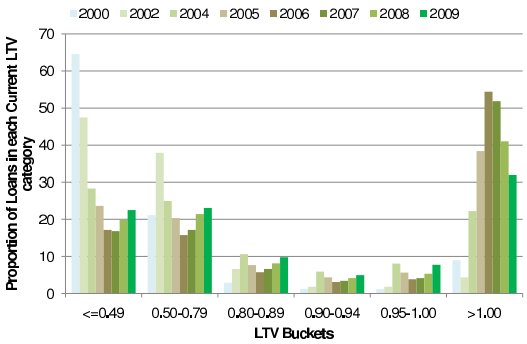
[49] at the end of 2010.

Figure 10: *Negative Equity and Current LTV Ratios, by Loan Origination*

(a) Negative Equity



(b) Current LTV Ratios



Source: Loan-level Data (December, 2010).

These figures give an indication as to the sensitivity of our negative equity estimates to further house price falls (see Table 7). Indeed, were house prices to fall a further 20 per cent from the level recorded by the PTSB/ESRI Index at the end of 2010,[50] the number of properties in negative equity would grow to approximately 218,000 or 46 per cent of all properties in the data.

5.3 Characteristics of Properties in Negative Equity

Figure 11 illustrates the extent of negative equity across the major buyer categories in terms of their share of negative equity and the proportion of the category in negative equity. FTBs account for 47 per cent of all negative equity properties, although they only account for about one third of the original property loans in the data. The rise in the number of loans at higher LTVs, particularly 100 per cent mortgages, obtained by FTBs, between 2005 and 2008 means that these borrowers had less housing equity accumulated before house prices began to fall and is one reason why the cohort is so heavily represented in the negative equity numbers.[51] There are approximately 34,000 properties, originally purchased for investment purposes, in negative equity at the end of 2010. Although BTLs account for only 16 per cent of all original property loans, they constitute 23 per cent of properties in negative equity. Overall, the problem is less serious for Movers, who make up almost 40 per cent of the original loans on the mortgaged properties yet comprise 26 per cent of the properties in negative equity.

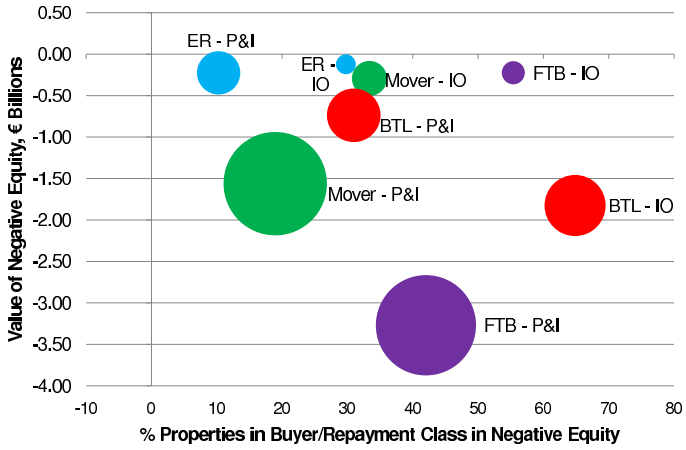
Properties on which the primary loan's repayment terms are IO at the end of 2010, constitute approximately €2.5 billion[52] of the estimated negative equity figure, with loans on P&I terms making

[50] I.e., resulting in an aggregate decline in house prices of over 50 per cent from peak.

[51] See DoECLG housing statistics for FTB LTV ranges. Over the years 2005, 2006, 2007 and 2008, the share of FTBs obtaining 100 per cent mortgages was 13 per cent, 34 per cent, 26 per cent and 23 per cent, respectively. The loan-level data figures are comparable at 9 per cent, 26 per cent, 20 per cent and 8 per cent, respectively.

[52] This can be sub-divided as follows: FTB €220m, Mover €300m, BTL €1.8bn, ER & other €130m.

Figure 11: *Relative Market Size of Buyer & Repayment Classes by Value & Volume of Properties in Negative Equity*



Source: Loan-level Data (December, 2010).

up the balance, €5.8 billion.[53] Where IO arrangements are part of the original loan terms they typically last for 5 years. This means that the time is approaching when many of these borrowers, who took out mortgages at the height of the house price boom, will have to meet principal as well as interest repayments on their loan obligations. Were a large number to find that they cannot meet these terms the fact that they are in negative equity will complicate resolution options available for the borrower and the lending institution involved,[54] and so these borrowers may have to remain on IO contracts by way of forbearance.

It is noteworthy that a sizable proportion of the FTB-P&I and BTL-IO groups are in negative equity. Almost 42 per cent and 64 per cent of the mortgages, respectively, of each group has an outstanding mortgage balance that is greater than the value of the underlying property. These borrower groups account for a significant size of the outstanding balance in the data. Further, large numbers of them are vulnerable to interest rate increases.[55] While it is possible that some of these, BTL-IO borrowers in particular, may have additional financial commitments, for example, mortgages repayments on primary dwellings, we are unable to identify this in the data.

Negative equity by property type is detailed in Figure 12a. Of the four property types identified in the data, the shares of semi-detached and terraced properties in negative equity[56] broadly follow their relative shares in the overall data[57]. However, only 24 per cent of the properties in negative equity are identified as detached houses, despite these properties accounting for 43 per cent of the aggregate data. While fully 17 per cent of the properties in negative equity are apartments,

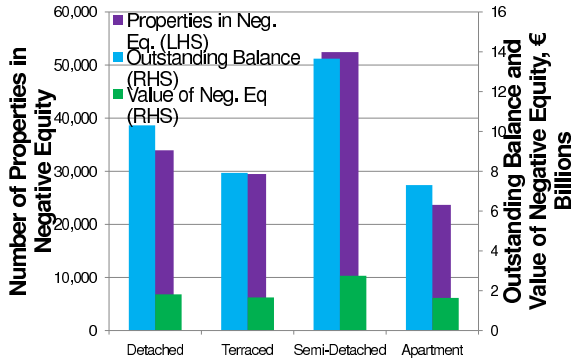
[53] This can be sub-divided as follows: FTB €3.2bn, Mover €1.6bn, BTL €740m, ER & other €280m.
[54] Should the borrower default and the lender foreclose on the underlying property, the existence of negative equity means that the sale of the property would not fully cover the outstanding mortgage balance on the property.
[55] Identified in Section 3.2.4
[56] 38 per cent and 21 per cent, respectively.
[57] 32 per cent and 16 per cent, respectively.

these account for just 9 per cent of all properties in the data. This implies that 55 per cent of all apartments in the sample are in negative equity, a much larger proportion than for any of the remaining three property types.[58]

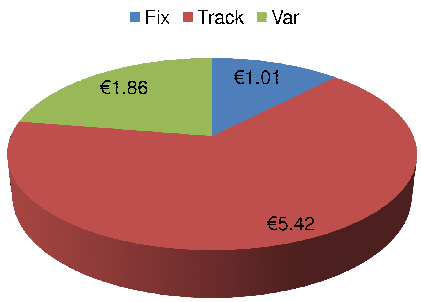
Recent data from the CSO HPI shows that the fall in the value of apartments in Dublin is greater than the falls in the values of other property types (Central Statistics Office, 2011c). This implies that the negative equity figures presented here may be lower bound estimates, for example, for apartments, given that we apply a uniform HPI to the data. Futher, demand for apartments was dominated by FTB and BTL borrowers between 2004 and 2008. During this period they accounted for over 77 per cent of all apartments purchased each year in the data. The activity of these borrower groups since 2008, as well as other factors,[59] indicates that it is unlikely this demand will resume in the medium term. These demand-side factors, along with additional potential falls in apartment prices, have implications for both borrowers and lenders in the apartment segment of the mortgage market, especially with regards distressed mortgages on these properties.

Figure 12: *Negative Equity, Interest Rate and Dwelling Type - Volume & Outstanding Balance*

(a) Dwelling Type



(b) Interest Rate Type - Value of Neg. Equity



Source: Loan-level Data (December, 2010).

Figure 12b provides details of the relationship between negative equity and interest rate type. Given the large number of tracker interest rate mortgages in the data and the prevalence of this interest rate type during the peak years of the property boom, it is to be expected that the primary loans on the majority of negative equity properties (81,000) are written on these terms and contribute approximately €5.4 billion to the value of the negative equity estimate. Households whose primary loan has a variable interest rate account for 40,000 instances of negative equity or €1.9 billion of the total. Finally, 24,000 fixed interest rate contracts make up over €1 billion worth of negative equity. This is relevant in relation to mortgage repayment affordability, as it is borrowers with variable and tracker interest rates whose monthly mortgage repayments will be most affected in the event of future changes to interest rates.

[58] 38 per cent of semi-detached, 43 per cent of terraced and 18 per cent of detached properties are in negative equity.

[59] For example, the affordability of other property types has improved since the 2007 and the housing needs of those who purchased apartments originally may change over time, i.e., those starting a family may require more space.

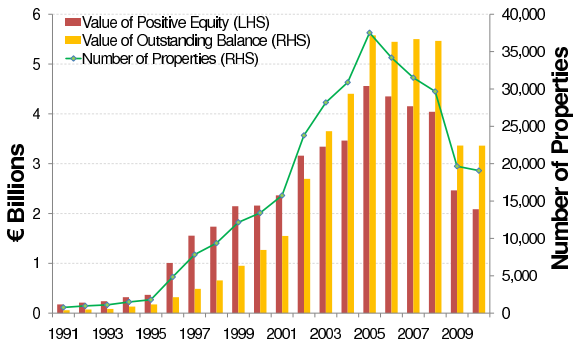
Finally, in absolute numbers the regional distribution of negative equity is unremarkable (Table 6), with the greatest number of affected properties in Dublin (42,000) and the least number of affected properties in the Midlands (9,000).

5.4 Positive Equity in the Loan-Level Data

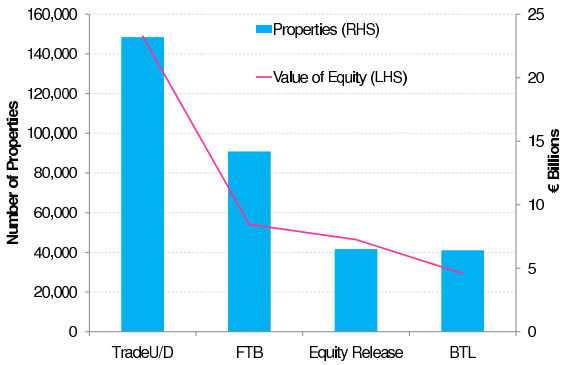
While approximately 30 per cent of properties in the data are in negative equity, the remainder retain some positive equity. Indeed, just over 325,000 properties in the data, with an outstanding mortgage balance of €45.4 billion, have an estimated current house price that exceeds the outstanding amount owed on the property. Interestingly, the cumulative value of this equity is €44.2 billion, which means that together these houses are worth approximately twice what is owed on them. Figure 13a develops this point further, outlining the situation at the end of 2010 as regards to the cumulative level of positive equity and the outstanding balance on the properties concerned, by year of origination. The cumulative positive equity possessed by borrowers who took out their original loan between 1996 and 1997 is in excess of 3 times the amount owed by them on their mortgage. Furthermore, although the 37,500 positive equity borrowers who took out an original loan in 2005 have built up the largest cumulative buffer (€4.6 billion), it is the 760 borrowers in positive equity with an original loan from 1991 which are individually best-off with an average positive equity figure of just under €230,000. Overall the average value of housing equity for those properties in positive equity is €136,000, which indicates that substantial equity, in notional terms at least, still remained in the Irish housing market at the end of 2010.[60]

Figure 13: *Positive Equity*

(a) Positive Equity



(b) Buyer Type



Source: Loan-level Data (December, 2010).

Movers and FTB's are the two dominant categories, accounting for 46 per cent and 28 per cent of properties in positive equity, respectively (Figure 13b). It is plausible that throughout the property boom many Movers may have used the equity built up in a previous residence in order to reduce

[60]The continued fall in property prices since the end of 2010 may have reduced the value of this equity further, contingent on loan repayments.

the amount they needed to borrow to finance subsequent purchases. The breakdown between ERs and BTLs is quite similar at 13 per cent of the total each. Given that ER loans are generally for smaller amounts than traditional mortgages it is unsurprising that 88 per cent of all properties with an original ER loan are also in positive equity. Movers have the highest individual average positive equity figure at €187,000, while BTLs have the lowest at approximately €75,000.

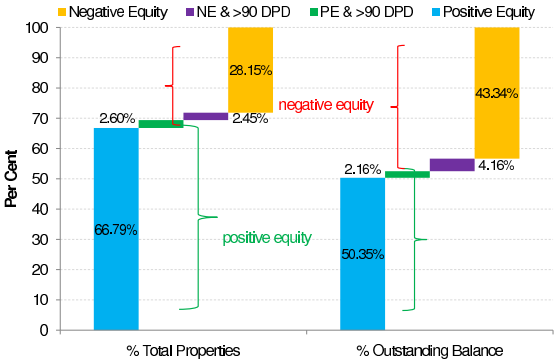
5.5 Joint Incidence of Negative Equity and Mortgages Arrears

The estimates presented in Section 5.1 suggest that up to 3 in 10 mortgaged properties, representing over 47 per cent of the outstanding balance of the loan-level data, may be in negative equity at the end of 2010. The majority of these borrowers, however, continue to meet their mortgage repayments each month. The situation is more serious for the 24,000 borrowers who have accumulated at least three months of unpaid mortgage repayments on their mortgage loans.[61] Of this group, it is the 11,600 borrowers who are simultaneously at least three months in arrears on their mortgage loans and in negative equity that are the most troubling cases, from the borrower, lender and policy perspective. The intersection between these two categories, which accounts for 2.5 per cent of all properties in the data and 8 per cent of negative equity properties, is illustrated in Figure 14 (purple rectangle).[62] As well as an outstanding mortgage balance of €3.6 billion on these properties, they also account for an accumulated arrears balance of over €200 million.

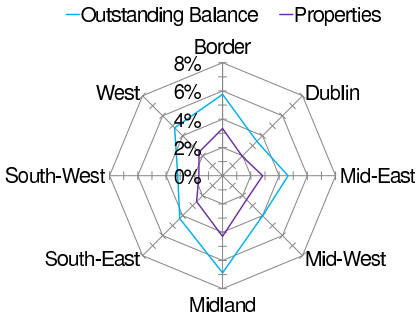
Similarly, we identify in the data approximately 12,400 properties (2.4 per cent of the total), in positive equity that have also accumulated at least three months worth of arrears. These borrowers account for €150 million of the total arrears in the data.[63]

Figure 14: *Joint Incidence of Negative Equity and Mortgages 90DPD Arrears*

(a) Negative Equity and Arrears



(b) Regional Distribution of Negative Equity & 90DPD



Source: Loan-level Data (December, 2010).

[61] Note, this has been calculated at the property level, i.e., for those properties with more than one secured loan, the total arrears balance is compared to the total repayment amount for the property.

[62] And set out in Table 8.

[63] Overall, over 37,000 households with an outstanding balance of €5.2 billion are in positive equity with some level of arrears.

Tracking the transition of mortgage borrowers over the coming years between the positive and negative equity, non-arrears and three month arrears categories described above (Figure 14a) will be important in understanding the strengths and vulnerabilities in the Irish mortgage market. For example, the continued uncertainty surrounding employment and income levels, i.e., affecting debt affordability, makes it possible that those in the yellow segment could move into the purple rectangle. Alternatively should the downward trajectory of house prices continue, borrowers in the blue or green segments may also find themselves in the purple box. Indeed, given the arrears data from the Central Bank to 2011Q2, the continued high levels of unemployment and house price depreciation since the end of 2010, it is likely that a number of borrowers may have already transitioned into more vulnerable segments of the market, as described in Figure 14a.

There are some interesting regional dynamics worth exploring in the distribution of distressed negative equity borrowers. The largest number of properties simultaneously in negative equity and 90DPD (approximately 2,500), with an outstanding mortgage balance of €1 billion, is held in Dublin. Proportionally, it is one of the best performing regions nationally (see Figure 14b). Just two per cent of Dublin properties are in negative equity and arrears of 90 days or more. Meanwhile, in the Midlands and Border regions 4.3 per cent and 3.4 per cent of mortgaged properties in these areas, respectively, are faced with both negative equity and more than 3 months of accumulated arrears. Indeed, despite accounting for relatively small shares of the mortgage book (5.3 per cent and 10.8 per cent respectively), the Midland and Border regions' overall share of distressed negative equity properties is much larger at 9.3 per cent and 14.8 per cent, respectively. The Mid-East also has a higher proportion (14.7 per cent) of outstanding mortgage balances secured on properties in negative equity and 90DPD than would be suggested by that region's share in the national distribution of mortgage loans (12.7 per cent).

Using published house price indices along with the house price valuations in the loan-level data we have estimated the level of housing equity within the dataset. Approximately 31 per cent of mortgaged properties, or 47 per cent of the value of outstanding loans, are found to be in negative equity at the end of 2010. Negative equity is more prevalent amongst FTBs and BTL borrowers, many of whom purchased properties during a period of high house prices with high LTV ratios and/or interest only contracts. We also show that a significant amount of positive equity remains on the FMP institutions' books. Although, house prices would only have to decline 20 per cent from their (official) 2010Q4 levels for another 61,600 mortgages to be classified as falling into negative equity. Furthermore, we find that while Dublin is home to the largest number of borrowers simultaneously in negative equity and arrears distress, proportionally a greater cohort of householders outside of Dublin, such as the Midlands and Border, are facing both negative equity and are in arrears distress on their mortgage loans.

6 Conclusions

Arising from the Prudential Capital Assessment Review (PCAR II), loan-level data was collected from the institutions subject to the FMP. This paper has outlined some of the key characteristics

of the borrowers, properties and loans underlying a substantial part of the Irish mortgage book. This includes details on over 475,000 properties underlying these loans. Together, the data have facilitated a detailed analysis of these mortgage loans, useful for policy makers as well as micro and macro prudential regulation of the mortgage market. The data's stylised facts as well as details of our analysis are outlined below.

The mortgage loans are concentrated in a relatively small geographic area, with a small area in Leinster (Dublin and the Mid-East) accounting for almost half of the outstanding balance in the data. In terms of buyer categories, while FTBs and Movers dominate the market, a sizeable proportion of BTL mortgages are also observed. The prominence of interest only (IO) loan contracts amongst loans that originated at the height of the housing boom may be a signal of the potential distress amongst this group, while the popularity of these contracts amongst investment buyers is also a cause for concern. To this end, we highlight the number of borrowers already on IO contracts and variable or tracker interest rates, the increase in the proportion of original LTV ratios of over 0.95 on mortgage loans originating between 2004-2008 and the increase in loan terms over the same time period. Together these factors describe the vulnerability of a large swathe of borrowers to interest rate movements and the limitations they may face with regards potential lender forbearance should they face affordability difficulties, given income or other shocks, going forward.

The data contains approximately 74,000 loans in arrears at the end of 2010, associated with 63,000 properties. Of these, 24,011 properties have at least three months worth of repayments outstanding on their mortgages. Unsurprisingly, the largest cohorts of borrower types (FTB- and Mover-P&I borrowers) account for the majority of the 90DPD arrears balance (58 per cent), they are in general better performing, with less than five per cent of their mortgaged properties in 90DPD, than the groups which make up a smaller section of the mortgage book and whose repayments are on an interest only basis. For example, BTL-IO borrowers have the highest arrears balance per property (€2,100) of all borrower groups, this is of particular concern as these borrowers are the third largest borrower group in the data, accounting for 12 per cent of all outstanding balances. Similarly, borrowers located in the Midlands, Border and Mid-East regions are experiencing relatively high levels of mortgage distress. This may be associated with factors including, but not limited to, relatively high property vacancy and/or unemployment rates.

Using published house price indices along with the house price valuations in the loan-level data we estimated the level of housing equity within the dataset. Approximately 30 per cent of mortgaged properties, or 50 per cent of the value of outstanding loans, are found to be in negative equity at the end of 2010. Negative equity is more prevalent amongst FTBs and BTL borrowers, many of whom purchased properties during a period of high house prices with high LTV ratios and/or interest only contracts. We also show that a significant amount of positive equity remains on the FMP institutions' books and that house prices would have to fall considerably from their 2010Q4 levels to see the levels of positive housing equity fall substantially. Furthermore, we find that while Dublin is home to the largest number of borrowers simultaneously in negative equity and arrears distress, proportionally, a greater cohort of householders outside of Dublin, such as the Midlands and Border, are facing both negative equity and are in arrears distress on their mortgage loans.

References

Basel Committee on Banking Supervision (2006): "International Convergence of Capital Measurement and Capital Standards: A Revised Framework Comprehensive Version," Discussion paper, Bank for International Settlements.

Central Bank of Ireland (2010): "Code of Conduct on Mortgage Arrears," Discussion paper, Central Bank of Ireland.

——— (2011a): "Financial Measures Programme Report," Discussion paper, Central Bank of Ireland.

——— (2011b): "Residential Mortgage Arrears, Repossessions and Restructures Statistics," Statistical publication, Central Bank of Ireland.

Central Statistics Office (2010): "Private Rental Index," Discussion paper, CSO.

——— (2011a): "Census Of Population 2011 Preliminary Results," Discussion paper, CSO.

——— (2011b): "Quarterly National Household Survey: Quarter 2 2011," Discussion paper, CSO.

——— (2011c): "Residential Property Price Index," Latest releases and publications, Central Statistics Office.

DoECLG (2011): "Latest Housing Statistics - House Prices Loans and Profile of Borrowers," Discussion paper, Department of the Environment, Community and Local Government.

Doyle, N. (2009): "Housing Finance Developments in Ireland," Quarterly Bulletin 4, Central Bank of Ireland, Dublin.

Duffy, D. (2010): "Negative Equity in the Irish Housing Market," *The Economic and Social Review*, 41(1), 109–132.

Ellis, L. (2008): "How Many in Negative Equity? The Role of Mortgage Contract Characteristics," Quarterly review, Bank of International Settlements, Basel.

Fitzpatrick, T., and K. McQuinn (2007): "House Prices and Mortgage Credit: Empirical Evidence for Ireland," *The Manchester School*, 75(1), 82–103.

Hellebrandt, T., S. Kawar, and M. Waldron (2009): "The Economics and Estimation of Negative Equity," Quarterly Bulletin 49, Bank of England.

Honohan, P. (2010): "The Irish Banking Crisis Regulatory and Financial Stability Policy 2003-2008," Discussion paper, Central Bank of Ireland.

International Monetary Fund (2003): "Staff Report for the 2003 Article IV Consultation," Discussion paper, International Monetary Fund.

——— (2004): "Ireland, Selected Issues: Adjustment in the Housing Market," IMF Country Report 04/349, International Monetary Fund.

Kelly, M. (2007): "On the Likely Extent of Falls In Irish House Prices," *Quarterly Economic Commentary*, Summer 2007, 42–54.

Kelly, R. (Forthcoming): "The good, the bad and the impaired - A credit risk model of the Irish mortgage market," Research technical paper, Central Bank of Ireland.

Kelly, R., Y. McCarthy, and K. McQuinn (2011): "Impairment and Negative Equity in the Irish Mortgage Market," Research Technical Paper 09RT11, Central Bank of Ireland, Dublin.

Ludwig, A., and T. Slok (2002): "The Impact of Changes in Stock Prices and House Prices on Consumption in OECD Countries," IMF Working Paper WP/02/1, IMF.

Lydon, R., and Y. McCarthy (Forthcoming): "What lies beneath? Understanding recent trends in Irish mortgage arrears," Research technical paper, Central Bank of Ireland.

Lyons, R. (2010): "House Price Falls of 40%, Suggest 100,000 in Severe Negative Equity," Available online at http://www.ronanlyons.com.

McCarthy, Y., and K. McQuinn (Forthcoming): "Decomposition of Irish house price movements 2000 - 2010," Technical research paper, Central Bank of Ireland.

McGuinness, A. (Forthcoming): "Mortgage Arrears and Distressed Households," Economic letter, Central Bank of Ireland.

Permanent TSB/ESRI (2011): "Permanent TSB/ESRI House Price Index 1996-2011," Discussion paper, Economic and Social Research Institute.

Rae, D., and P. van den Noord (2006): "Ireland's housing boom: what has driven it and have prices overshot?," Discussion paper, OECD.

Roche, M. (2003): "Will there be a Crash in Irish House Prices," Quarterly Economic Commentary Winter, ESRI, Dublin.

Sherry FitzGerald (2011): "Clarity on housing supply: less than 90,000 units on market," Discussion paper, Sherry FitzGerald.

7 Additional Tables

Table 3: *Properties with Multiple Loans by Location*

No. Of Loans	Border	Dublin	Mid-East	Mid-West	Midland	South-East	South-West	West	Total
1	41,659	101,761	47,102	27,677	20,469	47,320	55,449	35,912	377,349
2	7,938	20,841	10,412	5,729	3,785	8,957	11,310	7,224	76,196
3	1,354	4,715	2,115	1,224	688	1,699	2,267	1,405	15,467
4	354	1,393	567	400	172	416	588	408	4,298
5	73	435	167	100	46	119	156	108	1,204
6	24	164	61	25	14	36	54	44	422
7	8	57	25	8	3	10	19	11	141
8	4	17	6	4	1	1	1	2	36
9	1	8	1	1	-	2	3	1	17
10	-	2	2	-	-	-	-	1	5
11	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	1	-	-	1
Grand Total	51,415	129,393	60,458	35,168	25,178	58,561	69,847	45,116	475,136

Source: Loan-level Data (December, 2010).
NUTS3 Regions: Border - Cavan, Donegal, Leitrim, Louth, Monaghan, Sligo; Dublin - city, county; Mid-East - Kildare, Meath, Wicklow; Mid-West - Clare, Limerick; Midland - Laois, Longford, Offaly, Westmeath; South-East - Carlow, Kilkenny, Tipperary, Waterford, Wexford; South-West - Cork, Kerry; West - Galway, Mayo, Roscommon.

Table 4: *Number of Loans, Properties, Outstanding Balance, by Loan and Borrower Characteristics*

	No. of Loans	Properties Associated with Primary Loans	Outstanding Balance by Property (€Billions)
		Regional Distribution	
Border	63,619	51,415	7.61
Dublin	166,946	129,393	30.11
Mid-East	77,992	60,458	11.70
Mid-West	45,154	35,168	5.37
Midland	31,134	25,178	3.86
South-East	72,914	58,561	8.85
South-West	88,494	69,847	11.98
West	57,123	45,116	7.15
		Buyer Type	
FTB	164,266	159,926	27.22
TradeUD&Swtich	206,747	187,191	30.62
RIL	82,577	74,785	18.22
ER	142,342	47,359	9.86
		Property Type	
Detached	234,997	187,612	31.49
Terraced	79,264	69,151	13.37
Semi-Detached	165,313	138,654	25.23
Apartment	48,630	42,985	10.79
		Interest Type	
Fix	89,248	75,784	13.36
Track	252,269	206,366	46.75
Var	258,795	189,929	26.02
		Payment Type	
IO	67,652	54,654	16.66
P&I	532,937	417,882	69.67
Total	603,376	475,136	86.63

Source: Loan-level Data (December, 2010).
NUTS3 Regions: Border - Cavan, Donegal, Leitrim, Louth, Monaghan, Sligo; Dublin - city, county; Mid-East - Kildare, Meath, Wicklow; Mid-West - Clare, Limerick; Midland - Laois, Longford, Offaly, Westmeath; South-East - Carlow, Kilkenny, Tipperary, Waterford, Wexford; South-West - Cork, Kerry; West - Galway, Mayo, Roscommon.

Table 5: *Level of Arrears in the Loan-Level Data*

	Number of Properties	Number of Loans	Value of Arrears, €Bn	Value of Outstanding Balances, €Bn
Arrears	63,371	74,236	0.43	12.84
Arrears - 90DPD	24,011	29,991	0.36	5.47

Source: Loan-level Data (December, 2010).

Table 6: *Regional Negative Equity by Number of Properties, Outstanding Balance and Value*

Region	Number of Properties in Negative Equity (#)	Outstanding Mortgage Balance on all Properties in Negative Equity (€billion)	Value of Negative Equity in Region (€billion)	Percentage of Region's Mortgaged Properties in Negative Equity (%)	Percentage of Region's Outstanding Mortgage Balance in Negative Equity (%)
Border	15,855	3.57	-0.70	30.84	46.82
Dublin	42,002	15.07	-3.06	32.47	50.07
Mid-East	19,017	5.53	-1.10	31.46	47.30
Mid-West	11,163	2.56	-0.52	31.74	47.59
Midlands	8,860	2.00	-0.43	35.19	51.88
South-East	17,835	4.06	-0.80	30.46	45.94
South-West	18,385	5.20	-1.07	26.32	43.38
West	12,297	3.16	-0.65	27.26	44.12
Total	145,414	41.14	-8.33	30.61	47.50

Source: Loan-level Data (December, 2010).
NUTS3 Regions: Border - Cavan, Donegal, Leitrim, Louth, Monaghan, Sligo; Dublin - city, county; Mid-East - Kildare, Meath, Wicklow; Mid-West - Clare, Limerick; Midland - Laois, Longford, Offaly, Westmeath; South-East - Carlow, Kilkenny, Tipperary, Waterford, Wexford; South-West - Cork, Kerry; West - Galway, Mayo, Roscommon.

Table 7: *Sensitivity of Negative Equity Calculations to Further House Price Falls*

% Negative Equity in Properties	% of Properties	% Positive Equity in Properties	% of Properties
>100	0.37	1-10	8.11
91-100	0.06	11-20	7.37
81-90	0.09	21-30	7.10
71-80	0.13	31-40	7.23
61-70	0.30	41-50	6.86
51-60	1.53	51-60	6.93
41-50	3.32	61-70	7.07
31-40	4.81	71-80	7.10
21-30	5.71	81-90	6.85
11-20	7.03	91-100	4.49
0.1-10	7.55		

Source: Loan-level Data (December, 2010).

Table 8: *Positive & Negative Equity & 90 day Arrears*

	Properties (Number)	Outstanding Balance (€Billion)	% of Total Properties	% of Total Outstanding Balance	Arrears Balance (€Billion)
Negative Equity	145,414	41.14	30.61	47.50	0.25
Positive Equity	329,722	45.48	69.4	52.5	
Arrears	63,371	12.84	13.34	14.82	0.43
>90 DPD	24,011	5.47	5.05	6.32	0.36
NE & >90DPD	11,644	3.60	2.45	4.15	0.21
PE & >90 DPD	12,367	1.9	2.60	2.2	0.15
Total	475,136	86.6			

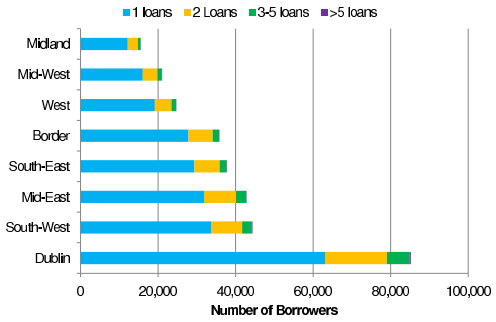
Source: Loan-level Data (December, 2010).

A Appendix

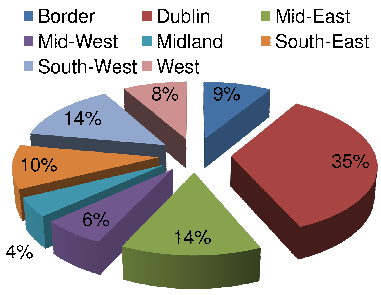
Figure A1a, plots the proportion of borrowers identified in the FMP institutions' mortgage loans with multiple loan.[64] While 26 per cent of borrowers have more than one loan, this is concentrated amongst those with second loans, who account for 7 out of 10 of borrowers with multiple loans. Only one per cent of the borrowers in the data have more than 5 loans. The average size of mortgage loans for those borrowers with between 2 and 5 loans is €117,500, lower than that for those with just one loan whose average loan size is €167,300. This suggests the presence of ER loans for the former borrowers. However, those borrowers with more than 5 loans have considerably higher average loan sizes at €167,200, than the majority of multiple loan borrowers, though not out of line with the average loan size of single loan borrowers.

Figure A1: *Multiple Loan Borrowers and Property Location*

(a) Borrowers with Multiple Loans



(b) Location of Loans - Outstanding Balance



Source: Loan-level Data.

A.1 Property Location

Figure A1b, provides the regional breakdown of the loan book in terms of the value of outstanding mortgages. The percentage of the loan book accounted for by Dublin is even greater using the outstanding balance metric at 35 per cent, while almost half the loan book is concentrated in a relatively small geographical area within Leinster if the three counties of the Mid-East (14 per cent), are included. A further indication of the degree of concentration of the national property market in Dublin is the fact that 23 per cent (€20 billion) of all current outstanding loans originated in Dublin between 2005 and 2008. This is not surprising, given the strength of house price growth in Dublin and surrounding counties during the boom years. The smallest share of the loan book by value is accounted for by the Midlands (€4 billion), while the region with the lowest average outstanding loan figure is the Mid-West with €119,000.

A.2 Property Type

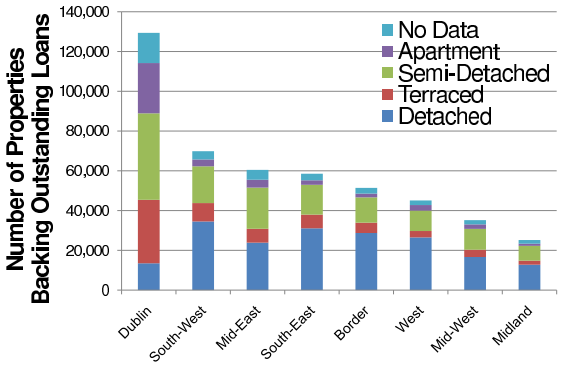
Of the 475,000 residential properties in the data (against which the primary and subsequent loans were secured), 187,000 were taken out on detached and 139,000 on semi-detached homes (see Figure A2a). Terraced housing and apartments account for 69,000 and 43,000 observations, respectively.

[64] This information is available for three of the four FMP institutions.

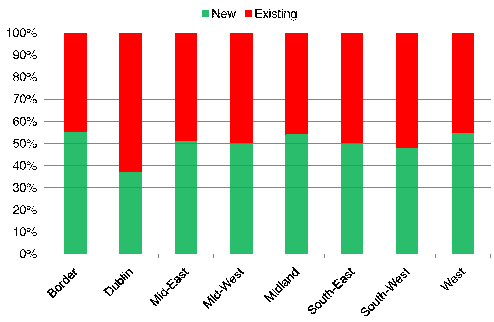
Regionally, detached homes are especially prevalent outside of Dublin, particularly in the more rural regions of the West, Border and Midlands where they account for at least half of all primary loans in each area, compared to a national figure of 40 per cent. Semi-detached residences are particularly common in Dublin (38 per cent) and the Mid-East (37 per cent). Given the premium on space, the preference for apartments and terraces is to be expected in the regions with the largest urban populations, for example, in Dublin and the South-West. Just over a quarter of Dublin properties are terraced, with 11 per cent the equivalent figure in the South-West. Although they are not the primary property-type in Dublin, 59 per cent of the entire sample's apartments are located there, accounting for 22 per cent all Dublin properties.[65]

Figure A2: *Property Type and Age - Location and Volume*

(a) Property Type



(b) New and Existing Properties



Source: Loan-level Data.

A.3 New and Old Residential Properties

The loan-level data distinguishes between 'new' and 'old', i.e., existing, properties[66] at the time the original loan is drawn down. The data contains 210,000 existing and 191,000 new properties.[67] Regionally the biggest differences are within Dublin, where existing houses outnumber new houses by 1.7 to 1 (see Figure A2b). Conversely, in the Border counties, outstanding loans on *new* houses exceed their *existing* counterparts by 1.2 to 1. As regards buyer type, new builds are particularly well represented amongst the FTB group (where 64 per cent of FTB-owned properties are new), whereas the data shows that when Movers and BTL borrowers purchase a property it is more likely to be an existing property.[68] One reason why FTBs may favour new properties is their relative price, for example, the DoECLG Housing statistics shows that since 1997 the average price of a new house has been below that of a second hand property - in 2006 this difference was as much as 22 per cent, at the end of 2010 it was close to 19 per cent.[69]

Figure A3 gives the breakdown of borrower, repayment and interest rate types in the loan-level data at the loan (number and value of outstanding balance) and property levels. Columns 1 and 2

[65]The remaining 37,000 primary loans do not include property type data details.

[66]In the loan-level data we have defined 'new' properties as those where the property is built within two years of the property's primary loan being issued.

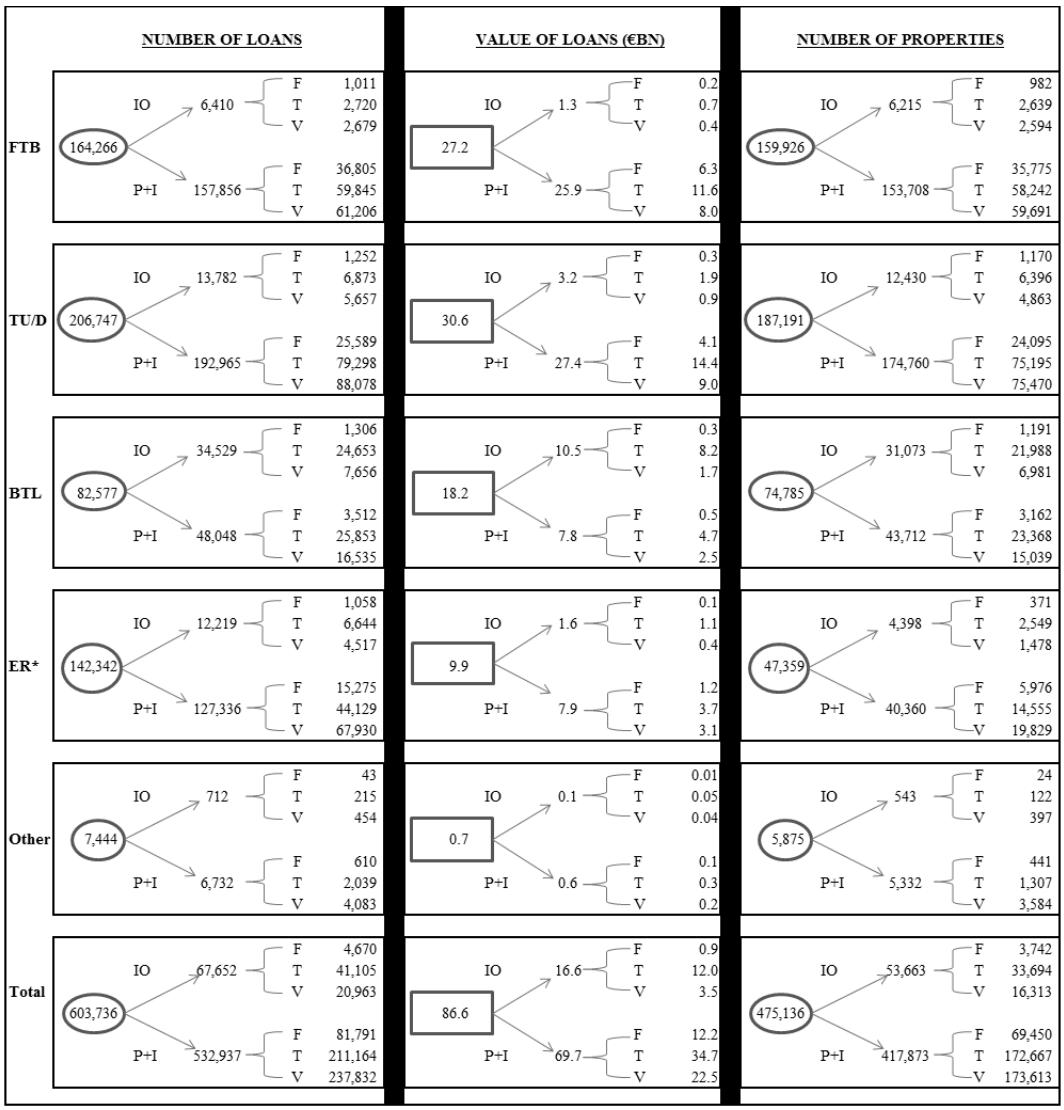
[67]No data is provided in 74,000 cases.

[68]Movers, FTB and BTL borrowers account for 33 per cent, 15 per cent and 47 per cent of all new properties, respectively.

[69]See the DoECLG website for more details: http://www.environ.ie/en/Publications/

inform Figure 5 in the text.

Figure A3: *Borrower, Repayment and Interest Rate Types*



Source: Loan-level Data (December 2010).