

POLICY PAPER

The Introduction of Macroprudential Measures for the Irish Mortgage Market

MARK CASSIDY

Central Bank of Ireland, Dublin

NIAMH HALLISSEY¹

Central Bank of Ireland, Dublin

Abstract: In February 2015 the Central Bank of Ireland introduced macroprudential measures for the Irish mortgage market in the form of limits on new lending at high loan-to-value and loan-to-income ratios. The objectives of the measures are to enhance resilience of banks and households to financial shocks and to curb cyclical tendencies in the mortgage market. The timing of the introduction of the measures was carefully considered and reflected emerging imbalances in the market as well as existing vulnerabilities in the household and banking sectors. While similar measures have been introduced in other jurisdictions, the design and application of the measures differ across countries. Some specific aspects of the design of the Irish measures include differentiated treatment for first-time buyers, buy-to-let borrowers and homeowners in negative equity. This paper discusses the rationale for the introduction of the measures as well as issues relating to their design and implementation.

I INTRODUCTION

The Central Bank of Ireland (Central Bank) introduced limits on the amount of new mortgage lending which can take place at high loan-to-value (LTV) and loan-to-income (LTI) ratios from 9 February 2015. The introduction of the measures was preceded by a two-month consultation process, which garnered

¹ The authors are, respectively, Head of Division and Senior Economist in the Financial Stability Division of the Central Bank of Ireland. They would like to thank Heedon Kang, Maria Woods and an anonymous referee for very helpful comments. The views expressed are those of the authors.

responses from a broad spectrum of interested parties and resulted in some amendments to the initial proposal. These mortgage market measures are examples of macroprudential policies and aim to reduce both the probability and depth of future financial crises.²

As the macroprudential authority in Ireland, the Central Bank is responsible for monitoring systemic risk and, when considered necessary, taking action to mitigate such risks. With the introduction of the Single Supervisory Mechanism (SSM), the European Central Bank (ECB) also has a macroprudential mandate and works together with national central banks on macroprudential policy. However, the ECB's powers are only those under the European banking regulations (CRD IV/CRR) and the introduction of instruments that directly affect borrowers, including LTV and LTI limits, remains at the sole discretion of the Irish authorities.

The objectives of the macroprudential measures are twofold, namely to strengthen the resilience of banks and households to financial shocks and to dampen in a precautionary way the pro-cyclical dynamics that can exist between property lending and house prices. The measures were introduced at a time of emerging imbalances in the housing market with prices increasing by around 15 per cent year-on-year nationally and by around 25 per cent in Dublin, generally attributed to supply shortages (CBI, 2014c). However, while the rate of increase in house prices at the time was a consideration in the timing of the introduction of the measures, and effects on house prices may be expected, it is not an objective of the measures to directly control or target house prices. The measures were instead introduced in a precautionary way to ensure that the housing market recovery would not be destabilised by the re-emergence of a dangerous credit-driven price dynamic nor that it would be fuelled by imprudent lending standards which would exacerbate existing structural vulnerabilities in the household and banking sectors and weaken resilience to any future downturn in economic or financial conditions.

The Irish measures can also be considered in an international context. Prior to the crisis a number of countries had implemented LTV and/or debt-to-income (DTI) or LTI restrictions, most notably Asian economies with experience of strong housing and credit cycles such as Hong Kong, South Korea and Singapore. Since the crisis an increasing number of economies have introduced measures, including New Zealand and a large number of EU countries including Norway, Sweden, the United Kingdom, the Netherlands, Finland, and Estonia, among others. These measures differ across countries in a number of important

² Macroprudential policies refer to regulatory policies introduced with the objective of reducing risks to the financial system as a whole, i.e. systemic risks. The framework for macroprudential policy is outlined in CBI (2014a) while a discussion of the instruments available to the Central Bank is provided in Grace *et al.* (2015).

respects, including whether the primary objective is to curb the financial cycle or enhance resilience; whether restrictions on LTV, LTI or DTI or a combination of these are introduced; the level at which the caps are set; and other country-specific features of the measures, including exemptions, coverage, legal basis and whether the measures apply immediately or are phased in. As highlighted in Jacome and Mitra (2015), these very different country-specific features mean there is a gap in the understanding of how countries have actually implemented those tools.

The design of the Central Bank policies was informed by a substantial body of internal analytical research, most of which has been published, as well as by international experience and evidence. This paper aims to provide some insight into the rationale for the measures as well as their design. Section II sets out the reasons for introducing the measures while key features in their design and calibration are outlined in Section III. Section IV concludes.

II RATIONALE FOR INTRODUCTION OF LTV/LTI CAPS

2.1 *Details of the Measures*

The new mortgage market regulations set out a maximum LTV ratio of 80 per cent for *non-first-time buyers* of primary dwelling homes (PDHs) (Table 1 and as outlined in CBI, 2015). For *first-time buyers* (FTBs) a higher cap of 90 per cent applies for the first €220,000 of the value of the house and the 80 per cent LTV then applies to the part of the value of the house above €220,000. For reasons discussed in Section III, some new lending is allowed above these limits, with no more than 15 per cent of the value of new mortgage lending for PDHs allowed above the caps. A more stringent limit of 70 per cent LTV is applied to the purchase of houses for *buy-to-let* (BTL) purchases, to be exceeded by no more than 10 per cent of the value of new BTL lending.

For the LTI ratio, a maximum of 3.5 times gross income is allowed, assessed on combined gross income in the case of joint borrowers, with up to 20 per cent of the value of new lending allowed above this limit. This only applies to mortgages on primary residences and there is no LTI limit imposed on BTL borrowings since the LTI ratio is not considered to be a particularly relevant metric for such lending (see Section III).

There are a number of exemptions to the measures. These include (i) borrowers in negative equity selling their home and purchasing a new one, who are exempt from the LTV limits, (ii) switcher mortgages, i.e. borrowers changing mortgage provider with no increase in principal, and (iii) mortgages in arrears that are under restructuring with the mortgage providers. Switcher mortgages are exempt because the decision to move mortgage to a new provider does not

Table 1: *Details of the Measures*

Loan-to-value limits	Private dwelling homes	FTBs: Sliding LTV limit from 90% Non FTBs: 80%	To be exceeded by no more than 15% of new lending
	Investors	70% LTV limit	To be exceeded by no more than 10% of new lending
Loan-to-income limits	Primary dwelling homes	3.5 times LTI limit	To be exceeded by no more than 20% of new lending
Exemptions	From LTV: Borrowers in negative equity	From LTI: Borrowers for investment properties	From both: Switcher mortgages Restructuring of mortgages in arrears

Source: Central Bank of Ireland.

increase the indebtedness of the borrower and it is not the intention to restrict competition in the market.³ While mortgages in arrears undergoing restructuring may not always be recorded as new lending, the exemption is included to ensure that the measures do not interfere with efforts between borrowers and lenders to restructure such mortgages. The reasons for exempting negative equity borrowers are discussed in Section III.

The Regulations were introduced under Section 48 of the *Central Bank (Supervision and Enforcement) Act 2013*, and apply to all regulated financial services providers and therefore apply to all domestic mortgage providers as well as both subsidiaries and branches of foreign-owned banks.⁴ The measures came into effect from 9 February 2015, and there was no phase-in period.

2.2 *Reasons for Introducing*

Historical evidence indicates that boom bust cycles are an intrinsic feature of real estate markets. This can reflect a number of factors including strong linkages between the sector and the real economy; higher leverage for borrowers than is typically the case for other investment activities; speculative behaviour by investors; lags in supply response; and the slow pace of price discovery and illiquidity in the market (Crowe *et al.*, 2011). Moreover, given that housing busts tend to weaken the financial positions of both households and banks and can have systemic effects through, for example, forced selling of assets (firesales),

³ There are no restrictions on the amount of times borrowers can switch mortgage providers once there is no increase in principal associated with the re-mortgage.

⁴ *Central Bank (Supervision and Enforcement) Act 2013 (Section 48) (Housing Loan Requirements) Regulations 2013 (S.I. No. 47 of 2015).*

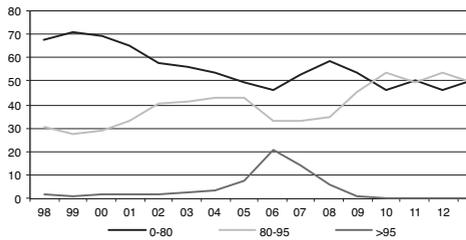
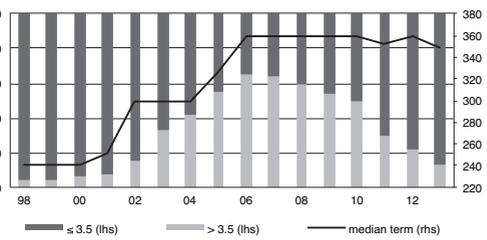
they are often associated with financial crises and deeper and more prolonged recessions. As noted in IMF (2011), not all housing busts end in financial crisis, and whether or not they do may depend on whether the housing boom was the result of a deterioration of lending standards, the degree of leverage or whether the solvency and liquidity buffers are strong enough to sustain the financial system through the bust.

In line with these findings on lending standards and leverage, there is growing international evidence that lending at high LTVs and LTIs can have a negative effect on financial stability by (i) contributing to harmful boom bust cycles in housing markets and (ii) weakening the resilience of banks and households to property market downturns. Empirical evidence also indicates that macroprudential policies such as LTV and LTI/DTI limits can be effective in reducing these risks by limiting the pro-cyclicality of house prices, credit and leverage and lowering the probability of default and loss given default on mortgage credit. This research either takes the form of cross-country analysis or case studies, the latter often based on experiences in Asian economies including Hong Kong, Korea and Singapore. An overview of the available evidence on the effectiveness of these measures, both in curbing pro-cyclicality and in increasing resilience, is provided in IMF (2014).

2.2.1 Reducing Pro-cyclicality

During a house price-credit boom, cyclical behaviour can be underpinned by rising leverage of borrowers, reflecting higher credit extended for a given level of income or equity, rising price expectations and/or speculative behaviour. As an example, the loosening of underwriting standards played a significant role in fuelling the Irish property boom of the 2000s, as recent quantitative research confirms.⁵ As house prices rose rapidly, banks extended more credit through increasing LTV and LTI ratios and by offering mortgages of longer duration, thereby allowing borrowers to overcome the financing constraints caused by higher prices. In particular, the variation in the amount of a borrower's income allocated to mortgage repayments (the income fraction, similar to LTI ratios) has been found to be one of the main causes of price increases during the upturn. Figure 1 illustrates the decrease in the amount of new lending with LTVs below 80 per cent up until 2006 and the corresponding increase in new lending with originating LTVs above 95 per cent (which reached over 20 per cent of new lending in 2006). Figure 2 illustrates the increase in lending with originating LTIs above 3.5 times (which reached over 60 per cent of new lending in 2006), as well as the increase in the median duration or term of mortgages to over 30 years by 2006.

⁵ See, for example, Lydon and McCarthy (2011) and McCarthy and McQuinn (2013).

Figure 1: *LTV Ratios at Origination*Figure 2: *LTI Ratios at Origination*

Source: Central Bank of Ireland

From a policy perspective, restrictions on mortgage lending standards can rein in purchasing power and mortgage loan growth during a boom, thereby limiting the build-up of household leverage, dampening price expectations and containing speculative demand. While ceilings on LTVs and LTIs can be imposed as cyclical pressures are growing, having these measures in place at all times can act in a more structural way to dampen the pro-cyclical tendencies that can be inherent in housing markets and, importantly, to restrict the build-up of leverage during the early stages of the cycle. These measures ensure that prudent lending standards are maintained at all times. The parameters can then be adjusted counter-cyclically if necessary in response to economic or market developments. These types of restrictions cannot necessarily fully curb credit growth during house price booms, nor are they expected to. For example, even in the presence of a LTV cap, the amount of credit allowed can expand in proportion to the increase in house prices and existing home owners benefit from an increase in their housing collateral, increasing their ability to purchase a new property. However, even if these measures cannot fully eliminate the risk of housing booms, they can limit the extent of the pro-cyclicality and bring further benefits in terms of increasing resilience.

A number of cross-country studies have examined the link between macroprudential policies and credit growth and other variables. These have broadly found that LTV / LTI measures can curb mortgage credit growth and reduce the risk of house price bubbles emerging. One of the first such studies was Lim *et al.* (2011). This finds, in a cross country regression using data from a group of 49 countries, that caps on LTVs and DTIs among other instruments are effective in reducing pro-cyclicality of credit and leverage. Looking specifically at real estate cycles and using data from 57 countries since 1980, Kuttner and Shim (2013) find that tightening DTI limits typically reduces

housing credit by 4 to 7 per cent over the following year while tightening LTV limits reduces housing credit by around 1 per cent. MacDonald (2015), using the model of Kuttner and Shim (2013) on data for 17 economies, finds that tightening LTV and DTI ratios tends to be more effective than loosening them, and tightening measures have greater impact when credit is expanding quickly and when house prices are high relative to income. In a study covering 119 countries over the 2000-2014 period, Cerutti *et al.* (2015) find that usage of macroprudential policies, including borrower-based policies, are associated with lower growth in credit, notably household credit, and can have some impact on growth in house prices. They also find evidence that macroprudential policies work better in the boom than in the bust phase of a financial cycle.

Considering effectiveness from the perspective of the impact on individual banks' balance sheets, Claessens *et al.* (2014) analyse how changes in banks' balance sheets in 48 countries over 2000-2010 respond to specific macroprudential policies. They find that measures aimed at borrowers are effective in reducing asset growth and reducing the build-up of banking system vulnerabilities. These measures directly help reduce asset growth during upswings but also stop declines in bank asset growth in contractionary periods in a statistically significant way. Using an approach which deploys the Euro Area Bank Lending Survey to assess the effectiveness of macroprudential policies in containing credit growth and house price appreciation in mortgage markets, Tressel and Zhang (2016) find that limits on LTV ratios are effective in slowing down mortgage credit growth and house price appreciation, but their impact tends to be more moderate than instruments targeting the cost of bank credit. However limits on LTV ratios were found to be particularly effective when monetary policy is excessively loose.

Evidence from individual country case studies is also informative. House price growth and transaction activity are found to be positively related to LTV and DTI in Korea (Igan and Kang, 2011) while the association between house price growth and LTVs at origination is confirmed using state-level data in the US (Crowe *et al.*, 2011), with a ten percentage point increase in the maximum LTV ratio allowed by regulations associated with a 13 per cent increase in nominal house prices. Also using US data, Duca *et al.* (2010) find an impact of 8-11 per cent on house prices from a 10 percentage point increase in LTV for first-time buyers, assuming rents remain constant. Ahuja and Nabar (2011) find that reductions in LTV caps in Hong Kong contribute to falls in transactions volume and price growth with a lag and suggest that LTV tightening could affect property activity through the expectations channel rather than through the credit channel. Igan and Kang (2011) consider the expectations channel for these instruments and find that tighter limits, especially on LTVs, curb expectations and speculative incentives. In New

Zealand, early indications are of moderating credit growth and house price inflation since the LTV introduction and the proportion of high LTV lending has fallen significantly (RBNZ, 2014). For Ireland, Kelly *et al.* (2015b), using loan level data on Irish mortgages to link credit, macroprudential instruments and house prices, find that a ten per cent increase in credit available leads to a 1.5 per cent increase in the value of the property purchased. This paper constructs a measure of credit available at the loan level which models the way in which credit supply can bind along three channels, the LTV ratio, the LTI ratio and the debt-service ratio (DSR) and finds that in Ireland between 2003 and 2010, the majority of borrowers had their credit availability determined by the prevailing LTI ratio. Further analysis suggests that macroprudential limits would have had substantial impacts on house prices in the short run had they been introduced in 2003 or 2006 and that both the level at which measures are set and the timing of their introduction is a crucial determinant of their impact on housing values. The paper also finds that LTI is in general the more binding tool relative to LTV or a debt service ratio (DSR), but this changes as tighter caps on LTV and DSR are introduced.

2.2.2 Enhancing Resilience

If leverage or mortgage repayment burdens are high, even modest reductions in house prices or incomes can increase default risk among borrowers (i.e. the probability of default). High loan to value ratios make it more likely that borrowers will fall into negative equity, which can impact on default rates and/or consumption levels among borrowers. Moreover, the higher the LTV ratio, the greater the loss for the bank in the event of default is likely to be (i.e. loss given default). The link between LTI ratios and default rates is clear. High LTI ratios mean that borrowers' repayment capacity becomes stretched much more quickly in the event of a temporary or permanent shock to income.

Irish data confirm the link between LTV and LTI ratios and bank resilience. Using loan level data, Hallissey *et al.* (2014) analyse the relationship between originating levels of these ratios and mortgage defaults. They find a positive relationship between higher originating LTV and LTI ratios and subsequent defaults and also between higher LTV ratios and banks' losses from defaults for loans issued prior to end-2013. Figure 3 displays the relationship between LTI ratios and probability of default and Figure 4 shows the relationship between LTV ratios and loss given default for all loans in the sample period 2002-2013 (dashed line) and also for loans issued during the individual years. The analysis suggests that even if the housing cycle had developed as it did, lower LTV and LTI ratios during the build-up phase would have materially improved the resilience of the system and losses to households, banks and taxpayers. For example, using the Central Bank's loan loss forecasting models

shows that, if it is assumed that the same number of loans were made at the same house prices as actually prevailed but that each loan was capped at a LTV of 80 per cent, banks' losses over the period 2014-2017 would be lower by 17 per cent. As it overlooks the dampening cyclical effects such a restriction on LTV ratios would also have had, this estimate understates the true effect a LTV cap would have had on banks' losses.

Evidence from other countries also shows that these measures are successful in increasing resilience and reducing the severity of downturns. Lee (2013) shows that housing prices in Korea fell from 2009 after the global financial crisis, but the delinquency ratio on household loans remained extremely low, and claims that this implies that strict implementation of limits on LTV and DSTI ratios prevented delinquencies even as house prices fell, thus reducing financial institutions' losses. Hong Kong has had an LTV cap in place since 1994 and suffered very low mortgage losses after the Asian crisis even though house prices fell 60 per cent. Wong *et al.* (2011), examining Hong Kong's experience, show that the dampening effect of LTV policy on household leverage is more apparent than its effect on property market activities.

Figure 3: *Relationship Between LTI Ratios and Defaults by Originating Year*

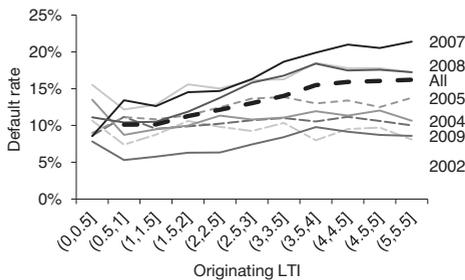
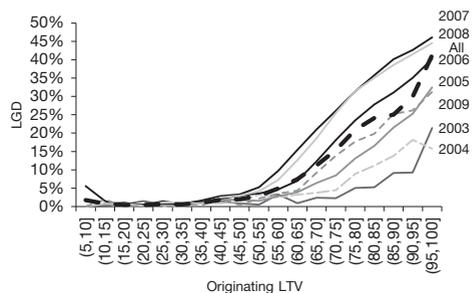


Figure 4: *Relationship Between LTV Ratios and Loss Given Default by Originating Year*



Source: Hallissey *et al.*, 2014.

2.3 Why Both LTV and LTI?

A number of different elements of the financial stability risks which can arise from the housing market are evident from the previous sub-section. These include the development of boom bust cycles, the probability of mortgage default if a bust occurs and the extent of banks' losses as a result of defaults. LTV and LTI restrictions naturally complement each other in addressing these risks and therefore it was considered optimal to combine these measures in order to address the overall objectives.

As already noted, LTV caps may not be sufficiently countercyclical on their own, given that mortgage credit and indebtedness still increase as house prices increase. Accordingly, LTIs may be more effective in limiting the build-up phase of a housing bubble as incomes tend to increase more slowly than house prices. In terms of the impact on the probability of default, LTV and LTI restrictions tend to re-enforce each other. LTI caps provide a buffer against the effects of income and employment shocks, thereby increasing the resilience of borrowers and reducing the probability of default. By enforcing a minimum down payment, LTV caps can also reduce borrowers' incentive to default in the event of house price declines.

Regarding the loss given default, LTV restrictions provide a collateral buffer against house price declines, and directly lower the loss in the event of a default. LTV limits without complementary restrictions on LTIs would still leave borrowers' capacity to service their mortgages vulnerable to income shocks. LTI restrictions without LTV measures could leave banks highly exposed to severe house price shocks, as occurred in Ireland after 2008.

III DESIGN AND KEY FEATURES OF THE MEASURES

The introduction of limits on high LTV and LTI mortgage lending followed a detailed internal risk assessment of financial stability conditions pertaining to the housing market as well as a public consultation process to gather feedback on the initial proposals. The design and calibration of the measures reflected international evidence and best practice as well as some specific features of the Irish mortgage market at the time of introduction. This section focuses on selected issues relating to the design of the measures, including the decision to introduce proportionate rather than absolute caps and the treatment of first-time buyers, buy-to-let borrowers and homeowners in negative equity. The section begins with an overview of the consultation process that preceded the introduction of the measures.

3.1 *Consultation Process*

Prior to finalisation of the Regulations, a two-month public consultation process was undertaken by the Central Bank. In total, 157 submissions were received, 110 of which were from individual members of the public and the remainder from banks and other parts of the industry, representative bodies, political representatives and the Department of Finance, research groups and academics.

Overall there was widespread agreement with the objectives of the measures as well as the introduction of some form of macroprudential measures

for mortgage markets. No submission suggested that the use of some form of LTV and/or LTI limits could not achieve the stated objectives. There were however a wide range of views regarding the timing of the measures and the level of the caps. These mainly related to the LTV cap for PDH borrowers. There was some but far less disagreement with the LTI proposal and no disagreement with the lower LTV limit for BTL lending. It is important to remember that the initial proposal consulted on was for a limit of 80 per cent LTV for both FTBs and non-FTBs.

A number of reasons for disagreement with the details of the proposal on PDH LTV limits were provided including negative impacts on potential FTBs, further pressures being placed on the rental market, the risk that borrowers might seek unsecured lending to increase their deposit to meet the LTV limits and inappropriate timing due to the stage of the economic cycle. Alternative proposals were for a higher LTV threshold, a phasing in of the limits and different LTV limits for FTBs. A number of responses were received from potential FTBs who were in agreement with the measures, welcoming them as a means of cooling the market and preventing another bubble. Responses were also received from FTBs who were not in favour of the measures, many of whom noted that the initial proposal of an 80 per cent LTV limit would either make homeownership unattainable or lead to a long delay in purchasing a home.

A number of implementation issues were raised by banking stakeholders, relating mainly to technical and operational changes required to comply with the proposed measures.⁶ The issue of whether adequately insured mortgages with higher LTVs should be exempt from the measures was addressed in around 30 submissions, with similar numbers agreeing and disagreeing with the question. A detailed feedback statement on the responses received is published in CBI (2015b).

A number of changes were made to the initial proposals following the consultation process. These included most notably a higher LTV limit for FTBs but also amendments to the negative equity exemption, changes to coverage such that the measure will only apply to mortgage lending in the Irish State and some changes to how the measures will be implemented, including extending the compliance period of six months to an annual compliance period in response to operational issues raised by the banks.

3.2 *Proportionate Caps*

An important element of the mortgage measures is that an amount of new lending is allowed above the thresholds. As already noted, 20 per cent of the

⁶ Operational difficulties identified by lenders include managing the pipeline of existing applicants who have been approved but have yet to draw down loans and managing the proportionate limits, particularly the portion of lending which exceeds the LTV and/or LTI limits (CBI, 2015b).

value of new mortgage lending is allowed at above 3.5 times gross income, 15 per cent is allowed at LTV ratios above the thresholds for primary dwelling homes and 10 per cent of lending at LTVs above the threshold for BTL properties.

These types of allowances were first introduced by the Reserve Bank of New Zealand when it introduced its LTV restrictions in 2013 and then by the Bank of England with its restrictions on LTIs in 2014. The decision to introduce these proportionate caps in Ireland recognises that higher LTV or LTI mortgages can be appropriate in some circumstances. Examples could include otherwise creditworthy borrowers who cannot raise the deposit required but who would be able to afford the loan repayments, or younger borrowers whose income can reasonably be expected to rise in the future. Proportionate caps also help to ease some valid concerns regarding market access difficulties, without compromising the overall financial stability objectives. It also avoids an overly prescriptive approach whereby the Central Bank prohibits a certain type of mortgage product or where it is the Central Bank that decides what type of borrowers might be exempt and it leaves responsibility with respect to individual exemptions with the banks. As with all other parameters of the measures, the possibility exists for the Central Bank to amend the proportions of lending allowed above the threshold in either direction if warranted by cyclical developments.

Compliance with the proportionate caps will be measured on an annual basis through a detailed monitoring template submitted by the banks. Lenders are required to report mortgage loan-level information for all loans covered by the Regulations and the information provided will be useful also for analytical purposes. Data submitted shall be based on actual drawn loan amounts on an individual residential property basis. All lenders must comply with the Regulations, but only lenders who advance more than €50 million or more in residential mortgage lending over a six-month period are required to submit a loan-level return. Lenders that advance less than €50 million over a six-month period are required to report the total value of residential mortgage lending over that time, to allow the Central Bank to monitor newer entrants to the market.

3.3 *First Time Buyers*

A key feature of the Irish measures is the differentiated treatment for FTBs. More specifically, a higher 90 per cent LTV limit applies to FTBs for any property value up to €220,000 and an 80 per cent limit applies to any remaining value of a property thereafter. Thus, there is no cliff effect, whereby the maximum LTV goes from 90 per cent to 80 per cent at €220,000, but rather a sliding LTV limit that decreases gradually towards 80 per cent with higher

house prices (Figure 5). For example, for a FTB purchasing a house worth €350,000, the maximum LTV works out at 86 per cent. FTBs are subject to the same LTI limits as other borrowers. The experience in Ireland has been that FTBs buy lower-value properties. This can be seen in Figure 6 which provides the distribution of house prices for new lending to FTBs in the first half of 2014. The median house price for a FTB was €182,000, and 57 per cent (84 per cent) of FTBs bought a property valued under €200,000 (€300,000). The sliding LTV limit would have affected 22 per cent of new lending if it had been in place in the first half of 2014, but most of these borrowers would have needed only a marginally higher deposit as almost 80 per cent of these were purchasing properties under €300,000 and thus would have had to pay less than 3 per cent of an additional deposit. This aspect of the policy was guided by the disproportionate cost that FTBs often have to bear as a result of LTV restrictions as well as empirical evidence regarding the lower credit risk of such borrowers.

Figure 5: *Maximum LTV Limits for First Time Buyers*

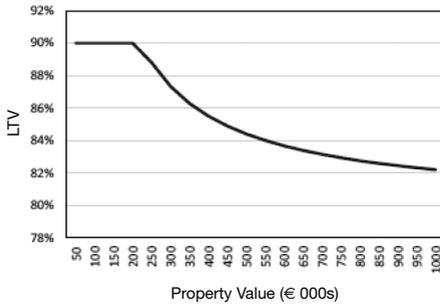
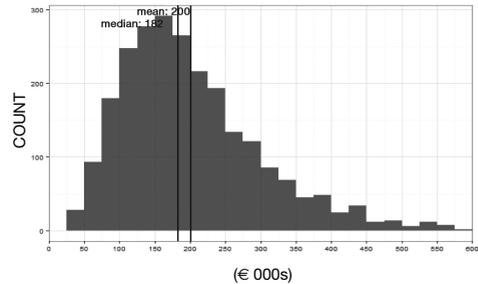


Figure 6: *Distribution of New Lending by FTB House Prices in H1 2014*



Source: Central Bank of Ireland

There is an established economic literature that indicates that FTBs are more sensitive to changes in banks’ lending conditions and to financing constraints in providing downpayments towards the purchase of a house.⁷ Unlike existing mortgage holders, FTBs cannot build up equity towards future purchase through amortisation and house price increases and are therefore often largely reliant on personal savings. As FTBs tend to be younger than subsequent buyers they may not have had much time to accumulate savings, even if their future income growth prospects can be favourable. From a homeownership perspective, it can also be argued that FTBs are more affected

⁷ See Kelly *et al.* (2015) for a discussion of the relevant literature in this area.

by financing constraints as they may be prevented from owning any home rather than from moving from one home to another. These concerns in relation to the potential effects of the LTV limits on access to finance and homeownership were, as already noted, highlighted in a large number of responses to the consultation paper.

Empirical research undertaken in the Central Bank looked at whether there was any economic justification for allowing less restrictive LTV limits for FTBs, i.e. whether higher caps could be allowed without reducing the effectiveness of the Regulations in meeting the objectives. Kelly *et al.* (2015) used loan-level data on 291,000 loans across four Irish banks to test whether FTBs have a different default risk to second and subsequent buyers (SSBs). They find a probability of default for FTBs that is lower by 4 percentage points, on average, with the differential at a maximum for LTVs of 80-85 per cent (Figure 8). Figure 7 displays the default rates at year of origination across FTBs and SSBs while Figure 8 displays the difference in the default rate according to originating LTV. Among the loan and borrower characteristics that are controlled for in the default probability model used by the authors are borrower age, employment and marital status and loan origination characteristics including loan size, LTV, LTI, term length and interest rate type. The raw default rate differential between FTBs and SSBs is 4.6 percentage points while the differential when these and other characteristics are controlled for remains 4 percentage points.

Figure 7: *Sample Default Rate by FTB Status and Year*

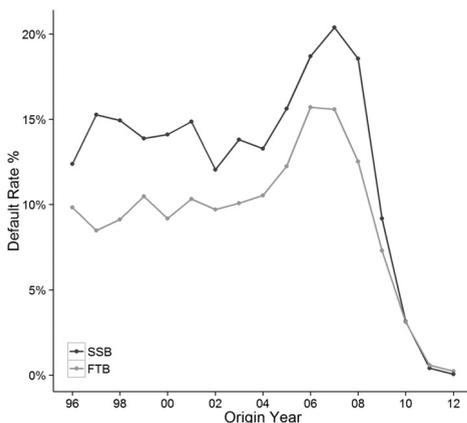
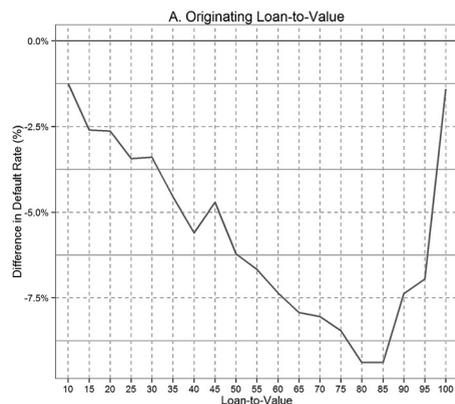


Figure 8: *Difference in Default Rate by originating LTV*



Source: Kelly *et al.* (2015)

A number of possible hypotheses to explain why FTBs might be a lower credit risk are explored in Kelly *et al.* (2015). On the borrower side, these include the possibility that FTBs see their first purchase as a means of building up a favourable credit history and are more concerned about the impact of default on their future credit access. A second possible explanation relates to risk appetite, namely that taking a second mortgage reveals a higher tolerance for risk relative to borrowers who remain FTBs and that this higher risk appetite may lead to a higher probability of default for second and subsequent buyers. Related to this is a possible explanation whereby FTBs have a greater aversion to loss if they are more likely to have funded their down payment through a lengthy period of savings rather than through capital gains. In this case the attachment of FTBs to a home may be higher. From a bank's perspective, one possible explanation explored by the authors is that due to a lack of credit history, banks apply more thorough lending evaluations and stricter appraisal criteria to FTBs.

The findings of Kelly *et al.* (2015) provide support for allowing a higher LTV cap for FTBs without weakening the objective of enhancing resilience of households and banks to financial shocks. A higher LTV ratio usually implies a higher loss given default. The expected loss for a bank on a mortgage equals the value of the loan at the time of default (i.e. exposure at default) times the probability of default times the loss given default (i.e. $EL = EAD \times PD \times LGD$). In this case, a higher loss given default for a particular category of borrower can be justified from a credit risk/resilience perspective for borrowers with a lower probability of default.

The application of a flat 90 per cent LTV limit for FTBs regardless of property value was not considered sufficient to meet a second objective of the Regulations, that of dampening the pro-cyclicality of property lending, and FTBs purchasing more expensive properties are subject to lower maximum LTVs. By limiting higher LTVs in this manner, it reduces the risk of the emergence of house price/credit cycles while at the same time not overly restricting access to mortgage credit and home ownership of FTBs. An argument can be made that existing home owners benefit (lose) more during a property upswing (downturn) from an increase in housing collateral which means they have a tendency to contribute more to boom-bust cycles than FTBs. Some stylised facts discussed in Coates *et al.* (2015) lend some support to this view, notably that the transaction rate for FTBs (i.e. the number of mortgages per thousand population) remained stable over the period 1999 to 2007 while it increased quite sharply for other purchasers (Figure 9). However, as noted below, this was driven more by the sharp increase in BTL borrowers rather than movers and empirical evidence for a different role for FTBs compared to movers is difficult to find.

3.4 *Buy-to-Let Borrowers*

Mortgages granted for investment or buy-to-let purposes are treated differently in the Regulations than those for purchase of primary dwelling homes. First, there are no LTI restrictions for this category of borrower and, secondly, a more stringent LTV cap of 70 per cent is applied, subject to no more than 10 per cent of the value of all new BTL loans being allowed above this limit. At the time of introduction of the measures, an examination of new lending and available products in the market showed that lending above 80 per cent LTV to BTL borrowers was at extremely low levels, and almost 70 per cent of new lending to BTL borrowers was under 70 per cent LTV (CBI, 2014b), although the volume of new lending to the sector was extremely low at this point.

BTL mortgages are exempt from the LTI requirement since the affordability of mortgage repayments is less affected by current non-rental income than it is by future income streams on the new property. While lenders assess expected rental income streams in making decisions on BTL mortgage lending, this is difficult to regulate for in the same way as LTI caps. The Central Bank has noted that the imposition of a debt-to-income (DTI) cap, taking some account too of potential rental income, will be considered when the new credit register is established.

The lower LTV cap for BTL borrowers in Ireland reflects both the role in amplifying the property cycle and the higher credit risk of these borrowers.

3.4.1 Dampening Pro-cyclicality

Speculative activities in the housing market are a concern in many countries and are considered to have played a role in the Irish housing bubble. Coates *et al.* (2015) discuss the role of different buyer types during the housing boom and note the disproportionate increase in BTL transactions after 2001 such that the share of these transactions rose from less than 5 per cent to account for more than a quarter of all transactions for house purchases at the peak of the cycle. Moreover, the authors find that the share of BTL lending is positively correlated with a measure of overvaluation of the market, a result which does not hold for other buyer groups. Figure 9 compares the transaction rates for BTL borrowers with those of borrowers for PDHs, distinguishing between FTBs and non-FTBs.

Different LTV limits for non-owner occupiers have been used in several other countries including Hong Kong, Israel, Malaysia, New Zealand, and Singapore, with limits ranging from 70 per cent (New Zealand) to 20 per cent (for non-individuals in Singapore with one or more outstanding loans). These limits are used most commonly with the aim of reducing the role of speculative buyers in the property market. This can be done by identifying speculation

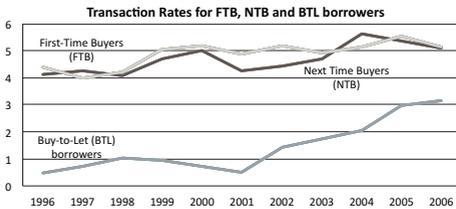
prone areas or by applying tighter LTV caps for borrowers with several loans (Jacome and Mitra, 2015).

3.4.2 Increasing Resilience

Although differentiated LTV limits for non-owner occupier borrowers have most commonly been used to counter pro-cyclicality, evidence has emerged from the recent crisis that indicates that this lending is also riskier in severe downturns compared to lending to owner occupiers. Cross-country evidence is limited, as many countries have not experienced the magnitude of house price falls that happened in Ireland and a large BTL market is not a universal feature of property markets. However, Central Bank research has shown that BTL mortgages were more likely to be in arrears and default. McCarthy (2014) using a combination of loan-level data and a detailed survey of mortgage holders finds that BTL borrowers have a 10 per cent higher probability of experiencing mortgage arrears compared to PDH borrowers. Research controlling for loan vintage and unemployment rate (Kelly, 2012) shows that BTL borrowers are more likely to default for a given LTV level, but particularly when in negative equity. Kelly and O'Malley (2016) show that both homeowners and investors have increasing default risk with increasing LTV but investors show significantly increased default risk for loans in negative equity which is not the case for owner occupiers and conclude that high LTV investor loans are riskier than their homeowner counterparts.

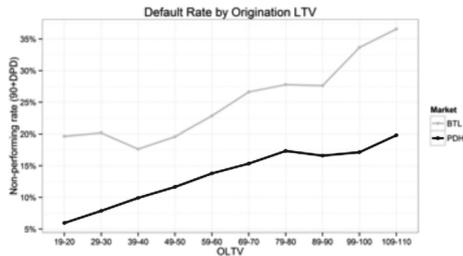
Figure 10 compares the default rates by LTV at origination (OLTV) for BTL and PDH mortgages using loan-level data from the Irish banks. This shows that for any given originating LTV level, the default rate is higher for BTL mortgages than for PDH mortgages. The default rate is 10 percentage points higher for a BTL mortgage at originating LTV of 70 per cent.

Figure 9: Transaction Rates for Different Borrower Types



Source: Coates et al. (2015)

Figure 10: Default Rate by Origination LTV



Source: Central Bank of Ireland

Other central banks have also warned of the inherent riskiness of BTL lending. RBNZ (2015) highlights some evidence from the US supporting the thesis that investor borrowing is riskier. Bank of England (2015) also warns on the potential risks to financial stability from buy-to-let lending, particularly from loosening lending standards in the sector, and flag that the number of advertised buy-to-let mortgage products at LTV ratios of 75 per cent and above has increased since mid-2013.

Some rating agency models assign higher risk to investor lending. Rating agency models for Irish covered bonds take into account whether a loan is for owner-occupier purposes or not. For example, DBRS (2014) applies additional penalties to any loans to non-owner occupiers as they expect performance of investment properties to be inferior in terms of performance to residential properties in a stressed macroeconomic environment. Similarly, Fitch Ratings (2013) adjusts the risk of a standard mortgage loan defaulting in Ireland if it is a buy-to-let loan, with typical adjustments in the range of 60 to 70 per cent. In Australia, Fitch Ratings (2012) assumes a 25 per cent higher base default probability for mortgages collateralised with investment properties compared to owner-occupied properties. Fitch believes that Australian investor mortgages will have a higher probability of default in an economic downturn as these borrowers do not have the incentive of protecting their primary residence.

3.5 Negative Equity Borrowers

Ireland is somewhat unusual in the fact that binding LTV limits were introduced at a time when negative equity among existing home owners was widespread. At the time of going to consultation, Central Bank data on the outstanding stock of loans showed that around 40 per cent of these were in negative equity. The introduction of a LTV cap at a time when existing homeowners have low or negative equity levels in their existing homes can lead to these borrowers being trapped in their homes, reducing labour market mobility as well as household consumption and savings. Given these issues, it was important to design the Regulations in a way that negative equity borrowers would not be trapped and disproportionately affected by the new rules, while still meeting the overall objectives of the Regulations.

When considering how borrowers in negative equity (NEBs) would be affected by a LTV cap, the current treatment by banks of these borrowers who wished to move was considered. All the main banks in Ireland offer negative equity mover products, which allow a NEB to sell the property in negative equity, crystallise the outstanding debt on this property, carry this over and add it on to the mortgage on the new property. The banks were requiring these borrowers to put down a deposit on the new property in line with their own product offerings (usually around 10 per cent deposit), so that the new mortgage

had an initial LTV of 90 per cent, say, and then a higher combined LTV after the residual debt was carried over. Although these products were available from the five domestically active banks, very limited numbers of these transactions were taking place, with fewer than 300 in 2014.

The initial proposal by the Central Bank was to exempt the residual debt from the LTV limits, so that NEBs would face the same 20 per cent deposit requirement on the new property as all borrowers. However, responses in the consultation paper indicated that a 20 per cent down-payment requirement from these borrowers was too restrictive and further consideration was needed on how these borrowers should be treated.

When considering how the Regulations should be designed to achieve the objective of not restricting mobility for NEBs, the cost of any additional complexity in the Regulations was weighed against the objectives of the measures. Exempting these borrowers fully could allow unconstrained borrowing conditions for trading-up and, given the extent of negative equity in the system, any such exemption would need to be carefully considered. How negative equity interacts with a LTV cap is a complex issue. Several policy options were considered, all of which involved some form of deposit requirement on a NEB while still fostering mobility. However, defining any of these options in practice was quite difficult, and would have involved a large increase in the prescriptiveness of the Regulations. This increase in complexity was weighed against the fact that the current levels of negative equity mover mortgages were very low.

Taking these trade-offs into account, and given the low level of transactions and risk appetite of banks in this area, it was decided to exempt NEBs who were selling their existing home from the LTV limits, noting that the banks' own lending standards and risk management would apply in these cases. The LTI limit would still apply. In doing so, the Central Bank reserved the right to amend this exemption if there was evidence of adverse behaviour arising from it. NEBs not selling their existing property before purchasing a new home are still in scope of the LTV limits and an 80 per cent LTV applies.

3.6 *Mortgage Insurance*

Mortgage insurance has been used together with LTV limits in some countries, and the issue was raised in the consultation as to whether an exemption should be considered for mortgages with insurance. The benefit of such an exemption is that it would alleviate the liquidity constraint, in particular for first time buyers, caused by a LTV cap. However, consideration needed to be given to how any exemption would affect the objectives of the measures.⁸

⁸ For a full discussion of these issues, see Hallissey (2015).

Mortgage insurance protects lenders from some or all of the losses incurred in the event of a default. Mortgage insurance does not cover borrowers, who are still liable to the insurance company for any losses. However, mortgage insurance can be used to allow creditworthy borrowers without a sufficient deposit access to credit. Mortgage insurance is widely used in only a few countries around the world, including Hong Kong where it is used together with a LTV limit to increase bank resilience while still allowing access to credit for qualified borrowers. Mortgage insurance is provided by the government in several countries (e.g. Canada, Hong Kong, the Netherlands, the UK, and the US). Markets for private mortgage insurance also exist in the US, Australia and Canada.

Mortgage insurance could be used to partly meet the first objective in that it could increase the resilience of banks to shocks in the property market. However, it would not improve households' resilience. In addition, allowing an exemption for insured mortgages could also reduce the effectiveness of a LTV cap in dampening the pro-cyclicality of property lending.

Mortgage insurance does not remove the risk of losses when an economic shock occurs but transfers it to the insurer. If the insurers, whether private or State-owned, are domestic, the risk and vulnerability remains within the State. The cost of mortgage insurance is usually borne by the borrower, either directly or through higher interest rates, and given the scale of the recent crisis, this could be quite large. If an exemption were to be granted for insured mortgages, a microprudential framework would also need to be developed to supervise the companies providing this insurance, given that this has not been a large feature of the Irish market in recent years. Taking these issues together with the limited role of mortgage insurance in meeting the macroprudential objectives of the measures, an exemption for suitably-insured mortgages was not considered to be an effective addition to the Regulations at this point in time.

3.7 Side Effects

In devising the detail of the Regulations, the potential for unintended consequences was considered in depth. While there may always be unintended consequences which are unforeseen, there are some which can be identified in advance and dealt with if possible. Other country experiences in implementing mortgage market measures are instrumental in this regard. The consultation process was also used to garner views from a wide range of stakeholders as to where unintended consequences could arise. Moreover, the Central Bank has committed to ongoing monitoring of the impact and effectiveness of the measures in achieving its stated objectives including any unintended consequences.

Shift in lending to other sectors: The introduction of limits on mortgage lending can lead to a shift in lending to other, potentially unregulated, sectors. This is discussed in IMF (2014), and Cizel *et al.* (2016) find strong cross sector substitution effects of quantity constraints such as LTV limits. By using Section 48 of the *Central Bank (Supervision and Enforcement) Act 2013*, the Regulations were applied to lending by all regulated financial services providers in Ireland which is secured on residential property in the State. A regulated financial service provider includes a financial service provider whose business is subject to regulation by the Central Bank or a comparable entity in another EEA jurisdiction and so this includes lending by both subsidiaries and branches of foreign banks, direct cross-border lending for property secured in the State and lending by retail credit firms. Thus the Regulations cover as broad a scope as possible to minimise this potential risk.

Use of unsecured borrowing to meet new deposit requirements: Any increase in deposit requirements for borrowers brings with it the risk that individuals will resort to unsecured borrowing to meet the new requirements (see Bank of England, 2014 for a short discussion). This could be mitigated by a central credit register (CCR), which would allow lenders to monitor this. The Central Bank is committed to launching and managing a CCR over the period 2016-2018. Until then there is the possibility that LTV limits may transfer borrowing in some cases to more risky short-term sources of finance, reducing the effectiveness of the measures. However, the Consumer Protection Code (2012)⁹ contains provisions in terms of how Irish lenders assess the affordability of a mortgage for an individual borrower. This requires lenders to thoroughly assess the personal and financial circumstances of consumers who are applying for a mortgage and contains provisions which are aimed at promoting a greater level of responsible lending. The Irish banks verify the source of a borrower's deposit as part of the mortgage underwriting process and any changes to this approach will be reviewed by the Central Bank.

Lowering of standards for valuing collateral: It is theoretically possible to achieve a lower LTV ratio on a transaction by reporting a higher collateral value for the transaction than is actually the case. While there was no evidence that such behaviour would become widespread, the Regulations contain a provision (Regulation 7) on the valuation of residential property and within this the value of the property is defined as the lower of the contract price or the market value of the property.

Front-loading of lending before introduction of the caps: Experience from other countries has shown that the announcement of impending mortgage market measures can lead to house purchases being brought forward to avoid

⁹ See <https://www.centralbank.ie/regulation/processes/consumer-protection-code/documents/consumer%20protection%20code%202012.pdf> for further details.

the limits. This happened in Canada due to a three-month lag between policy announcement and implementation but did not happen in New Zealand, where a six-week gap existed (Bank of England, 2014). Different countries also have different approaches to how mortgages which have been approved before the measures come into effect are treated. In Ireland, the need for a public consultation and discussion on the measures was balanced against the disruption to the property market that any period of uncertainty could have. During the interim period, lenders were instructed to take account of the likely introduction of LTV and LTI measures and to begin to adapt their lending practices already in anticipation of its introduction (CBI, 2014b). However, any mortgage applications which were approved prior to the introduction of the Regulations on 9 February 2015 were exempt from the limit. It is difficult to assess precisely whether the time lag led to a front-loading of mortgage approvals in advance of the Regulations coming into force; however, anecdotal evidence suggests that some front-loading of this sort did take place.¹⁰

Effect on housing market: As discussed in CBI (2015b), the effect the measures would have on the housing market featured strongly across the submissions to the consultation, particularly regarding the impact on potential new construction. While precise quantification of the effects is not possible, Cussen *et al.* (2015) model the economic effects of an 80 per cent LTV limit applied to *all* borrowers under conservative scenarios. This research finds relatively moderate impact on house prices and mortgage interest rates and a slightly higher impact on housing supply. The indications from such macroeconomic modelling are that macroeconomic side effects were thought to be sufficiently limited in relation to the aimed-for reduction in macroprudential risk. Kennedy and Stuart (2015) also discuss the potential side effects of the measure on the housing market and policy options, outside the remit of the Central Bank, to address these effects are reviewed. The side effects identified are taken from numerous sources including the responses to the consultation paper, economic theory and the experiences of other countries in using such macroprudential tools.

Effect on rental market: Increased pressure on the rental market and the potential for rents to increase as a result of the measures also featured heavily in the submissions to the consultation, particularly in an environment where rents were already rising rapidly. In the short-term, measures of this type can impact on rents if they have the consequence of delaying house purchases by potential first time buyers. If demand for owner-occupied housing falls, demand for rented accommodation increases. These potential effects on the rental

¹⁰ See, for example, www.irishtimes.com/business/personal-finance/early-approval-can-beat-new-mortgage-rules-1.1970686

market were considered in Kennedy and Stuart (2015), which found that the net effect over the more medium term will be the result of a number of offsetting factors. In particular, the relative shifts in demand alter pricing and shift incentives for investors. Over time, supply of new dwellings may be influenced by the measures and the proposed measures will not necessarily increase rents once it is taken into consideration that the supply of rented accommodation will increase as well as demand. The higher LTV caps for FTBs buying lower valued properties should also reduce the impact that the measures would have on the rental market, as fewer FTBs will be restricted by the measures.

IV CONCLUDING REMARKS

The purpose of the limits on LTV and LTI ratios introduced by the Central Bank is to increase resilience in households and banks and in the mortgage market generally. In particular, these measures are intended to limit the extent of pro-cyclicality in the housing market and reduce losses to the economy in the event of financial shocks. The design of the measures was influenced by a public consultation process. While the parameters of the restrictions may be amended in response to cyclical conditions, their introduction is intended as a permanent, structural feature of the mortgage market to ensure prudent lending standards throughout the cycle.

The design of the measures takes into consideration the more difficult situation facing first-time-buyers in entering the housing market and the evidence of lower credit risk among this cohort of borrowers. Higher risks for banks in lending for investment or speculative purposes are also reflected in the calibration of the measures. Exemptions for borrowers in negative equity, mortgage holders switching providers and loans in restructuring reflect specific features of the Irish market at the time of introduction. An amount of new lending is allowed above the limits in order to ease concerns about market access and to allow a suitable balance between flexibility on the one hand and maintaining prudent lending standards on the other.

The decision to introduce these regulations was based on strong international and domestic evidence regarding the effectiveness of these types of measures. While the risk of housing market and financial crises cannot be eliminated fully, it is expected that these measures, along with other macro-prudential measures deployed by the Central Bank, can reduce the probability and severity of crises.

The Central Bank has continued to monitor housing market developments since the introduction of the measures and will undertake regular analysis to evaluate their effectiveness. In the first year since their introduction, there was

a moderation in house price growth and expectations. The annual rate of increase in residential property prices fell from 16.3 per cent in Q4 2014 to 6.6 per cent in Q4 2015, nationally, and from 22.3 per cent to 2.6 per cent in Dublin over the same period. The Central Bank's quarterly survey of property professionals showed that while prices were still expected to rise over the following one to three years, the expected pace of appreciation became more modest after introduction of the measures. Inflation in the rental market remained high, averaging 10 per cent during Q4 2015, up from 8.4 per cent during the same period of the previous year. Mortgage drawdowns continued to increase during 2015, although the rate of growth in sales was slowing throughout 2015 and into 2016 and the level of transactions remains low by historical standards. Housing supply also continued to increase. Overall, 12,666 new units were completed in 2015, a 15 per cent increase on the total for 2014, although a shortage of supply in the market remains a concern for policy makers.

An evaluation of the impact of the measures will be undertaken during 2016 when sufficient data are available. There are a range of data sources available to the Central Bank for this purpose including notably the loan-level dataset. This series includes bi-annual snapshots (at June and December) of the entire mortgage book of the banks, detailing loan-level information, including LTV and LTI ratios, for every mortgage outstanding on the banks' books. In addition, a monitoring template has been developed by the Central Bank to assess compliance with the residential mortgage market measures. Entities are required to report detailed mortgage loan-level information for all loans covered by the Regulations and the information provided will be useful also for analytical purposes.

The available data allow for an assessment of how the characteristics of loans have changed prior to and after the introduction of the measures and the resilience of banks and borrowers to financial shocks. Evaluation will also take into consideration housing market and broader economic developments as well as potential side effects including the possibility for recourse to unsecured lending which could result in financial stability concerns. On an ongoing basis, housing and rental market developments will be reported in the Central Bank's Macro-Financial Review¹¹ while household credit conditions are reported in the bi-annual Household Market Report.¹²

¹¹ www.centralbank.ie/publications/Pages/MacroFinancialReviews.aspx

¹² www.centralbank.ie/publications/Pages/HouseholdCreditMarketReport.aspx

REFERENCES

- AHUJA, A. and M. NABAR, 2011. "Safeguarding Banks and Containing Property Booms; Cross-Country Evidence on Macroprudential Policies and Lessons From Hong Kong SAR," IMF Working Papers 11/284, International Monetary Fund.
- BANK OF ENGLAND, 2014. *Financial Stability Review*, June 2014, Bank of England.
- BANK OF ENGLAND, 2015. *Financial Stability Review*, July 2015, Bank of England.
- CENTRAL BANK OF IRELAND, 2014a. *A Macroprudential Policy Framework for Ireland*, Dublin: Central Bank of Ireland.
- CENTRAL BANK OF IRELAND, 2014b. "Macroprudential Policy for Residential Mortgage Lending" Consultation Paper CP87, Dublin: Central Bank of Ireland.
- CENTRAL BANK OF IRELAND, 2014c. *Macro-Financial Review*, 2014:II, Dublin: Central Bank of Ireland.
- CENTRAL BANK OF IRELAND, 2015. "Information Note: Restrictions on Residential Mortgage Lending", Dublin: Central Bank of Ireland.
- CENTRAL BANK OF IRELAND, 2015b. "Feedback Statement on CP87: Macroprudential Policy for Residential Mortgage Lending", Dublin: Central Bank of Ireland, January.
- CERUTTI, E., S. CLAESSENS and L. LAEVEN, 2015. "The Use and Effectiveness of Macroprudential Policies: New Evidence", *IMF Working Paper 15/61*, International Monetary Fund.
- CIZEL, J., J. FROST, A. HOUBEN and P. WIERTS, 2016. "Effective Macroprudential Policy: Cross-Sector Substitution of Price and Quantity Measures." *IMF Working Paper 16/94*, International Monetary Fund.
- CLAESSENS, S., S. GHOSH and R. MIHET, 2014. "Macroprudential Policies to Mitigate Financial System Vulnerabilities", *IMF Working Paper 14/155*, International Monetary Fund.
- COATES D., R. LYDON and Y. MCCARTHY, 2015. "House Price Volatility: The Role of Different Buyer Types", *Economic Letter*, Vol. 2015. No. 2. Central Bank of Ireland.
- CROWE, C., G. DELL'ARICCIA, D. IGAN and P. RABANAL, 2011. "How to Deal with Real Estate Booms: Lessons from Country Experiences," *IMF Working Paper 11/91*, International Monetary Fund.
- CUSSEN, M., M. O'BRIEN, L. ONORANTE and G. O'REILLY, 2015. "Assessing the Impact of Macroprudential Measures", *Economic Letter*, Vol. 2015. No. 3. Central Bank of Ireland.
- DBRS, 2014. "Master European Residential Mortgage-Backed Securities Rating Methodology and Jurisdictional Addenda", March.
- DUCA, J., J. MUELLBAUER and A. MURPHY, 2010. "House Prices and Credit Constraints: Making Sense of the U.S. Experience," Oxford University Working Paper.
- FITCH RATINGS, 2012. "Investment Versus Owner Occupied: Divergence in Mortgage Performance across Australia", February.
- FITCH RATINGS, 2013. "EMEA Criteria Addendum – Ireland Mortgage Loss and Cash Flow Assumptions", July.
- GRACE, T., N. HALLISSEY and M. WOODS, 2015. "The Instruments of Macroprudential policy", *Quarterly Bulletin 01*, January 2015, Dublin: Central Bank of Ireland.

- HALLISSEY, N., R. KELLY and T. O'MALLEY, 2014. "Macroprudential Tools and Credit Risk of Property Lending at Irish banks", *Economic Letter*, Vol. 2014. No. 10, Dublin: Central Bank of Ireland.
- HALLISSEY, N., 2015. "Mortgage Insurance in an Irish Context", *Economic Letter*, Vol. 2015. No. 5, Dublin: Central Bank of Ireland.
- IGAN, D. and H. KANG, 2011. "Do Loan-to-Value and Debt-to-Income Limits Work? Evidence from Korea", *IMF Working Papers 11/297*. International Monetary Fund.
- INTERNATIONAL MONETARY FUND, 2009. *Global Financial Stability Report*, International Monetary Fund, April.
- INTERNATIONAL MONETARY FUND, 2011. *Global Financial Stability Report*, April, Chapter 3, "Housing Finance and Financial Stability – Back to Basics", International Monetary Fund.
- INTERNATIONAL MONETARY FUND, 2013. "Key Aspects of Macroprudential Policy – Background Paper", International Monetary Fund, June.
- INTERNATIONAL MONETARY FUND, 2014. "Staff Guidance Note on Macroprudential Policy – Detailed Guidance on Instruments", International Monetary Fund, December.
- JACOME, L. and S. MITRA, 2015. "LTV and DTI Limits – Going Granular", WP/15/154, International Monetary Fund, July.
- KELLY R., 2012. "House Prices, Unemployment and Irish Mortgage Losses", Paper presented to De Nederlandsche Bank Conference "Household Finances and Behaviour in Times of Crisis", October.
- KELLY, R., T. O'MALLEY and C. O'TOOLE, 2015. "Designing Macroprudential Policy in Mortgage Lending: Do First Time Buyers Default Less?", *Research Technical Paper*, Vol. 2015, No. 2, Dublin: Central Bank of Ireland.
- KELLY, R., F. MCCANN and C. O'TOOLE, 2015b. "Credit Conditions, Macroprudential Policy and House Prices", *Research Technical Paper*, Vol. 2015, No. 6, Dublin: Central Bank of Ireland.
- KELLY, R. and T. O'MALLEY, 2016. "The Good, The Bad and The Impaired: A Credit Risk Model of the Irish Mortgage Market", *Journal of Financial Stability*, Vol. 22, pp 1-9.
- KENNEDY, G. and R. STUART, 2015. "Macroprudential Measures and the Housing Market", *Economic Letter*, Vol. 2015. No. 4, Dublin: Central Bank of Ireland.
- KUTTNER, K. and I. SHIM, 2013. "Can Non-Interest Rate Policies Stabilise Housing Markets? Evidence From a Panel of 57 Countries", *BIS Working Papers No. 433*, Bank for International Settlements, November.
- LEE, J. K., 2013. "The Operation of Macroprudential Policy Measures: The Case of Korea in the 2000s", Bank of Korea *Working Paper No. 2013-1*.
- LIM, CHENG H., F. COLUMBA, A. COSTA, P. KONGSAMUT, A. OTANI, M. SAIYID, T. WEZEL and X. WU, 2011. "Macroprudential Policy: What Instruments and How to Use Them? Lessons from Country Experiences", International Monetary Fund, *Working Paper 11/238*.
- LYDON, R., and Y. MCCARTHY, 2011. "What Lies Beneath? Understanding Recent Trends in Irish Mortgage Arrears", *Research Technical Paper*, No. 14/RT/11, Dublin: Central Bank of Ireland, .
- MACDONALD, C., 2015. "When is Macroprudential Policy Effective?", *BIS Working Papers No. 496*, Bank for International Settlements, March.

- MCCARTHY, Y., 2014. "Dis-entangling the Mortgage Arrears Crisis: The Role of the Labour Market, Income Volatility and Negative Equity", *Journal of the Statistical and Social Inquiry Society of Ireland*, Vol. XLIII.
- MCCARTHY, Y., and K. MCQUINN, 2013. "Credit Conditions in a Boom and Bust Property Market", *Research Technical Paper, No. 8/RT/13*, Dublin: Central Bank of Ireland.
- RESERVE BANK OF NEW ZEALAND, 2014, *RBNZ Financial Stability Report*, November, Reserve Bank of New Zealand.
- RESERVE BANK OF NEW ZEALAND, 2015. "Consultation Paper: Adjustments to Restrictions on High-LVR Residential Mortgage Lending", June, Reserve Bank of New Zealand.
- TRESSEL, T. and Y. S. ZHANG, 2016. "Effectiveness and Channels of Macroprudential Instruments: Lessons from the Euro Area", *Working Paper 16/4*, International Monetary Fund.
- WONG, E., T. FONG, K. LI and H. CHOI, 2011. "Loan-To-Value Ratio as a Macroprudential Tool Hong Kong's Experience and Cross-Country Evidence", *Working Paper No.01/2011*, Hong Kong Monetary Authority.

