



## Macro-prudential Tools and Credit Risk of Property Lending at Irish banks

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### Abstract

The high level of mortgage arrears in the Irish financial system and the associated overhang on economic growth underlines the importance of prudent lending standards throughout the property cycle. Macro-prudential tools such as loan-to-value (LTV) ratio caps and loan-to-income (LTI) ratio caps improve the resilience of the banking system by reducing the credit risk on new lending. Loan-level data are used to analyse the relationship between originating levels of these ratios and mortgage defaults. We find that there is a positive relationship between originating LTV and LTI ratios and subsequent defaults, with the strength of the relationship dependent on the point of the property cycle at which a loan is originated. Default rates on loans issued near the peak of the cycle to first-time buyers are particularly sensitive to LTV at origination while those issued to non first-time buyers are sensitive to both LTV and LTI at origination. In addition, there is a sharp increase in the losses on defaulted loans for loans issued above 85 per cent LTV. Although lending at higher LTI ratios has decreased significantly, 50 per cent of new lending to owner occupiers was at LTV levels above 80 per cent in 2013.

## 1 Introduction

The importance of monitoring the provision of mortgage debt has been highlighted by the recent crisis in Ireland. A sharp deterioration in house prices and an unemployment rate increase from 5 to 15 per cent culminated in almost a fifth of mortgages experiencing arrears. Dealing with the legacy of the crisis is and has been the main focus of policymakers but consideration must also be given to building a safe and sustainable mortgage lending market for the future. In this context, the

recent rising trend in house prices warrants attention due to the potential risk to new lending in the presence of volatile property prices. There is no evidence the current price increases are credit driven but the number of mortgage approvals, a potential measure of new mortgage credit demand, rose sharply in the first seven months of 2014<sup>2,3</sup>. This is therefore a key time to investigate the tools available to policymakers to safeguard future lending.

This letter examines the impact of an introduction of a LTV and LTI cap on credit quality using loan level data for the domestic institu-

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<sup>2</sup>Outstanding mortgage credit has fallen 2 per cent monthly since mid 2010. See Central Bank of Ireland Credit, Money and Banking Statistics, Table A.5.1.

<sup>3</sup>The value of mortgage approvals has risen by 64 per cent over the year ending July 2014. See Banking & Payments Federation Ireland.

tions<sup>4</sup> to investigate the relationship between defaults and losses and the originating LTV and LTI ratios. Section 2 looks at LTV and LTI caps as macro-prudential tools and Section 3 discusses the loan-level data used. Section 4 looks at the relationship between LTV and LTI ratios at origination and subsequent defaults and Section 5 concludes.

## 2 LTV and LTI caps as macro-prudential tools

Caps on LTV ratios impose a minimum down payment on households and lower borrowings relative to the price of the underlying collateral. Caps on LTI ratios, by restricting the size of a mortgage loan to a multiple of gross income, are a constraint on households' capacity to borrow at unsustainable levels. Both macro-prudential tools act counter-cyclically by constraining borrowing, directly reducing credit demand, and containing unsustainable increases in household debt, thus reducing the financial accelerator effect. In general, LTI ratios become more binding than LTV ratios in a credit boom, when house prices and credit usually grow faster than income. LTV and LTI caps are both risk reducing but act through different channels. The LTI affects the repayment capacity of a borrower, while the LTV acts through the wealth channel. The LTV ratio has a particularly strong effect on credit risk as negative equity is a well documented cause of default (Lydon and McCarthy, 2011; Kelly, 2011) but higher originating LTV also increases the size of the loss in the event of a default.

Limits on LTV and LTI ratios have been common in Asia over the past decade, and are coming to increasing prominence in Europe. According to an IMF (2013) survey of macro-prudential instruments to address real estate booms, the most popular tool is the limit on LTV ratio, followed by sectoral capital requirements and LTI caps or a combination of LTI and LTV limits. Norway, Sweden, and Finland all introduced various forms of limits on LTV ratios for new residential mortgage lending in recent years. In Asia, Hong Kong implemented LTV caps as early as the early 1990s and has varied the level of these caps counter-cyclically. New Zealand introduced a LTV cap on a proportion of new lending in 2013. A limit on lending at high

LTI levels will be introduced in the UK in 2014, also on a proportion of new lending.

There is a large literature addressing the effectiveness of macro-prudential measures for the housing sector. IMF (2013) examines the growing body of evidence that shows the benefit of LTV and DTI ratios<sup>5</sup> in reducing the severity of downturns, fire-sale dynamics and loan losses when the housing market turns (IMF, 2011; Wong et al., 2011, 2014). Hong Kong had an LTV cap in place since 1994 and suffered low mortgage losses after the Asian crisis even though house prices fell 40 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, suggesting that the policy effect may mainly manifest in impacts on household sector leverage. In general, as highlighted in BoE (2014), these policy measures increase the resilience of the financial system and are generally not targeted at house price growth, although there is some evidence of a modest and lagged effect on the latter.

## 3 Loan-Level Data (LLD)

The data employed in this Economic Letter come from a loan-level data set of loans issued by the three domestic Irish banks, collected as part of the Financial Measures Programme. The data are a point-in-time view of the current stock of mortgages held on the books of the banks as of 31st December 2013. The data contain micro-level information on the current status of each loan as well as originating terms. The primary focus here is the originating characteristics of the loan which influence credit risk, such as LTI and LTV ratios. In addition, the sample of loans is restricted to home purchase of owner occupiers. Investment loans are excluded as income is often recorded as the rent receivable on the property while it is often the case the property is part of a larger portfolio, some of which is not leveraged. LTV is calculated as the ratio of the loan balance at origination to the valuation of the house, also at origination. LTI is defined as the ratio of the originating loan balance to the household gross income at the time of origination. We follow the standard Basel definition

<sup>4</sup>Domestic banks refer to Allied Irish Banks plc (including EBS), Bank of Ireland, and Permanent TSB.

<sup>5</sup>Debt-to-income ratios are similar to LTI ratios but take into account a borrower's total debt, not just the individual loan amount.

of loan delinquency in defining defaulted loans as those with arrears in excess of 90 days.<sup>6</sup>

## 4 Credit risk and LTV and LTI ratios at origination

Before implementing any risk mitigating tools, context in terms of current lending standards is required. Figure 1 shows time series of LTI and LTV ratios since 1997. There is a significant lowering of the originating LTI ratios above 4 times since 2006. In 2013, only 5 per cent of the loan book had a LTI greater than 4 times, down from over half of new lending in 2006. This shift in the LTI distribution is consistent with McCarthy and McQuinn (2013) which showed that variation in the "income fraction" (the proportion of a borrower's gross income allocated to mortgage repayments) was one of the main causes of price increases and the subsequent sharp contraction over the period 2000 - 2011.

The evolution of originating LTV is strongly influenced by the maximum level available in the market at time of origination. There is significant shift downwards in recent originating LTV levels mainly driven by a substitution from the 90+ to the 80-90 per cent levels. This can be partly explained by the relatively greater proportion of first time buyers post 2010 as a large number of mortgage homeowners experienced negative equity, increasing the cost of moving house. While there is no clear consensus as to what constitutes a LTV which is "too high" at the origination of a loan (indeed, this will depend on the individual borrower's circumstances), LTVs over 80 per cent are high as defined by the Joint Forum of the Basel Committee on Banking Supervision (2010) and compared to international standards.

In order to assess whether limits on lending at high LTV and high LTI ratios would improve bank resilience, we examine the relationship between these ratios at the time of loan origination and subsequent levels of defaults. Figure 2 and Figure 3 look at the relationship between defaults and originating LTV and LTI ratios for the full sample (red line) and for loans issued during individual years. We can see a linear relationship between the two, where the level of default is higher for higher originating levels. However, credit risk is highly

dependent on the property price cycle. Loans issued at the peak of the cycle demonstrate a strong relationship between originating LTV and LTI and defaults but the relationship is less strong for loans issued earlier in the decade.

Controlling for time effects, all loans issued in 2007 are examined, and the sample is split into first time buyers (FTBs) and movers (non FTBs). Figure 4 shows that first time buyer default rates are found to be sensitive to LTV at origination but less so to LTI. The default rate for loans with a LTV greater than 92 per cent (which comprised 40 per cent of 2007 FTB loans) is between 15 and 20 per cent, with the maximum rate of default occurring at LTI ratios of 3.8 to 4.3 times. For movers, there is a direct relationship between both LTV and LTI and loan default. For individuals in the top 20 per cent of both originating LTV and LTI, the default rate is greater than one in four loans.

Given this relationship between originating LTV and LTI ratios and later defaults, it is clear that limiting high LTV and LTI lending will improve bank resilience and help protect borrowers from movements in property prices.

Another factor in increasing bank resilience through reduced credit risk is by reducing the losses experienced by the bank in the event of a default (the LGD). Reducing the LTV of a loan directly reduces the LGD on this loan. We examine the relationship between originating LTV and the LGD of all loans currently in default. Figure 5 shows this relationship for the full sample (red line) and by different years of origination. These charts show a positive slope for loan with an LTV greater than 50 per cent with a sharp increase in the losses of defaulted loans greater than 85 per cent. This finding is amplified for loans issued at the peak of the property cycle but the relationship is still strong for several years before the peak. Thus, notwithstanding the stage of the property cycle, limits on high LTV lending will improve bank resilience by reducing losses in the event of a default.

It is also important to consider the relationship between LTV ratios and LTI ratios at origination. While LTV and LTI caps are often used together, the use of one or a combination of instruments will depend on the macro-prudential objective of the policymaker. The choice of tool or the combination of both also depends on relationship between LTI and LTV at origination. If borrowers

<sup>6</sup>For an extended discussion of the LLD, see Kennedy and McIndoe-Calder (2011)

with the highest LTV also extend themselves furthest in terms of the LTI, then an either or approach will remove the highest risk loans from the book. In the Irish case, Figure 6 shows there is a strong positive relationship for low to moderate LTV and LTI levels for the whole sample. This relationship breaks down for originating LTVs between 80 and 90 per cent, followed by a strong relationship for the very highest LTV loans issued. Given the large portion of lending in the 80 to 90 per cent LTV region, a combination of both tools is required to reduce risk on the repayment and collateral channels.

## 5 Concluding Remarks

The link between credit standards on new lending and later defaults is examined for LTV and LTI ratios using micro level mortgage loan data. There

is a positive relationship between high LTV and LTI ratios at origination and defaults, although the strength of this relationship is naturally related to the property cycle. Considering the losses from defaults, LTV limits reduce the loss given default, with a sharp increase in the losses of defaulted loans with originating LTV greater than 85 per cent. This finding is amplified for loans issued at the height of the house price cycle but also holds for loans issued several years prior to the peak. It is shown that for Irish data, although there is a strong relationship between LTV and LTI at origination at very high levels of both, this is not the case for a significant part of the distribution. To achieve the full risk reduction benefits, limits on both ratios would need to be considered. This will dampen the cyclical nature of mortgage loan demand and build resilience in the banking and household sectors.

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Figure 1: Comparison of Originating LTI and LTV pre and post 2010

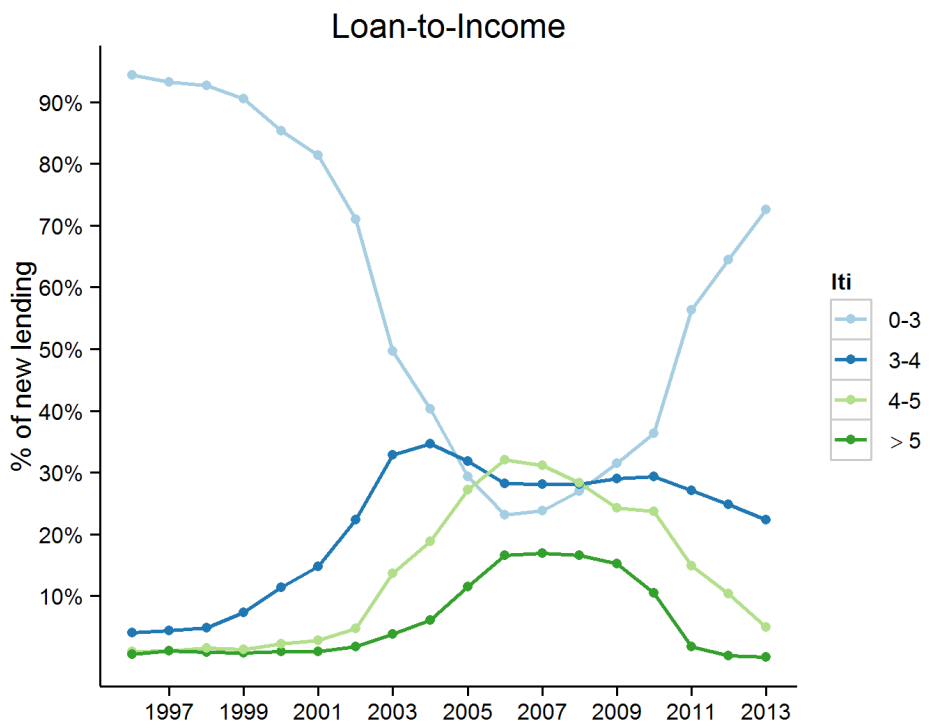
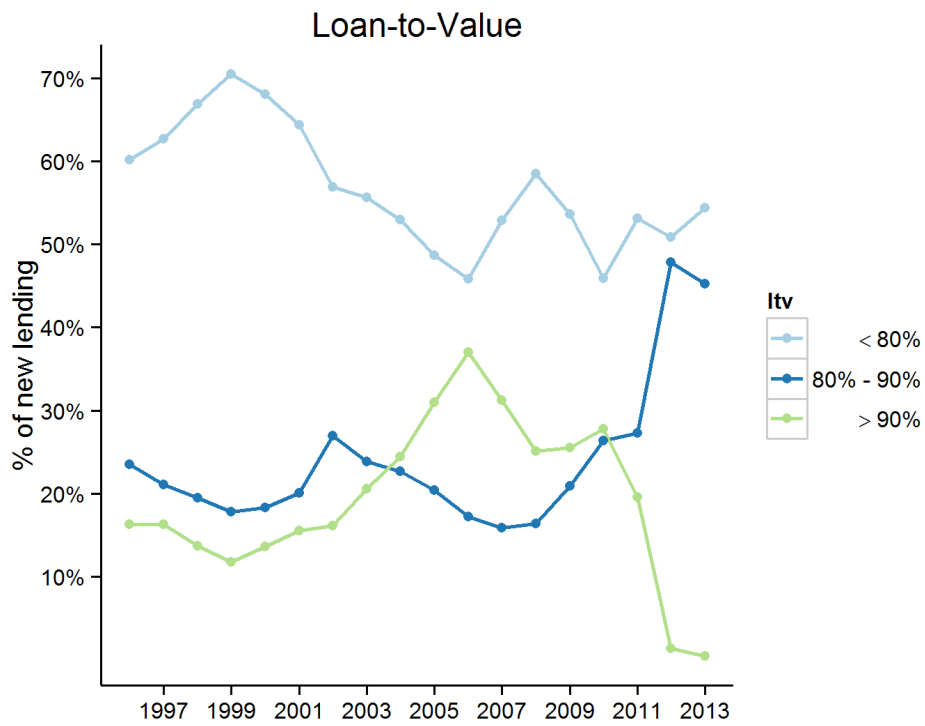


Figure 2: Credit risk highly dependent on the property price cycle: Credit risk and originating LTV by year

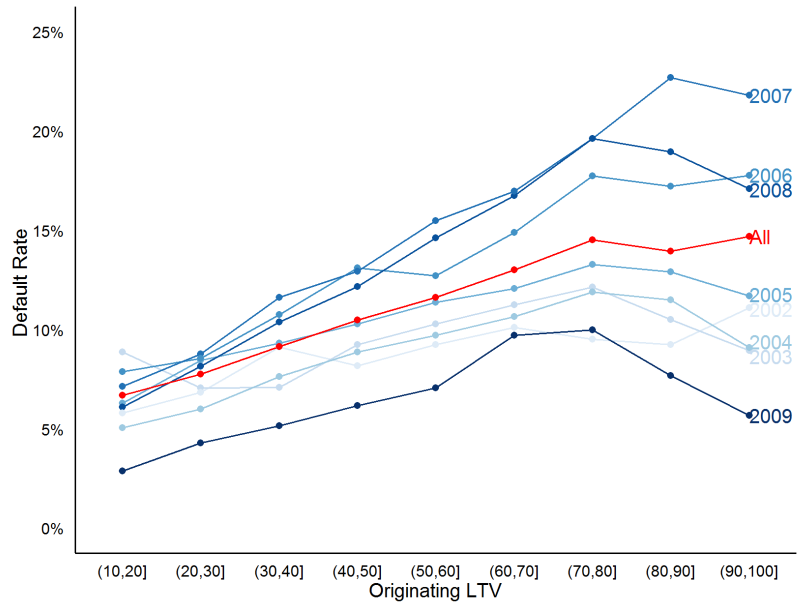
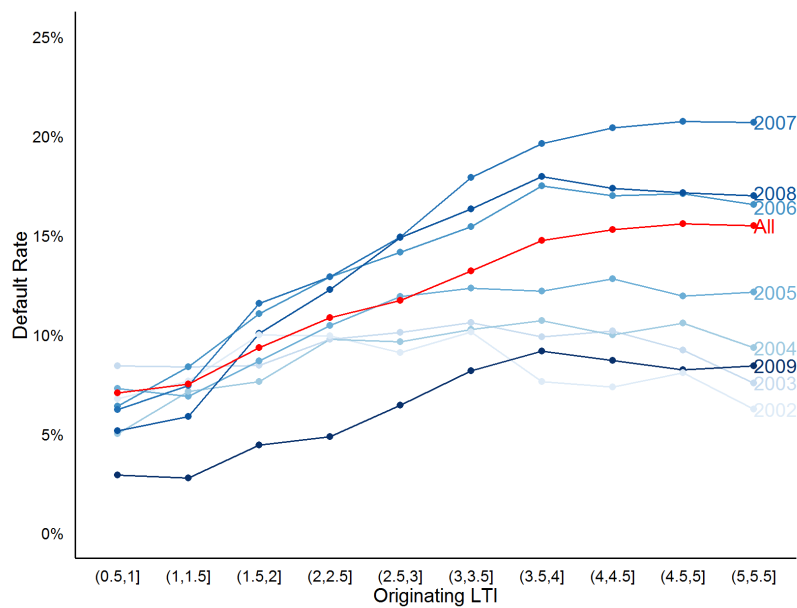


Figure 3: Credit risk and originating LTI by year



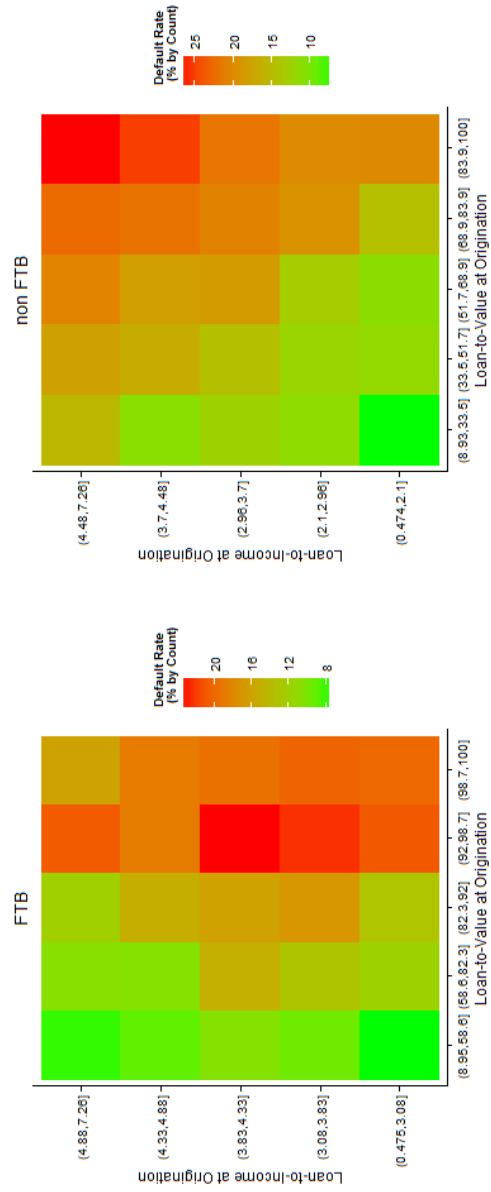


Figure 4: Heatmap of Default by Originating LTV and LTI

Figure 5: Current loss given default and originating LTV by year

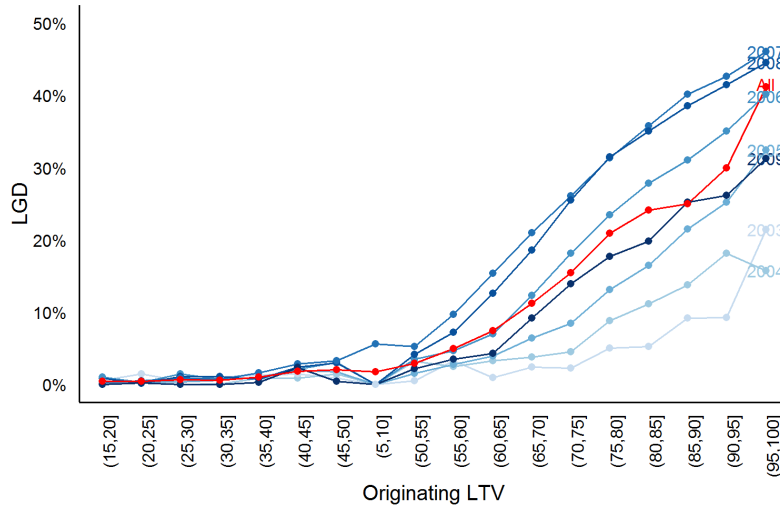
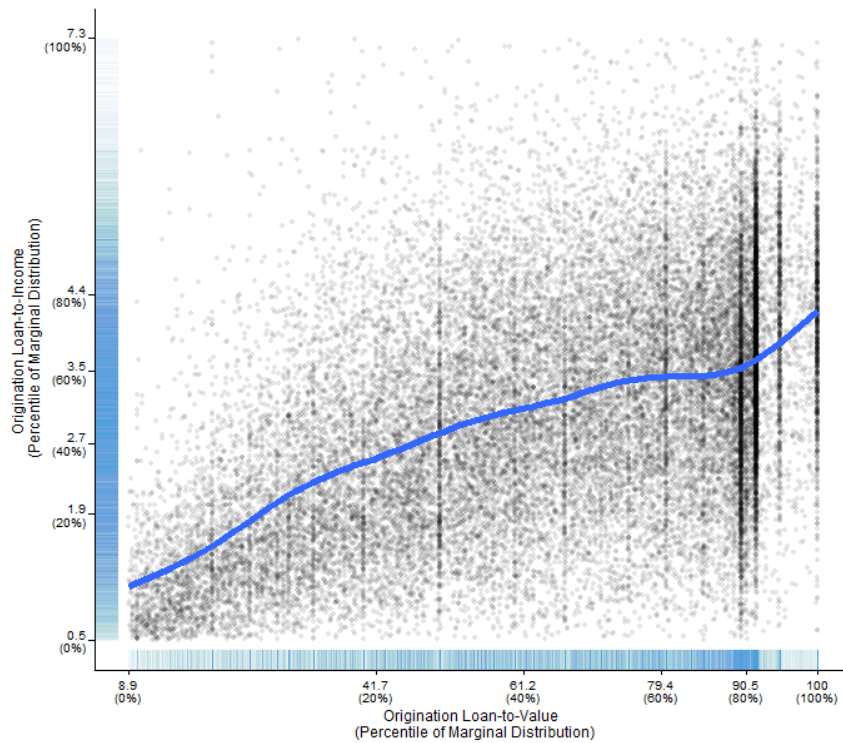


Figure 6: Scatter Plot of Originating LTV and LTI with fitted spline



**Notes:** Raw data of LTV and LTI. Blue line is a smoothing spline with 9 knots, added to show a trend in the data. Blue lines on each axis represent the quantity of each variable that occurs in different parts of the distributions.