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Raffaele Giuliana

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Have First-Time Buyers continued to default less?

Raffaele Giuliana[1]

Central Bank of Ireland

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Abstract

Several countries that have introduced macroprudential limits in the mortgage market apply differential limits to first time buyers relative to second and subsequent buyers. From a financial stability perspective, a key reason for such differentiation stems from a systematic observed difference in the probability of default across these different groups of borrowers. Kelly et al. (2015) already show that, in Ireland, FTBs were significantly less likely to default to the end of 2013. In order to further investigate whether FTBs are inherently less exposed to default, and to confirm that a key rationale of the calibration of the LTV restrictions under the Irish mortgage measures continues to hold, this paper provides two main contributions using Irish loan-level data. First, I show that the evidence of lower default probability among FTBs is consistent over time from 2013 to 2017. Second, in order to address a potential persistency bias, I implement a "default flow analysis" confirming that FTBs default less than SSBs.

1 Introduction

It is widely recognized that a critical cause of the financial crisis was excessive mortgage lending relative to collateral values or households' income (Duca et al. (2009), Duca et al. (2010)). Thus, a fundamental lesson from the crisis has been that curtailing lending at excessive Loan-To-Value (LTV) and Loan-To-Income (LTI) levels may be beneficial for financial stability. Ten years after the crisis, restrictions on LTV and LTI form a crucial part of the overarching macroprudential framework of numerous countries.

An extensive literature has already demonstrated the effectiveness of LTV/LTI limits by illustrating that these limits restrain unsustainable lending (Igan and Kang (2011), Wong et al. (2011), Crowe et al. (2011), IMF (2013)). However, there has been much less research investigating how these limits are calibrated, and especially how they are calibrated across different groups of borrowers such as first time buyers (FTBs) and second or subsequent borrowers (SSBs). While several countries are already imposing higher LTV limits for FTBs, it is surprising that we do not observe any systematic empirical enquiry on this theme, apart from the Irish experience. In fact, Kelly, O'Malley and O'Toole (2015) already demonstrated that

[1] Economist, Macro-Financial Division. Raffaele.Giuliana@centralbank.ie. This paper has benefited from discussions with Edward Gaffney, Jane Kelly, Paul Lyons, Vasileios Madouros and Fergal McCann. I am also grateful for comments from seminar participants at the Central Bank of Ireland. All errors are my own. The views presented in this paper are those of the author alone and do not represent the official views of the Central Bank of Ireland or the ESCB.

FTBs in 2013H2 were significantly less likely to default. The relevance of their type of evidence is motivated by the fact that, from a financial stability perspective, the systematic observed difference in the probability of default across these different groups of borrowers is a key reason for the differentiated approach of FTBs.

In order to further investigate whether FTBs are intrinsically less likely to default than SSBs, this paper provides a twofold contribution using loan-level data on 269,900 loans across three Irish banks. First, I study whether the lower default probability of FTBs found by Kelly, O'Malley and O'Toole (2015) is stable over time. Using cross-sectional models from 2013Q1 to 2017Q4, I find that the probability of default of FTBs is 3.5% smaller than SSBs. This negative "FTB spread" is also economically significant given that this spread represents almost 30% of the total default probability among Irish mortgages. Second, this paper extends the empirical investigation by implementing a "default flow analysis" that examines the transition into default of individual loans through time. This analysis represents a stricter test of the difference in default probability between FTBs and SSBs, because it better controls for the previous history of each loan. Results of the "default flow analysis" confirm that FTBs default less than SSBs.

With regard to macroprudential policy calibration, while a higher LTV/LTI limit is associated with more default risk buffers, the presence of an FTB spread suggests that having less stringent limits for FTBs - compared to SSBs - should pose less risks for financial stability. These findings confirm that the empirical patterns on default propensity, which formed a part of the rationale for the differential treatment of FTBs under the Central Bank's mortgage measures, have continued to persist since the introduction of the measures.

2 Data and Empirical Model

2.2 Data

This paper uses loan-level data (LLD) of three Irish banks, which account for two thirds of the Irish residential mortgage market. The dataset includes Bank of Ireland (BoI), Allied Irish Banks (AIB), and Permanent TSB (PTSB). The dataset covers the period from March 2013 to December 2017 (this paper uses a version of the LLD with quarterly loan information, as in Kelly and O'Malley (2016)). For each loan, the LLD provides data on originating characteristics in addition to the most recent information on the current non-performing status of mortgages.[2] Given that the objective of this paper is to analyse macro-prudential policy for non-investment residential mortgage lending, the sample includes only primary loans for principal dwellings granted for home purchases. The entire sample contains quarterly information on 269,900 loans over a time series of twenty quarters, with a total of 1,797,691 observations.

[2] In this paper, non-performing status is used interchangeably with defaulted status.

Table 1: Descriptive Statistics. The sample is extracted from LLD from March 2013 to December 2017. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

	Originating/Current	FTB	SSB	Difference
Default Prob.	Current	11.3%	16.1%	-4.8%***
Loan Size	Originating	192,576	189,152	3,424***
Collateral Value	Originating	259,955	339,321	-79,366***
Collateral Value	Current	209,577	260,496	-50,918***
Income	Originating	55,708	64,338	-8,630***
Age	Originating	32	39	-7***
Employed	Originating	50.1%	47.9%	2.2%***
OLTV	Originating	76.5%	58.7%	17.8%***
OLTI	Originating	3.65	3.16	0.49***
Term	Current	359	303	56***
Dublin	Originating	24.4%	25.3%	-0.9%***

Table 1 illustrates descriptive statistics of important variables depending on whether or not the borrower is a FTB. The figures are pooled across all waves of the data from 2013 to 2017. The second column indicates whether each variable reflects information at origination or current values. Using an approach similar to Kelly, O'Malley and O'Toole (2015), this paper mainly uses information at origination because, from a macro-prudential policy perspective, it is important to analyse the information banks have at their disposal when making the lending decision and assess how this can best be used to promote future financial stability.

The fourth column indicates the differences between the two groups with the associated t-statistics. The default rate for FTBs is lower than that for SSBs: the default rate for FTBs is 11.3 percent with a statistically significant difference of 4.8%, which is a third of the SSB default rate. FTBs' loan size is approximately €192,000, which is statistically larger than SSBs, even though the magnitude of the difference is not large. The original collateral price for FTBs is approximately €260,000, which is approximately €79,000 smaller than SSBs' average. FTBs' average income is €56,000, which is statistically lower than SSBs. However, FTBs' original-loan-to-income (OLTI) of 3.65 is greater than SSBs'. The mean original-loan-to-value (OLTV) is 76% for FTBs and 59% for SSBs. The terms of FTBs' loans are 56 months longer than for SSBs. The average age of FTBs is 32 years, which is lower than SSBs. The proportion of employed borrowers is higher for FTBs, while the ratio of FTBs whose collateral is located in Dublin is smaller than SSBs. Overall, the summary statistics in Table 1 show that, compared to the SSBs, FTBs are less likely to default and younger, have lower income, have higher OLTV and OLTI and buy less expensive properties.

2.3 Empirical Model

The empirical model aims to test whether FTBs have lower default risk compared to SSBs with similar characteristics. In line with Kelly, O'Malley and O'Toole (2015) or Jiang, Nelson and Vytlacil (2014), I model the default probability of loans using a binary model framework. The baseline regression considers the default probability as a function of features of the loan, collateral and borrower.

$$P(NP_i) = F(\alpha;\ FTB_i;\ X_i;\ Z_i) \tag{1}$$

I define NP_i as the dummy variable indicating whether a loan i is performing or non-performing, defined on the basis of whether the days of arrears exceed 90 days. Results concerning the FTB spread are robust

when I use the EBA definition of non-performing loans.[3] X_i is a vector of controls of borrower characteristics and Z_i a vector of loan controls. The variable of interest, FTB, is a dummy variable indicating whether the loan was granted to a FTB. A negative coefficient on this variable would be consistent with a lower propensity to default among FTBs compared to SSBs.

The borrower controls, X_i, include originating characteristics of borrowers, such as marital status fixed effects, size of additional loans extended by the same bank to the same borrower, and a dummy variable indicating whether a borrower is self-employed or drawing a salary. Borrower controls, X_i, also include borrowers' current age (as a quadratic term) to take into account that the age of FTBs' significantly lower than SSBs'.

Loan origination controls, Z_i, include loan size at origination (in logarithm), bank fixed effect, LTI and LTV at origination (OLTI and OLTV), origination year fixed effect, term length, interest rate type fixed effect, dummy for Dublin area, and whether the application had a single or joint borrower assessment. In line with Kelly, O'Malley and O'Toole (2015), I model the default probability as a function of origination features rather than including also current features as inputs. The exclusion of current features ensures that the information contained in the regressions does not exceed banks' information set at the time of their actual decision about whether granting the loan or not. Importantly for the interpretation of the results, all of the analyses in this paper involve regressing model (1) separately for each cross-section of the LLD. In this paper, each cross-section is represented by a quarter from March 2013 to December 2017. This design ensures that results are not driven by abnormal periods. I perform a "default stock analysis" by estimating model (1) for entire cross-sections of LLD, which do not exclude defaulted loans whose default had occurred in previous quarters.

In order to address the persistency bias, in that the same pool of defaulted loans may be present in each cross-section of the data from 2013 to 2017, I also implement a "default flow analysis" by estimating model (1) on subsamples that exclude defaulted loans whose default persists from previous waves. Thus, these subsamples include only performing loans or non-performing loans that have just transitioned into default status.

3 Empirical Results

3.2 Default Stock Analysis

This section presents the main results of the empirical analyses. In this paper, model (1) is estimated using a logit framework with robust standard errors. Table 2 outlines the marginal effects calculated at the mean from the default stock analysis. Columns (1) to (6) contain the estimates of the empirical model in six cross-sections of the LLD (from 2013Q1 to 2017Q4).

The main variable of interest is FTB. Coefficients on FTB in columns (1) to (6) are negative and statistically significant at the 1% level. Estimates illustrate that FTBs are on average 3.5% less likely to default than

[3] According to paragraph 145 of Annex V of the EBA ITS on supervisory reporting: "non-performing exposures are those that satisfy either or both of the following criteria: 1. material exposures which are more than 90 days past-due; 2. the debtor is assessed as unlikely to pay its credit obligations in full without realisation of collateral, regardless of the existence of any past-due amount or of the number of days past due."

SSBs. This magnitude is similar to the findings of Kelly, O'Malley and O'Toole (2015). The economic magnitude of these results are discussed below.

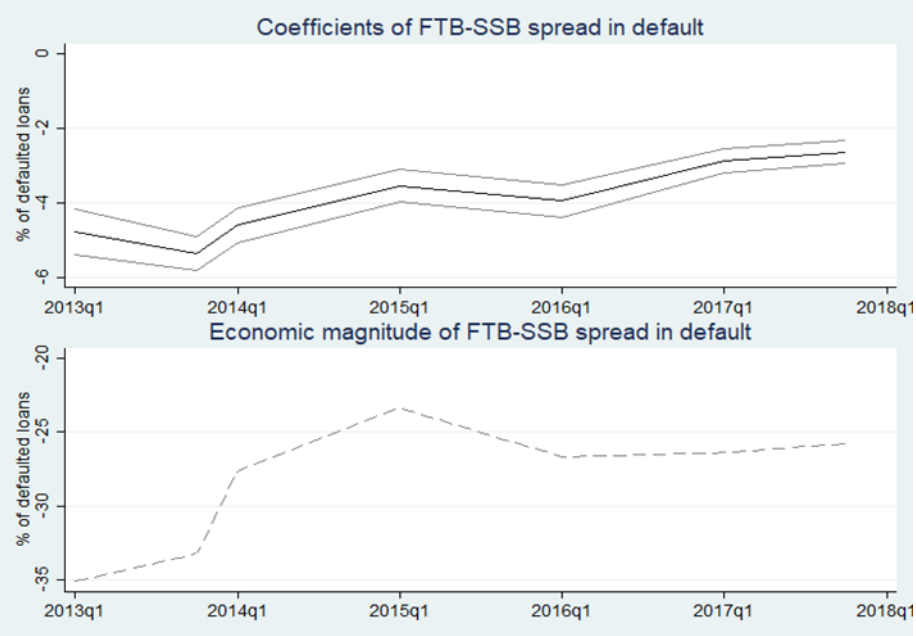
To understand how macro-prudential regulations on LTV and LTI levels support financial stability, it is important to control for OLTI and OLTV. Table 2 indicates that OLTV and OLTI both significantly increase the probability of default. Origination LTV exhibits a marginal effect of 0.001, which means that a unit increase in the OLTV increases the probability of default by 0.1%. The average marginal effect of OLTI is 0.007. Thus, a unit increase in the OLTI increases the default probability by 0.7%. These findings show that macro-prudential caps on OLTI and OLTV should mitigate default propensities. The estimates of the covariate indicate that the loan term has a significantly positive effect on the non-performing status. Moreover, loans with collateral in Dublin are less likely to default. Table 2 also indicates that the loan size alternates positive or insignificant marginal effects. Notice that the number of observations in 2013Q1 is significantly smaller than other periods because of missing information concerning the employment dummy. Results are robust when I exclude the employment dummy.

Table 2: Marginal Effects of Logit Model. Each column illustrates the estimates of the model $\boldsymbol{P(NP_i) = F(\alpha;\ FTB_i;\ X_i;\ Z_i)}$ and uses a drop of the LLD. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively. Notice that the number of observations in 2013Q1 is significantly smaller than other periods because of missing information concerning the employment dummy. Results are robust when I exclude the employment dummy.

	(1) 2013Q1	(2) 2014Q1	(3) 2015Q1	(4) 2016Q1	(5) 2017Q1	(6) 2017Q4
FTB	-0.048***	-0.046***	-0.035***	-0.039***	-0.029***	-0.026***
	[-15.52]	[-19.69]	[-15.83]	[-17.64]	[-17.39]	[-16.24]
Loan Size	0.015***	-0.003	-0.003	-0.001	0.002	0.005**
	[4.83]	[-1.06]	[-1.15]	[-0.30]	[0.81]	[2.23]
Term	0.001***	0.000***	0.001***	0.001***	0.001***	0.001***
	[22.29]	[23.18]	[37.54]	[42.06]	[41.06]	[39.67]
Dublin	-0.035***	-0.028***	-0.031***	-0.033***	-0.028***	-0.026***
	[-10.91]	[-9.82]	[-13.70]	[-14.03]	[-16.23]	[-15.51]
OLTV	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	[3.89]	[25.30]	[23.66]	[21.12]	[22.57]	[20.94]
OLTI	0.010***	0.010***	0.007***	0.006***	0.004***	0.004***
	[7.46]	[11.85]	[9.13]	[7.79]	[7.20]	[6.56]
Add. Loan Size	0.008***	0.011***	0.010***	0.010***	0.007***	0.007***
	[28.14]	[67.60]	[71.52]	[68.29]	[64.66]	[64.14]
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Interest Rate FE	Yes	Yes	Yes	Yes	Yes	Yes
Marital Status FE	Yes	Yes	Yes	Yes	Yes	Yes
Employment FE	Yes	Yes	Yes	Yes	Yes	Yes
Origination Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Vintage	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Age	Yes	Yes	Yes	Yes	Yes	Yes
N	66541	149863	145310	137999	198388	193951

To explore the economic significance, Figure 1 plots both the FTB coefficients of Table 2 and the ratio between FTB coefficients and FTBs' unconditional default rates. Figure 1 shows that the FTB spread is approximately equivalent to 30% of default rate.

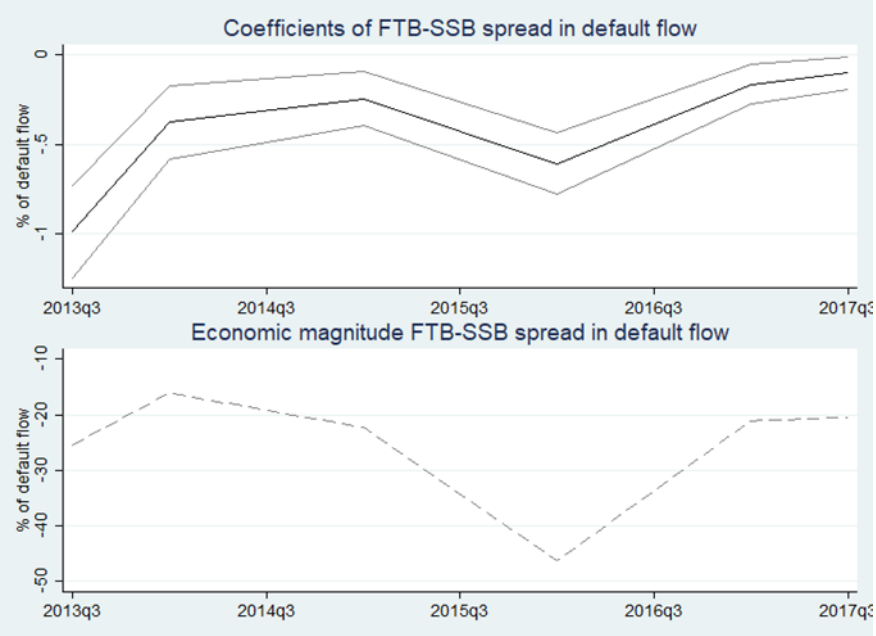
Figure 1: Marginal Effects of Default Stock Analysis. The solid black line is the FTB spread, i.e., the marginal effects described in Table 2. The dashed grey line is the ratio of FTB spread relative to total default probability.



3.3 Default Flow Analysis

In order to address the persistency bias, I implement a "default flow analysis" by estimating model (1) on subsamples that consider only performing loans in t. Thus, the econometric model analyses whether or not performing loans at time t transition into default at time t-1. Figure 2 shows that the FTB estimates - the solid line - are negative and significant (except from 2017Q1 and 2017Q3), with an average coefficient of 0.5% across years and a maximum coefficient of 1% reached in 2013Q3. Thus, from 2013Q1 to 2016Q4, FTBs transitioned into default less than similar SSBs, and such a difference in probability is 0.5%. To explore the economic significance, Figure 2 shows the ratio between this FTB spread in flow and the percentage of loans transitioning into default, which results in an average economic magnitude of approximately 30%. Therefore, the economic magnitude resulting from the "default flow analysis" is in line with the one from the "default stock analysis", which is outlined in Figure 1.

Figure 2: Marginal Effects of Default Flow Analysis. The solid black line is the FTB spread in flow. The dashed grey line is the ratio of FTB spread in flow relative to total default probability.



4 Conclusions

Restrictions on Loan-To-Value (LTV) and Loan-To-Income (LTI) levels represent a crucial part of the macroprudential framework. Many jurisdictions applying macroprudential limits in the mortgage market impose differential limits to first time buyers relative to second and subsequent buyers. From a financial stability perspective, a key reason for such differentiation stems from a systematic observed difference in the probability of default across these different groups of borrowers. Concerning the Irish mortgage market, Kelly, O'Malley and O'Toole (2015) have already demonstrated that Irish FTBs in 2013H2 were significantly less likely to default. In order to investigate whether FTBs are intrinsically less exposed to default, this paper provides two main contributions using Irish loan-level data. First, I show that FTBs have a lower default probability that is also stable over time. Second, in order to address a potential persistency bias, I implement a "default flow analysis", which confirms that FTBs are fundamentally less susceptible to default than SSBs. These findings confirm that the empirical patterns on default propensity, which formed a part of the rationale for the differential treatment of FTBs under the Central Bank's mortgage measures, have continued to persist since the introduction of the measures.

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