Measuring Mortgage Availability & Take-Up
An application to Macro-Prudential Policy

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[1] The views expressed in this paper are those of the authors only and do not necessarily reflect the views of the Central Bank of Ireland.

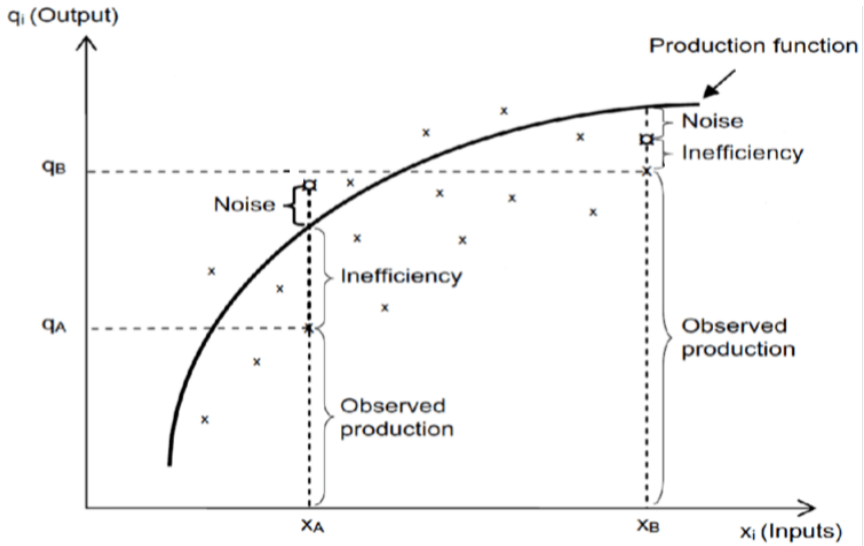
Motivation

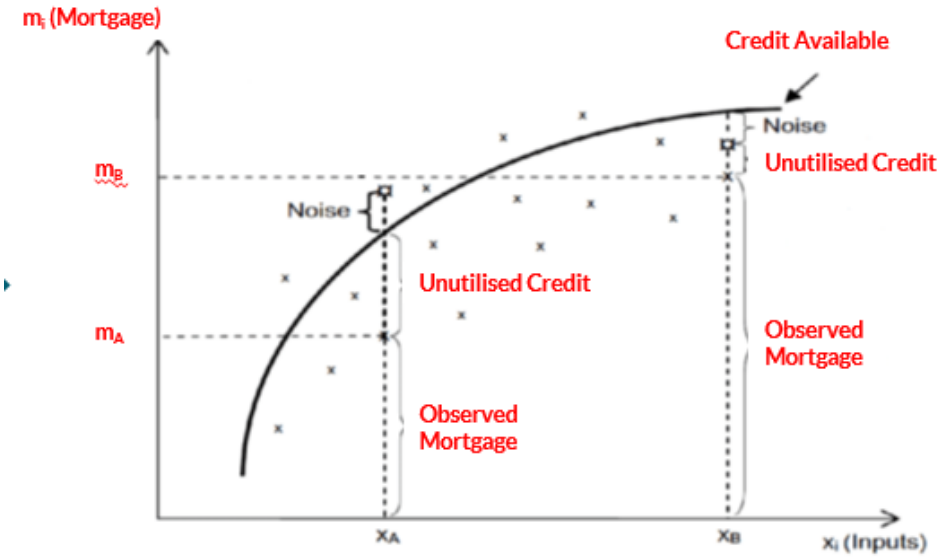
- Prior to financial crisis, pro-cyclical and ever-growing debt-capacity of home-owners.
- Post global financial crisis, Central Banks' have increasingly developed new and utilised existing macroprudential instruments.
  - Tool kits include both capital and **borrower-based** measures.
- The impact of these rules on credit supply and "how binding" they are for borrowers is important for instrument review
  - Infancy of the measures
  - Variation in their effectiveness

Contribution

- **Contribution 1:** We illustrate pro-cyclicality of credit supply and the take-up of the available mortgage credit 2003-2018;
- **Contribution 2:** We illustrate the effect of macro-prudential stabilisers on credit availability and take-up;
- Our approach focuses on the cohort of draw-downs not on the unfulfilled demand (lack of supply); the focus here is on borrower credit constraints not the volume of mortgage credit.
- **Contribution 3:** Estimated Withdrawn Credit $= X\beta * TE$;

Firm IO to Mortgage Market

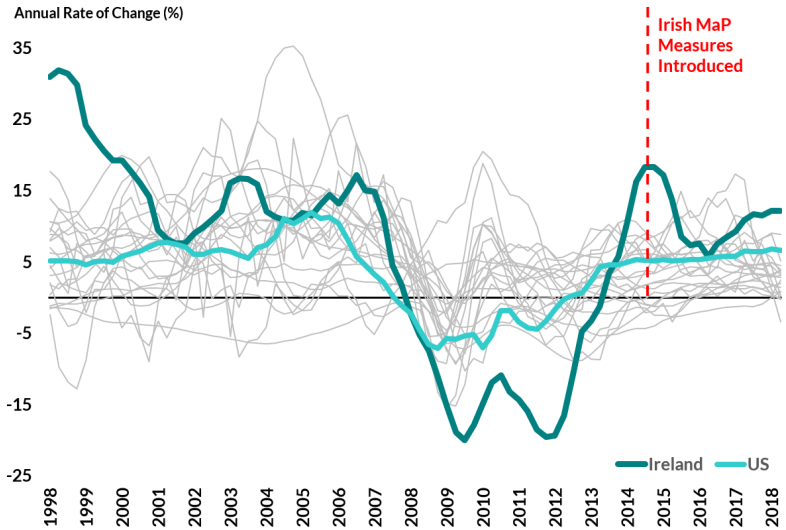




Research Context

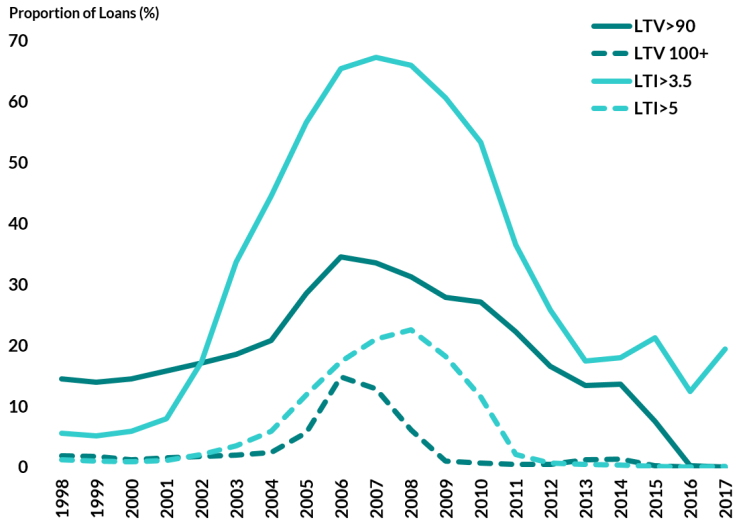
- Mortgage credit standards and heterogeneity of credit supply (Anenberg et al., 2017; Peydro' et al., 2017);
- Impact of MaP on the housing market (Cerutti et al., 2017; Lozej and O'Brien 2018; Van Bekkum et al., 2019);
- MaP and the Irish mortgage market (Kelly et al., 2018);

Evolution of Irish House Prices and Credit Conditions



(a) Evolution of Irish House Prices

Source: Dallas FED International Housing Database



(b) Evolution of Credit Conditions

Source: LLD, Central Bank of Ireland

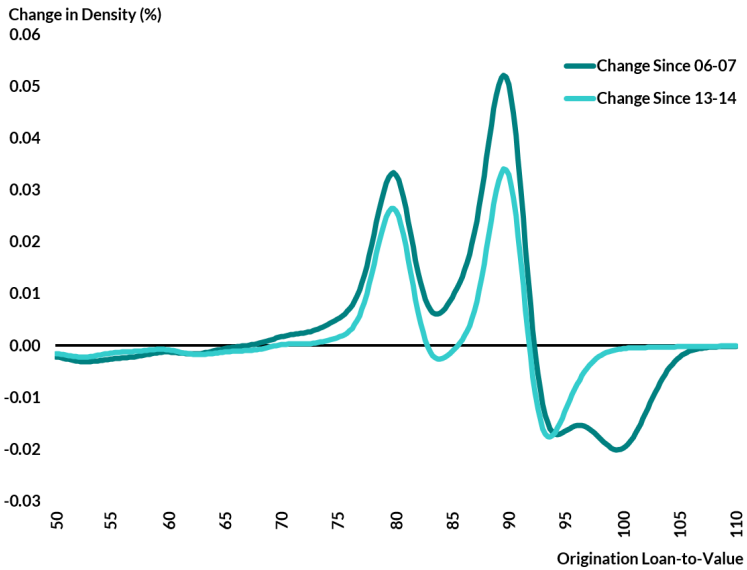
MaP in Ireland

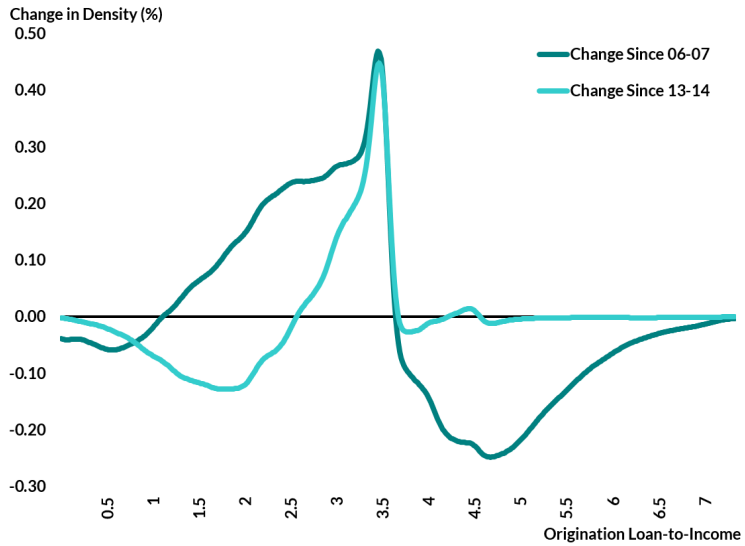
Table: Macroprudential Regulations for Mortgage Lending

2015/16	LTV Limit	**FTBs:** 90% Limit on house value up to 220k, 80% LTV applies above this value. **SSBs:** 80% Limit	Allowance: 10% of new PDH Lending
	LTI Limit	**FTBs:** 3.5 times gross income **SSBs:** 3.5 times gross income	Allowance: 20% of new PDH lending
2017	LTV Limit	**FTBs:** 90% Limit **SSBs:** 80% Limit	Allowance: 5% of new FTB lending 20% of new SSB lending
	LTI Limit	**FTBs:** 3.5 times gross income **SSBs:** 3.5 times gross income	Allowance: 20% of new PDH lending
2018/19	LTV Limit	**FTBs:** 90% Limit **SSBs:** 80% Limit	Allowance: 5% of new FTB lending 20% of new SSB lending
	LTI Limit	**FTBs:** 3.5 times gross income **SSBs:** 3.5 times gross income	Allowance: 20% of new FTB lending 10% of new SSB lending

Notes: Exemptions are granted for negative equity mortgages, switchers with no increase in balance and modifications of distressed mortgages. Loan-to-value of 90% up to house value of 220,000. Above 220,000, there is a maximum 80% loan-to-value for the portion above 220,000.

Evolution of LTV and LTI (boom, bust and macro-pru)





Data

- New Lending View:
  - LLD (2003-2014)
  - Monitoring Templates (2015-2018)
- LLD: All loans issued by Irish banks participating into 2011 Financial Measures Programme (over 90% of originations in mortgage market);
- Loan-origination data: loan-to-income, loan-to-value, loan interest rate/type, maturity, collateral information, borrower characteristics.

Summary Statistics 2003 -2018

Table: Summary Statistics 2013 - 2018

	Vbls. Mean and Std. Deviation (in parentheses)		
Main Variables	2003-2008	2009-2013	2014-2018
Balance	206812.4	189763.3	222171.5
	(96572.24)	(90093.95)	(129860.2)
Deposit	113899.4	87934.91	80542.97
	(118689.8)	(100680.1)	(84681.29)
Rate	3.20	3.67	3.41
	(1.83)	(.93)	(.62)
Income	62615.34	62873.73	80940.98
	(29087.03)	(31427.6)	(40471.61)
Borrower Age	34.95	34.63	36.52
	(8.03)	(7.63)	(6.83)
FTB share	.46	.65	.62
	(.49)	(.47)	(.48)
Total	160,087	40,686	85,835

No Allowance vs Allowance post 2015 (incl.)

Table: Mean Differences Between Allowance/No Allowance

	(Mean)NoAllowance	(Mean)Allowance
MainVariables		
overall balance	207,854.1	304,643.8
	(121,812.8)	(144,487.6)
deposit	82,343.03	71,030.11
	(86,633.87)	(64,347.66)
interest rate	3.28	3.33
	(.41)	(.40)
income	80,178.19	86,731.31
	(40,361.28)	(41,873.56)
FTB	64%	59%
borrower age	36.91	34.87
	(7.07)	(5.33)
N. Obs.	64,353	13,974

Notes: Exemptions are granted for negative equity mortgages, switchers with no increase in balance and modifications of distressed mortgages. Loan-to-value of 90% up to house value of 220,000. Above 220,000, there is a maximum 80% loan-to-value for the portion above 220,000.

Stochastic frontier models

- Adaptation of production frontier to mortgage market:
  - Frontier: maximum attainable output, in this case, max credit;
  - Technical Efficiency: extent to which agents achieve max credit (take-up);

$$y_i = f(X_i, \beta) TE_i exp(\nu_i)$$

$$0 < TE(y_i, X_i) \leq 1$$

Empirical counterpart

Assuming that there are k inputs, that the production function is linear in logs and defining

$$u_i = -ln(TE_i)$$

we obtain:

$$ln(y_i) = \beta_0 + \sum_{j=1}^{k} \beta_j ln(x_{ji}) - u_i + \nu_i, i = 1, ..., N$$

$$u_i \sim \mathcal{N}^+(\mu, \sigma_u^2)$$

$$\nu_i \sim \mathcal{N}(0, \sigma_\nu^2)$$

Our specification

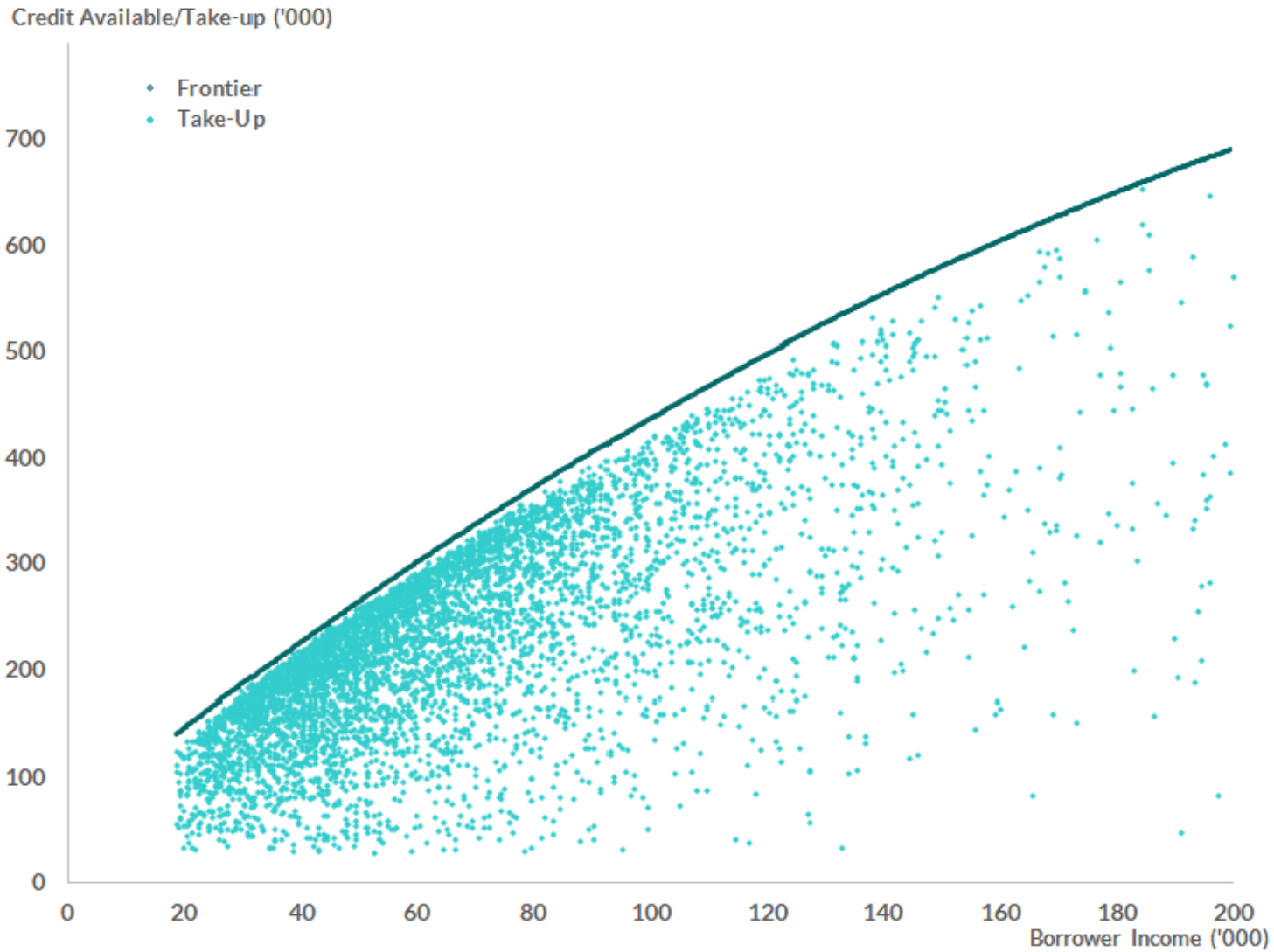
- Model Specification
  - Dependent variable: Overall drawn balance
  - Credit Available:
    - Main inputs: income, downpayment
    - Factors impact credit conditions: borrower age, interest rate, FTB
    - Controls: bank id
  - Take-Up:
    - Main inputs: income, downpayment
    - Factors impact credit conditions: borrower age, interest rate, FTB
    - Controls: bank id
- Model 1: Pooled Cross Section
- Model 2: Pooled Cross Section with Time Interactions

Static Coefficients

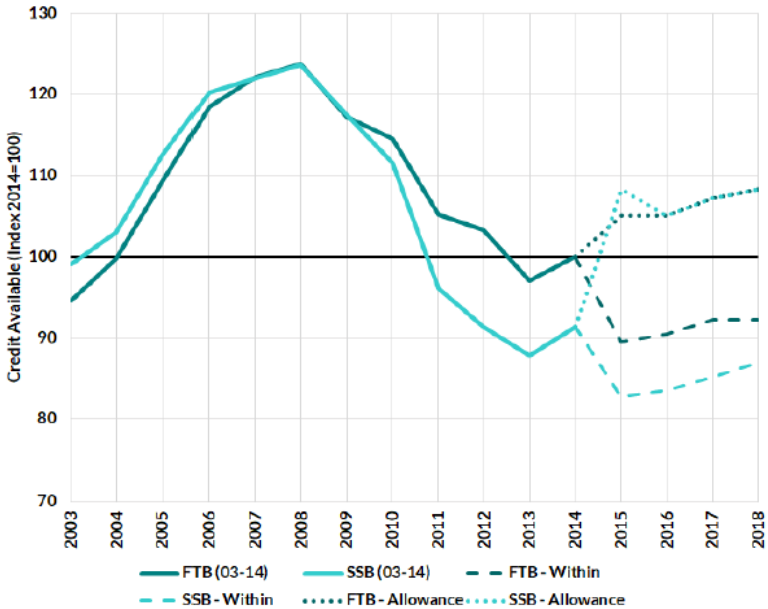
	Balance (in log)	Balance (in log)
Income	0.504***	0.74***
	(.0014)	(.0016)
log deposit	0.045***	0.04***
	(.001)	(.0007)
log age		-0.436***
		(.003)
log rate		-0.055***
		(.001)
FTB		-0.016***
		(.0015)
constant	3.35***	3.96***
	(.005)	(.011)
mu		
log deposit	.543***	1.42***
	(.005)	(.054)
log income	-.764***	- .049***
	(.0098)	(.025)
age		-2.83***
		(.122)
rate		.267***
		(.024)
FTB		-1 .041***
		(.047)
ilgtgamma	2.53***	4.109***
	(.014)	(.0375)
lnsigma2	-.431***	0.611***
	(.012)	(.039)
Bank FE	Yes	Yes
N	314,373	286,608

t statistics in parentheses

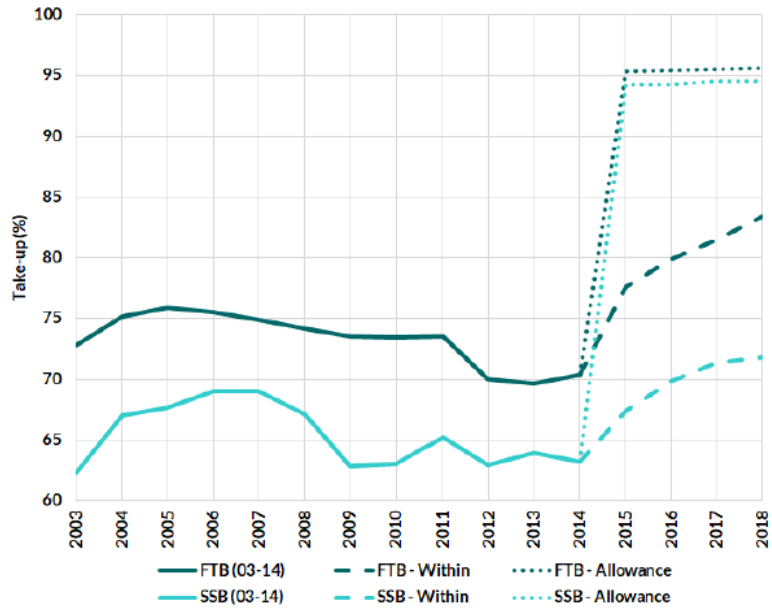
Static Coefficients



Credit Availability and Take-up

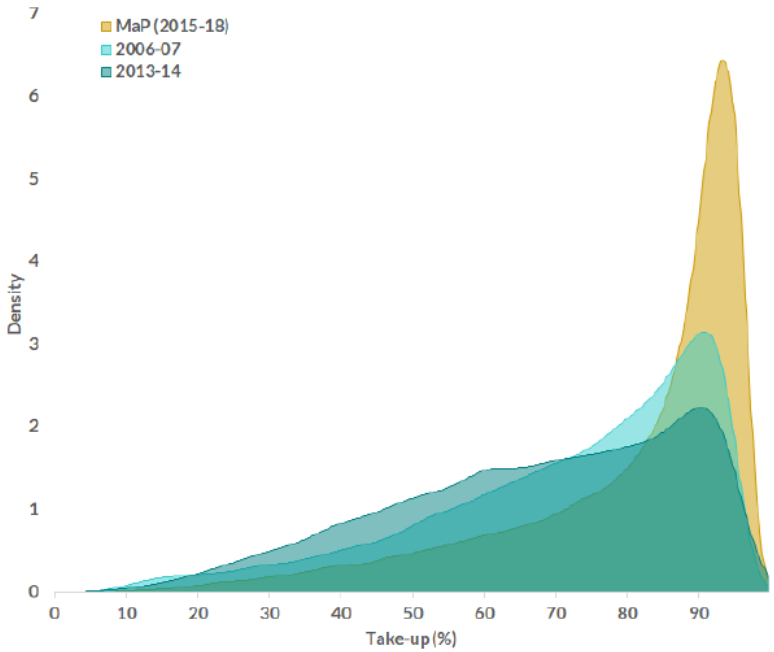


a. Average Credit Available over Time

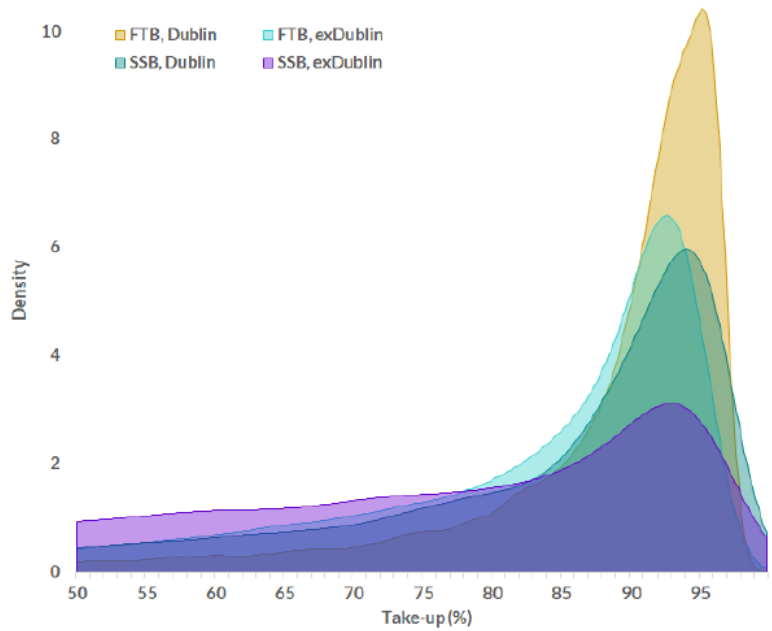


b. Average Take-up over Time

Take-up

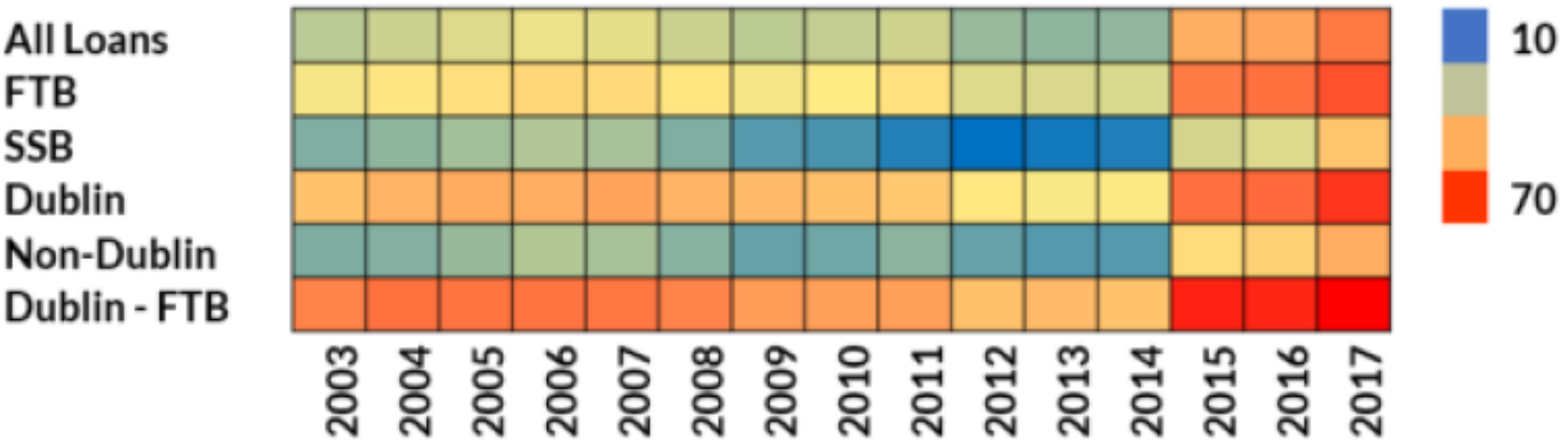


a. Take-up pre-/post- MaP



b. Take-up across groups

Indicator


All Loans
FTB
SSB
Dublin
Non-Dublin
Dublin - FTB
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
10
70

Conclusions

- Impact of these MaPs on credit supply and "how binding" they are for borrowers is important for instrument review;
- Outline a methodology to estimate credit availability and the take-up:
  - Income leverage a main contributor to credit available in 03-07;
  - Take-up increased since introduction of MaP;
- Derived indicator of "binding"
  - Increased binding since 2014.
  - Large cross-sectional variation.
  - Almost 70% of FTBs in Dublin are using more than 90% of the credit available to them;

Appendix