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Asymmetric effects of borrower-based measures on household access to finance and default¹

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Using a rich dataset which combines credit registry data with household income records, our paper aims to uncover the asymmetric effects in terms of access to finance determined by the implementation of macroprudential borrower-based measures. Based on granular debtor-level data, our results reveal that the implementation of a LTV limit in November 2011 did not impede access to finance for low-income debtors, while reducing the flow of new loans to high-income debtors and those with larger amounts at origination. Using a counterfactual analysis, we prove that the introduction of the LTV limit led to a 20 percent improvement compared to the absence of the measure for mortgage loans. Concurrently, we analyze the impact of a 5-year maturity cap that was implemented for consumer loans in the same period. In a similar manner, we observe that higher income debtors, as well those who contracted larger loans, experienced the strongest reduction in terms of access to finance, while low income debtors were unaffected. The introduction of a maturity cap for consumer loans did not impact payment discipline for secured consumer loans, however its introduction led to a 10 percent reduction in the average probability of default for unsecured consumer loans, with low income borrowers experiencing the strongest benefits.

JEL codes: G51, E58, C35, D14.

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[&]quot;Macroprudential policy effects on the access to finance, default and inequality: evidence from Romania"

1. INTRODUCTION

Loose credit standards, such as lower down-payments and higher debt-service-to-income limits, improve access to finance for households in the short run by increasing the pool of eligible debtors and allowing those accepted to take out higher amounts. While these effects will increase affordability for households in the short run, in the medium and long run, looser credit standards fuel appreciation of house prices (Kelly et al (2018), Anenberg et al.(2017)), thus forcing debtors to take on higher debt in order to afford a similar home. However, as the subprime mortgage crisis has shown (Mian and Sufi, (2019)), these short term gains may be overshadowed in the long run if borrowers have an untenable level of debt in relation to their income, thus are unable to service their monthly instalments.

In the aftermath of the global financial crisis, started in 2007-2008, central banks and regulators responded by increasingly relying on macroprudential instruments to strengthen financial stability. **Extensive evidence shows that borrower-based macroprudential policies are effective in moderating the amplitude of credit and asset price cycles** (Kuttner and Shim (2016), Cerutti et al. (2015), Claessens et al. (2013), Richter et al. (2018), Alam et al. (2019), Araujo et al. (2020)). As these papers rely on aggregate data, they cannot identify which categories of the population are most affected by macroprudential measures. However most empirical studies have focused on the potential benefits of macroprudential policies, while the **potential costs** have received less attention. Macroprudential instruments may have welfare costs, such as restricting access to credit and access to the financial market in a broader sense and could slow down economic growth in the short run (Richter et al., 2019). Additionally, DNB (2015) show that introducing a stricter LTV limit would postpone the decision of purchase for first-time home buyers, as they would require additional savings, thus putting extra pressure on the rental market, leading to a slow-down in house prices and residential investment.

Over the past years, studies employing granular micro-data have appeared, focusing on the drivers for default of debtors. Many have focused on the ability-to-pay hypothesis, demonstrating that default is associated with a higher level of indebtedness or a negative income shock (McCarthy (2014), Kelly and O'Malley (2016), Kukk (2021)). Nier et al. (2019) highlight there is a non-linear relationship between DSTI and the probability of default responding to increases in DSTI only above a 50% level for mortgages and 30% for consumer loans. Similarly, O'Toole and Slaymaker (2021) find that changes in DSTI have a stronger effect on default for highly indebted individuals, while shocks to DSTI have a larger impact on borrowers' payment discipline during crisis periods. Other have focused on the dual-trigger hypothesis: that debtors face a combination of affordability and negative equity shocks (Connor and Flavin (2015), Gerlach-Kristena and Lyons (2018), Byrne et al. (2017), Linn and Lyons (2019)).

Our paper is part of the growing body of literature which utilizes microdata to study the implications of macroprudential actions, bringing to light its asymmetric effects depending on borrower characteristics and show-casing its distributional consequences. Tzur-Ilan (2020) analyzes the introduction of LTV limits in Israel in 2010 and 2012 using loan level microdata. According to their results, the LTV limit measure resulted in changing borrowers preference to more affordable dwellings, located far from city center in less advanced areas, with investors experiencing a stronger effect compared to first-time home borrowers. Acharya et al. (2019), using data on loans in Ireland to study the impact of LTV and LTI, shows that mortgage loans are reallocated from low-income to high-income borrowers and from urban to rural area borrowers. Peydro et al (2020) show that low-income debtors were affected to a greater extent by the LTI cap imposed in 2014 on UK mortgage lenders, with effects both on intensive and the extensive margin. Van Bekkum et al. (2019) focus on the implementation of LTV ratio limits in Netherlands in 2011 by connecting credit registry data with administrative information regarding ownership records and income. They find a stronger impact on LTV of newly issued loans for liquidity-constrained households and first-time homebuyers. Furthermore, lower leverage has a positive effect on borrower resiliency, as they are better able to absorb a negative income shock. Aastveit et al. (2020) find similar results in the case of Norway on the effectives of LTV limit on the extensive and intensive margin, however according to their results households are more vulnerable to an income shock after purchasing a home with a higher down payment as this depletes their liquid assets. Giannoulakis et al. (2022) extend Gross and Poblacion's (2017) framework and prove that borrower-based measures are more effective when implemented jointly and the effect is stronger for low-income and low-wealth debtors. Finally, Kinghan et al. (2019) find that the LTV limit introduced in Ireland in 2015 impacted high income borrowers to a greater, while low income borrowers did not reduce the leverage after the introduction of the regulation, as a stricter LTV limit was placed for loans above 220,000 Euros

Additionally, theoretical frameworks provide an important starting point evaluating the asymmetric effects of macroprudential policies on heterogeneous agents, given the lack of access to micro data in many jurisdictions (Punzi and Rabitsch (2017), Rubio and Unsal (2017), Gete and Reher (2016)). Others combine calibrations from survey data with DSGE modelling to construct micro-macro simulation models in order to evaluate the impact of macroprudential tools on households, the economy and the banking sector (Gross and Poblacion, (2017), Jurča et al. (2020), Reichenbachas (2020), Gross et al. (2022), Ampudia et al. (2021)).

The present paper analyses the consequences of macroprudential policies on access to finance, loan volumes and default. We take advantage of Romania's rich history with debtor based macroprudential instruments and focus our analysis on two important regime changes: i) the releasing of hard limits for DSTI and LTV in 2007 as a result of Romania's accession to the EU and the introduction of a self-regulation policy and ii) the implementation of currency-differentiated LTV caps for mortgage loans and consumer loans maturity restriction in 2011. We utilize a unique debtor-based dataset which combines information regarding loan characteristics and default, with income data from the Ministry of Finance.

Using a bank level quarterly panel model, we are able to evaluate the probability of a debtor being granted a loan, before and after the macroprudential regime was changed. . Finally, we evaluate debtors' default behavior, using a logit model, by monitoring them for 3 years after the origination of the loan. As we observe income on an annual basis, we are able

to control for transitions to unemployment and changes to salary, as well as for debt-service shocks due to changes in interest rates of fluctuations of the exchange rate.

To our knowledge, this is a unique paper that attempts to study the impact of macroprudential policies on access to finance using debtor-level data from the credit register, as well as taking a multi-year time horizon to evaluate their impact on debtors' payment discipline rate. In order to show the effect of macroprudential policies, we also calculate counter-factual scenarios by which we assume that the structure of the loans granted would remain unchanged. We apply an income correction for each age bracket to debtors in the first year of our sample to match the evolution between the two samples and using our updated incomes, we create an estimated probability of being granted a loan thus allowing us to calculate the amount and size of loans that would have been granted in the absence of the regulation.

We complement existing literature using credit registry data from Romania. Our approach is closely related to Epure et al. (2018) who study the impact of macroprudential policies between 2004 and 2012 on loan amounts, and find that tightening of macroprudential conditions is associated with a decline in average loan amounts to households, especially for riskier foreign currency loans and for borrowers with higher DSTI ratios. We complement their research by analyzing the impact of macroprudential policies on the extensive margin, controlling for the selection bias on the impact of the amount at origination, as well as including consumer loans bellow 4,000 Euros from the Credit Bureau, thus giving a complete assessment of borrowers' indebtedness. Furthermore, we also control for access to finance by borrower's income category, thus being able to identify asymmetries in the transmission mechanism of macroprudential policies on credit demand. We also complement Neagu et al. (2015), which using aggregate credit registry data on a bank level for Romania between 2003 and 2012, find that borrower based measures are effective in reducing credit growth, but the impact lasts only for one year. Additionally, they find that the period of self-regulation was associated with a deterioration in the quality of loans granted. We go further by analyzing how specific income categories have been affected, both in terms of loan issuance, as well as payment discipline.

Finally, our paper is one of the few works utilizing panel credit registry data over multiple years. Similar to our work is also Mocetti and Viviano (2017) who utilize panel data from Italy credit register and tax records for loans granted between 2005 and 2011 showing that stricter credit standards in the aftermath of the Global Financial Crisis led to a halving of the delinquency rate. Additionally, Kukk (2021) deploys a panel approach based on Estonian credit registry data for loans granted between 2005 and 2011, demonstrating that lower income and higher debt service ratio borrowers are likely to have a higher probability of arrears.

We show that the reintroduction of hard LTV limits in 2011 did have a restrictive effect in terms of overall access to mortgage credit. However, we observe significant heterogeneous effects by currency, income category and loan amount. Overall, the probability of being granted a mortgage loan was stable for low-income debtors, while average probability of being granted a loan fell for high-income debtors. In terms of currency, the regulation supported loans in national currency, as expected by the stricter LTV limits for FC- denominated loans. Loans with larger amounts were affected to a greater extent. In the case of consumer loans, the maturity cap led to a significant decrease in the probability of receiving secured and unsecured consumer credit, as well as a reduction in the amount granted for loans that were accepted. Debtors with higher incomes experienced the strongest decreases.

Due to deteriorating macroeconomic conditions, the average probability of default for loans granted under the new regime deteriorated compared to the previous year for all types of loans, with the exception of First Home loans. Using a counterfactual analysis, we prove that by encouraging RON-denominated loans, the introduction of the LTV limit led to a 20 percent improvement in the average probability of default compared to maintain the self-regulation regime in the case of mortgage loans. Our counterfactual analysis shows that for unsecured consumer loans the maturity cap led to a 10 percent reduction in the average probability of default. Furthermore, the biggest improvement is observed for lower income debtors, showing that tighter macroprudential policy protects the most vulnerable income categories to a greater extent.

1. DATA

The credit event of interest for us occurred in November 2011 with the introduction of a hard LTV limit, as well as a maturity cap for consumer loans. Following the recommendation of the European Systemic Risk Board regarding foreign currency lending and the recognized systemic risks of the banking sector, distinct LTV limits were established in November 2011, depending on the borrowers' characteristics (hedged or unhedged) and on the currency the loans are denominated. The LTV caps were introduced for all new loans, except for "First Home" government program. The LTV ratio was capped as follows: (i) 85% for leudenominated credit; (ii) 80% for foreign currency-denominated housing loans to hedged borrowers; (iii) 75% for EUR-denominated housing loans to unhedged borrowers. Consumer credit maturity was restricted to five years in order to prevent household over-indebtedness and ensure that debtors were not utilizing these loans for long-term investment purposes.

As Credit Bureau was in place then, we include in our analysis unsecured consumer credit loans as well. We begin our analysis in Q4 2010, thus having a full year before the implementation of the new regulation to control for changes in access to credit. As the First Home government-program was already in place then, we divide debtors by the type of mortgage loan they have taken out (standard loan vs. First Home), while also controlling for additional consumer loans. First Home loans represented around a third of new loans granted between 2009 and 2012², increasing to 50% of new loans in 2012 as the government increased the allocated funding for the project. Our control group for the self-regulation period spans Q4 2010 to Q3 2011, the transition period is Q4 2011 to Q1 2012, while the sample for evaluating the efficiency of the measures spans Q2 2012 to Q1 2013.

 $^{^2}$ In 2009, a social governmental program (called "the First Home") is introduced in an attempt to support the rebound of mortgage lending, providing 80% state-guarantee for the issued loans. Debtors benefited from lower financing costs compared to regular mortgages and the minimum down-payment was 5%. In order to qualify for a First Home loan, debtors were not allowed to own any properties and the maximum amount was capped at 67,500 Euros.

In order to assess the impact of macroprudential instruments on borrower's access to credit, we use debtor-level data from the Central Credit Register, covering all consumer or mortgage loans above RON 20,000 (around EUR 5,000 equivalent) on banks' balance sheets. The credit registry has detailed information regarding loan characteristics such as month and year of issuance, amount at origination and outstanding amount, residual maturity and maturity at origination, as well as currency, interest rate of the loan. Given this information, we calculate the monthly instalment using the constant annuity assumption.. Regarding debtors, we also have information regarding the person's age, as well as county of residence. Starting from September 2008, a privately own credit registry is founded, the Credit Bureau, which covers all household loans.

As our analysis is debtor-based, we consolidate all loans taken out by a debtor within a year, excluding refinanced and restructured loans, and construct a weighted average by outstanding amounts of maturity, interest rate. Finally, we divide debtors by the type of loan granted (mortgage loan vs. secured consumer loan vs. unsecured consumer loan) and amount interval. We introduce this specification as it allows us to better identify how access to finance in both the extensive, as well as the intensive margin, has changed after the switch in the regulation. Debtors that already had loans outstanding greater than 33% of the newly granted amount are excluded.

In order to evaluate debtors' financial standing and access to credit in respect to the general population, we intersect data on newly issued loans with yearly tax records from the Ministry of Finance. These records cover all households that pay income tax within a fiscal year, thus includes both self-employed, as well as salaried employee. We divide debtors into four income categories: those bellow the 50th percentile (low income), those with incomes between the 50th and the 75th percentile, those with incomes between the 75th and the 90th percentile and those with incomes above the 90th percentile. Given that we control for income category, this is an important determinant of demand for loans. If there exists a fall in overall demand for loans, we should observe a parallel shift in probability of being granted a loan for all income categories. Moreover, we also divide debtors based on age: bellow 30 years, between 30 and 35 years, between 35 and 40 years and above 40 years. Especially for mortgage loans, age is a very poignant indicator for loan demand as younger debtors are more likely to start a family and purchase a home. However these debtors tend to have lower incomes and smaller savings, thus can be affected to a greater extent by the introduction of an LTV limit. Finally, we divide also categorize debtors by gender.

i. Access to finance dataset

Our access to finance dataset, spanning the period between 2010 Q4 and 2013 Q1, contains 818 thousand new loans observations, out of which 23 thousand are standard mortgage loans, 53 thousand "First Home" loans, 24 thousand secured consumer credit and 717 thousand unsecured consumer loans (**Table i. 1**).

The introduction of the LTV limit in November 2011 led to a decrease in the number of standard mortgage loans that were granted in the following year (-39% - no policy period 2010 Q1 - 2011 Q3 versus policy period 2012 Q2 - 2013 Q1). The decrease was caused by FC-denominated loans which fell by 55%, while RON-denominated loans doubled. "First Home" loans, which were not under the purview of the regulation, increased by 50%. The 5-year

maturity cap had a significant effect on secured consumer loans (-81%) and, to a lesser extent, on unsecured consumer loans (-149%).

We observe significant disparities among different credit types and years of origination regarding the currency of denomination. For unsecured consumer loans, the loans are granted almost exclusively in domestic currency (97%). On the other hand, for standard mortgages (95%), "First Home" loans (99%) and secured consumer loans (80%) are granted almost exclusively in FC due to the significant interest rate differential between RON-denominated loans and FC-denominated loans (~3,5 percentage points). On the other hand, after the implementation of FC-differentiated LTV-limit in 2011, the share of standard mortgages denominated in RON increased to 31% for standard mortgages and to 49% for secured consumer loans in domestic currency in 2013 Q1 (**Table i. 1**)... Thus, we observe that the regulation provided an important incentive for domestic currency mortgage-financing, thus decreasing exposure to any future currency depreciation.

Approximately half of mortgage debtors have incomes above the 90th percentile, while only 14 percent are in the bottom 50 percent of the distribution. Debtors between the 50th percentile and the 90th percentile make up 40 percent of loans. The divergence is less pronounced for First Home loans: debtors above the 90th percentile make up around a third of the portfolio. Debtors with unsecured loans have the lowest incomes, with around a third with incomes below the median and only 15 percent above the 90th percentile, while the income distribution of secured loans is similar to First Home loans.

Regarding the amount at origination, around 30 percent of mortgage loans are between 22,500 Euros and 45,000 Euros, and only 9% are above 60,000 Euros. Standard mortgage loans above 22,500 Euros decreased by 40 percent compared to 22 percent for those with amounts bellow. For First Home loans, the maximum property value 75,000 Euros for new apartments, 60,000 Euros for apartments older than 5 years, thus 80 percent of loans are between 22,500 Euros and 68,000 Euros. Secured consumer loans have quite large amounts, with 33 percent above 30,000 Euros, while for secured loans 55 percent are below 3,000 Euros.

ii. Default dataset

In order to measure default, we track debtors that have taken out a loan in a specific quarter for 8 quarters starting 1 year after the origination of the loan. Each specific quarter is presented as a distinct observation in the logit model. We define a debtor as having defaulted if the repayment on any of their loans outstanding within that specific quarter has a delay greater than 90 days. This allows us to identify if a negative credit event occurs for any of the loans taken out, which is relevant for debtors with multiple loans. We also track changes in debtor's income by performing an intersection with the database from the Ministry of Finance, this allows us to control for changes in their income after loan origination. If a debtor has no loans outstanding, given that they have repaid in advance or the loan has matured, they are no longer included in the logit sample for the following quarters. Once a debtor has been classified as defaulted on a loan during a certain quarter, he will be excluded from further vintages. Additionally, if debtors take on new loans, exceeding 33% of the existing outstanding amount, they will also be excluded from the sample as their current level of indebtedness, as well as loan characteristics, are no longer representative of the credit conditions at origination.

The dataset contains approximately 1 million unique debtors, out of which 907 thousand are consumer loans, 23 thousand standard mortgage loans, 56 thousand First Home loans and 38 thousand secured consumer loans. Around 45 percent are issued during the self regulation period, 20 percent during the transition period and 35 percent after the introduction of the new macroprudential limits loans.

Overall, "First Home" loans have the lowest probability of default for the entire period (0,11%), in line with literature that emphasizes the superior creditworthiness of first time homebuyers. Standard mortgage loans have an average probability of default of 0,33%, while for secured consumer loans it is 0,9%. The highest probability of default is observed for unsecured loans (1,76%). The mean probability of default of loans after the new macroprudential regulations were implemented increased compared to the previous regime for both standard mortgage loans, as well as secured consumer credit, while it has increased to a lesser extent for "First Home" loans and unsecured consumer loans due to the uncertain macroeconomic conditions caused by the Eurozone sovereign crisis (**Table ii. 2**).

Important differences in term of default between currency of denomination can be observed for mortgage loans (0,35% compared to 0,22%), although it is important to mention that only 18% of loans are denominated in RON. In the case of "First Home" credit, loans are primarily (92%) in euro, while for unsecured consumer loans they are in large part (86%) denominated in the local currency. For secured consumer loans, 40 of loans are denominated in RON and have a higher probability of default compared to those in foreign currency (1,19% versus 0,67%).

2. METHODOLOGY

We employ debtor-level microdata to assess the impact of macroprudential policy tools on access to finance on the extensive margin (the probability of being granted a loan) and the intensive margin (conditional on acceptance, the amount granted). Finally, we evaluate the impact of macroprudential policy on the resilience of debtors via their probability of default.

The baseline model utilized to measure the impact of macroprudential policies on households' **access to finance** is a quarterly bank level panel where the dependent variable $x_{ivrfxav}$ measures the share of debtors in each gender, income and age bracket which took out a loan from a specific bank within that quarter, differentiated by currency and amount at origination:

 $\begin{aligned} x_{i\,v\,r\,fx\,a\,v} &= \beta_0 + \pmb{\beta_1} dummy \ regulation + \beta_2 \ income_cat_v + \\ \beta_3 age_cat_r + \beta_4 currency_{fx} + \beta_5 \ amount_cat_a + \\ + \beta_6 gender_v + Bank \ FE \\ + Quarter \ FE \end{aligned}$

We estimate four different models, by credit type: standard mortgage loan, "First Home" mortgage loan, secured consumer credit and unsecured consumer credit. This allows us to analyze in a granular fashion the impact of the LTV limit and whether there were leakages to the First Home program, and to which extent the maturity cap had a differential effect by loan type. We have decided upon this empirical strategy as it captures the decision process of the household who can choose between different types of loans depending on their financing needs.

The extended models also take into consideration interactions between currency loan amount, income category and age category in order to evaluate potential asymmetric effects of regulation on different borrowers,

$$\begin{aligned} x_{ivrfxav} &= \beta_0 + \sum_{v=1}^4 \theta_v \, dummy \, regulation + \beta_2 \, income_cat_v + \\ \beta_3 age_cat_r + \beta_4 currency_{fx} + \beta_5 \, amount_cat_a + \\ + \beta_6 gender_v + Bank \, FE \\ + \, Ouarter \, FE \end{aligned}$$

where we separate between mortgage loans and secured consumer loans by domestic versus foreign currency denomination in order to evaluate potential asymmetric effects of regulation on different borrowers

In order to construct the counterfactual probability of being granted a loan we employ a two step procedure. First of all, we analyze how the medium income has changed between the two different years of origination. We apply the income correction for each age bracket to debtors in the first year of our sample. Finally, using our updated incomes for the initial year, we create an estimated probability of being granted a loan with the dummy for the initial year, which controls for other changes besides household income.

The second model we deploy is a logit model utilized to quantify the impact of the discussed macroprudential measures on default. The dependent variable $X_{i,t,j}$ is equal to 1 if the debtor had any delay greater than 90 days during the specific quarter *t* for debtor *i* with loan type *j* and 0 otherwise:

$$\begin{split} X_{i,t,j} &= \alpha_0 + \alpha_1 * \textit{Income dummy}_{i,t} + \alpha_2 * \textit{Year of origination}_t \\ &+ \alpha_3 * \textit{Age}_{i,t} + \alpha_4 * \textit{DSTI}_{i,t,j} + \alpha_4 * \textit{Amount}_{i,t,j} \\ &+ \alpha_5 * \textit{Interest rate}_{i,t,j} + \alpha_6 * \textit{Residual maturity}_{i,t,j} + \\ &\alpha_7 * \textit{Currency}_j + \alpha_8 * \textit{Quarters from origination}_{i,j} + \varepsilon_{i,t,j} \end{split}$$

where j refers to loan type (standard mortgage loan, First Home loan, unsecured consumer loans or secured consumer loans. Using a logit model is a standard approach for micro-data in order to determine the impact of borrower characteristics on default, utilized in papers based on Irish data such as Connor and Flavin (2015)

Finally, in order to evaluate any non-linear effects of currency denomination of the loan, income category and county of residence, after a change in the macroprudential regime, we perform interactions between the specific dummy variables and the year of origination.

3. **RESULTS**

We find that the introduction of the LTV limit led to a 30 percent reduction in the average share of households being granted a mortgage loan (Figure 1), while First Home loans, which were not under the purview of the regulation, fell by 25 percent (Figure 12) (**Table ii. 1**).

Figure 1 Average probability of being granted a mortgage loan

Figure 2 Average probability of being granted a mortgage loan a consumer loan



As expected, the measure had diverging effects by currency, supporting standard mortgage loans denominated in RON (+30 percent), while the estimated probability of being granted a foreign currency-denominated mortgage loans fell by 40 percent. Our results are in line with Epure at al. (2018) findings, showing that tighter macroprudential conditions are associated with a decrease in the volume of household credit, especially for foreign currency loans.

On the other hand, the maturity cap led a significant decrease in access to finance for debtors taking out secured consumer loans (-66%) (Figure 13), while having a stronger effect for FC-denominated loans (-78%) compared to RON-denominated secured loans (-48%), The impact on unsecured consumer loans was more contained, with the average probability of being granted a loan decreasing by 22% (Figure 1) (**Table i. 2**).



As we are interested in determining whether macroprudential measures had a differentiated effect based on income categories, we also run a interaction of the regulation dummy with the income category dummies (**Table i. 3**). Overall, access to finance for mortgage loans for debtors with average salary below the 75th percentile was stable, indicating that access to finance for low- and medium-income borrowers was not affected (Figure 1). On the other hand, in the case of debtors with incomes above the 90th percentile wage, the predicted

probability of being granted a loan fell significantly (-45%), while the impact was more muted for those with incomes between the 75th and 90th percentile (-23%). The evolution of First Home loans was similar, with the share of debtors above the 90th percentile falling by 34 percent, while those bellow were not affected. Given that loan issuance fell for both types of mortgage loans, this indicates a reduced regulatory leakage for high-income borrowers which could benefit from lower down payment under the First Home program.







For consumer loans we see that the probability of being granted such a loan decreased for those with incomes above the 75th percentile, with those above the 90th percentile experiencing the largest decrease (-80 percent) (Figure 7). Similar to mortgage loans, those with incomes bellow the 75th percentile were not impacted. In the case of unsecured consumer loans, we observe a similar pattern, with debtors above the 75th percentile experiencing important decrease in the probability of being granted a new loan (-35 percent) (Figure 8).





Figure 8 Average probability of being granted an unsecured consumer loan, by income level



The impact of the 2011 macroprudential policy regime on the loan value, given that the debtor was selected for accessing finance, was also tested by interacting the policy dummy with the amount at origination dummy. Issuance of standard mortgage loans with loan amounts bellow 30,000 Euros at origination declined by 20 percent in comparison to -40 percent for other loan amount brackets (Figure 9). Furthermore, First Home loans between 50,000 Euros and 70,000 euros declined by 17 percent, showing the lack of regulatory leakages from standard mortgages, while other issuance in smaller loan brackets was stable (Figure 10) (**Table ii. 3**).

Figure 9 Average probability of being granted a mortgage loan, by amount interval





The maturity cap significantly reduced the origination of consumer loans with larger amounts: issuance of secured loans with amounts bellow 15,000 Euros was relatively stable, while those with amounts higher than 30,000 Euros fell by 80 percent (Figure 11). A similar pattern is observed for unsecured loans where loan issuance with amounts bellow 3,000 Euros were not impacted, while those above 5,000 euros shrank by 50 percent (Figure 12) (**Table i. 4**)

Figure 11 Average probability of being granted a secured consumer loans, by amount interval



Figure 12 Average probability of being granted an unsecured consumer loan, by amount interval



Analyzing the impact of the newly introduced macroprudential measures on default, we observe a deterioration in the average probability of default for all types of loans issued in 2012 compared to 2011, prior to the introduction of the LTV limit and maturity cap for consumer loans, with the exception of "First Home" loans. Similar to Kely et al. (2015), loans granted under First Home program have a lower probability of default.

However, using a counterfactual analysis, we observe that in the absence of new macroprudential regulations, the average probabilities of default would have been 20 percent lower for standard mortgage loans and 54 percent lower for First Home loans. In the case of secured consumer loans, due to the inelastic demand of risky borrowers, the average probability of default under the new regime does not differ significantly as opposed to the maintaining the same portfolio structure as loans granted in 2011, while for unsecured consumer loans the introduction of the maturity cap led to a 9% improvement compared to the counterfactual probability of default (Figure 13).

Figure 13 Average probability of default by macroprudential regime and loan type



*if LTV limit / Maturity cap would have not been in place

Figure 14 Average probability of default by macroprudential regime, loan type and currency



*if LTV limit / Maturity cap would have not been in place

The regulation was successful in supporting mortgage loans denominated in RON in 2012, thus it is important to note that the probability of default for these loans is decreased in 2012 compared to the previous year by 12%, while in the absence of the regulation it would have increased by 125%. In regards to FC-denominated mortgage loans, the difference between the realized value and counterfactual is not statistically significant.

Given that 97% of "First Home" loans were denominated in Euro in 2012, we do not have a representative sample to compare between currency cohorts. Similarly, for unsecured consumer loans, 87% of loans were denominated in RON, thus we will not present currencydifferentiated probabilities of defaults for these two types of loans.

Figure 15 Impact of tightening macroprudential policy in 2012 on payment discipline by income category – unsecured consumer loans



* if the maturity cap wouldn't have been implemented

Going in depth regarding the interaction between payment discipline and income for mortgage loans, we observe a similar pattern as in our first sample: before the introduction of the LTV limit, debtors with income above the medium wage had a medium probability of default approximately 3 to 4 times higher compared to those with incomes lower than 50 percent of the average income. However, what is of interest to us is the policy counterfactual. In this regard, we observe a stronger impact for

low-income debtors specifically for unsecured consumer loans, while for other types of loans, the improvement is not statistically significant. Given that low income-debtors access consumer loans to a greater extent compared to higher income debtors, this proves that introducing the maturity cap led to the biggest improvements for the most vulnerable income categories.

4. CONCLUSION

Empirical evidence regarding the asymmetric effects of macroprudential policies is still scarce, given the relative novelty of such instruments, as well as the challenges regarding granular data. In this paper we utilize a novel dataset which combines credit-registry information and data regarding tax returns to analyze the consequences of macroprudential policies on extensive and intensive margin, as well as debtor's payment discipline. Our paper is one of the few works which utilizes such granular data over multiple years.

Using a rich dataset which combines credit registry data with household income records, our paper aims to uncover the asymmetric effects in terms of access to finance determined by the implementation of macroprudential borrower-based measures. Based on granular debtor-level data, our results reveal that the implementation of a LTV limit in November 2011 did not impede access to finance for low-income debtors, while reducing the flow of new loans to high-income debtors and those with larger amounts at origination. Using a counterfactual analysis, we prove that the introduction of the LTV limit led to a 20 percent improvement compared to the absence of the measure for mortgage loans.

Concurrently, we analyze the impact of a 5-year maturity cap that was implemented for consumer loans in the same period. In a similar manner, we observe that higher income debtors, as well those who contracted larger loans, experienced the strongest reduction in terms of access to finance, while low income debtors were unaffected. The introduction of a maturity cap for consumer loans did not impact payment discipline for secured consumer loans, however its introduction led to a 10 percent reduction in the average probability of default for unsecured consumer loans, with low income borrowers experiencing the strongest benefits.

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6. ANNEX 1 Descriptive statistics

i. Access to finance dataset

Table i. 1 Number of debtors by loan type

	Standard mortage	First Home	Secured consumer loan	Unsercured consumer loan
Dec-10	2,172	4,743	3,446	58,124
Mar-11	1,996	3,223	3,104	54,234
Jun-11	4,406	3,370	5,292	123,183
Sep-11	2,883	5,436	4,907	89,282
Dec-11	3,364	6,696	3,195	76,495
Mar-12	1,712	4,862	1,826	53,693
Jun-12	1,569	5,983	1,019	72,593
Sep-12	1,957	6,733	749	66,284
Dec-12	1,995	6,659	802	71,531
Mar-13	1,609	5,614	577	51,658
Total	23,663	53,319	24,917	717,077

Table i. 2 Share of loans denominated in foreign currency by loan type

	Standard mortage	First Home	Secured consumer loan	Unsercured consumer loan
Dec-10	94%	99%	87%	5%
Mar-11	94%	98%	87%	5%
Jun-11	95%	99%	80%	3%
Sep-11	92%	99%	77%	3%
Dec-11	93%	98%	78%	3%
Mar-12	85%	98%	71%	2%
Jun-12	68%	97%	59%	2%
Sep-12	61%	96%	46%	1%
Dec-12	70%	95%	44%	1%
Mar-13	69%	92%	51%	1%

ii. Default dataset

	Self regulation	Transition	Hard LTV / Maturity cap
Mortgage loan	84,964	38,019	51,331
RON-denominated	4,068	3,356	15,673
FC-denominated	80,896	34,663	35,658
First Home	140,163	97,254	207,909
RON-denominated	764	1,397	8,261
FC-denominated	139,399	95,857	199,648
Secured consumer credit	131,836	43,556	84,094
RON-denominated	25,202	10,280	64,710
FC-denominated	106,634	33,276	19,384
Unsecured consumer credit	2,105,681	852,283	1,631,125
RON-denominated	2,105,681	852,283	1,631,125
FC-denominated	320,522	127,274	241,963

Table ii. 1 Number of debtors by type of credit, currency of denomination and sample

Table ii. 2 Average probability of default by type of credit, currency of denomination and sample

	Self regulation	Transition	Hard LTV / Maturity cap
Mortgage loan	0.26%	0.36%	0.45%
RON-denominated	0.25%	0.54%	0.22%
FC-denominated	0.26%	0.34%	0.56%
First Home	0.11%	0.13%	0.12%
RON-denominated	0.00%	0.29%	0.10%
FC-denominated	0.11%	0.13%	0.12%
Secured consumer credit	0.59%	0.48%	1.59%
RON-denominated	0.49%	0.48%	1.66%
FC-denominated	0.61%	0.48%	1.36%
Unsecured consumer credit	1.58%	2.03%	1.85%
RON-denominated	1.58%	2.03%	1.85%
FC-denominated	2.13%	2.42%	1.77%

Quarter of origination	Self regulation	Transition	Hard LTV / Maturity cap
Dec-10	527,818	0	0
Mar-11	479,466	0	0
Jun-11	997,249	0	0
Sep-11	778,633	0	0
Dec-11	0	682,605	0
Mar-12	0	475,781	0
Jun-12	0	0	614,151
Sep-12	0	0	592,728
Dec-12	0	0	558,839
Mar-13	0	0	450,704
Total	2,783,166	1,158,386	2,216,422

 Table ii. 3 Number of debtors by quarter of origination and sample

Table ii. 4 Number of debtors by	y quarters	since of	origination	and	sample
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Quarters since origination	Self regulation	Transition	Hard LTV / Maturity cap
+5	448,214	193,521	384,691
+6	410,748	175,658	341,935
+7	383,863	161,803	311,621
+8	360,923	149,491	285,544
+9	324,957	132,827	250,160
+10	304,805	123,648	231,787
+11	284,713	114,568	214,204
+12	264,943	106,870	196,480
Total	2,783,166	1,158,386	2,216,422

7. Annex 2 - Results

i. Access to finance

Table i. 1 Mortgage loans - baseline and Currency of denomination interaction

	Standard	Standard	Standard		
	mortgage	mortgage	mortgage	First Home	First Home
	loan	loan	Ioan - FC		
Macroprudential regime = 2 . Announcement		0.00064***	0.00010		0.00124**
period		-0.00004	(0.00010		(0.00124)
Macroprudential regime – 3 Policy		(0.00010)	(0.00024)		(0.00032)
implementation		-0.00102***	0.00039**		-0.00218***
Macroprudential regime = 2 Appouncement		(0.00008)	(0.00019)		(0.00039)
period # Foreign currency denominated			-0.00082***		
Macronrudantial ragime -3 Policy			(0.00026)		
implementation# Foreign currency			-0.00172***		
denominated			(0.00021)		
Quarter $= 6, Q2$		0.00100***	0.00100***		0.00242***
		(0.00010)	(0.00010)		(0.00051)
Quarter = 9, Q3		0.00040***	0.00040***		0.00450***
		(0.00010)	(0.00010)		(0.00052)
Ouarter = 12, O4		0.00055***	0.00054***		0.00272***
		(0.00009)	(0.00009)		(0.00042)
Amount bracket = 2	0.00006	0.00010	0.00007	-0.00068	-0.00066
	(0.00009)	(0.00009)	(0.00009)	(0.00045)	(0.00045)
Amount bracket = 3	-0.00056***	-0.00047***	-0.00050***	-0.00058	-0.00056
	(0.00011)	(0.00010)	(0.00010)	(0.00047)	(0.00047)
Amount bracket – 4	-0.00071***	-0.00045***	-0.00047***	0.00266***	0.00268***
	(0.00071)	(0.00043)	(0,00011)	(0.00200	(0.00200
Income category $= 1.0$ -p50	-0.00282***	-0.00306***	-0.00307***	-0.00489***	-0.00487***
income category = 1, 0-p30	(0.00013)	(0.00012)	(0.00012)	(0,00055)	(0,00055)
Income category $= 2$ p50-p75	-0.00216***	-0.00237***	-0.00236***	-0.00352***	-0.00353***
niconic category = 2, pso pro	(0.00013)	(0.00257)	(0.00250)	(0.00052)	(0.00052)
Income category $= 3 \text{ p75-p90}$	-0.00167***	-0.0018/***	-0.00183***	-0.00150***	-0.00151***
niconic category = 3, pr3-p30	(0.00010)	(0.00010)	(0.00010)	(0.00045)	(0.00045)
Currency - 1 Foreign currency	0.00124***	0.00121***	0.00231***	(0.00043)	(0.00043)
Currency – 1, Poreign currency	(0.00124)	(0.00121)	(0.00231^{20})		
$A = h_{\text{max}} + 2 [20, 25]$	0.00066***	0.00010)	(0.00018)	0.00/15***	0.00/12***
Age blacket = 2 , [50-55)	-0.00060****	-0.00044	-0.00044****	-0.00413	-0.00413
	(0.00011)	(0.00010)	(0.00010)	(0.00042)	(0.00042)
Age bracket = 3 , [$35-40$)	-0.00115***	-0.0009/***	-0.0009/***	-0.004/9***	-0.004/9***
	(0.00011)	(0.00011)	(0.00011)	(0.00048)	(0.00048)
Age bracket = 4, $[40-65)$	-0.00244***	-0.00244***	-0.00243***	-0.00607***	-0.00605***
	(0.00010)	(0.00010)	(0.00010)	(0.00055)	(0.00055)
Gender = 1, Female	0.00032***	0.00026***	0.00026***	0.00025	0.00025
	(0.00007)	(0.00007)	(0.00007)	(0.00034)	(0.00034)
Constant	0.00382***	0.00380***	0.00307***	0.00709***	0.00442***
	(0.00030)	(0.00029)	(0.00031)	(0.00133)	(0.00129)
	0.500	10.70-	10.507	0.512	0.510
Observations	8,509	10,697	10,697	9,513	9,513
R-squared	0.38838	0.35330	0.35760	0.42728	0.42521
Banks FE	Yes	Yes	Yes	Yes	Yes
R2	0.388	0.353	0.358	0.427	0.425
Likelihood	36721	45388	45424	25742	25725

Table i. 2 Consumer loans - baseline and currency of denomination interaction

	Secured	Unsecured	Secured	Secured	Unsecured
	consumer	consumer	consumer	consumer	consumer
	loan	loan	loan	loan - FC	loan
				interaction	
			1		
Macroprudential regime = 2 ,			-0.00085***	0.00004	-0.00027
Announcement period			(0.00014)	(0.00022)	(0.00061)
Macroprudential regime = 3, Policy			-0.00209***	-0.00073***	-0.00426***
Implementation			(0.00013)	(0.00019)	(0.00048)
Macroprudential regime = 2 ,				-0.00122***	
Announcement period # Foreign				(0.00026)	
Macroprudential regime -3 Policy					
implementation# Foreign currency				-0.00237***	
denominated				(0.00026)	
Amount bracket = 2	0.00074***	0.00155**	0.00068***	0.00067***	0.00129**
	(0.00015)	(0.00075)	(0.00012)	(0.00012)	(0.00064)
Amount bracket = 3	0.00172***	0.00056	0.00166***	0.00167***	0.00038
	(0.00016)	(0.00074)	(0.00013)	(0.00013)	(0.00064)
Amount bracket = 4	(0100010)	0.00936***	(0100010)	(0.000000)	0.00912***
		(0,00072)			(0,00062)
Currency = 1. Foreign currency	0.00159***	-0.02380***	0.00140***	0.00231***	-0.02306***
	(0.0013)	(0.00070)	(0.00140)	(0.00231	(0.00060)
Ω uarter = 6 Ω^2	(0.00013)	0.00472***	0.00072***	0.00086***	0.01108***
Quarter = 0, Q2		(0,00007)	(0.00015)	(0.00015)	(0.00062)
Ouarter $-9,03$		(0.00097)	0.000(1***	(0.00013)	(0.00002)
Quarter = 7, Q5		(0,00008)	(0.00064^{++++})	$(0.000/1^{4444})$	$(0.00747)^{+++}$
Ouerter -12 O4		(0.00098)	(0.00013)	(0.00013)	(0.00062)
Quarter = 12, Q4		0.00114	0.00042***	0.00041***	0.00330***
In some sets some $-1, 0, n50$	0.000454	(0.00099)	(0.00013)	(0.00013)	(0.00054)
meome category = 1, 0-p50	-0.0034/***	-0.00/43***	-0.00344***	-0.00344***	-0.00684***
In some sets some -2 = 50 = 75	(0.00021)	(0.00071)	(0.00017)	(0.00017)	(0.00061)
Income category = 2, pso-p75	-0.00291***	-0.00333***	-0.00289***	-0.00290***	-0.00318***
1 2 75 00	(0.00020)	(0.00070)	(0.00017)	(0.00017)	(0.00060)
Income category = 3 , p/ 3 -p 90	-0.00209***	-0.00163**	-0.00211***	-0.00213***	-0.00158***
	(0.00016)	(0.00067)	(0.00014)	(0.00014)	(0.00058)
Age bracket = 2 , [30-35)	0.00071***	-0.00977***	0.00073***	0.00073***	-0.00972***
	(0.00020)	(0.00071)	(0.00016)	(0.00016)	(0.00061)
Age bracket = 3 , [$35-40$)	0.00031	-0.01149***	0.00034**	0.00034**	-0.01149***
	(0.00020)	(0.00072)	(0.00017)	(0.00017)	(0.00062)
Age bracket = 4 , [40-65)	-0.00110***	-0.01047***	-0.00108***	-0.00107***	-0.01063***
	(0.00018)	(0.00067)	(0.00015)	(0.00015)	(0.00058)
Gender = 1, Female	-0.00004	0.00019	0.00004	0.00004	0.00020
	(0.00012)	(0.00050)	(0.00010)	(0.00010)	(0.00043)
Constant	0.00206***	0.00505***	0.00203***	0.00170***	0.00677***
	(0.00055)	(0.00146)	(0.00045)	(0.00045)	(0.00121)
Observations	6,595	19,321	8,593	8,593	24,001
R-squared	0.28178	0.34923	0.27680	0.28421	0.35578
Banks FE	Yes	Yes	Yes	Yes	Yes
Vintage FE	Yes	Yes	No	No	No
R2	0.282	0.349	0.277	0.284	0.356
Likelihood	26020	38464	34340	34384	48809

Table i. 3 Income category interaction

	Standard mortgage loan	First Home loan	Secured consumer loan	Unsecured consumer loan
Macroprudential regime $= 3$,	-0.00223***	-0.00433***	-0.00500***	-0.01012***
Policy implementation	(0.00011)	(0.00067)	(0.00022)	(0.00097)
Income category = 1, 0-p50	-0.00381***	-0.00879***	-0.00498***	-0.01287***
	(0.00015)	(0.00081)	(0.00023)	(0.00097)
Income category = 2, p50-p75	-0.00309***	-0.00738***	-0.00425***	-0.00764***
	(0.00016)	(0.00079)	(0.00022)	(0.00098)
Income category = 3, p75-p90	-0.00240***	-0.00454***	-0.00316***	-0.00315***
	(0.00013)	(0.00071)	0.00513***	0.01114***
Macroprudential regime =3,	0.00240***	0.00481***	0.00513***	0.01114***
Policy implementation# 0-p50	(0.00020)	(0.00106)	(0.00035)	(0.00136)
Macroprudential regime =3,	0.00214***	0.00499***	0.00469***	0.00880***
Policy implementation# p50-p75	(0.00021)	(0.00102)	(0.00037)	(0.00138)
Macroprudential regime =3,	0.00165***	0.00396***	0.00346***	0.00324**
Policy implementation#p75-p90	(0.00018)	(0.00092)	(0.00032)	(0.00132)
Other controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	8,509	7,852	6,595	19,321
R-squared	0.39521	0.40417	0.31077	0.34677
Banks FE	Yes	Yes	Yes	Yes
R2	0.395	0.404	0.311	0.347
Likelihood	36769	21509	26156	38427

	Standard mortgage loan	First Home loan	Secured consumer loan	Unsecured consumer loan
Macroprudential regime $=$ 3, Policy	-0.00068***	0.00044	-0.00022	0.00451***
implementation	(0.00012)	(0.00067)	(0.00025)	(0.00108)
Amount bracket = 2	0.00040***	0.00005	0.00126***	0.00320***
	(0.00012)	(0.00074)	(0.00017)	(0.00106)
Amount bracket = 3	-0.00030**	-0.00023	0.00277***	0.00459***
	(0.00014)	(0.00078)	(0.00018)	(0.00104)
Amount bracket = 4	-0.00049***	0.00346***		0.01883***
	(0.00015)	(0.00075)		(0.00099)
Macroprudential regime = 3, Policy	-0.00072***	-0.00201**	-0.00186***	-0.00305**
implementation # Amount bracket 2	(0.00018)	(0.00097)	(0.00031)	(0.00148)
Macroprudential regime = 3, Policy	-0.00054***	-0.00164	-0.00356***	-0.00765***
implementation # Amount bracket 3	(0.00021)	(0.00101)	(0.00032)	(0.00145)
Macroprudential regime = 3, Policy	-0.00044**	-0.00304***		-0.01910***
implementation # Amount bracket 4	(0.00021)	(0.00100)		(0.00135)
Other controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	8,509	7,852	6,595	19,321
R-squared	0.38199	0.40234	0.29405	0.35256
Banks FE	Yes	Yes	Yes	Yes

0.382

36677

0.402

21497

0.294

26077

0.353

38513

Table i. 4 Loan amount interaction

R2

Likelihood

ii. Payment discipline results

Table ii. 1 Baseline model

	Mortgage loans	First Home	Secured	Unsecured
			consumer loans	consumer loans
No policy	_	_	_	-
Macroprudential regime = 2,	0.472***	0.620***	-0.137*	0.238***
Announcement period	(0.123)	(0.128)	(0.081)	(0.009)
Macroprudential regime = 3,	0.804***	0.780***	0.891***	0.179***
Policy implementation	(0.103)	(0.115)	(0.073)	(0.008)
FC denominated loan	0.685***	3.821***	0.687***	0.528***
	(0.193)	(0.440)	(0.131)	(0.019)
Interest rate	0.334***	1.223***	0.209***	0.058***
	(0.039)	(0.056)	(0.020)	(0.002)
Maturity	0.020**	-0.030***	0.005	-0.040***
	(0.008)	(0.009)	(0.004)	(0.001)
Amount outstanding	0.003***	0.002***	0.002***	0.002***
	(0.000)	(0.001)	(0.000)	(0.000)
DSTI	0.413***	0.475***	0.276***	0.282***
	(0.057)	(0.054)	(0.028)	(0.004)
Unregistered	-	-	-	-
<0,5*Medium wage	-0.927***	-0.716***	-0.435***	-0.311***
	(0.186)	(0.196)	(0.091)	(0.011)
[0,5* Medium wage - Medium	-1.241***	-0.969***	-0.931***	-1.034***
wage)	(0.155)	(0.169)	(0.072)	(0.011)
> Medium wage	-1.972***	-1.557***	-1.473***	-1.733***
	(0.131)	(0.148)	(0.064)	(0.012)

Bank FE	Yes	Yes	Yes	Yes
# Quarters since origination FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year of observation FE	Yes	Yes	Yes	Yes

Observations	173,062	439,292	259,048	5,278,809
Pseudo R2	0.146	0.111	0.0932	0.115
Likelihood	-3366	-3636	-12036	-421427
ROC	0.8185	0.8135	0.7579	0.751

	Mortgage loans
Self regulation period - FC	0.644*
denominated	(0.376)
Macroprudential regime $= 2$,	0.969**
Announcement period - RON	
denominated	(0.401)
Macroprudential regime $= 2$,	0.940**
Announcement period - FC	
denominated	(0.395)
Macroprudential regime $=$ 3,	0.729*
Policy implementation -	
RON denominated	(0.384)
Macroprudential regime $=$ 3,	1.413***
Policy implementation - FC	
denominated	(0.386)

Table ii. 2 Currency of denomination interaction model

Loan controls	Yes
Borrower controls	Yes
Bank FE	Yes
# Quarters since origination	
FE	Yes
County FE	Yes
Year of observation FE	Yes

Observations	174,289
Pseudo R2	0.131
Likelihood	-3430

	Mortgage loans	First Home	Secured consumer	Unsecured
			Ioans	consumer toans
Macroprudential regime = 1, No	0.000	0.000	0.000	0.000
policy- Unregistered	(0.000)	(0.000)	(0.000)	(0.000)
Macroprudential regime = 1, No	-0.935***	-0.404	-0.671***	-0.305***
policy- <0,5*Medium wage	(0.239)	(0.292)	(0.126)	(0.015)
Macroprudential regime = 1, No policy- [0,5* Medium wage -	-1.343***	-0.975***	-1.038***	-1.069***
Medium wage)	(0.231)	(0.292)	(0.117)	(0.015)
Macroprudential regime = 1, No	-1.788***	-1.491***	-1.555***	-1.767***
poncy- > Medium wage	(0.190)	(0.264)	(0.099)	(0.018)
Macroprudential regime = 2, Announcement period-	0.748***	0.717**	-0.080	0.252***
Unregistered	(0.203)	(0.317)	(0.148)	(0.017)
Macroprudential regime = 2, Announcement period-	-0.418	0.055	-0.944***	-0.107***
> Medium wage	(0.265)	(0.307)	(0.181)	(0.017)
Macroprudential regime = 2 ,	-1.111***	-0.105	-1.218***	-0.800***
Medium wage - Medium wage)	(0.292)	(0.293)	(0.189)	(0.019)
Macroprudential regime = 2 ,	-1.539***	-0.946***	-1.621***	-1.504***
Announcement period-	(0.237)	(0.283)	(0.144)	(0.023)
Macroprudential regime = 3 ,	0.687***	0.979***	0.698***	0.143***
Policy implementation -	(0.100)		(0.100)	
Unregistered	(0.193)	(0.268)	(0.109)	(0.015)
Macroprudential regime = 3 , Policy implementation-	-0.060	0.033	0.462***	-0.148***
<0,5*Medium wage	(0.237)	(0.290)	(0.125)	(0.015)
Macroprudential regime = 3, Policy implementation- [0.5*	-0.130	-0.060	-0.131	-0.839***
Medium wage - Medium wage)	(0.214)	(0.272)	(0.113)	(0.016)
Macroprudential regime = 3,	-1.269***	-0.569**	-0.707***	-1.534***
Medium wage	(0.209)	(0.251)	(0.108)	(0.019)

Table ii. 3 Income category interaction model

Loan controls	Yes	Yes	Yes	Yes
Borrower controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
# Quarters since origination FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year of observation FE	Yes	Yes	Yes	Yes
Observations	173,062	439,292	259,048	5,278,809
Pseudo R2	0.148	0.112	0.0938	0.115
Likelihood	-3359	-3633	-12028	-421409