# NATIONAL BANK OF ROMANIA

The asymmetric effects of borrower-based

measures on access to finance and default

Radu Popa, Simona Ichim,   Alexie Alupoaiei, Florian Neagu

*The opinions expressed in this paper/presentation are those of the authors and do not necessarily reflect the views of the National Bank of Romania.*
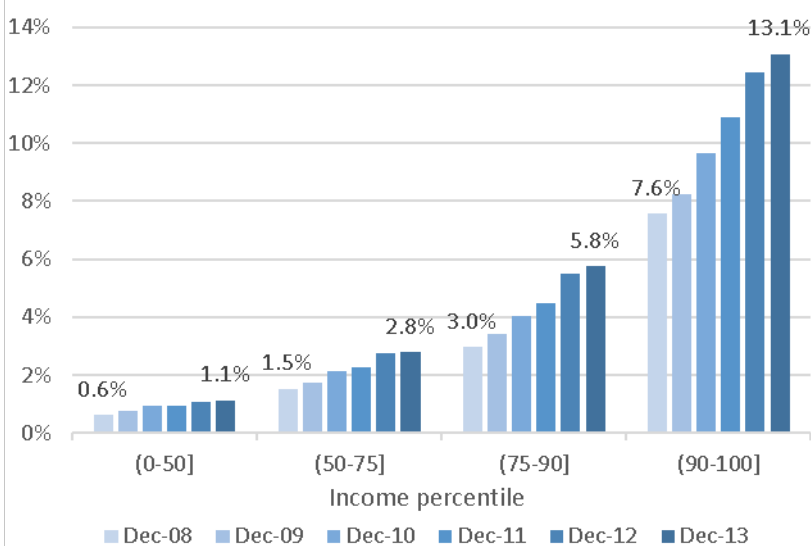
# Background information

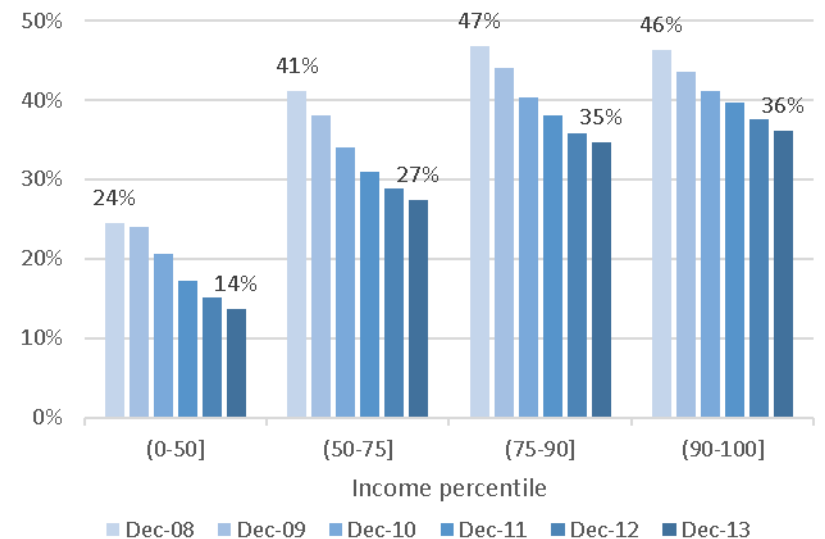# Romania has a rich history of macroprudential measures
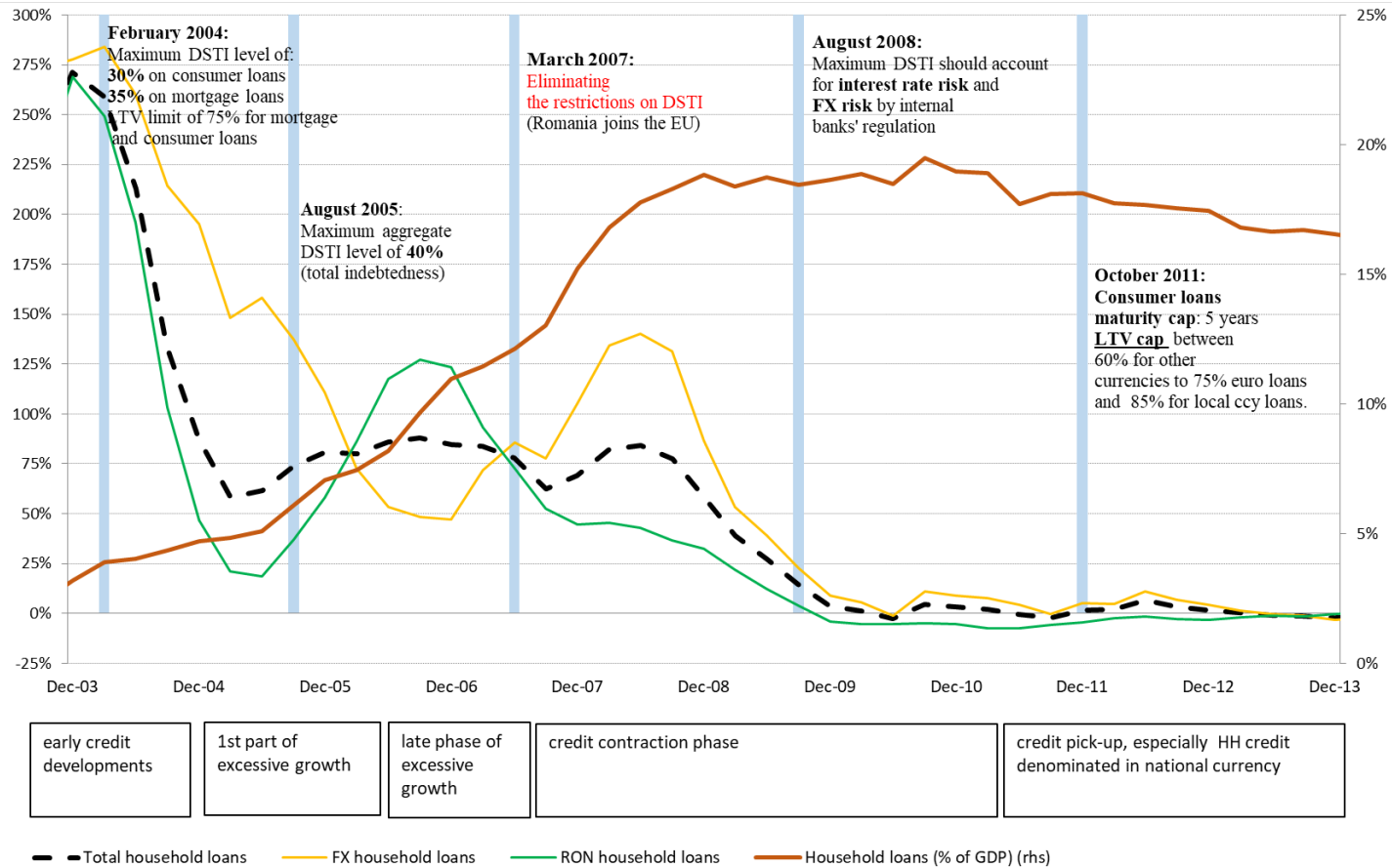


Source: National Bank of Romania, own calculations

# Access to finance differs greatly between income groups and types of credit

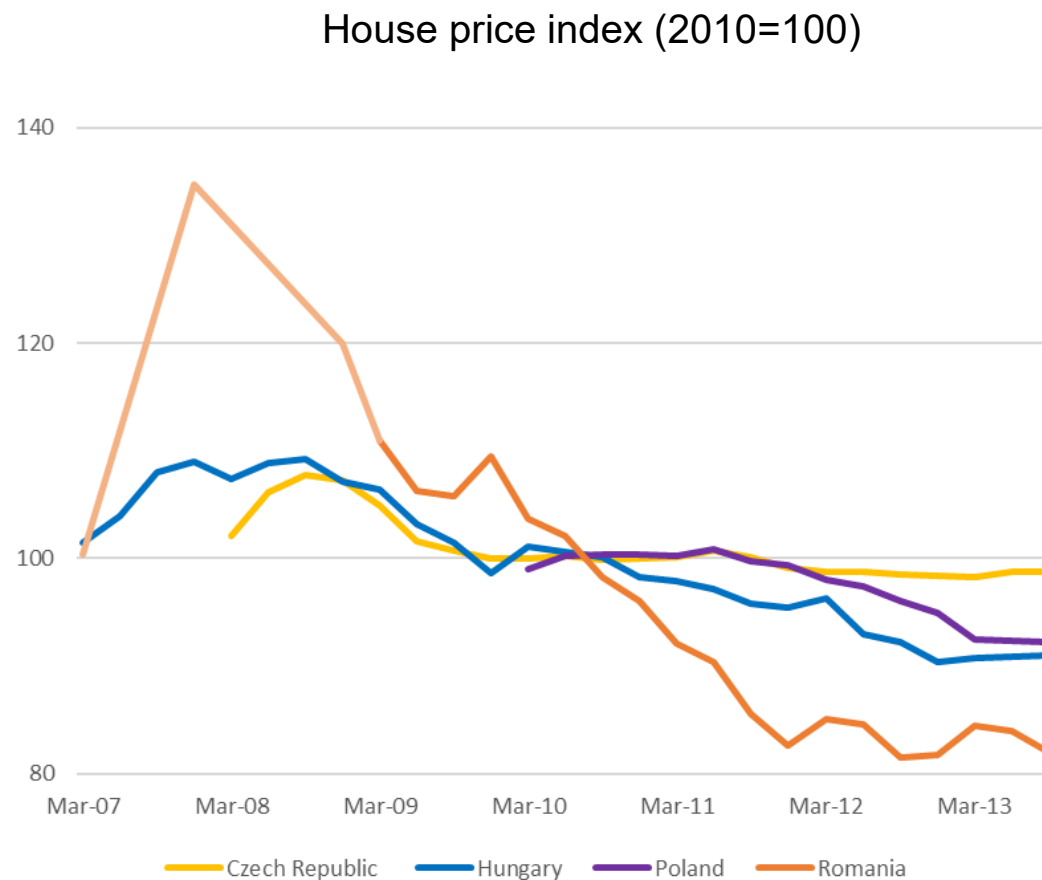### Distribution of debtors with mortgage loans by income percentile



### Distribution of debtors with consumer loans by income percentile



Source: Ministry of Finance, National Bank of Romania, Credit Bureau, own calculations
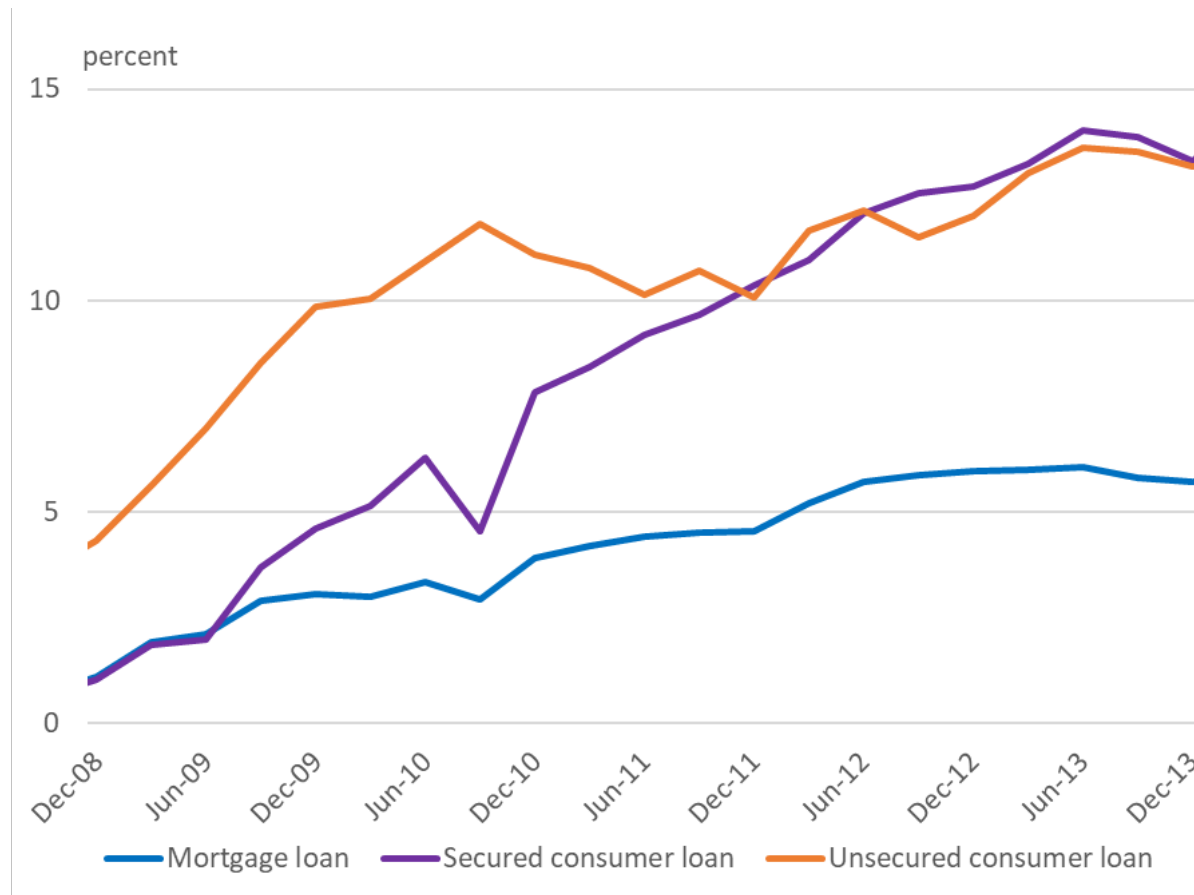
NATIONAL BANK OF ROMANIA

# House prices fell significantly in the aftermath of the Global Financial Crisis

## House price index (2010=100)



Source: Eurostat, NIS, own calculations

# Combined with a deteriorating macroeconomic environment, NPL rates increased significantly



Source: National Bank of Romania

# Motivation and literature review

# Motivation

- In this context, and following the *Recommendation of the European Systemic Risk Board on lending in foreign currency*, the National Bank of Romania decided to tighten credit standards in order to limit new lending in foreign currency and improve household resilience to future negative property shocks

- As a result, in October 2011, the *NBR Regulation number 24 regarding household loans* was implemented, with implementation starting in February 2012

# Motivation

- In order to protect debtors from future house price depreciations and to reduce the foreign currency risk, a currency-differentiated LTV limit was implemented:

  – 85% for leu-denominated mortgage loans;

  – 80% for foreign currency-denominated housing loans to hedged borrowers;

  – 75% for EUR-denominated housing loans to unhedged borrowers, and

  – 60% for housing loans in other currencies extended 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.

# Literature

- Extensive evidence shows that borrower-based macroprudential policies are effective in moderating the amplitude of credit and asset price cycles

- First generation – panel country-level data using macroprudential index to measure efficiency / impact ((Claessens et al. (2013), Cerutti et al. (2015))

- Alam et al. (2019) use a propensity-score-based method to address endogeneity concerns and control for calibration of the LTV.

- Macroprudential instruments may have welfare costs, such as restricting access to credit and could slow down economic growth in the short run (Richter et al., 2019).

# Literature

- Papers using micro data find larger impact of macroprudential policies due to stronger identification power provided by micro-level data (Araujo et al. (2020))

- Many papers using granular data have found a stronger impact on access to finance of borrower-based measures on low income debtors (Acharya et al. (2019), Peydro et al (2020)) or on high-income debtors (Kinghan et al. (2019) ) .

- Borrower-based macroprudential tools have an impact on mortgage loan size and property location (Tzur-Ilan (2020) , Hodula et al. (2022) )

- Papers with administrative level  are able to link access to finance, household wealth and resilience to negative shocks (Van Bekkum al. (2019) Aastveit et al (2020))

# Literature

- Neagu et al. (2015), use 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

- Epure et al. (2018) study the impact of macroprudential policies in Romania 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.

# Contribution to literature

- We focus on the implications of borrower-based measures, bringing to light their asymmetric effects depending on borrower (income, age) and loan characteristics (amount, currency)

- We focus on both the extensive margin (number of loans issued) and intensive margin (by controlling for loan amount intervals)

- We utilize a granular debtor-based dataset which combines information regarding loan characteristics with income data from the Ministry of Finance.

- By merging the two datasets we are able to control for changes in household financial health, demand for loans and bank characteristics

# Main results – Access to finance

- The reinstatement of hard-LTV limits in 2011 boosted lending in local currency and did not impede access to finance for medium and low-income borrowers, while reducing the flow of loans to high-income borrowers, as well as those with higher amounts

- The maturity cap for consumer loans led to the strongest reduction in terms of access to finance for higher income debtors, as well those who contracted larger loans.

- Both measures supported lending in domestic currency, while discouraging foreign currency denominated loans, supporting household resilience

# Main results – Probability of default

- Average probability of default increased for standard mortgage issued under the policy regime, due to foreign-currency denominated loans and middle-income debtors

- The probability of default for secured consumer loans increased significantly after the introduction of the maturity cap

- However the impact on the banking sector was mitigated by a significant reduction in the origination of secured consumer loans

- The probability of default for unsecured consumer loans was stable

# Data

# Data sources

- Central Credit Register – monthly frequency – covers loans above 20,000 lei (~4,000 Euros)
- Credit Bureau – monthly frequency – covers all loans
  - Information regarding loan characteristics: outstanding amount, currency of denomination, current interest rate, monthly debt service, residual maturity, month of origination, bank of origination
  - Borrower characteristics : age, gender, county of residence

- Ministry of Finance – yearly frequency – covers all households that pay income tax within a fiscal year

- Combine the three datasets using national identifier (CNP)

# Methodology

- Quarterly bank and loan type panel
- Dependent variable 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:

$$x_{i\,v\,r\,fx\,a\,v} = \beta_0 + \boldsymbol{\beta_1 Policy\ dummy} + \beta_2\ income\_cat_v + \\ \beta_3 age\_cat_r + \beta_4 currency_{fx} + \beta_5\ amount\_cat_a + \\ + \beta_6 gender_v + Bank\ FE \\ + Quarter\ FE$$

The dataset will be split into 2 periods

- No policy period - Q4 2010 – Q3 2011
- Policy period – Q2 2012 – Q1 2013

Announcement period( Q4 2011 – Q1 2012) excluded from estimations

# Example

- In Q2 2011, Bank X granted 552 loans in foreign currency with amounts between 30.000 Euros and 50.000 Euros to male debtors, with age between 30 and 35 years with income between the 75th and 90th percentile
- In 2011, there were, in total, 30.000 households with ages 30 and 35 years and incomes between the 75th and 90th percentile

$$x_{0\ p75\ 35yrs\ FX\ 50k\ Bank\ X\ Q_2} = \frac{552}{30000} = 1.8\%$$

- In Q4 2012, Bank X granted 375 loans in foreign currency with amounts between 30.000 Euros and 50.000 Euros to male debtors, with age between 30 and 35 years with income between the 75th and 90th percentile
- In 2012, there were, in total, 27.500 households with ages 30 and 35 years and income between the 75th and 90th percentile

$$x_{1\ p75\ 35yrs\ FX\ 50k\ Bank\ X\ Q_4} = \frac{375}{27500} = 1.36\%$$

# Methodology – Probability of default

- The second model we deploy is a logit model utilized to quantify the impact of the discussed macroprudential measures on default.

$$X_{i,t,j} = \alpha_0 + \alpha_1 * \boldsymbol{Policy\ dummy}_t + \alpha_2 * Income\ dummy_{i,t} +$$
$$+ \alpha_3 * Age_{i,t} + \alpha_4 * DSTI_{i,t,j} + \alpha_4 * Amount_{i,t,j}$$
$$+ \alpha_5 * Interest\ rate_{i,t,j} + \alpha_6 * Residual\ maturity_{i,t,j} +$$
$$\alpha_7 * Currency_j + \alpha_8 * \#\ quarters\ from\ origination_{i,t,j} +$$
$$Quarter\ of\ observation\ FE + Bank\ FE + County\ FE + \varepsilon_{i,t,j}$$

- 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
- The loan is monitored for 8 quarters, starting 1 year after the origination

# Results – Access to finance

# The introduction of the LTV limit led to a reduction of standard mortgage loan issuance
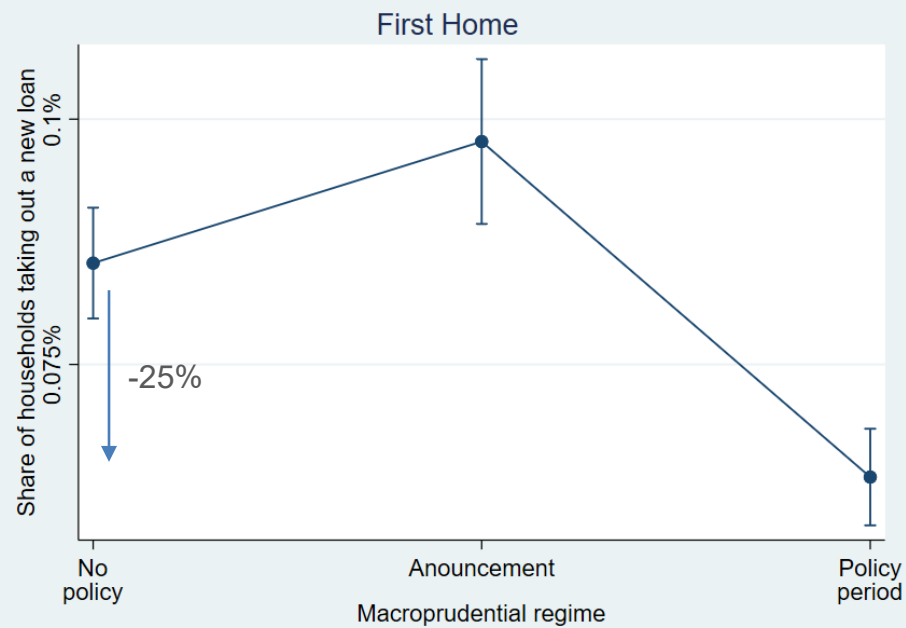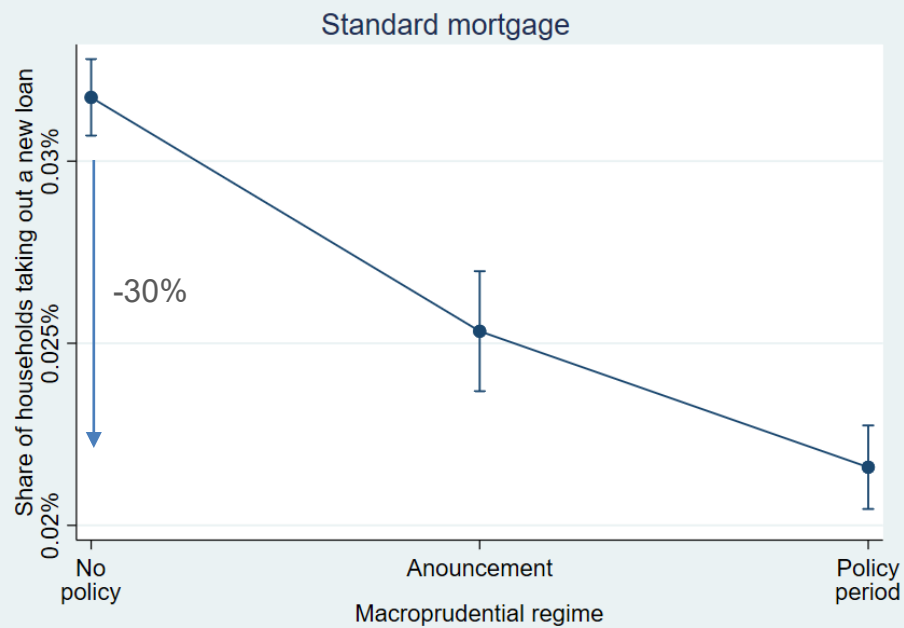
# The introduction of the maturity cap for consumer loans led to a significant reduction of loan originations
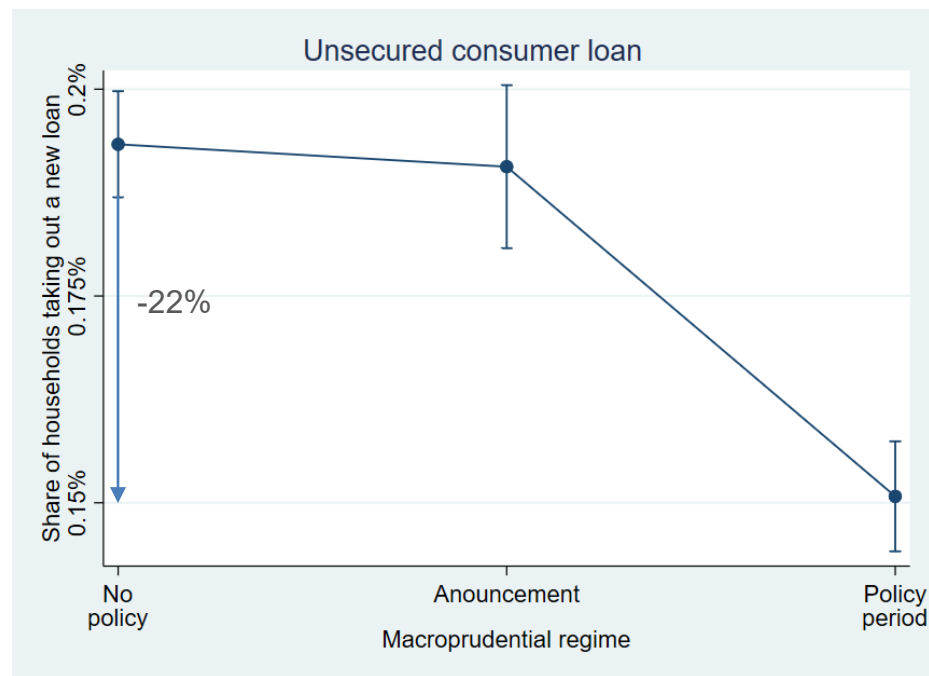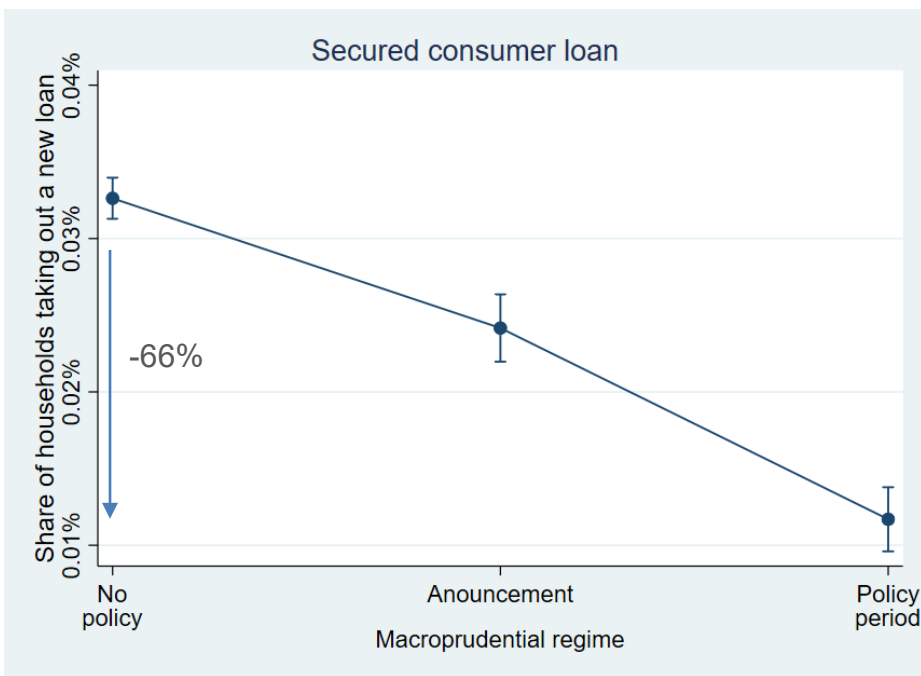
# The regulation was successful in bolstering lending in domestic currency and deterring loans in foreign currency
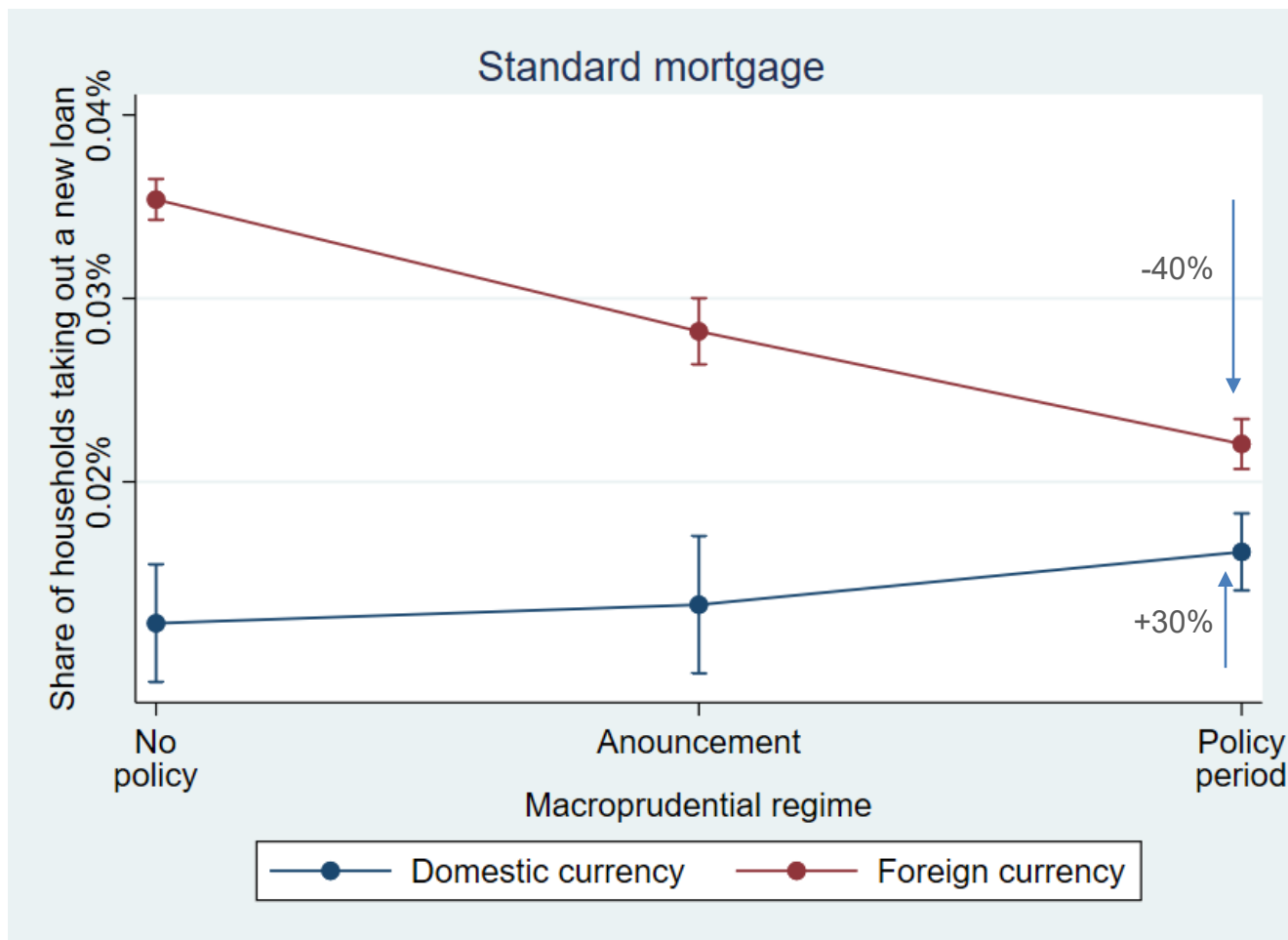
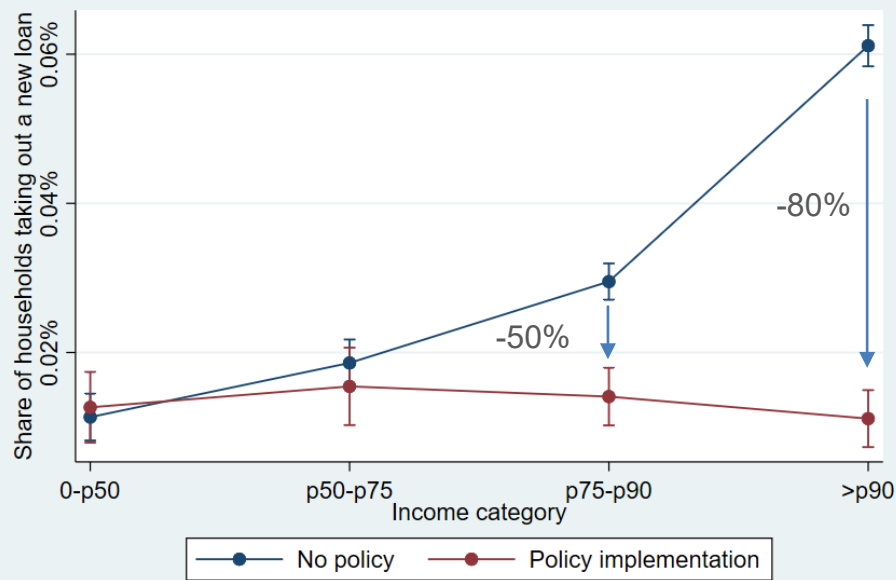# Loan issuance in foreign currency decreased in a more pronounced manner
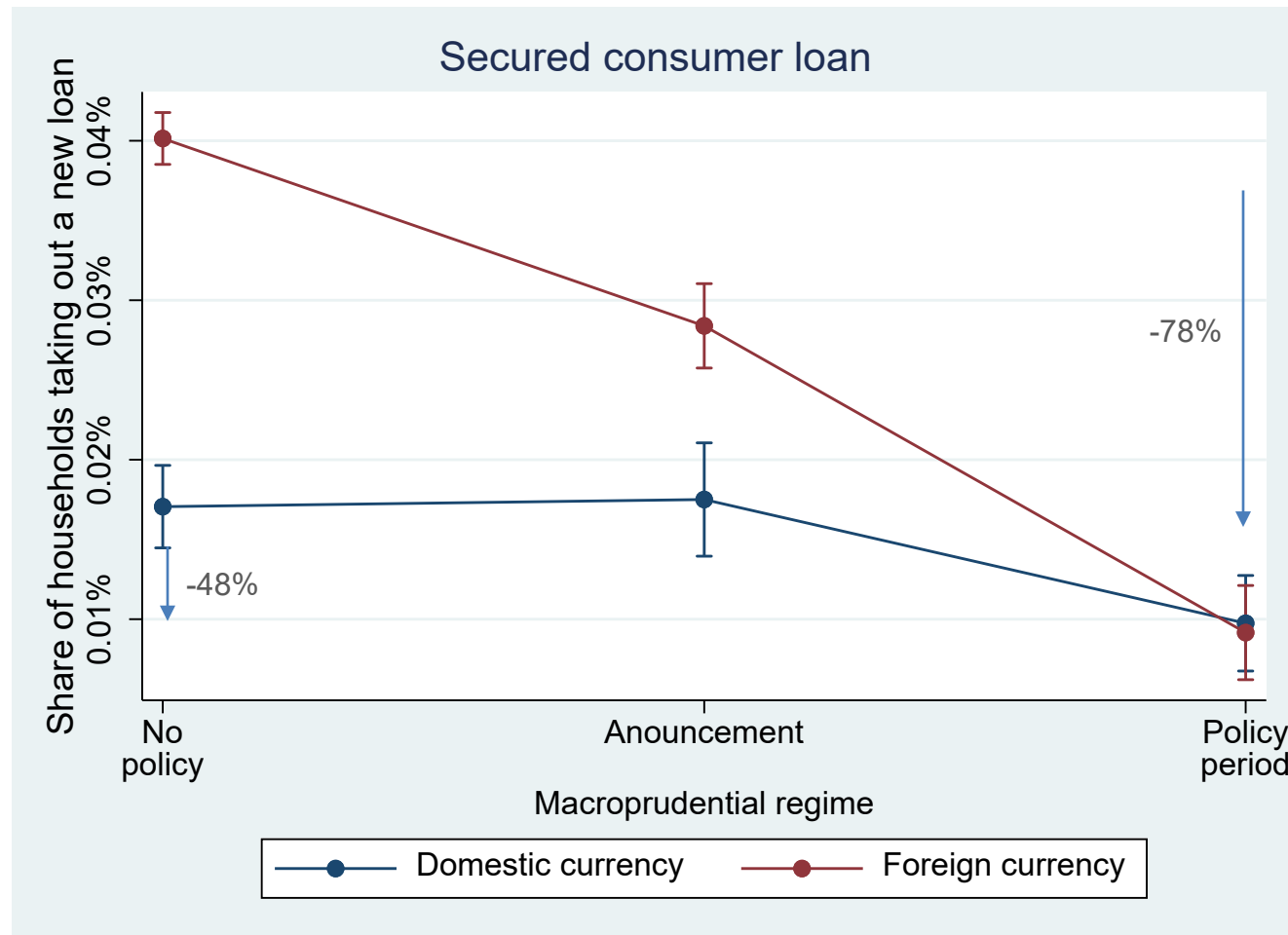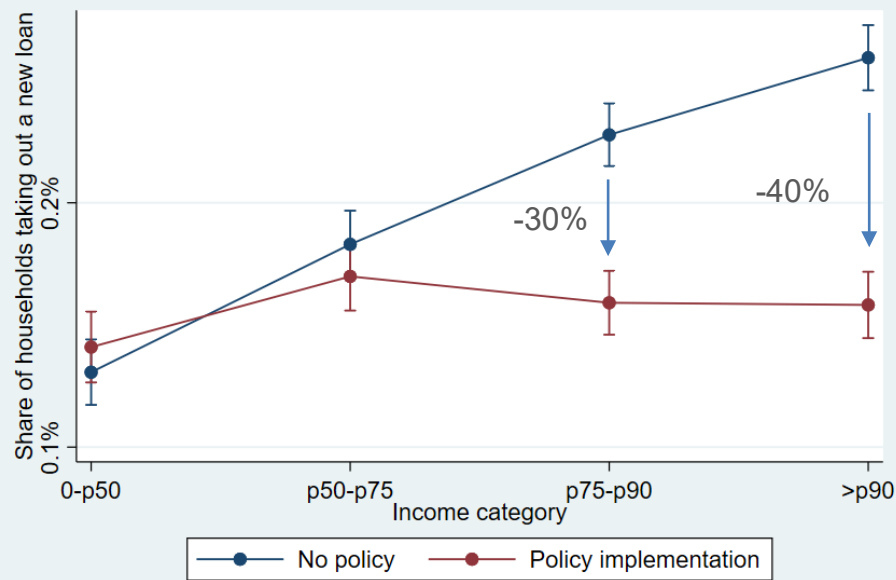
# High income debtors were most affected by the introduction of the LTV limit
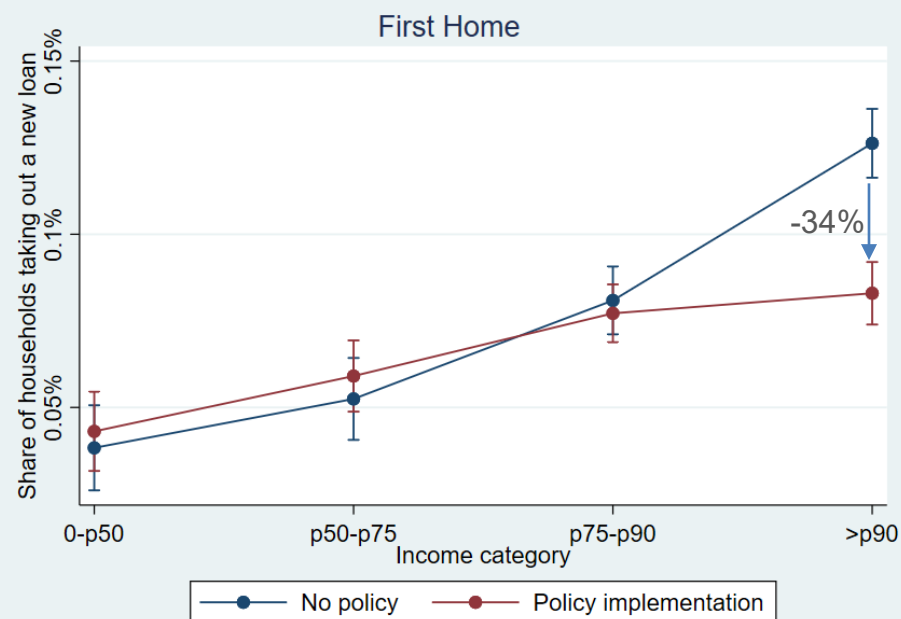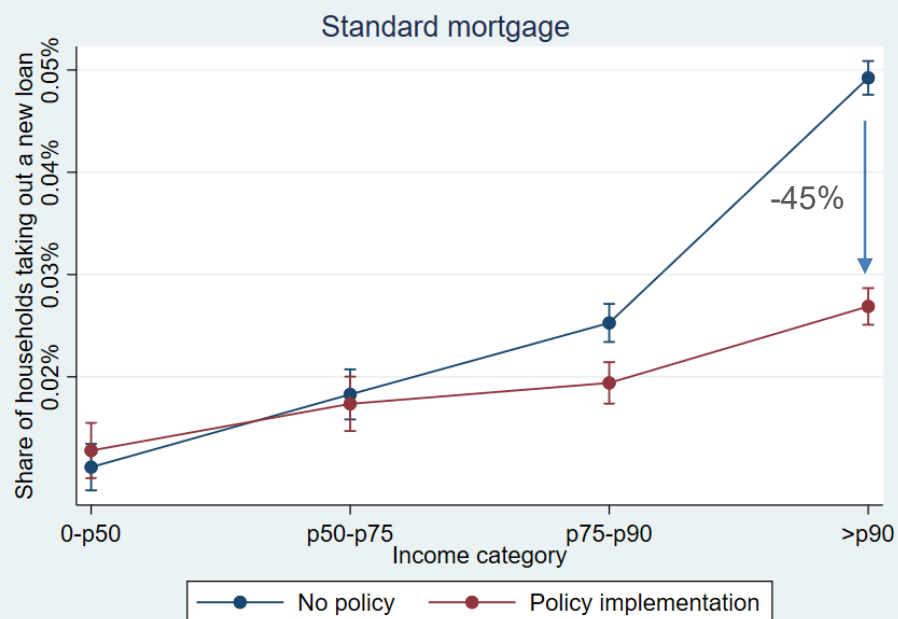
# Consumer loans granted to higher income debtors were the most impacted

# Results – Probability of default

# Probability of default for standard mortgage loans increased due to FC loans



Average probability of default by macroprudential regime and loan type
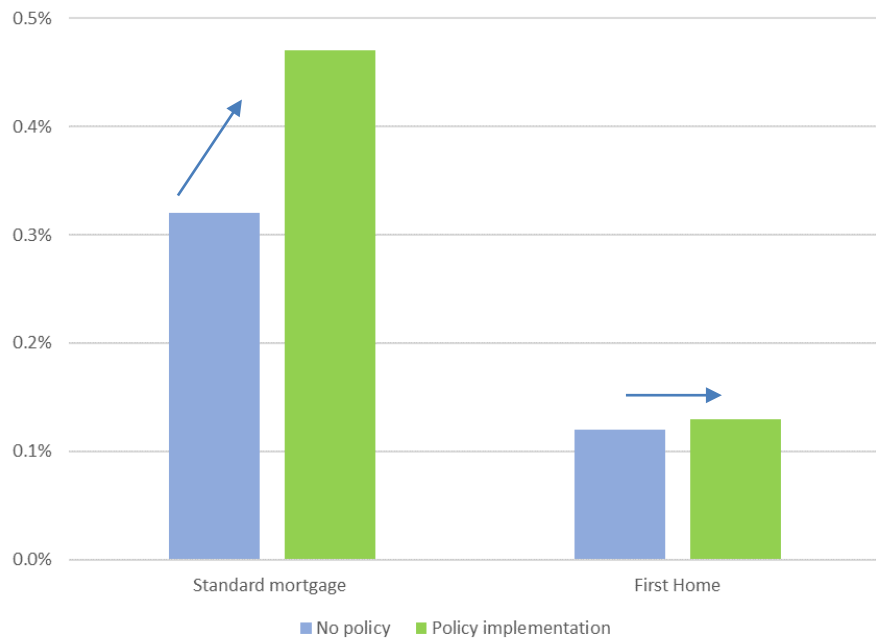
Average probability of default by macroprudential regime and currency
**Standard mortgage loans**

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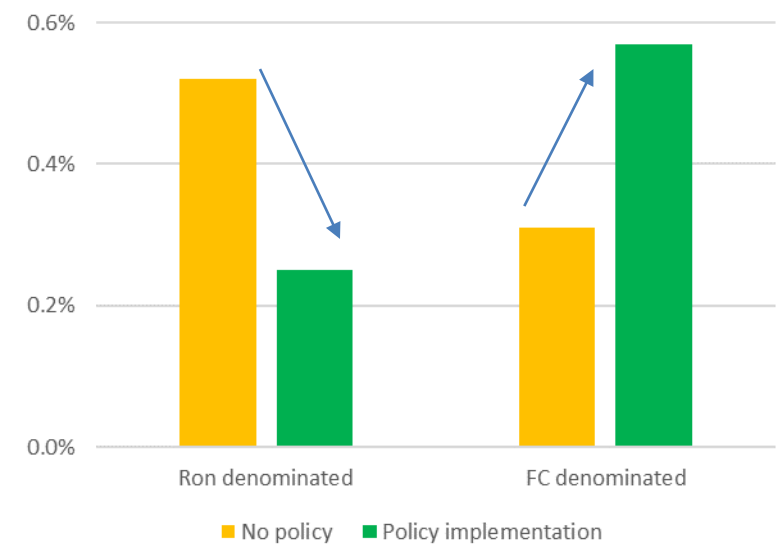
# ... as well as debtors in the middle income category

Average probability of default by macroprudential regime and income category                                       .
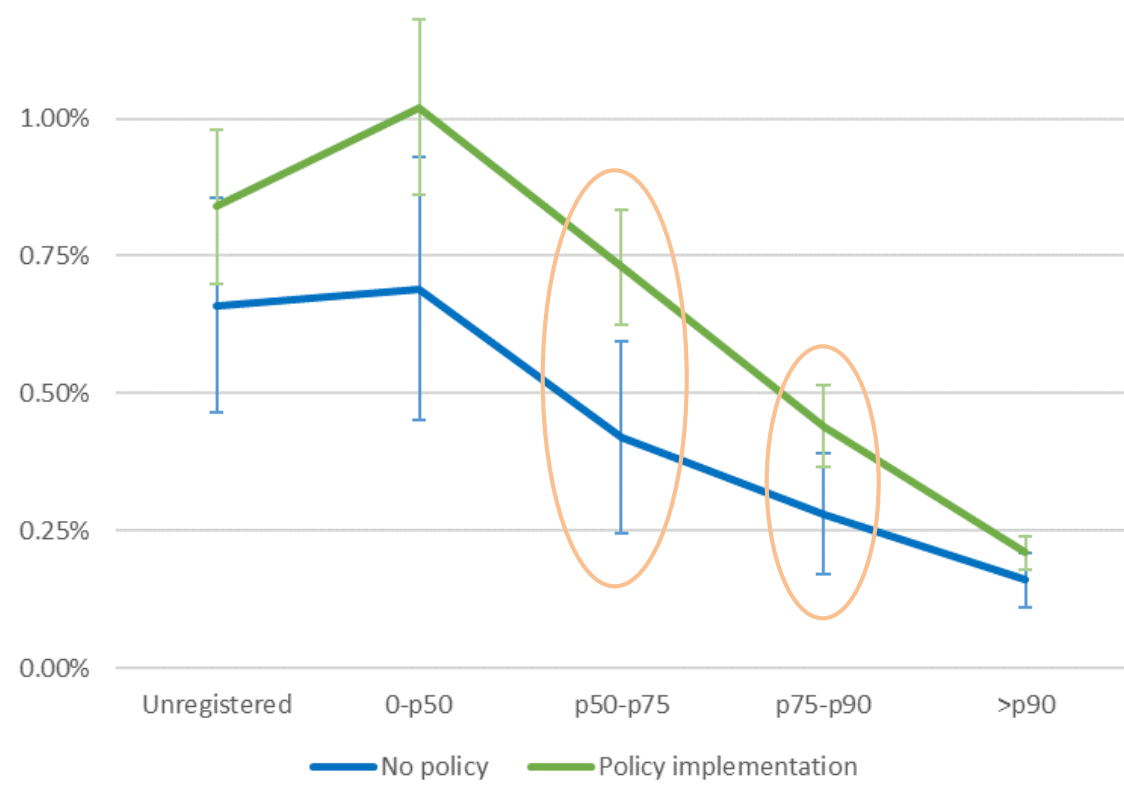
# The introduction of a maturity cap led to an increase in probability of default for secured consumer loans

Average probability of default by macroprudential regime and loan type



Legend: No policy | Policy implementation
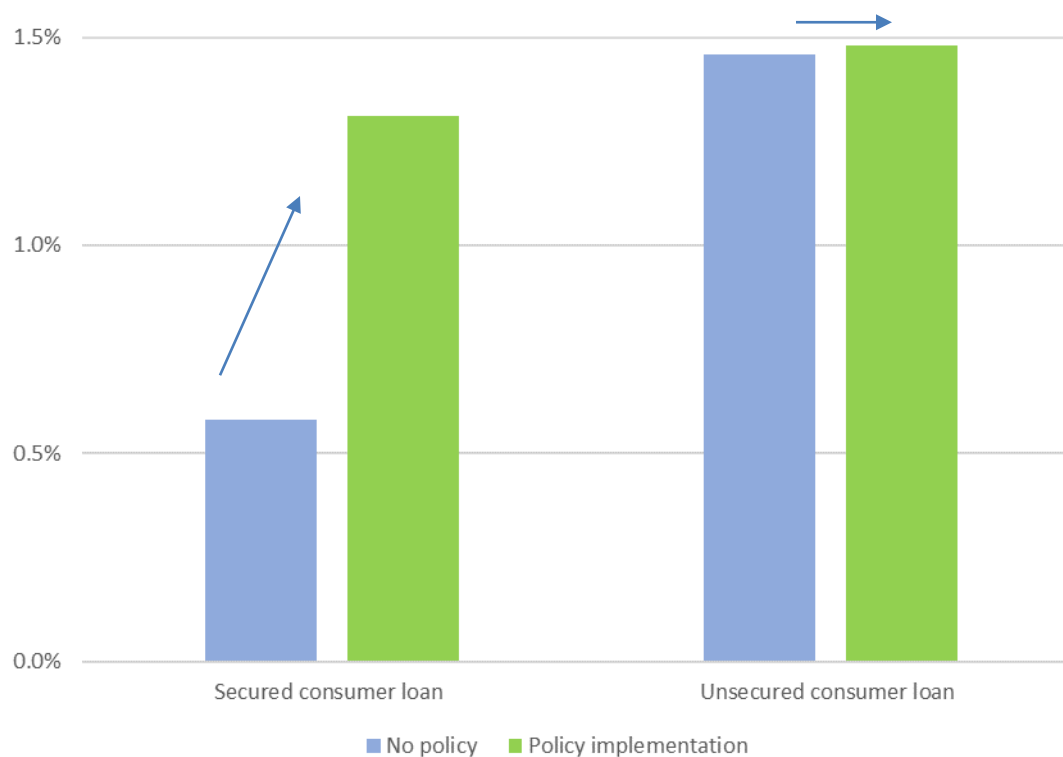
# … especially due to low-income debtors

Average probability of default by macroprudential regime and income category
Secured consumer loans
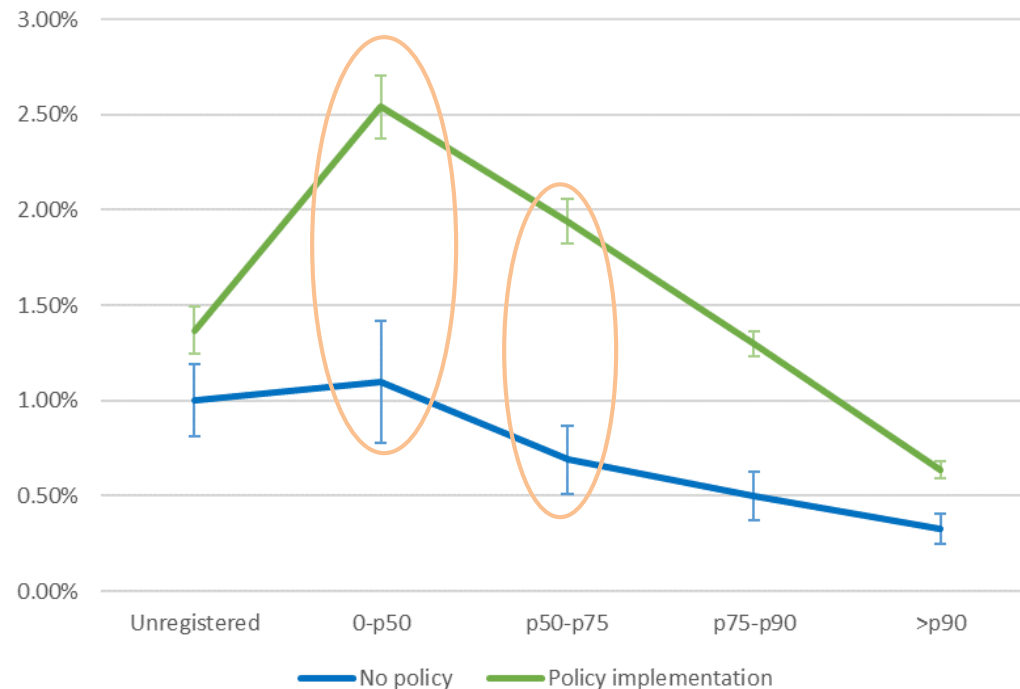
# Conclusions

- The reinstatement of hard-LTV limits in 2011 and maturity caps for consumer loans supported lending in local currency and did not limit access to finance for medium and low-income borrowers
- Loans with larger amounts, as well as those granted to higher income debtors, were affected to the greater extend by the regulation
- Foreign currency loans and middle-income debtors contributed to an increase in the average probability of default for standard mortgages during the policy period
- For secured loans, the higher probability of default was due mainly to low-income debtors.

# Thank you for your attention!

radu.popa@bnro.ro

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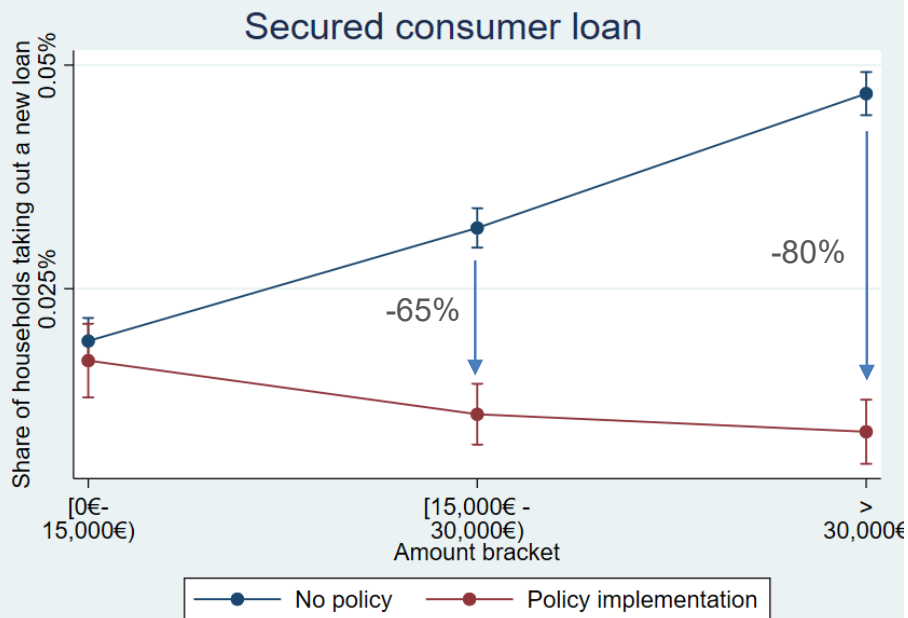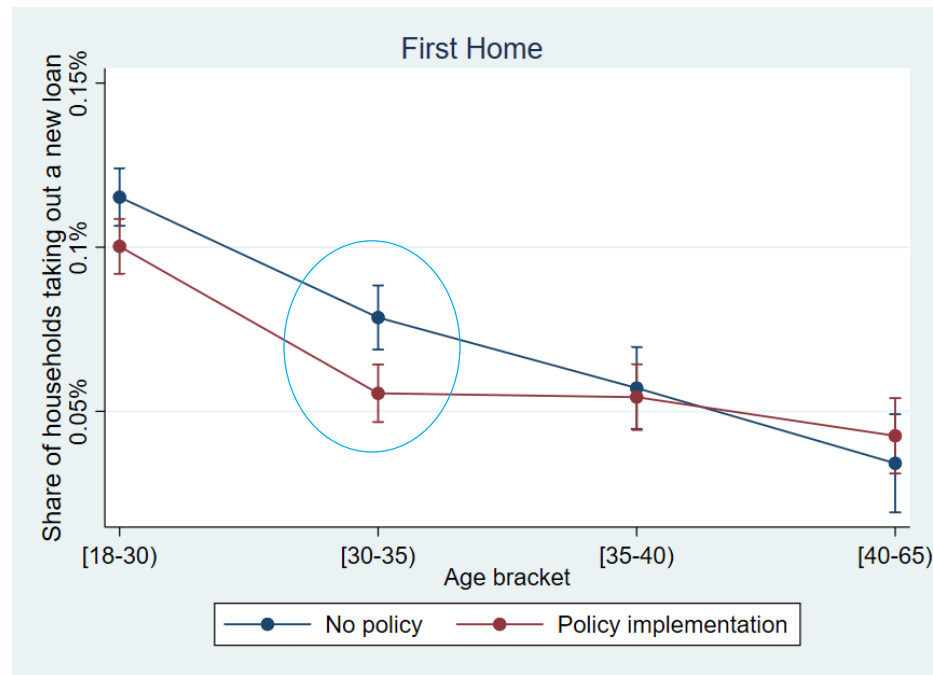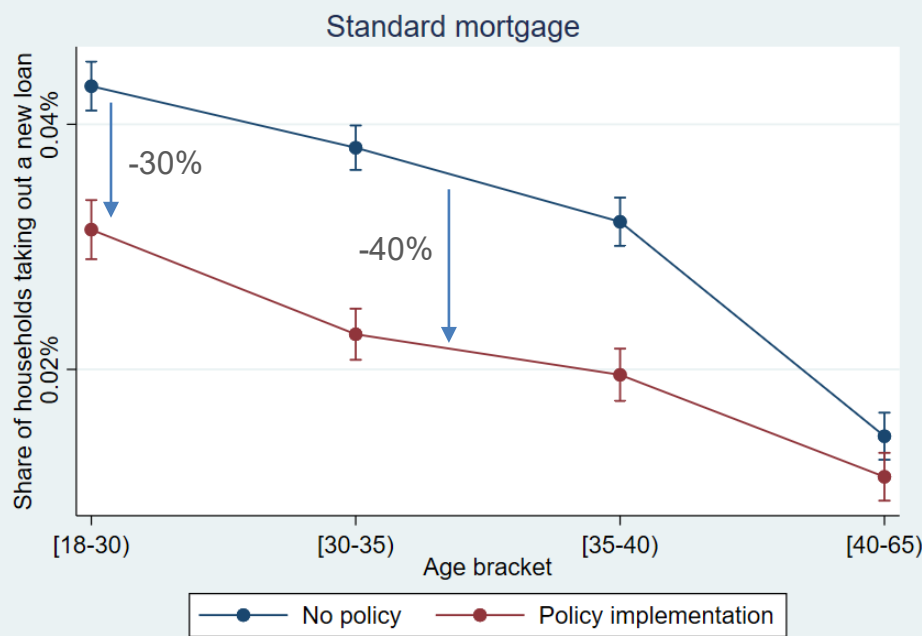
# Additional slides
Results

# Issuance of loans with larger amounts was impacted to a greater extent
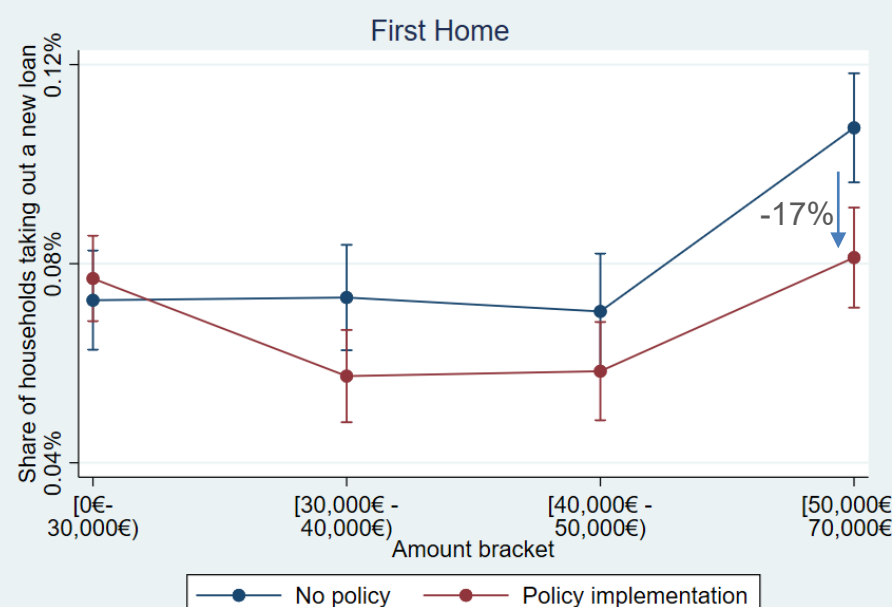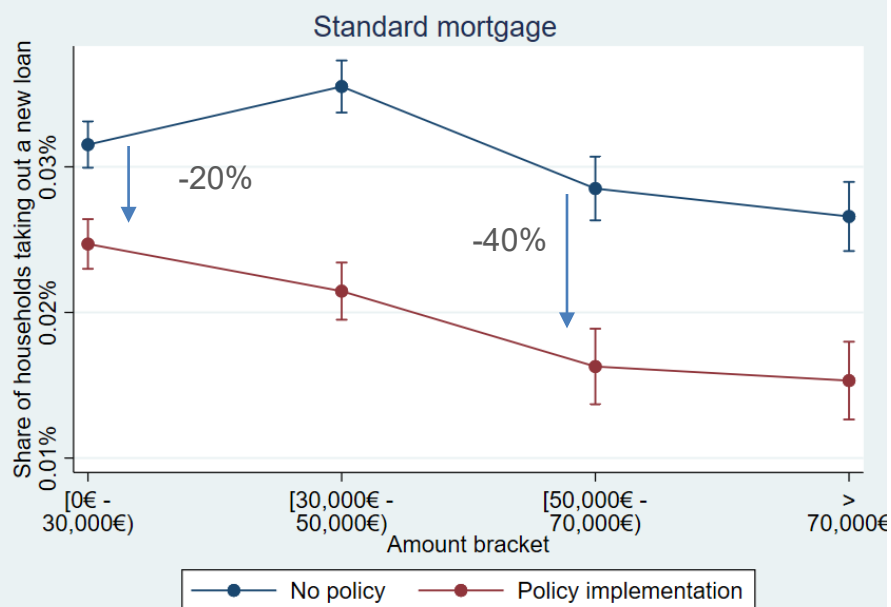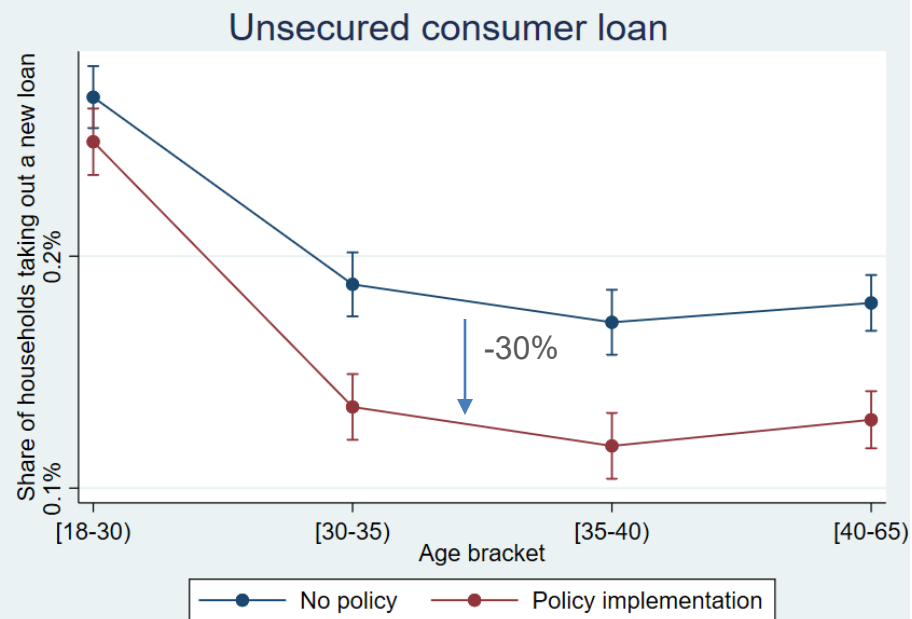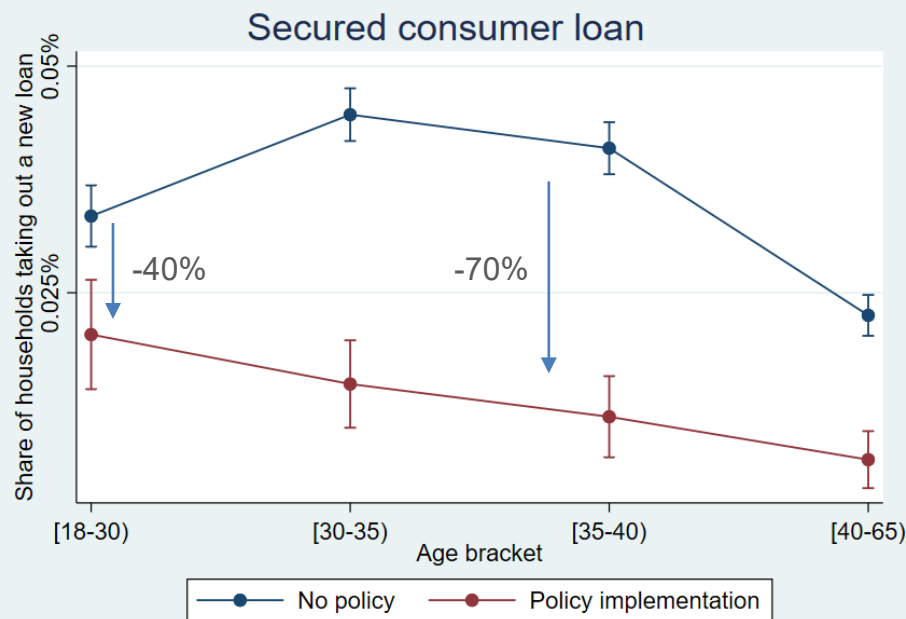
# The maturity cap significantly reduced the origination of consumer loans with larger amounts
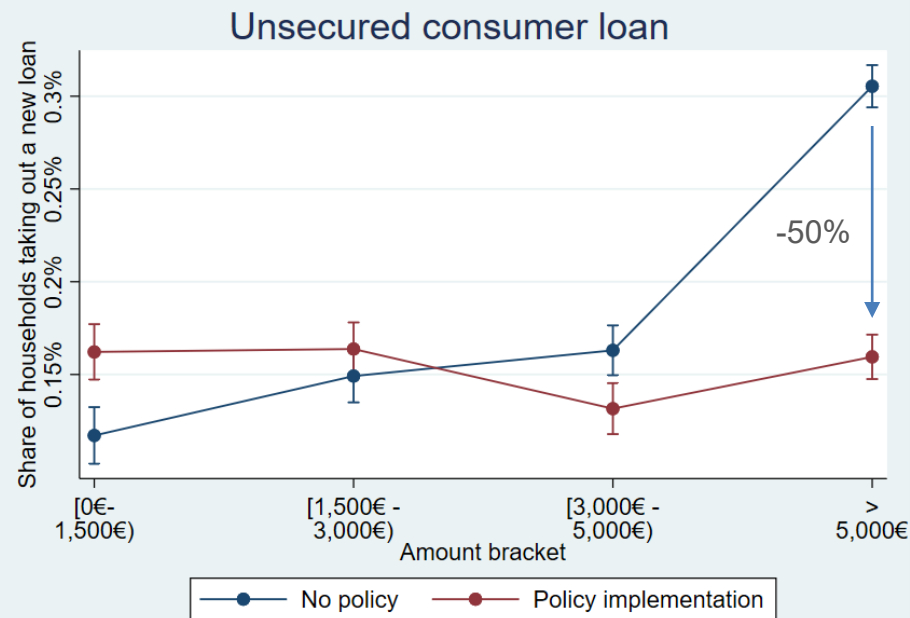
# Issuance of loans to debtors between 30 and 40 years old experienced the strongest reduction



National Bank of Romania

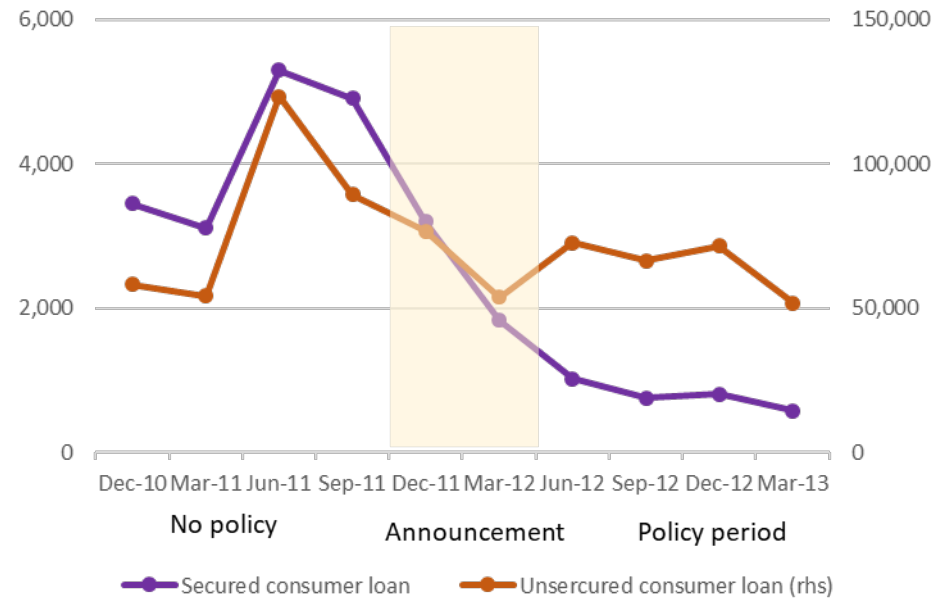# Access to finance for younger debtors was impacted to a lesser extent
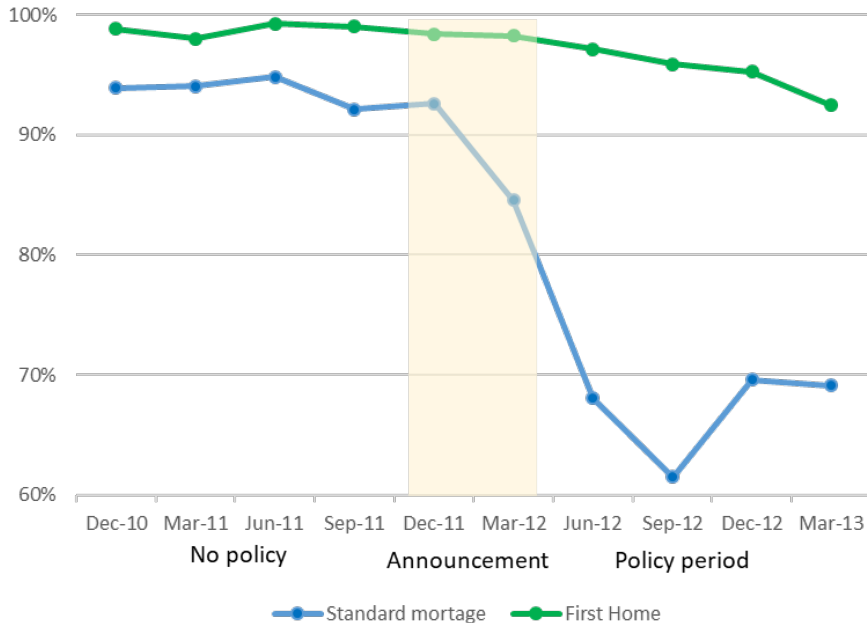
# Additional slides
# Data description

# Data description
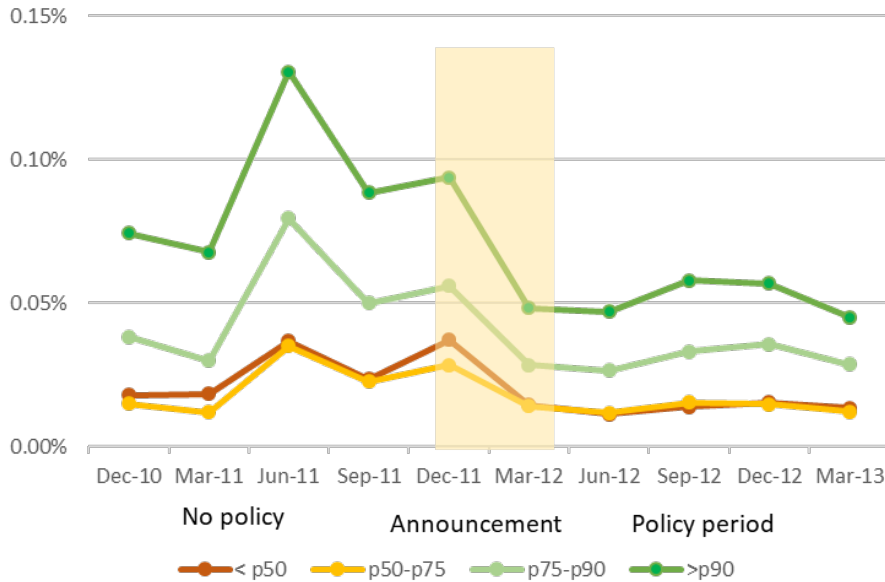
Number of new loans granted per quarter
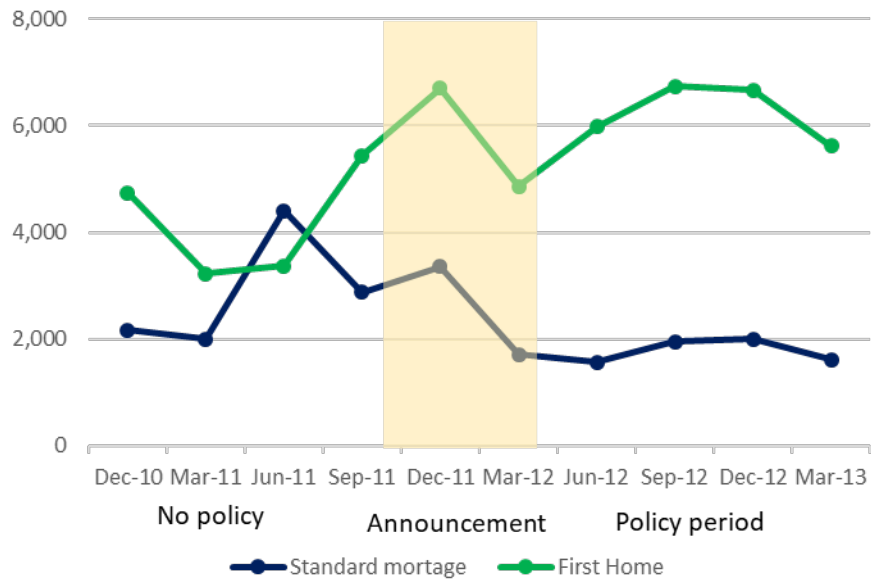
# Data description

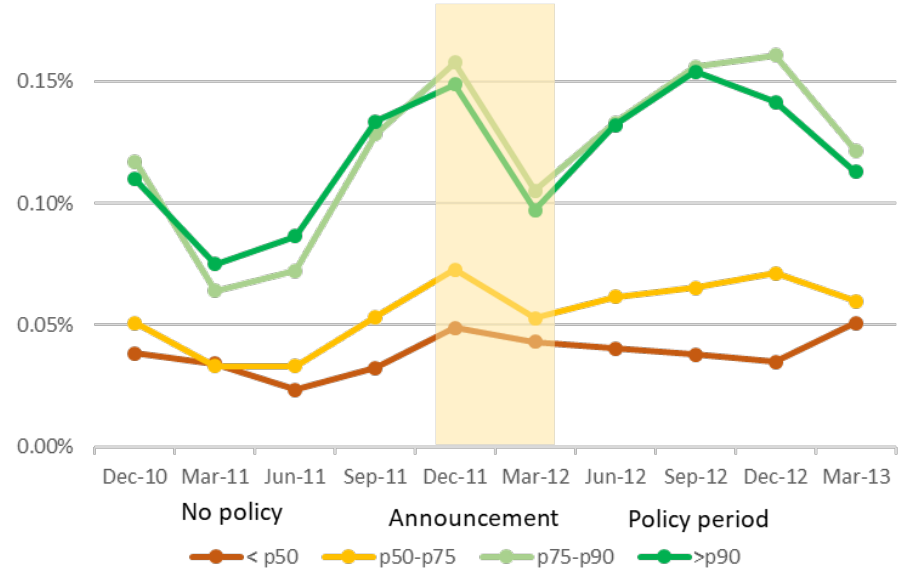## Share of foreign-currency denominated loans by quarter of origination and loan type
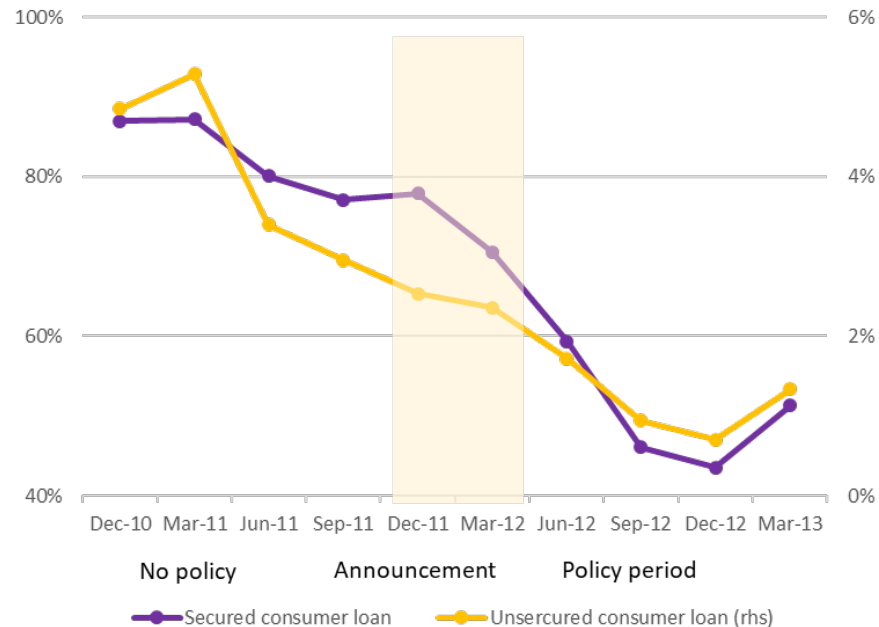
# Data description



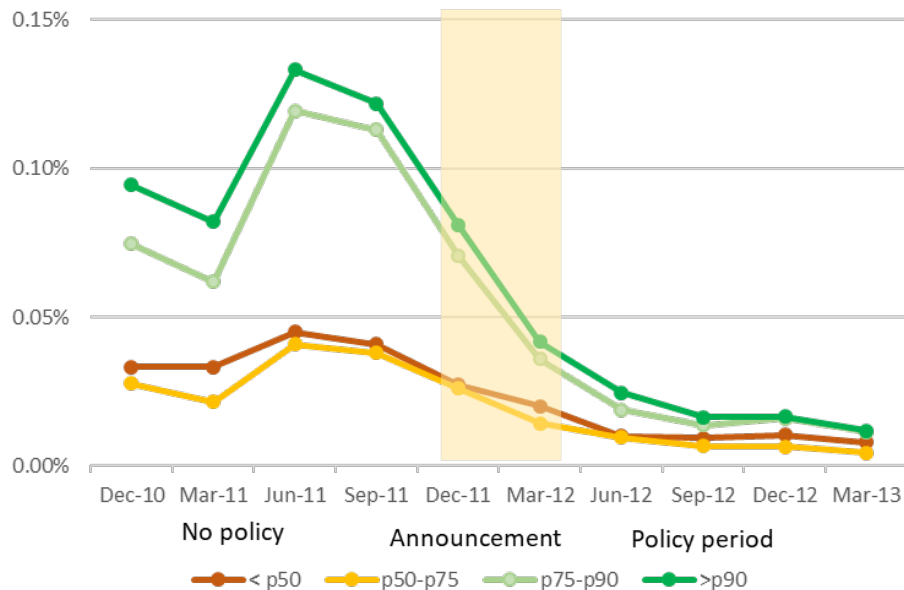Share of households with a new mortgage loan by income category

# Data description



Share of households with a new consumer loan by income category