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Determinants of household loan arrears in Central, Eastern and Southeastern Europe

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The views expressed are the authors and do not necessarily reflect those of the Oesterreichische Nationalbank

Motivation and contribution

Unsustainable debt has micro and macro consequences including

- welfare costs, credit costs, future credit constraint, non-monetary costs (social stigma)
- reduction of domestic credit supply, international propagation through funding markets

A substantial body of research – with a focus on the US – looks at the following questions:

- ✓ Which households get into repayment difficulties?
- ✓ Which loans get into repayment difficulties?
- ✓ What role do banks play for repayment difficulties?

This paper sheds light on the following questions:

- How do household, loan and bank level characteristics affect repayment difficulties?
- How do these three dimensions interact?
 - one of few studies covering several countries thus allowing cross-country comparisons,
 - first study covering a number of CESEE countries and analyzing the effect of FX loans on repayment difficulties



Bank branch data

- Regular survey of individuals in 6 EU Member States, 4 (potential) candidate countries
- Conducted by OeNB since 2007
- Representative sample of 1000 individuals in each country & wave, face-to-face interviews

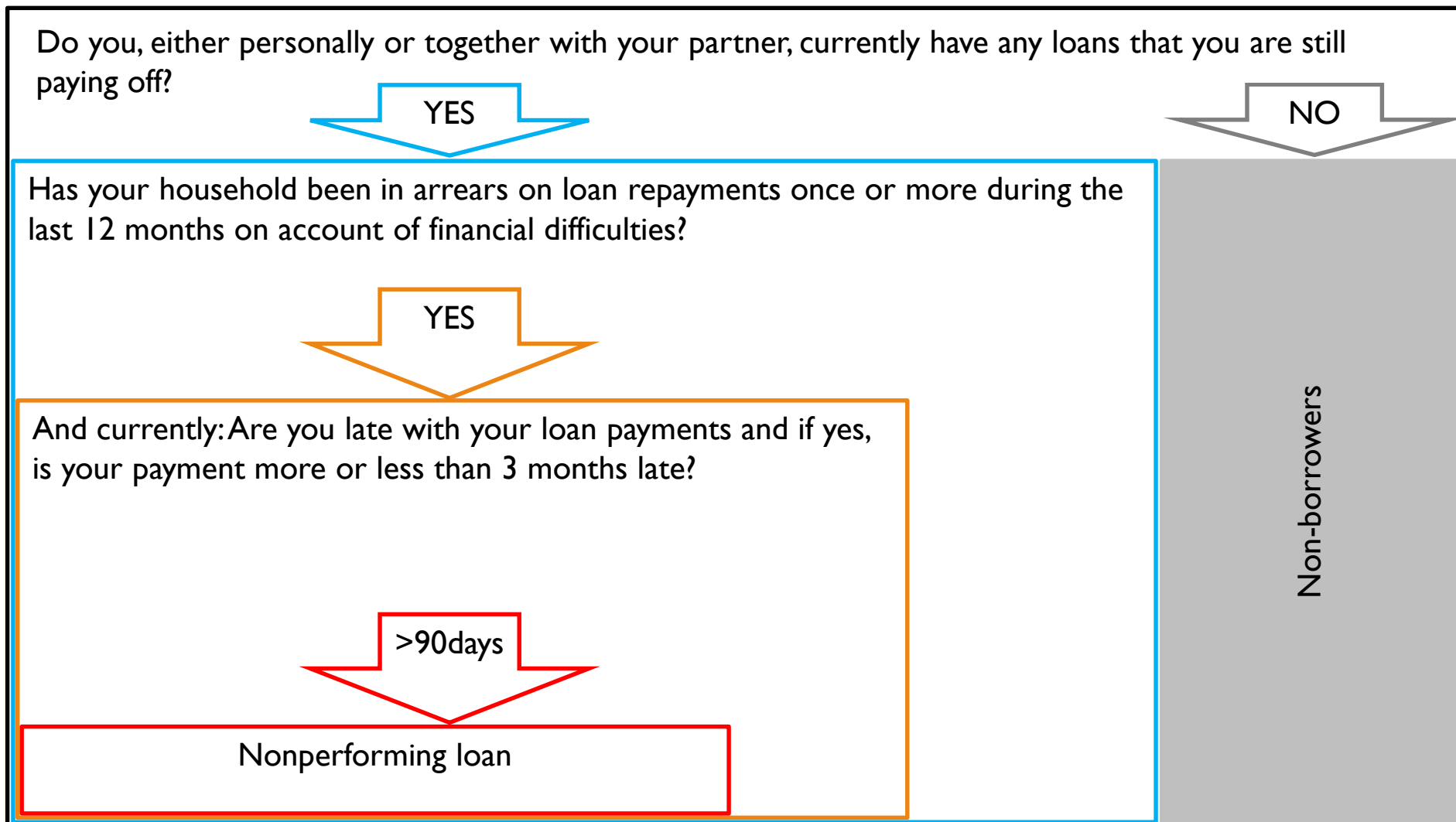
- Received from central banks for Albania, Hungary and Serbia, hand-collected for the seven other countries, geocoded at the street level
- Merge survey data with variables measuring bank proximity, concentration & credit supply

We use data from 2012-2016

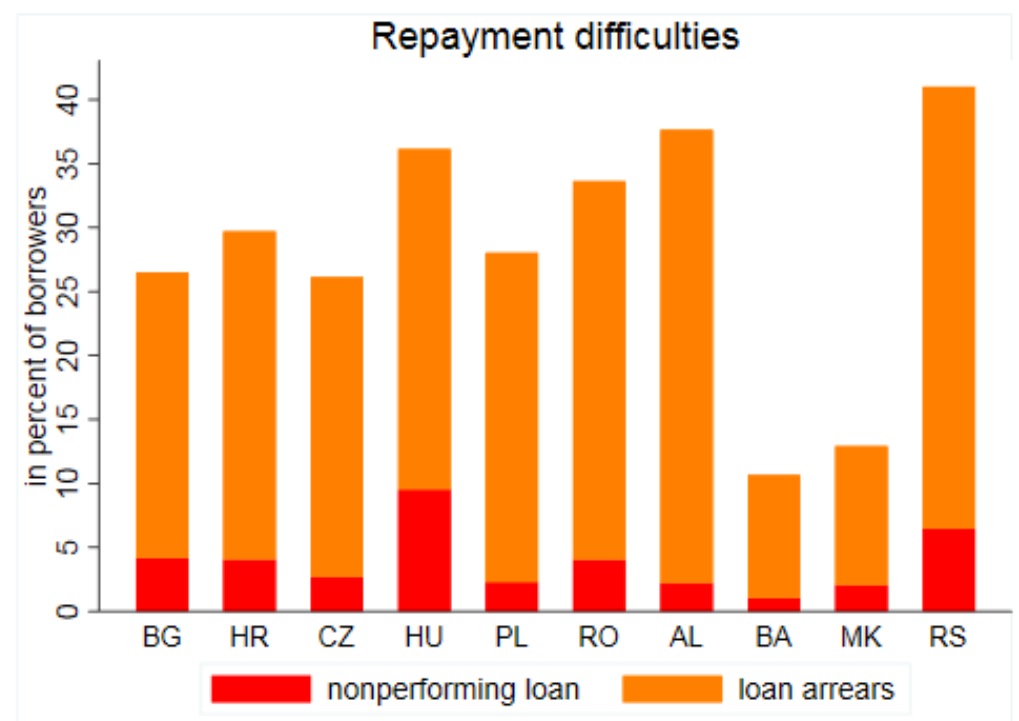
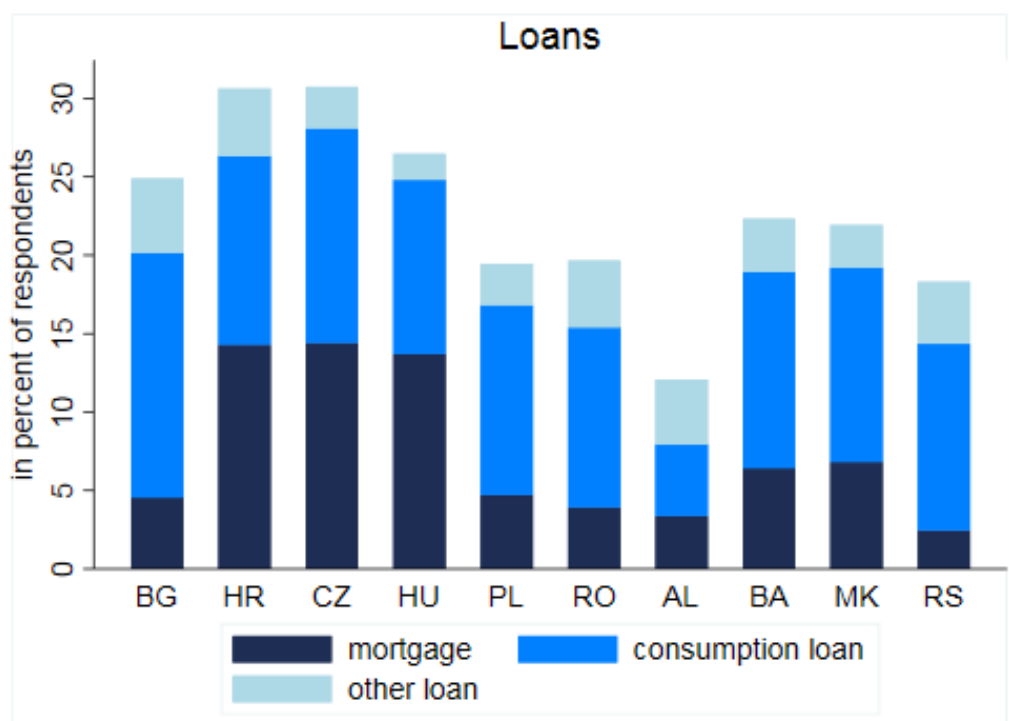
- Household level
- Loan level
- Bank level
- Geographic information allows combination with:
 - average night light as a proxy for local economic activity
 - Bank branch data



Definitions



Frequency of loans and repayment difficulties



Empirical strategy

1. Estimate probability that a borrower is in arrears:

$$P(A=1) = \Phi_A (X_A \beta_1 + L_A \beta_2 + B_A \beta_3 + u_A)$$

2. Estimate probability that a borrower in arrears has a nonperforming loan

$$P(NPL=1) = \Phi_{NPL} (X_{NPL} \beta_1 + L_{NPL} \beta_2 + B_{NPL} \beta_3 + u_{NPL})$$

where X household level controls

L loan level controls

B bank level controls

All estimations include a full set of country-wave fixed effects. Standard errors are clustered at the country-wave level.

Estimation results presented always include the full set of controls but in the interest of accessibility tables only present subsets.

Robustness analyses:

Heckman selection model

- 1) Estimate probability that respondent has a loan:

$$P(L=1) = \Phi_L (X_L \beta_L + u_L)$$

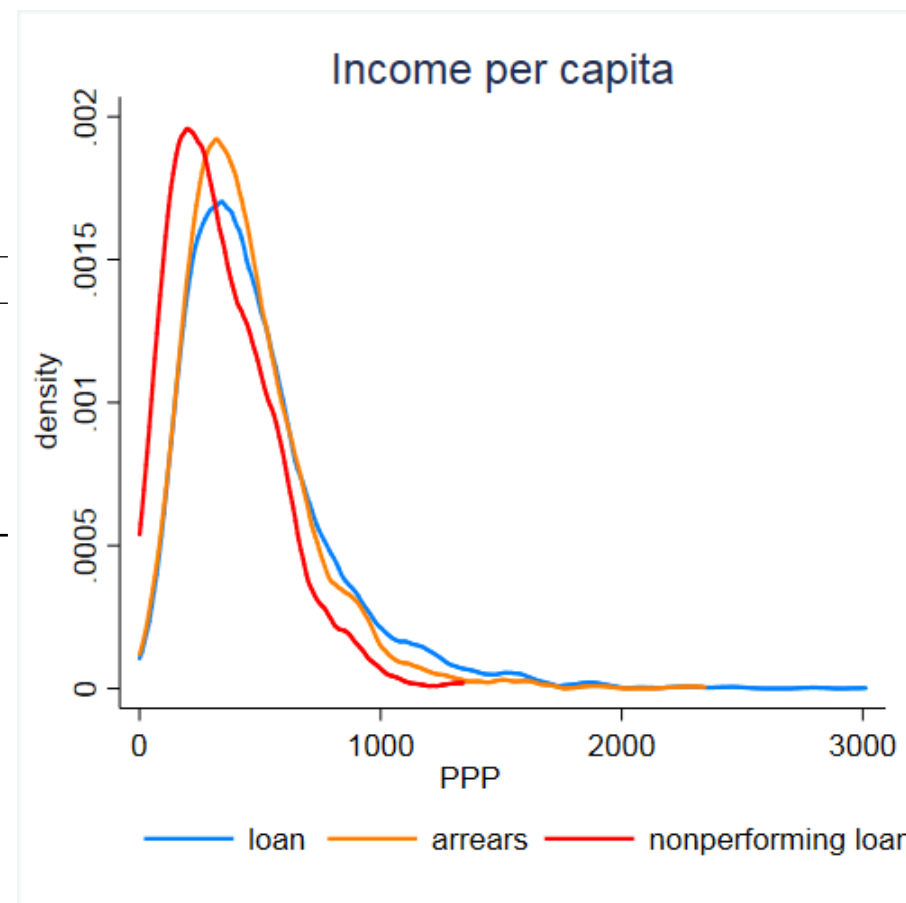
- 2) Estimate probability that respondent is in arrears

$$P(A=1 | L=1) = \Phi_A (X_A \beta_A + u_A)$$

where error terms u_L and u_A are normally distributed but correlated.

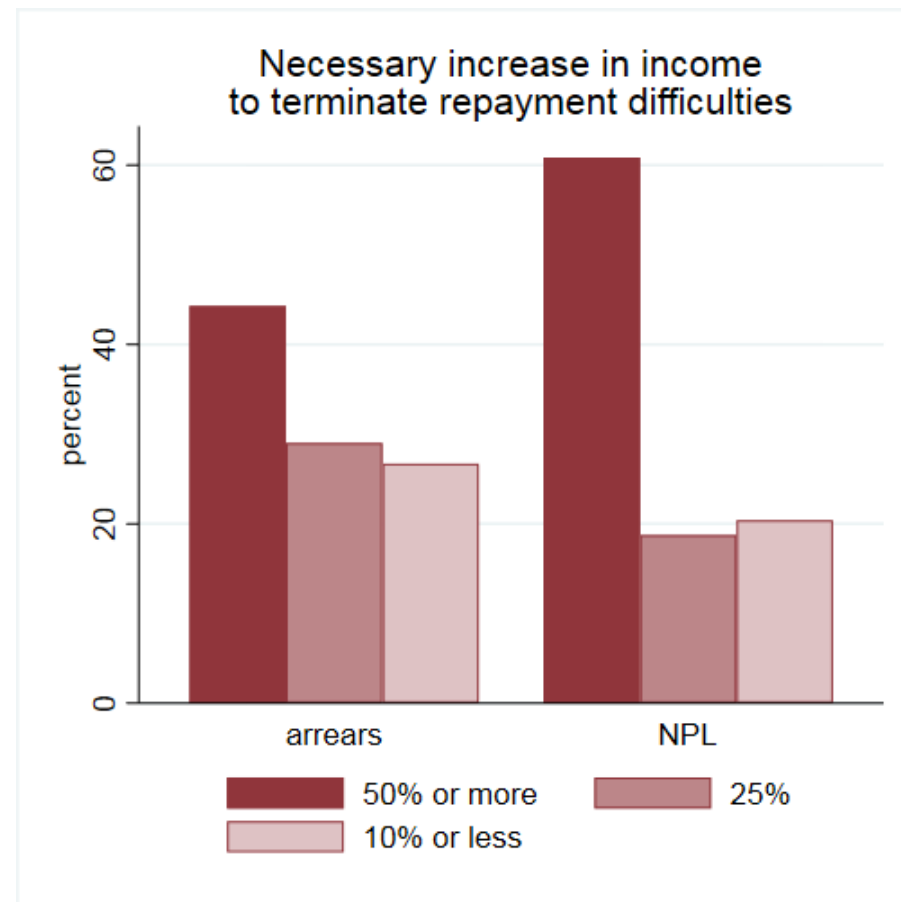
Are socio-economic characteristics a significant determinant of repayment difficulties?

| | arrears | NPL |
|------------------------------------|---------|-----|
| Age, Gender, Marital Status | No | No |
| Education | Yes | No |
| Labour market status | No | Yes |
| Income | Yes | Yes |
| Indicators of non-financial wealth | Yes | Yes |



Household “shocks” as a trigger of repayment difficulties

| Dependent variable | arrears | |
|-----------------------------|----------------------|---------------------|
| Sample | borrowers | |
| income high | -0.070*** (0.026) | -0.059* (0.031) |
| income medium | -0.055*** (0.019) | -0.048** (0.024) |
| own house | -0.054** (0.022) | -0.051* (0.030) |
| interviewer: residence poor | 0.111*** (0.020) | 0.120*** (0.025) |
| household shock | 0.177*** (0.022) | |
| income shock | 0.159*** (0.030) | |
| Log-L | -2018.9 | -1408.1 |
| N | 4332 | 3039 |
| P(DepVar=1) | 0.25 | 0.24 |



Note: Based on 133 observations

Which type of loans are more susceptible to repayment difficulties?

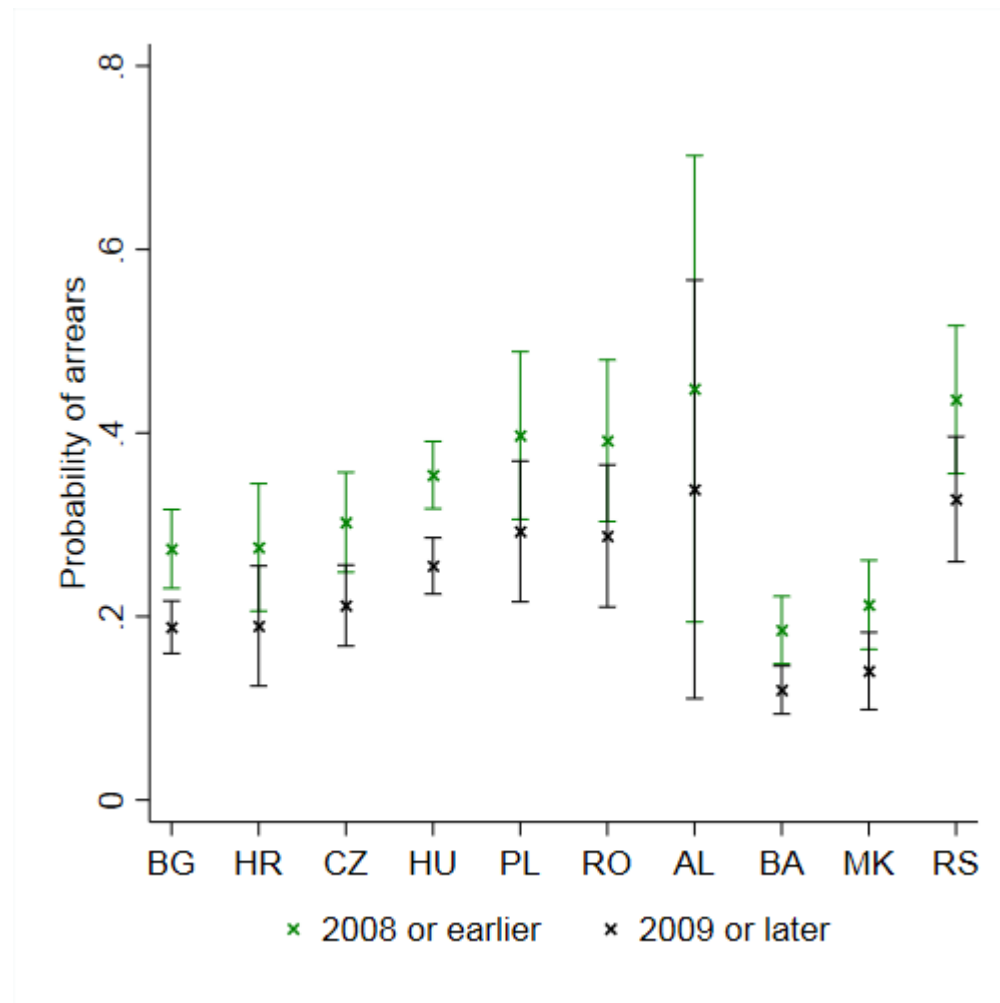
| Dependent variable | arrears | |
|----------------------------------|----------------------|----------------------|
| Sample | borrowers | |
| mortgage | -0.074*** (0.017) | -0.075*** (0.017) |
| FC loan | 0 (0.020) | 0.015 (0.018) |
| exchange rate shock | 0.006*** (0.001) | 0.002*** (0.000) |
| original term of loan | -0.213*** (0.056) | 0.001 (0.002) |
| loan with variable interest rate | | 0.025 (0.016) |
| year of loan origination | FE | FE |
| Log-L | -1807.7 | -1814.9 |
| N | 3913 | 3913 |
| P(DepVar=1) | 0.25 | 0.25 |

Do repayment difficulties differ by year of loan origination?

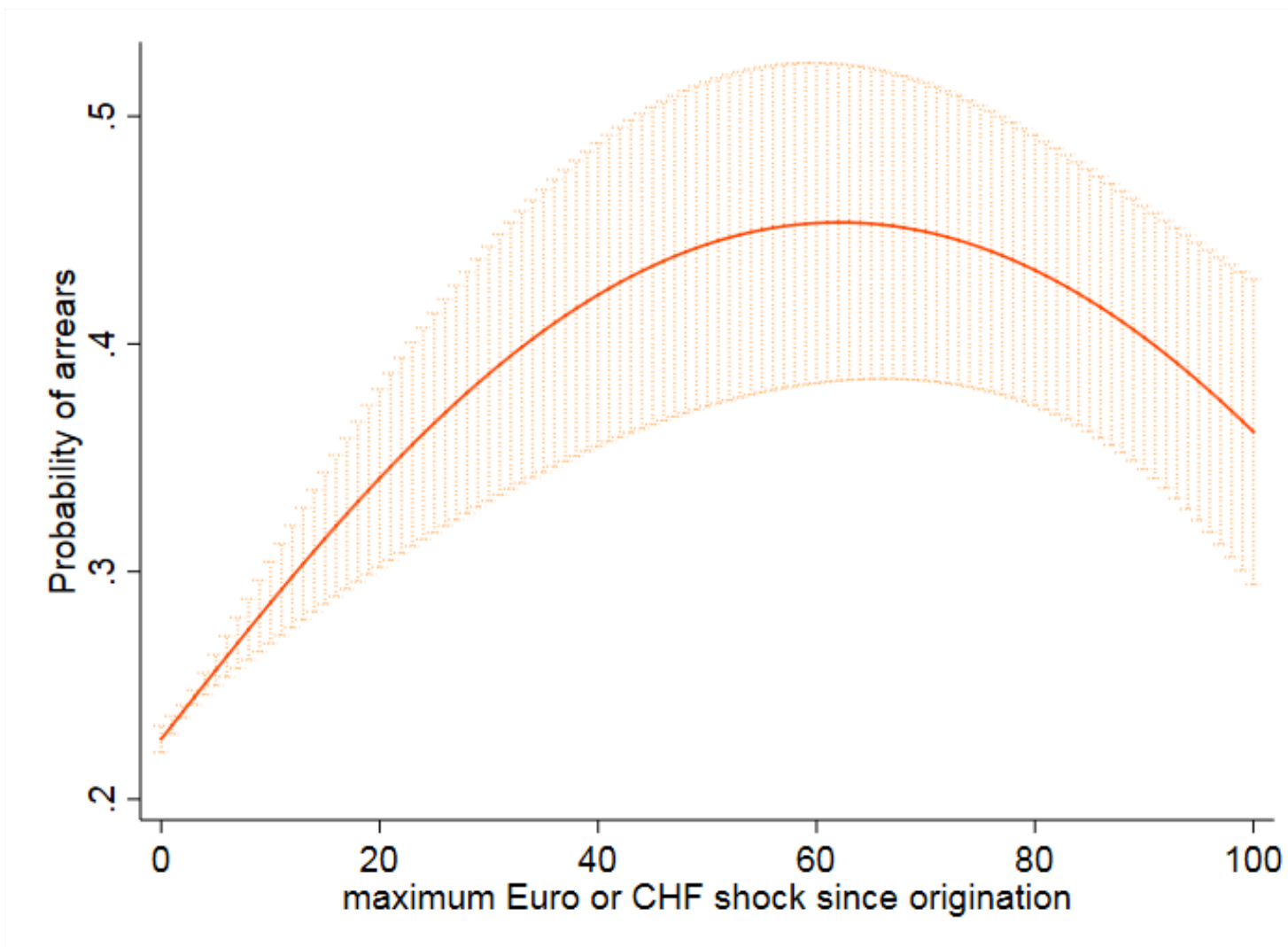
Loan year fixed effects show that borrowers with loans issued after 2011 are significantly less likely in arrears (-7pp.) than those with loans issued in 2011 or before.

- Reducing the sample to comparable mortgages intensifies the effect (-14pp.).
- If splitting the sample in 2008, i.e., when the financial crisis started, the effect is similar in magnitude (-8pp.).

Is this driven by a change in lending standards or by the effect of the recession?



Impact of exchange rate shocks on repayment difficulties



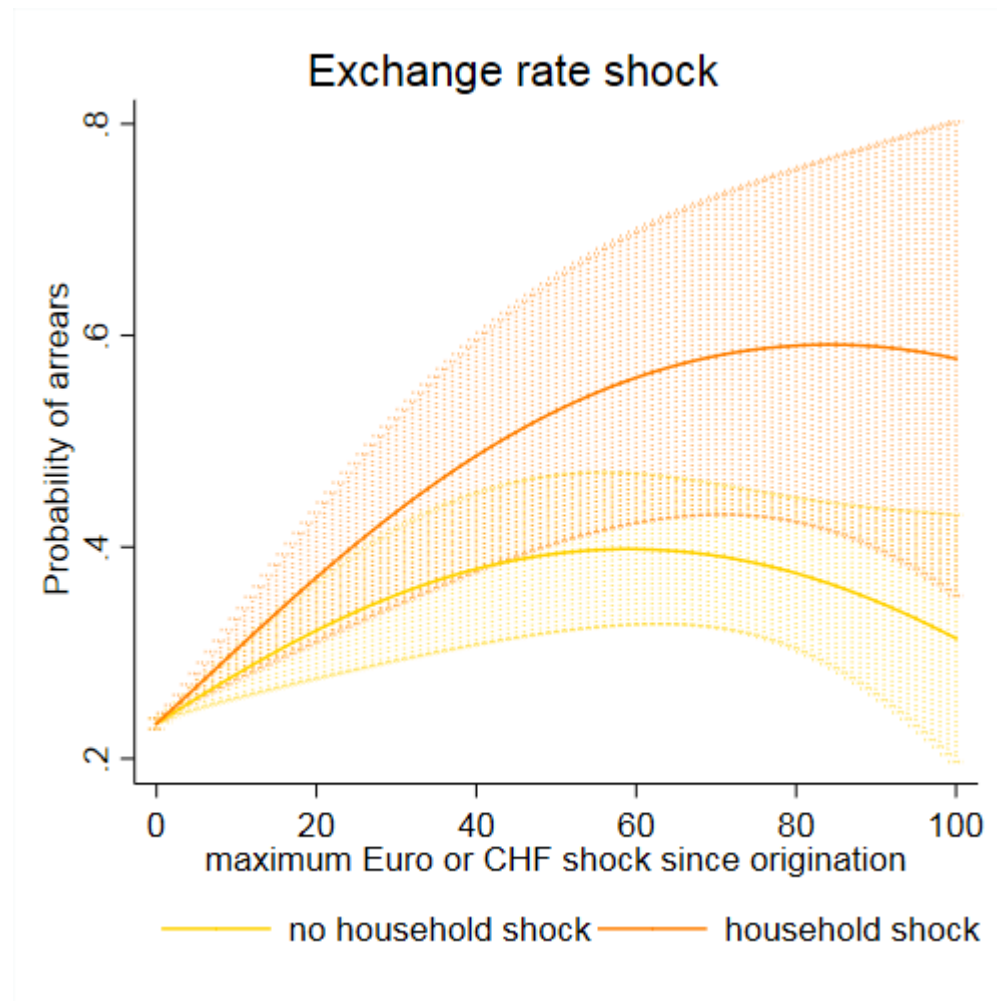
Do household and loan level determinants reinforce each other?

The likelihood of repayment difficulties

- does not differ between borrowers who have / don't have regular income in euro.
- decreases if borrowers have savings, especially foreign currency savings.
- Both of these factors do not reduce repayment difficulties in the event of exchange rate shocks.
- The impact of the exchange rate shock is lower for home owners compared to non-owners.

Borrowers are less likely to be in arrears if they have a mortgage. This effect is smaller

- for older borrowers.
- for less wealthy borrowers.



How does bank advice influence repayment difficulties?

Bank level determinants from the borrower perspective

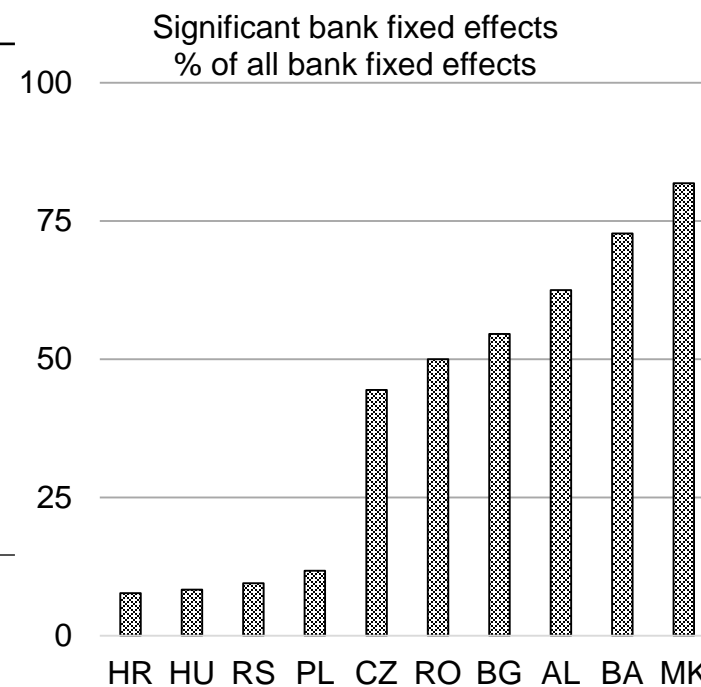
| Dependent variable | arrears | | | | | |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Sample | borrowers | | | | | |
| previous loan application refused | 0.145*** (0.024) | 0.128*** (0.026) | 0.155*** (0.039) | 0.155*** (0.039) | 0.152*** (0.040) | 0.161*** (0.041) |
| requested amount only granted in part | 0.068** (0.034) | | | | | |
| bank advised against loan | | 0.178* (0.104) | | | | |
| preferred FC loan | | | 0.015 (0.025) | | | |
| received different currency than requested | | | | -0.01 (0.056) | | |
| bank offered currency choice | | | | | 0.004 (0.017) | |
| bank "forced" currency | | | | | | 0.025 (0.043) |
| Log-L | -1588 | -686.5 | -840.3 | -840.4 | -817.8 | -757.6 |
| N | 3258 | 1424 | 1733 | 1733 | 1698 | 1587 |
| P(DepVar=1) | 0.27 | 0.27 | 0.26 | 0.26 | 0.26 | 0.26 |

“Credit-worthy”
FC demand vs. supply

Do repayment difficulties differ between banks?

No heterogeneity between banks?

| Dependent variable | arrears | | | | |
|----------------------------|-----------|---------|---------|---------|---------|
| Sample | borrowers | | | | |
| bank rejection rate medium | -0.017 | | | | |
| | (0.014) | | | | |
| bank rejection rate high | 0.011 | | | | |
| | (0.017) | | | | |
| bank rejection score | | -0.02 | | | |
| | | (0.052) | | | |
| domestic banks | | | | -0.012 | |
| | | | | (0.016) | |
| Austrian banks | | | | | 0.017 |
| | | | | | (0.018) |
| Log-L | -1913.4 | -1915 | -1910.6 | -2125.9 | -1931.1 |
| N | 4050 | 4050 | 4094 | 4487 | 4100 |
| P(DepVar=1) | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |



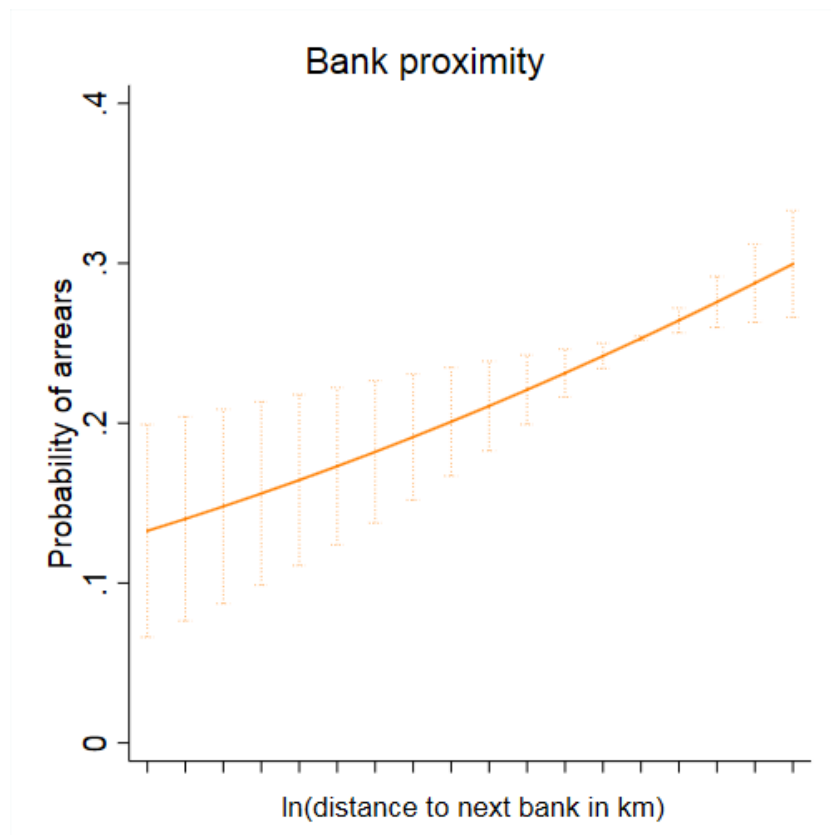
Fixed effects for other foreign banks are also insignificant.

Local banking market structure or customer relationships as determinants of repayment difficulties

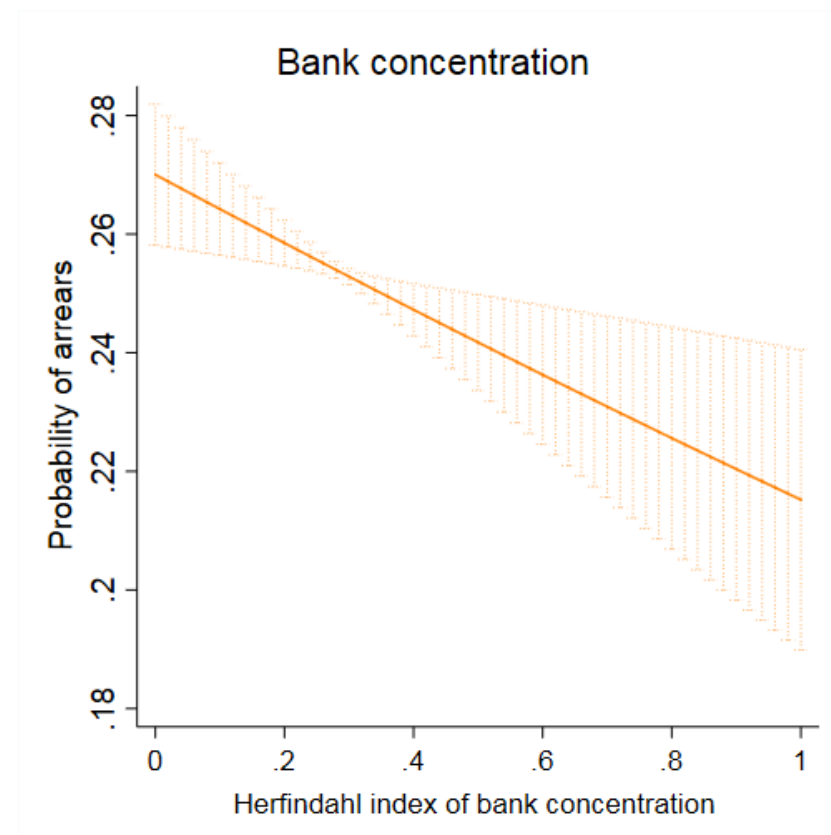
| Dependent variable | arrears | | |
|---------------------------------|----------------------|----------------------|-----------------------|
| Sample | borrowers | | |
| proximity to nearest bank (log) | 0.011*** (0.004) | 0.011*** (0.004) | local banking market |
| Herfindahl index | -0.080*** (0.013) | -0.080*** (0.013) | |
| account & loan at same bank | -0.034** (0.014) | | customer relationship |
| loan more recent than account | | -0.029** (0.013) | |
| Log-L | -2050.8 | -2052.2 | |
| N | 4298 | 4298 | |
| P(DepVar=1) | 0.26 | 0.26 | |

Credit standards, the share of foreign banks and concentration in terms of bank ownership at the local level do not affect loan performance.

How relevant is the local banking market structure and for whom?



Repayment difficulties increase with distance. Especially for poorer households or those who suffer an income shock.



The impact of bank concentration on repayment difficulties is small and equal for all households.

How do borrowers with nonperforming loans differ from borrowers with less severe arrears?

The probability that borrowers have a nonperforming loan compared to less severe arrears is:

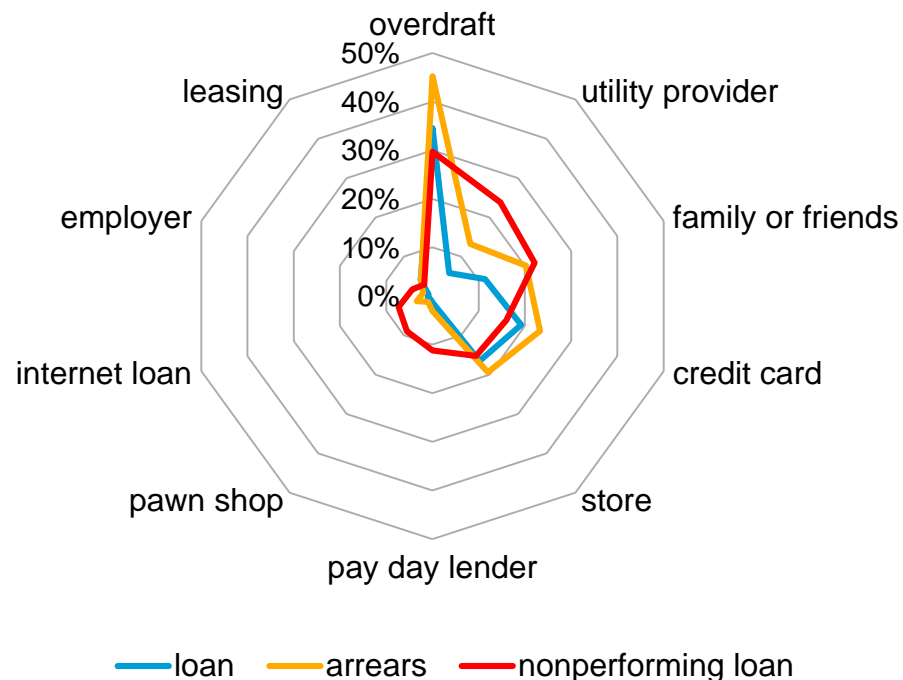
higher for households

- with lower income & wealth
- who suffered a larger income shock
- who suffered a larger exchange rate shock
- who were previously not successful in getting a loan from a bank

lower for households

- with higher risk aversion
- with a mortgage (and who have life insurance)
- who hold their loan at their “home” bank
- who have bank relations that have been established for a longer time
- where the bank did not grant the full amount requested

Additional debts of borrowers by level of repayment difficulties



Summary and further steps

Household, loan and bank level characteristics drive repayment difficulties.

- At the household level, income and income shocks are the most important determinant.
- Bank relations and bank proximity reduce the probability of arrears.
- Loans issued prior to 2008 are more frequently in arrears.
- Exchange rate shocks increase the probability of arrears.

Further steps:

- Selection into the credit market
- Other common patterns that drive the difference between banks
- Endogeneity, e.g. financial wealth

Related research:

Riedl, A., Scheiber, T.: Household vulnerability