# Stocks and flows

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# Recent results on interest rate pass-through to households

- Young households faced a more significant interest rate pass-through than the other age cohorts.
- In contrast, the pass-through to the oldest households was weaker than the benchmark.
- Maybe the pre-conditions (stocks information) might partially explain this heterogeneity across age groups...

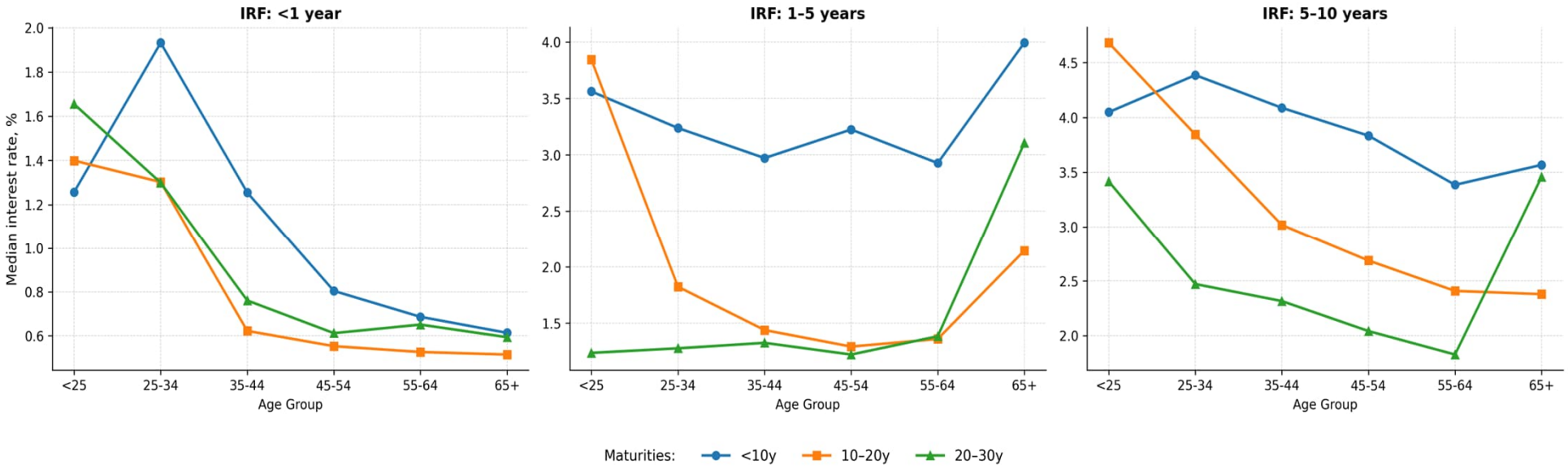
Table 3: Heterogeneity in the pass-through: Mortgages

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Dependent variable: Average interest rate on new contract | | | | | |
| Reference Rate | 0.904*** | 0.796*** | 0.799*** | 0.816*** | 0.865*** | 0.895*** |
| | (0.029) | (0.009) | (0.013) | (0.012) | (0.039) | (0.050) |
| Age: < 25 × Reference Rate | | | 0.073*** | | | 0.065*** |
| | | | (0.018) | | | (0.020) |
| Age: 25-34 × Reference Rate | | | 0.032*** | | | 0.027*** |
| | | | (0.009) | | | (0.009) |
| Age: 35-44 × Reference Rate | | | - | | | - |
| Age: 45-54 × Reference Rate | | | -0.006 | | | -0.002 |
| | | | (0.009) | | | (0.008) |
| Age: 55-64 × Reference Rate | | | -0.051** | | | -0.018 |
| | | | (0.021) | | | (0.029) |
| Age: >=65 × Reference Rate | | | -0.187*** | | | -0.152*** |
| | | | (0.045) | | | (0.048) |

# Related literature:

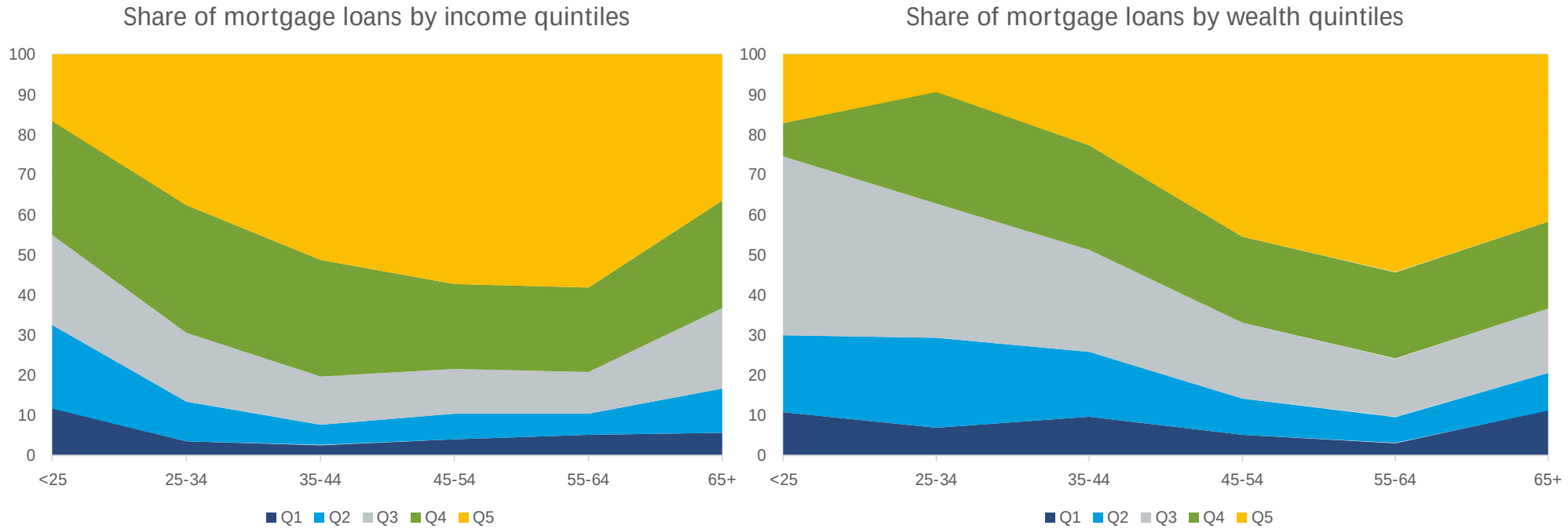
- Different loan pricing and distributional impact on HHs.
  - *Coen, J., Kashyap, A. K., & Rostom, M. (2023). Price discrimination and mortgage choice (No. w31652). National Bureau of Economic Research. (https://www.nber.org/papers/w31652).*
  - Main idea that HHs are priced differently by the banks based on their choices. There are *sophisticated* customers and *randomizers*.
    - Sophisticated customers – analyze more bank offers before the decision, they choose the cheapest option, they can back-off from the decision to take a mortgage if conditions do not satisfy them. Usually, these customers have lower loan to asset and loan to their income ratios as they have more assets accumulated and can take a lower loan than they need (make it cheaper).
    - Randomizers – usually considers only one option and accepts any pricing conditions, mostly are younger HHs or first-time buyers, usually these *randomizers* are associated with the larger loan to asset and loan to their income values.
  - *Can we identify these households from the recent monetary policy hike, and can price discrimination explain pass-through differences among different age cohorts?*

# Median mortgage interest rates (stocks 2021) over the age




- Different specifications of IRF's or Maturities hold the similar idea – interest rates go down over the age distribution or show the U-shape type dynamics.
- Young households (up to 34y) are on average priced with the higher interest rate.
- Mid-age cohorts (35y to 64y) are given the lower interest rate for mortgages.
- The oldest households (65+) show mixed results in terms of interest rates they pay for their mortgages.

# HFCS results on distribution over income and wealth quintiles




HFCS data is used to analyze the composition of total mortgage loans by the age cohorts and income/wealth quintiles.

- Graph over the income quintiles (left) indicates similar U-shape dynamics – mortgage loans are more equally distributed at the tales, and highly concentrated (around top quintiles) in the middle-aged cohorts.
- Graph over the wealth quintiles (right) suggests a better bargaining conditions for the older households, since their mortgages are backed-off by the higher value of wealth accumulated by households. More than 60% of mortgage loans are held by the top two wealth quintiles among the oldest HHs.

# Age group fixed effects in mortgage contract interest rates (all contracts outstanding in December 2021)

Table 1. Age Fixed effects: Mortgage interest rates

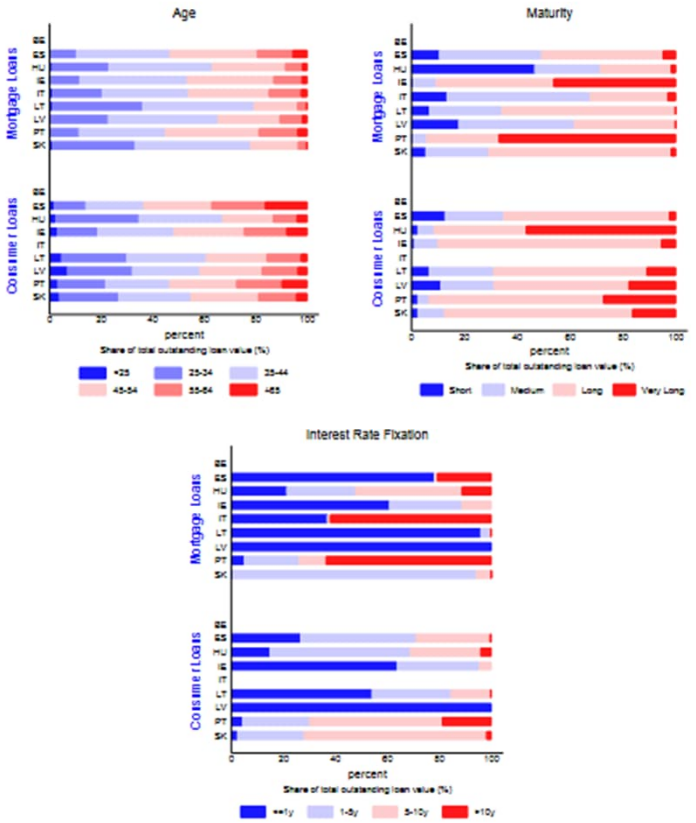
| | (1) Median interest rate | (2) Median interest rate | (3) Median interest rate | (4) Median interest rate |
|---|---|---|---|---|
| Age: < 25 | 0.1942** | 0.2613*** | 0.2381** | 0.2206** |
| | (0.0878) | (0.0976) | (0.0968) | (0.1005) |
| Age: 25-34 | 0.1128** | 0.1284** | 0.1246** | 0.1271* |
| | (0.0520) | (0.0497) | (0.0606) | (0.0688) |
| Age: 45-54 | -0.1851*** | -0.1849*** | -0.1964*** | -0.2092** |
| | (0.0692) | (0.0630) | (0.0728) | (0.0829) |
| Age: 55-64 | -0.1845** | -0.1633** | -0.2047** | -0.2242** |
| | (0.0897) | (0.0721) | (0.0962) | (0.1027) |
| Age: >=65 | -0.1316 | -0.1056 | -0.1590 | -0.1672 |
| | (0.1054) | (0.1016) | (0.1154) | (0.1221) |
| Log average amount | | 0.5788 | 0.1989 | 0.0494 |
| | | (0.4002) | (0.1466) | (0.1284) |
| HU | | | 3.4350*** | |
| | | | (0.2159) | |
| IE | | | 1.2254*** | |
| | | | (0.1792) | |
| IT | | | -1.3475*** | |
| | | | (0.1539) | |
| LT | | | 1.0745*** | |
| | | | (0.1577) | |
| LV | | | 1.3906*** | |
| | | | (0.1108) | |
| PT | | | -0.5261*** | |
| | | | (0.1623) | |
| SK | | | -0.3355** | |
| | | | (0.1405) | |
| Observations | 568 | 568 | 569 | 569 |
| R-squared | 0.97 | 0.97 | 0.94 | 0.93 |
| Adjusted R-squared | 0.96 | 0.97 | 0.94 | 0.93 |
| Maturity F.E. | Yes | Yes | Yes | - |
| IRF F.E. | Yes | Yes | Yes | - |
| Country F.E. | Yes | Yes | - | - |
| SE-cluster | Robust | Robust | Robust | Robust |
| WLS | nbr | nbr | nbr | nbr |

*Notes:* This table presents the age fixed effects from a regression of the median interest rate from all mortgage loan contracts outstanding in December 2021 (the dependent variable **Median interest rate**) controlling for maturity-interest rate fixation period (IRF) fixed effects or maturity-interest rate fixation period (IRF) - country fixed effects and **Log Average Amount** which is the log of the average residual amount on the contract outstanding in December 2021. All regressions are estimated using weighted least squares, where weights reflect the number of outstanding contracts in each country-age bin. Robust standard errors are clustered at the country-age group level. Statistical significance is denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

- Where contract interest rates systematically higher for younger borrowers independent of contract characteristics?
- Is there country heterogeneity after we control for contract and borrower (age) characteristics?
- U-shaped age fixed effects

# Breakdown of the stock of loan contracts (current value) by current age, remaining maturity and interest rate fixation period in December 2021

Figure 1. Breakdown of the stock of loan contracts (current value) by current age, remaining maturity and interest rate fixation period in December 2021




*Notes:* The figure shows the distribution of the stock of loan contracts (by current remaining value) across current borrower age (left), remaining loan maturity (middle), and interest-rate fixation (right) for mortgages (top) and consumer loans (bottom) in nine European countries in December 2021. Belgium is part of the sample but no data is available for the current value, age, and remaining maturity for the loan contracts.

Age:
In Slovakia, Lithuania, Latvia, and Hungary, about 80% to aged <45.
In Portugal, Spain, Italy, and Ireland, 50-65% to aged >45
IRF patterns in stocks vs new loans:

- Latvia and Lithuania, Spain and Italy have a stock of mostly ARM (<1 year) rate loans; Portugal mostly FRM loans.
- These patterns can be different from patterns in new loans.
- Mainly ARM new loans for LT and LV => portfolio consistency? Same pattern across all age groups
- => Or affordability (more prevalent in younger age groups?)
- In IT and ES mainly FRM in new lending: =>refinancing? Same pattern across all age groups
- => or affordability (mainly prevalent for older age groups)?
- For Portugal, the opposite occurs : existing loans are mainly fixed, new loans are mainly variable. Affordability? Switch to consumer loans?

Maturity
Cross country variation

# How Stock Conditions Influence New Loan Choices

•Rate exposure drives contract choice:
Borrowers with variable-rate stock loans (and rising payments) are more likely to seek *fixed-rate* contracts when taking a new mortgage or refinancing.
•Balance-sheet constraints matter:
High-rate or high-balance existing loans increase credit constraints → borrowers may shift toward *shorter maturities* or *consumer credit* (if mortgages become unaffordable).
•Lock-in effects:
Borrowers with low-rate fixed stock loans may delay or avoid new mortgages → lower likelihood of entering new mortgage markets.
•Portfolio consistency:
Households with long-maturity or fixed loans tend to choose similar products again (path dependence).

# Age Differences in New Loan Choice

- Young borrowers (lower wealth, higher risk weights):
  - More likely to take adjustable-rate or shorter IR fixation period contracts
  - Higher probability of relying on consumer credit when mortgage rates become too costly
  - More sensitive to borrowing constraints after tightening

- Older borrowers (higher income/wealth):
  - More likely to obtain fixed-rate or shorter IR fixation period contracts
  - More refinancing capacity → switch from ARM to fixed when tightening begins
  - More likely to delay borrowing entirely if conditions worsen

- Controlling for cross-country differences
  - Cross-country differences in contract supply (availability of FRM/ARM) : e.g. LT
  - Market structure: refinancing markets, prepayment penalties, bank funding
  - Institutional features: tax incentives, mortgage guarantee schemes

# Data exploration: Borrower choice in new loans and conditions in stocks: What does a high share of ARMs predict?

- Logit specification to investigate correlations
- Collapse data at TypexAgexIRFxDatexCountry level
- Dependent variable is a binary variable : choice of type of loan in terms of Consumer vs Mortgage and interest rate fixation term (IRF) in new loans during the tightening period (2022-2023)
- Independent variable: share of variable rate mortgages in value from all mortgage loan contracts outstanding in December 2021
- Weighted least squares: the number of outstanding contracts in each country-age bin.
- Robust standard errors are clustered at the country group level.

# High variable ARM share in stock => higher probability to get variable rate consumer loan

Table 1. Marginal Effects over Age Group: Cons. Var (<1yr) vs. All Others , by Date

| | (1) 2022H1 | (2) 2022H2 | (3) 2023H1 | (4) 2023H2 |
|---|---|---|---|---|
| Share Var.Mortg.in Stock | | | | |
| 18-24 | 0.002 | 0.136* | 0.083 | 0.142* |
| | (0.076) | (0.080) | (0.100) | (0.083) |
| 25-34 | 0.050 | 0.137** | 0.095 | 0.130* |
| | (0.068) | (0.056) | (0.113) | (0.066) |
| 35-44 | 0.092 | 0.154*** | 0.163* | 0.171*** |
| | (0.065) | (0.056) | (0.087) | (0.061) |
| 45-54 | 0.104 | 0.162** | 0.208** | 0.200*** |
| | (0.078) | (0.066) | (0.093) | (0.073) |
| 55-64 | 0.094 | 0.157*** | 0.211** | 0.200*** |
| | (0.074) | (0.058) | (0.093) | (0.072) |
| 65+ | 0.070 | 0.128** | 0.210** | 0.188** |
| | (0.066) | (0.052) | (0.091) | (0.078) |
| N (AME sample) | 6557749 | 7088252 | 7376947 | 7693282 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2. Marginal Effects over Age Group: Mortg. Var (<1yr) vs. All Others , by Date

| | (1) 2022H1 | (2) 2022H2 | (3) 2023H1 | (4) 2023H2 |
|---|---|---|---|---|
| Share Var.Mortg.in Stock | | | | |
| 18-24 | 0.010* | 0.003 | 0.008* | 0.008*** |
| | (0.006) | (0.012) | (0.004) | (0.002) |
| 25-34 | 0.023 | -0.006 | 0.015 | 0.017** |
| | (0.018) | (0.036) | (0.014) | (0.007) |
| 35-44 | 0.009 | -0.006 | -0.003 | -0.002 |
| | (0.012) | (0.025) | (0.010) | (0.005) |
| 45-54 | 0.010 | 0.004 | 0.000 | -0.002 |
| | (0.008) | (0.018) | (0.006) | (0.002) |
| 55-64 | 0.008* | 0.007 | 0.003 | 0.000 |
| | (0.005) | (0.009) | (0.003) | (0.001) |
| 65+ | 0.006** | 0.005 | 0.004*** | 0.002*** |
| | (0.003) | (0.004) | (0.001) | (0.000) |
| N (AME sample) | 6557749 | 7088252 | 7376947 | 7693282 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

# High variable ARM share in stock => lower probability to get a fixed rate mortgage if <55yr, or fixed rate consumer loan

Table 3. Marginal Effects over Age Group: Mortg. Fix (>1yr) vs. All Others , by Date

| | (1) 2022H1 | (2) 2022H2 | (3) 2023H1 | (4) 2023H2 |
|---|---|---|---|---|
| Share Var.Mortg.in Stock | | | | |
| 18-24 | 0.104 | 0.003 | -0.002 | -0.017 |
| | (0.190) | (0.040) | (0.029) | (0.016) |
| 25-34 | 0.009 | -0.042 | -0.058 | -0.090** |
| | (0.206) | (0.073) | (0.056) | (0.044) |
| 35-44 | -0.012 | -0.036 | -0.049 | -0.073*** |
| | (0.105) | (0.046) | (0.036) | (0.028) |
| 45-54 | 0.001 | -0.019 | -0.019 | -0.033** |
| | (0.062) | (0.026) | (0.020) | (0.015) |
| 55-64 | 0.013 | -0.005 | -0.003 | -0.008 |
| | (0.030) | (0.013) | (0.008) | (0.006) |
| 65+ | 0.007 | -0.000 | -0.001 | -0.001 |
| | (0.006) | (0.003) | (0.004) | (0.002) |
| N (AME sample) | 6300026 | 6864903 | 7165212 | 7472005 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Marginal Effects over Age Group: Cons. Fix (>1yr) vs. All Others , by Date

| | (1) 2022H1 | (2) 2022H2 | (3) 2023H1 | (4) 2023H2 |
|---|---|---|---|---|
| Share Var.Mortg.in Stock | | | | |
| 18-24 | -0.117 | -0.182** | -0.111 | -0.154* |
| | (0.094) | (0.087) | (0.096) | (0.089) |
| 25-34 | -0.027 | -0.099 | -0.030 | -0.040 |
| | (0.080) | (0.071) | (0.128) | (0.103) |
| 35-44 | -0.061 | -0.123* | -0.085 | -0.081 |
| | (0.081) | (0.065) | (0.095) | (0.087) |
| 45-54 | -0.127 | -0.170** | -0.193** | -0.181** |
| | (0.083) | (0.071) | (0.098) | (0.091) |
| 55-64 | -0.157** | -0.188*** | -0.247*** | -0.234*** |
| | (0.063) | (0.057) | (0.092) | (0.083) |
| 65+ | -0.152*** | -0.166*** | -0.271*** | -0.256*** |
| | (0.036) | (0.043) | (0.091) | (0.084) |
| N (AME sample) | 6557749 | 7088252 | 7376947 | 7693282 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

# Conclusions

- Mortgage rates are systematically higher for young households (below 35 year).
- Portfolio of mortgage loans is highly concentrated around
  - the top income quintiles among the middle- aged households;
  - and the top wealth quintiles among households between 44 and 65+.
- We explore the stocks and new loan dataset to investigate borrower choice in new loans and conditions in stocks
- Preliminary: High variable ARM share in stock is more frequently associated with a high probability to have variable rate consumer loan