

QUANTITATIVE EASING AND DISPARITY IN MORTGAGE LENDING

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Introduction

The US mortgage rate plunged after the announcement of QE1 on Nov. 25, 2008.

- Across the spectrum of applicants' income, do high-income mortgage applicants benefit more in QE1 than the low-income applicants, or conversely?
- Does QE1 enlarge inequality in the residential mortgage market?

Data

- Home Mortgage Disclosure Act (HMDA) data, 2008-2009:
 - HMDA requires financial institutions to report all loan applications since 1975.
 - covers 90% of all mortgages in the US.
 - HMDA data are considered the most comprehensive source of publicly available information in the US mortgage market.
- CoreLogic Deed (CL), 2008-2009:

Merge HMDA and CoreLogic Deed by the overlapping 5 variables: mortgage year, census tract, loan type, loan purpose, mortgage amount

Methodology & Results

I. Purchasing & Refinancing Mortgage Rate

$$mortgage\ rate_{it} = \alpha_{gv} + \delta\ postQE + \Lambda\ Decile + \Theta\ (Decile \times postQE) + \Gamma\ (X_{it} \times postQE) + \varepsilon_{it}$$

- *Decile* = 1 if the household belongs to a specific income decile
- *postQE* = 1 if the transaction is after QE1
- Time span: 1-year time window around 28/01/2009, 9 weeks after the QE1 announcement date 25/11/2008 due to a systematic lag
- Controls
 - Fixed Effects: county × week
 - Loan: loan-to-value ratio (LTV) bins, loan type, loan term
 - Borrowers: applicants' gender, race, ethnicity, co-applicant existence, owner occupancy
 - *postQE* × Controls

| | (1) | (2) | (3) | (4) |
|------------------|----------------------|----------------------|----------------------|----------------------|
| QE1 | -0.951*** (0.060) | | | |
| QE1 × Q2 | -0.031* (0.017) | -0.012 (0.008) | -0.014* (0.007) | -0.014* (0.007) |
| QE1 × Q3 | -0.056*** (0.017) | -0.023*** (0.009) | -0.025*** (0.008) | -0.021** (0.008) |
| QE1 × Q4 | -0.066*** (0.019) | -0.022* (0.011) | -0.026** (0.010) | -0.019* (0.010) |
| QE1 × Q5 | -0.053*** (0.018) | -0.021* (0.011) | -0.023** (0.010) | -0.012 (0.011) |
| QE1 × Q6 | -0.069*** (0.019) | -0.024** (0.011) | -0.027*** (0.009) | -0.012 (0.009) |
| QE1 × Q7 | -0.069*** (0.020) | -0.028** (0.010) | -0.034*** (0.010) | -0.013 (0.010) |
| QE1 × Q8 | -0.090*** (0.026) | -0.034** (0.016) | -0.041*** (0.014) | -0.014 (0.012) |
| QE1 × Q9 | -0.129*** (0.028) | -0.073*** (0.022) | -0.078*** (0.020) | -0.043*** (0.007) |
| QE1 × Q10 | -0.186*** (0.042) | -0.116*** (0.037) | -0.126*** (0.036) | -0.080*** (0.017) |
| county × week FE | | Yes | Yes | Yes |
| controls | | | Yes | Yes |
| controls × QE1 | | | | Yes |

Figure 1: Results for Purchasing Mortgage Rate

Results: In red frames, the coefficient decreases as income increases. → Both Purchasing and Refinancing Mortgage rates for higher-income applicants decrease more than their lower-income counterparties.

II. Refinance Propensity – Cox Proportional Hazard Model

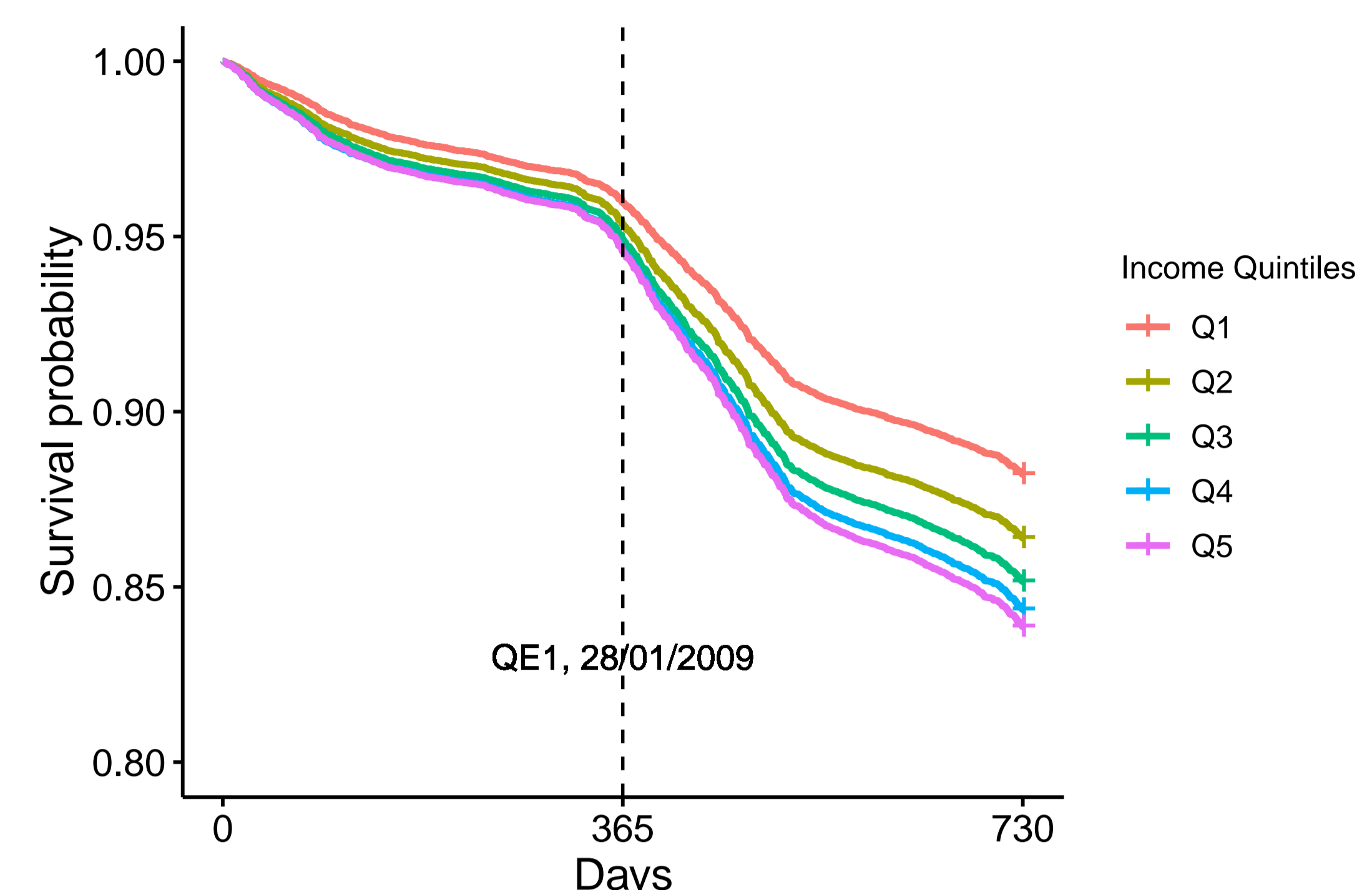


Figure 2: Kaplan-Meier survival probability for 30-year conforming conventional FRM

$$h_{ij}(t) = h_{0j}(t) \times \exp[\alpha_{gv} + \delta\ postQE + \Lambda\ Decile + \Theta\ (Decile \times postQE) + \Gamma\ (X_{it} \times postQE) + \varepsilon_{it}]$$

- A diff-in-diff setting in Cox Proportional Hazard Model
- *Decile* = 1 if the household belongs to a specific income decile
- *postQE* = 1 if the transaction is after QE1
- Time span: 2-year time window around 28/01/2009
- Controls are the same as regressions for the purchasing and refinancing mortgage rate

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| QE1 | 2.400*** (0.017) | | | | 1.200*** (0.048) | | | |
| QE1 × D2 | 0.043* (0.023) | 0.030 (0.025) | 0.027 (0.025) | 0.042* (0.025) | -0.052 (0.067) | -0.071 (0.074) | -0.058 (0.084) | -0.089 (0.085) |
| QE1 × D3 | 0.070*** (0.023) | 0.089*** (0.024) | 0.076*** (0.024) | 0.110*** (0.025) | 0.020 (0.065) | -0.002 (0.072) | -0.110 (0.082) | -0.180** (0.084) |
| QE1 × D4 | 0.050** (0.022) | 0.048** (0.024) | 0.033 (0.024) | 0.070*** (0.025) | -0.041 (0.064) | -0.055 (0.072) | -0.089 (0.082) | -0.170** (0.084) |
| QE1 × D5 | 0.050** (0.022) | 0.050** (0.024) | 0.042* (0.024) | 0.090*** (0.025) | 0.140** (0.063) | 0.110 (0.071) | 0.095 (0.081) | 0.002 (0.084) |
| QE1 × D6 | 0.110*** (0.022) | 0.110*** (0.024) | 0.082*** (0.024) | 0.140*** (0.025) | 0.170*** (0.063) | 0.100 (0.071) | 0.098 (0.081) | 0.003 (0.084) |
| QE1 × D7 | 0.073*** (0.022) | 0.081*** (0.024) | 0.060** (0.024) | 0.120*** (0.025) | 0.230*** (0.062) | 0.210*** (0.070) | 0.180** (0.080) | 0.088 (0.084) |
| QE1 × D8 | 0.100*** (0.022) | 0.120*** (0.024) | 0.096*** (0.024) | 0.170*** (0.025) | 0.220*** (0.061) | 0.200*** (0.069) | 0.180** (0.079) | 0.068 (0.084) |
| QE1 × D9 | 0.130*** (0.022) | 0.140*** (0.024) | 0.092*** (0.024) | 0.180*** (0.025) | 0.250*** (0.060) | 0.250*** (0.069) | 0.200** (0.080) | 0.078 (0.085) |
| QE1 × D10 | 0.150*** (0.022) | 0.150*** (0.024) | 0.098*** (0.024) | 0.210*** (0.026) | 0.500*** (0.062) | 0.470*** (0.071) | 0.250*** (0.082) | 0.140 (0.088) |
| county × week Strata | | Yes | Yes | Yes | | Yes | Yes | Yes |
| controls | | | Yes | Yes | | | Yes | Yes |
| controls × QE1 | | | | Yes | | | | Yes |

Figure 3: Probability to Refinance

Results: In red frames, the coefficient increases as income increases. → High-income applicants show higher propensity to refinance after QE1.

Conclusion

The inequality in the residential mortgage market is enlarged through three paths:

- Purchasing mortgage rate favors the high-income applicants to a larger extent after QE1.
- Refinance mortgage rate favors the high-income applicants to a larger extent after QE1.
- The high-income applicants show larger propensity to refinance after QE1 to take advantage of the rapid mortgage rate decline.