Refinancing Cross-Subsidies in the Mortgage Market

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Motivation

- Households vary considerably in their inertia/inattention in financial decisions, and thus end up paying different prices for financial products (Campbell, 2006; Agarwal et al., 2020; Gomes et al., 2021).
- Pricing design in household finance markets can mean inattentive/unsophisticated households cross-subsidize more attentive/sophisticated households (Miles, 2004; Gabaix and Laibson, 2006; Armstrong and Vickers, 2012).
  - Inattention correlated with wealth and income, so complexity of financial product can amplify inequality (Campbell et al, 2019; Greenwald et al., 2021).
- Mortgages: Largest household liability; cross-household differences in refinancing efficiency (Andersen et al, 2020; Keys et al., 2018).
- Do cross-subsidies arise from differential mortgage refinancing inertia? How big are they? How are they distributed?
  - Requires model to quantitatively assess.
  - Requires rich administrative data to map to model.

This Paper

- Studies mortgage refinancing using granular administrative data in the UK.
  - UK: initial discounted rates fixed for 2-5 years, automatically reset to high variable rate, unless refinanced into another discounted rate.
  - Sluggish refinancers cross-subsidize prompt refinancers.
- Data: universe of UK outstanding mortgage stock.
- Model: partial equilibrium model of UK mortgage market.
  - Heterogeneity in refinancing costs and valuations for housing.
  - Structurally estimate model parameters to match moments in the data.
- Structural approach means we can assess and quantify:
  - Size of cross-subsidy by comparing to a counterfactual single-rate market design.
  - Distribution of cross-subsidies: across income groups and regions of the UK; evidence that they are regressive.
  - Differential margins of adjustment.

Institutional Framework and Data

The UK Mortgage Market

- Mortgages pay discounted ("teaser") rate for initial fixation period (2-5 years), which reverts to high variable reset rate unless refinanced after fixation period.
  - Similar to credit cards, cellphone/electricity plans (Armstrong and Vickers, 2012).
  - Simplified optimal refinancing problem Option Value Simulation
    - Significant refinancing incentives at the end of fixed period (Cloyne et al., 2019).
    - Portable (reduced role of unobserved moving propensities).
    - High prepayment penalties deter early refinancing.

- Limited frictions to remortgaging: 2019 FCA Mortgage Market Study notes that remortgaging is easy, and most often with initial lender.
  - Filter ∼40K of 2M on reset rate that cannot refinance ("mortgage prisoners").
  - Filter potentially refinancing-ineligible borrowers (high LTV, payment shortfalls etc).
    Data Filtering Table

- Pricing based on product characteristics: rate type, fixation period, LTV.
  - Prices homogeneous across borrowers conditional on product (different from US).

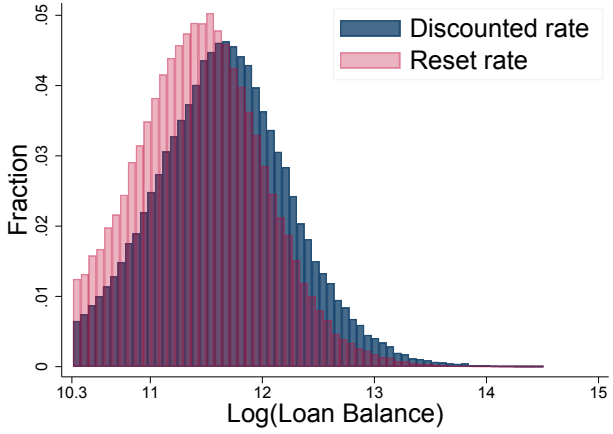
Example

Mortgages available	Maximum loan to value	Initial rate	Differential to Bank of England base rate (currently 0.25%)	Then changing to Santander's Standard Variable Rate	The overall cost for comparison is (APR)	Product fee	Additional benefits	Early repayment charge (ERC)	Monthly cost	Compare up to three rates
2 year fixed rate	80%	1.64%	n/a	4.49%	**4.1%**	£999	Free valuation and £250 cashback	3% + Repay £250 cashback	£813	☐
2 year fixed rate	85%	1.74%	n/a	4.49%	**4.1%**	£999	Free valuation and £250 cashback	3% + Repay £250 cashback	£823	☑
2 year fixed rate	85%	2.14%	n/a	4.49%	**4.2%**	£0	Free valuation and £250 cashback	3% + Repay £250 cashback	£861	☑

Data

- Data sourced from the Financial Conduct Authority (PSD007).
- Stock of all outstanding loans issued by regulated financial institutions in the UK, at semi-annual frequency.
- Stock at June 2015 (2015H1).
  - Eliminate tracker mortgages, focus on discounted and reset rate mortgages.
  - 3.59M mortgages, £470B aggregate debt in 2015H1
- Granular mortgage details, tracked over time, limited borrower characteristics (age, income, location).
- Used in other studies of UK mortgage markets: among others, Cloyne et al., 2019; Benetton, 2021; Robles-Garcia, 2019; Benetton et al. 2021; Liu, 2022.

Distribution of Loan Balances on Discounted and Reset Rates



- 69.8% of mortgage (by loan balance) on discounted rate, 30.2% on reset rate. More Detail
- Average loan balance: £140,647 on discounted vs. £112,692 on reset rate.

→ Cross-sectional variation in initial loan balance, time-series variation in remaining years.

Descriptive Statistics, Income Groups

Quantiles	Income (£)	Homeowners (%)	Balance (£)	Discounted (%)
0-10	24,604	0.50	61,522	0.65
10-20	30,504	0.61	76,141	0.64
20-30	35,631	0.64	86,894	0.64
30-40	40,701	0.68	96,752	0.64
40-50	46,198	0.72	107,326	0.64
50-60	52,687	0.75	118,920	0.64
60-70	60,974	0.80	132,885	0.65
70-80	73,154	0.82	152,206	0.66
80-85	82,349	0.84	173,235	0.66
85-90	96,616	0.86	195,018	0.67
90-95	126,236	0.91	232,354	0.68
95-100	214,486	0.96	351,530	0.69

Cross-subsidy Calculations

An Outline of the Model

Motivating the Model Framework

- The summary statistics show:
  - Spread between discounted and reset rates.
  - Share of mortgages on the discounted rate is roughly 35 percent on average, with variation across time, income groups, and regions.
  - Substantial heterogeneity in loan sizes.

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- To model cross-subsidies accurately, a desirable model will:
  - Capture heterogeneity in both refinancing costs and valuations/loan sizes.
  - Feature both persistent and time-varying inaction in mortgage refinancing.
  - Map to the stock of mortgages and not just the flow: (1) estimated parameters not influenced by changes over short periods; (2) captures behaviour across maturities.
  - Make aggregation easy, to assess cross-subsidies across income and regional groups.

Model: Assumptions

- Households:
  - Enjoy per-period housing value v_i
  - Pay a fixed cost k_i^o at origination.
    - Origination cost k_i^o is also a signal of future refinancing costs.
  - Pay cost $k_{i,t} = k_i \varepsilon_{i,t}$ when refinancing at t:
    - k_i is persistent cost for household i.
    - $k_i = k_i^o \varepsilon_{i,0}$ where $\varepsilon_{i,0}$ non-negative, iid with pdf $f_0(\varepsilon_{i,0})$, and realized after origination.
    - $\varepsilon_{i,t}$ household-specific multiplicative shock. Non-negative, iid with pdf $f(\varepsilon_{i,t})$.
  - Valuations, costs described by joint cdf $G_o(v_i, k_i^o)$, pdf $g_o(v_i, k_i^o)$.
- Mortgages:
  - Last for T periods. Discounted rate r_d for initial T_d periods.
  - Reset rate $R > r_d$ after T_d periods, if the household does not refinance.
- Choices:
  - At $t = 0$, decide to buy a property or rent.
  - At $t = 0$, if they buy, households choose loan size $l_{i,0}$ to finance a property priced at h_i, where $h_i = \omega l_{i,0}$ and LTV $= \frac{1}{\omega}$.
  - Every T_d periods, households decide to refinance or not by paying $k_{i,t}$.

Model: Optimal Refinancing

- Intuition:
  - Households refinance when $k_{i,t}$ is below a threshold that depends on loan balance.
  - Across households: larger loans increase refinancing likelihood.
  - Over time: refinancing incentives decline as loan amortizes.
  - Some households (almost) always refinance due to low persistent k_i.

- Solve for optimal refinancing path by backward induction:
  - In period T, refinance if $k_{i,T}$ below cutoff point $k_i^*(T)$

$$\begin{aligned} k_i^*(T) &= m(l_{i,T-1}, R, 1) - m(l_{i,T-1}, r_d, 1) \\ &= \underbrace{l_{i,T-1}(R - r_d)}_{\text{Benefit of refinancing at time } T}. \end{aligned}$$

where $m(l, r, s)$ is the mortgage payment of a loan with balance l, interest rate r, and remaining terms s.

Model: Optimal Refinancing (cont'd)

- Value function at time T equals expected mortgage payment:

$$V_T(k_i, l_{i,T-1}) = \int_0^{+\infty} \min\left(m(l_{i,T-1}, R, 1), m(l_{i,T-1}, r_d, 1) + k_i \cdot \varepsilon_{i,T}\right) dF(\varepsilon_{i,T})$$

$$= \int_0^{k_i^*(T)/k_i} \underbrace{\left(m(l_{i,T-1}, r_d, 1) + k_i \cdot \varepsilon_{i,T}\right)}_{\text{payment on discounted}} dF(\varepsilon_{i,T}) +$$

$$\int_{k_i^*(T)/k_i}^{+\infty} \underbrace{m(l_{i,T-1}, R, 1)}_{\text{payments on reset}} dF(\varepsilon_{i,T}).$$

- Similarly, define $V_t(k_i, l_{i,t-1})$ in generic period, with refinancing threshold $k_i^*(t)$.
- Evolution of loan balance $l_{i,t}(r, l_{i,t-1})$ depends on interest rate r:

$$r = \begin{cases} r_d & \text{if } k_{i,t} \leq k_i^*(t) \\ R & \text{otherwise.} \end{cases}$$

- Denote optimal refinancing policy function: $r(l_{i,t-1}, k_{i,t})$.

Model: Optimal Loan Size and Participation

- Households choose initial loan size that maximizes value function at origination:

$$W_0(v_i, k_i^o) = \max_{l_{i,0}} \sum_{t=0}^{+\infty} \beta^t v_i(\omega_i l_{i,0})^\alpha - k_i^o - \beta \int_0^{+\infty} V_1(k_i^o \varepsilon_{i,0}, l_{i,0}) dF_0(\varepsilon_{i,0}),$$

- Optimal loan size $l_{i,0}^*(v_i, k_i^o)$ depends on v_i and on origination cost k_i^o because it is a signal of future refinancing costs and refinancing policy $r(l_{i,t-1}, k_{i,t})$.
  - Households with higher k_i^o scale back initial loan, anticipating more reset rate payments (matters for counterfactuals).

- Extensive margin condition (EMC):

$$W_0(v_i, k_i^o) \geq \frac{\bar{u}}{1-\beta},$$

where $\bar{u}$ is a per-period utility of the outside rental option. $v_i^*(k_i^o)$ is the housing valuation at which household is indifferent between getting a mortgage or renting.

Model: Aggregation and the Stock of Mortgages

- Define three groups (i) of mortgages; derive aggregate number $N_i(\cdot)$ and aggregate balance $Q_i(\cdot)$ of mortgages in each group *in steady state*.
- Group 0: households with initial loan size $l_0(v_i, k_i^o)$ on their initial discounted rate.
  - Number $N_0(r)$ and quantity $Q_0(r)$ of these mortgages just adds all initial home buyers (all who satisfy EMC).
- Group 1: Mortgages of households who refinanced into the discounted rate.
  - Number $N_1(r)$ and quantity $Q_1(r)$ of these mortgages adds all refinancers (those with $k_{i,t}$ below $k^*(t)$ in each cohort observed in steady state, satisfying EMC).
- Group 2: Mortgages of households who did not refinance, and pay the reset rate.
  - Number $N_2(R)$ and quantity $Q_2(R)$ of these mortgages just adds all reset rate payers (those with $k_{i,t}$ above $k^*(t)$ in each cohort observed in steady state, satisfying EMC).

Aggregation Details

Structural Estimation

Outline of Structural Estimation

- The model facilitates aggregation of outstanding mortgages, delivering distributions of mortgages on the discounted and reset rates.
- We estimate the model by matching moments from the distributions of mortgages, assuming market is in steady state.
- Households receive a noisy signal of their persistent refinancing costs at origination. Households also form expectations of their average refinancing costs. Assumption: $\varepsilon_{i,0}$ has the same distribution of $\varepsilon_{i,t}$.
- Three specifications of household heterogeneity:
  1. UK-wide;
  2. 12 income groups;
  3. 12 regions and devolved administrations.

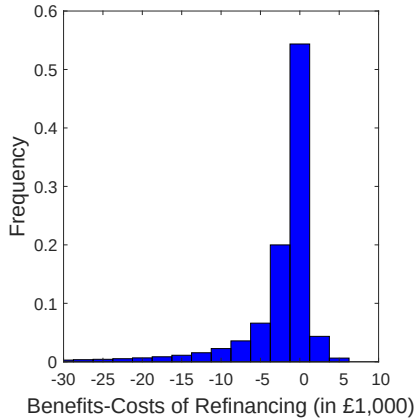
Sources of Identification

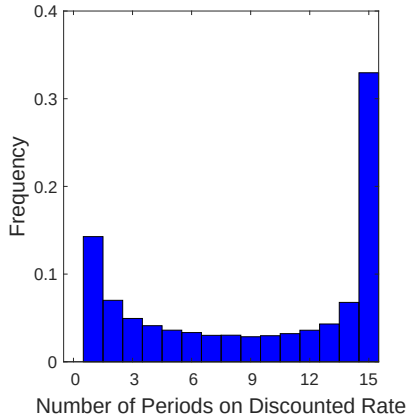
- We set discounted r_d and reset rates R to their averages in the data.
- We set maturity $T = 30$, fixation period $T_d = 2$, loan-to-value $1/\omega = 0.80$, and discount factor $\beta = 0.95$.
- We estimate the distributions of housing valuations and origination/persistent component of refinancing costs; variance of temporary component of refinancing cost shocks; utility parameters.
- Households' loan balances identify the distribution of housing preferences v_i.
- Shares of mortgages on the reset rate identify the parameters of the distribution of the refinancing cost $k_{i,t}$ and its components:
  - If the cost $k_{i,t}$ was prohibitively high (extremely low) for all borrowers, almost all mortgages would be on the reset (discounted) rate.
- Share of mortgages that transition from reset rate R "back" to discounted rate r_d informative about within-borrower heterogeneity in refinancing costs; identifies the distribution of transitory component $\varepsilon_{i,t}$.
  - If $Var(\varepsilon_{i,t}) = 0$, no mortgage would transition from R to r_d.

Model Fit: UK-wide

	Data	Model	t-statistic
Mean Loan Balance, Discounted Rate	140,647	141,240	-8.63
Standard Deviation Loan Balance, Discounted Rate	105,062	107,233	-11.49
Mean Loan Balance, Reset Rate	112,692	111,688	14.12
Standard Deviation Loan Balance, Reset Rate	79,684	78,120	6.65
Mean Remaining Years, Discounted Rate	20.57	18.82	28.96
Standard Deviation Remaining Years, Discounted Rate	7.73	7.85	-3.30
Mean Remaining Years, Reset Rate	16.84	15.51	17.95
Standard Deviation Remaining Years, Reset Rate	6.95	7.39	-8.67
Share of Mortgages on Discounted Rate, 0-5 Percentile	52.72	52.88	-1.39
Share of Mortgages on Discounted Rate, 5-25 Percentile	56.36	57.62	-21.53
Share of Mortgages on Discounted Rate, 25-50 Percentile	61.48	59.95	29.80
Share of Mortgages on Discounted Rate, 50-75 Percentile	67.76	63.97	76.82
Share of Mortgages on Discounted Rate, 75-95 Percentile	73.77	71.88	36.55
Share of Mortgages on Discounted Rate, 95-100 Percentile	81.19	81.93	-8.02
Transition from Reset Rate to Discounted Rate	16.52	16.82	-9.18
Share of Owners	63.13	63.12	0.97

Net Benefits of Refinancing





- Large heterogeneity in net benefits in the cross-section, with costs more heterogenous than gross benefits.
- Large heterogeneity of refinancing behavior in the time-series.

Cross-Subsidies and How They are Distributed

Model: Computing Cross-Subsidies

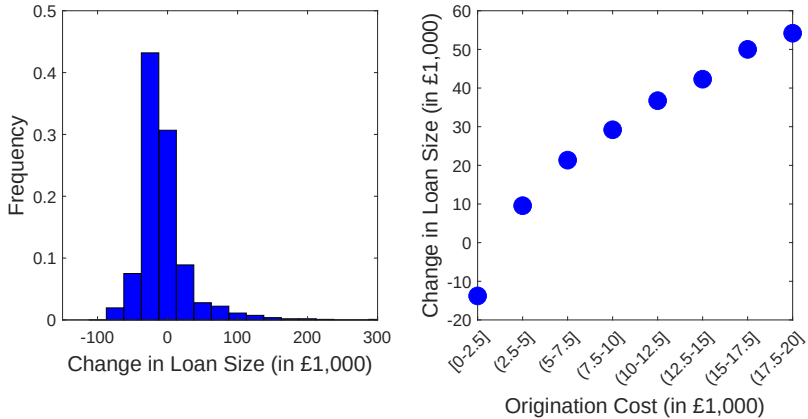
- Evaluate counterfactual in which all households pay single constant rate r_c.
  1. Lower bound: The average discounted rate.
  2. The weighted average rate paid by borrowers in the data (baseline economy).
  3. The rate that yields the same revenue as the composite of borrowers on the discounted rate and the reset rate (constant revenue assumption).
  4. Upper bound: The average reset rate.
- Remaining slides focus on weighted average rate r_c.
- Optimal loan size $l_{i,0}^{**}(v_i, k_i^o)$ in this case maximizes value function at origination evaluated at $\varepsilon_{i,t} = 0$.
- We can compute the aggregate number and balance of mortgages in this scenario.

Counterfactuals with Single Interest Rate: Average Rate

	UK-wide	Income Groups	Regions
Constant Interest Rate=683 bps			
Number of Mortgages	1.06	1.09	1.07
Mean Initial Loan Amount	0.97	0.97	0.97
Standard Deviation Initial Loan Amount	0.96	0.93	0.94
Mean Loan Balance	0.97	0.97	0.97
Standard Deviation Loan Balance	0.96	0.94	0.95
Consumer Surplus	1.04	1.03	1.03

Notes: Counterfactual quantities in rows shown as ratios relative to estimated market with dual interest rates.

Differences in Mortgage Size, Dual-Rate to Single-Rate



Notes: Noisy signal of persistent refinancing costs dampens changes in loan size and response of loan size to origination costs, because households estimate costs closer to the mean.

Cross-Subsidies Across Income and Regional Groups

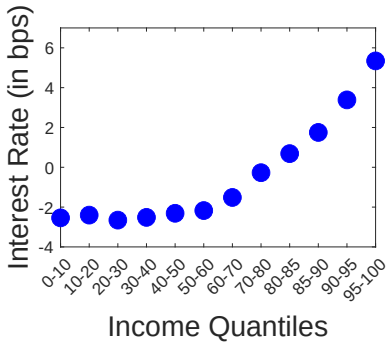
- We estimate the model for different subgroups of the data:
  - 12 income groups (10 income deciles, top two deciles further subdivided into two groups each).
  - 12 UK regions and devolved administrations.

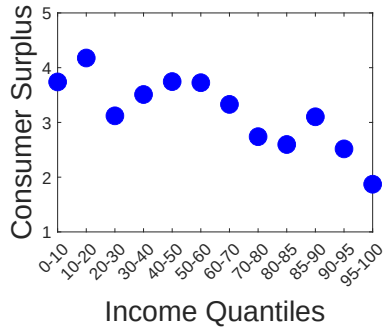
- Using group-specific parameters, we calculate:
  - Average interest rate difference (under single- vs dual-rate) for each group.
  - Average all-in costs (interest rate + refinancing costs).
  - Share of households with mortgages (extensive margin).
  - Average initial loan size (intensive margin).

- Focus on *across-group* distribution of cross-subsidies.

Differences in Outcomes, Dual-Rate to Single-Rate, Income Groups (I)

Progressive redistribution in average interest rates and consumer surplus.

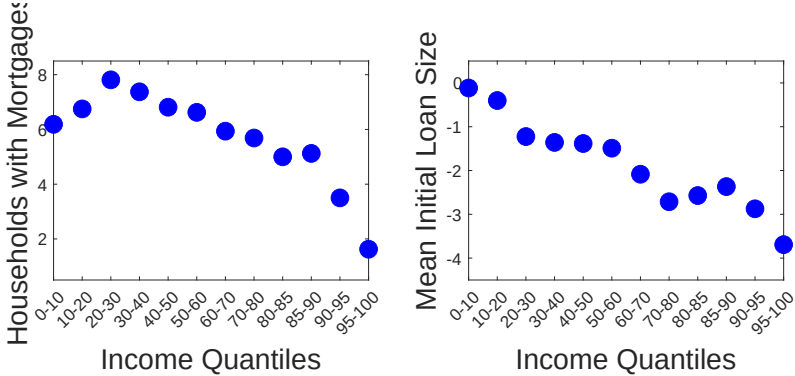




- Income groups from 80th percentile pay higher rates in counterfactual.
- Effect driven by higher-income households having larger loan balances.

Differences in Outcomes, Dual-Rate to Single-Rate, Income Groups (II)

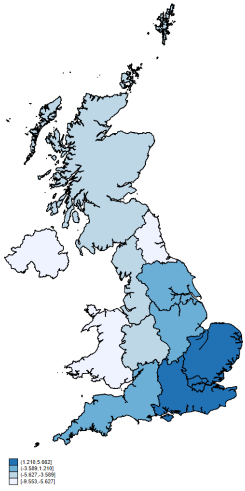
Significant adjustments to participation and mortgage debt in response to single-rate regime.



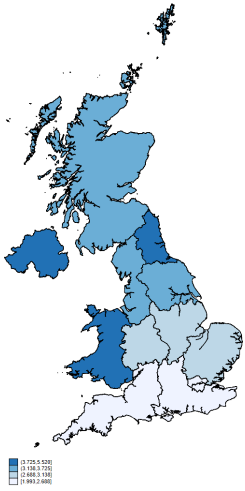
- Increase in number of mortgages especially for low-income households.
- High-income households decrease loan balances.
- Low-income households: net effect, infra-marginal households increase loan balances, but outweighed by entry from low-income (low loan balance) households.

Differences in Outcomes, Dual-Rate to Single-Rate, Regional

Interest rates higher and consumer surplus lower under counterfactual in wealthier regions.



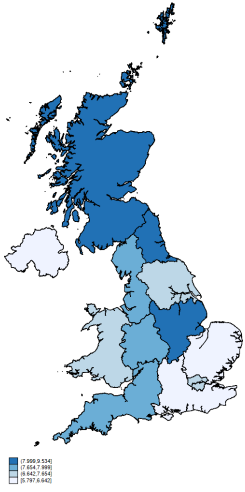
(a) Interest Rate



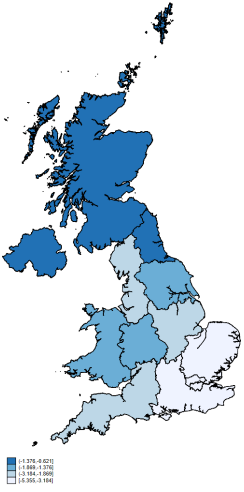
(b) Consumer Surplus

Differences in Outcomes, Dual-Rate to Single-Rate, Regional

Extensive and intensive margin adjustments across regions.



(c) Number of Mortgages



(d) Mean Initial Loan Size

Cross-Subsidy Mechanisms

- Redistributive effects depend on both housing valuation v and refinancing cost k.
  - Status quo benefits high v households (higher income) since $\uparrow v \rightarrow \uparrow l_0 \rightarrow \uparrow k^*(\cdot) \implies$ more time spent on the discounted rate (r_d).
  - Counterfactual single-rate world unambiguously benefits those with low v and high k, who mostly pay high reset rate R in dual-rate world.

- Margins of adjustment
  - Low-income households adjust their extensive margin participation: they enter the single-rate market, but are less keen to enter the dual-rate market.
  - High-income households adjust their intensive margin: they take smaller loans in the single-rate market.

Conclusions

- Structurally estimate refinancing cross-subsidies in the UK mortgage market.
  - Match broad features of the data, with realistic parameters that highlight significant cross-household variation in refinancing costs and incentives.

- Counterfactual comparisons show that mortgage take-up grows more for poorer groups/regions.
  - "Democratization" of mortgage take-up in single-rate world.

- **More broadly: complexity, cross-subsidies, and inequality in household financial products**
  - Richer households benefit due to larger stakes and greater propensity to take action.

Appendix

Model: Aggregation and the Stock of Mortgages

- Define three groups (g) of mortgages, and derive the aggregate number $N_g(\cdot)$ and aggregate balance $Q_g(\cdot)$ of mortgages in each group.
  - Expressions can be directly mapped to observed stock of mortgages in each category, under the assumption that the market is in steady-state.

- First, recursively define the endogenous distribution $H_t(\cdot)$ of loan balances after t periods from their origination, given evolution of loan balances and refinancing policy:

$$H_0(z) = \iint_{\{(v_i,k_i):v_i \geq v_i^*(k_i) \cap l_{i,0}^*(v_i,k_i) \leq z\}} g(v_i, k_i) dv_i dk_i,$$

$$H_t(z) = \int_{\{l_{i,t-1}:l_{i,t}(r,l_{i,t-1}) \leq z\}} dH_{t-1}(l_{i,t-1}).$$

Go back

Model: Aggregation and the Stock of Mortgages - Group 0

- Group 0: households with mortgage of initial size $l^*_{i,0}(v_i, k^o_i)$, on initial discount period.

$$N_0(r_d) = M \int_{-\infty}^{+\infty} \int_{v_i^*(k_i^o)}^{+\infty} g_o(v_i, k_i^o) dv_i dk_i^o,$$

$$Q_0(r_d) = N_0(r_d) \int_0^{+\infty} z dH_0(z) = M \int_{-\infty}^{+\infty} \int_{v_i^*(k_i^o)}^{+\infty} l^*_{i,0}(v_i, k_i^o) g_o(v_i, k_i^o) dv_i dk_i^o.$$

  - Intuition: recall mass M of households entering the market in each time period. The fraction of them getting (discounted-rate) mortgages equals those of them satisfying the extensive margin condition $v_i > v_i^*(k_i^0)$, with the outer integral integrating across the k_i distribution.

Model: Aggregation and the Stock of Mortgages - Group 1

- Group 1: Mortgages of households who refinance into paying the discounted rate.
- In each period $t \in \{1, \ldots, T-1\}$, the number $N_{1,t}(r_d)$ of mortgages is:

$$N_{1,t}(r_d) = N_0(r_d) \int_{\{l_{i,t}: r(l_{i,t}, k_{i,t}) = r_d\}} dH_t(l_{i,t})$$

  - Intuition: combines all borrowers who have a refinancing cost $k_{i,t}$ below the cutoff point $k_i^*(t+1)$, and thus have policy functions $r(l_{i,t}, k_{i,t}) = r_d$.
  - Thus, the aggregate number $N_1(r_d)$ of mortgages is $N_1(r_d) = \sum_{t=1}^{T-1} N_{1,t}(r_d)$

- The aggregate balance of this group is the sum of balances on r_d:

$$Q_{1,t}(r_d) = N_0(r_d) \int_{\{l_{i,t}: r(l_{i,t}, k_{i,t}) = r_d\}} l_{i,t} dH_t(l_{i,t}).$$

  - Thus, the aggregate balance equals $Q_1(r_d) = \sum_{t=1}^{T-1} Q_{1,t}(r_d)$.

Model: Aggregation and the Stock of Mortgages - Group 2

- Group 2: Mortgages of households who did not refinance, and pay the reset rate.
- In each period $t \in \{1, \ldots, T-1\}$, the number $N_{2,t}(R)$ of mortgages is:

$$N_{2,t}(R) = N_0(r_d) \int_{\{l_{i,t}: r(l_{i,t}, k_{i,t}) = R\}} dH_t(l_{i,t}),$$

  - Intuition: set of borrowers who have refinancing cost above cutoff point $k_i^*(t+1)$, and thus have policy functions $r(l_{i,t}, k_{i,t}) = R$.
  - Thus, the aggregate number of households who pay the reset rate equals $N_2(R) = \sum_{t=1}^{T-1} N_{2,t}(R)$.

- The aggregate balance of this group is the sum of balances on R:

$$Q_{2,t}(R) = N_0(r_d) \int_{\{l_{i,t}: r(l_{i,t}, k_{i,t}) = R\}} l_{i,t} dH_t(l_{i,t}).$$

  - Thus, the aggregate balance equals $Q_2(R) = \sum_{t=2}^{T} Q_{2,t}(R)$.

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Computing Cross-Subsidies: Single Interest Rate

- To compute cross-subsidies, we consider a counterfactual in which all households pay a single constant interest rate r_f (we consider different values of r_f).
- Optimal loan size $l_{i,0}^{**}(v_i, k_i)$ maximizes the value function at origination evaluated at $k_i = 0$. We get aggregate number and balance of mortgages:

$$N(r_f) = MT \int_{-\infty}^{+\infty} \int_{v_i^{**}(r_f)}^{+\infty} g(v_i, k_i) dv_i dk_i,$$

$$Q(r_f) = M \sum_{t=1}^{T} \gamma_{r_f}(t-1) \int_{-\infty}^{+\infty} \int_{v_i^{**}(r_f)}^{+\infty} l_{i,0}^{**}(v_i, k_i = 0) g(v_i, k_i) dv_i dk_i,$$

where

$$\gamma_{r_f}(t-1) = \frac{l_{i,t}(r_f, l_{i,0})}{l_{i,0}} = \frac{(1+r_f)^T - (1+r_f)^t}{(1+r_f)^T - 1},$$

is the beginning-of-period-t share of the initial loan still to be repaid, and $v_i^{**}(r_f)$ is the household that is indifferent between getting a mortgage or not in this constant rate scenario, i.e.: $W_0(v_i^{**}, k = 0, l_{i,0}^{**}(v_i^{**}, k_i = 0)) = \frac{\bar{u}}{1-\beta}$.

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Descriptive Statistics, U.K. Regions/Devolved Administrations (2015H1)

	Income	Homeowners	Balance	Discounted
Northern Ireland	46,236	0.69	88,790	0.59
Wales	46,443	0.67	100,026	0.62
North East (England)	46,465	0.61	93,488	0.60
Yorkshire and The Humber	47,138	0.63	100,650	0.64
East Midlands (England)	49,331	0.67	106,786	0.64
North West (England)	49,439	0.64	103,406	0.63
West Midlands (England)	50,270	0.65	110,089	0.61
Scotland	51,463	0.60	102,084	0.61
South West (England)	55,248	0.67	128,260	0.67
East of England	62,041	0.67	146,888	0.69
South East (England)	68,143	0.67	165,072	0.69
London	85,598	0.49	207,592	0.69

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Descriptive Statistics, Income Groups (2017H1)

	Inc. level	Prop. (Disc.)	Disc. rate	Reset rate	Bal.
0-10	25,435	0.75	2.90	3.78	61,726
10-20	30,470	0.74	2.87	3.68	76,792
20-30	35,737	0.75	2.85	3.62	88,696
30-40	40,962	0.75	2.82	3.57	99,790
40-50	46,597	0.76	2.77	3.52	111,548
50-60	53,167	0.76	2.73	3.48	124,665
60-70	61,536	0.77	2.68	3.43	140,210
70-80	73,712	0.78	2.63	3.38	161,470
80-85	82,981	0.78	2.57	3.35	183,833
85-90	97,194	0.78	2.53	3.34	206,593
90-95	126,414	0.79	2.47	3.33	246,039
95-100	216,018	0.79	2.39	3.28	370,173

Descriptive Statistics, U.K. Regions/Devolved Administrations (2017H1)

	Prop. (Disc.)	Disc. rate	Reset rate	Bal.
Northern Ireland	0.71	2.82	3.71	92,513
North East (England)	0.71	2.87	3.56	97,234
Scotland	0.72	2.80	3.59	105,329
West Midlands (England)	0.74	2.79	3.43	116,606
Wales	0.73	2.85	3.55	104,046
North West (England)	0.74	2.85	3.59	108,855
Yorkshire and The Humber	0.74	2.85	3.62	105,504
East Midlands (England)	0.76	2.79	3.45	113,622
South West (England)	0.79	2.72	3.35	136,328
South East (England)	0.80	2.59	3.39	178,564
East of England	0.80	2.62	3.44	160,469
London	0.79	2.46	3.58	227,780

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