Mortgage refinancing during tightening monetary policy: Evidence from the United Kingdom

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The views expressed in this paper are those of the authors, and not necessarily those of the Bank of England or its committees.

Introduction

- Mortgages play a central role in the transmission of monetary policy.
  - For many households, mortgage debt is the most important liability.
  - Fluctuations in interest rates and required debt servicing can have a large impact on the cash available for non-housing consumption.
- The speed and magnitude of the monetary policy transmission depends on the type of mortgages, eg. ARMs vs. fixed rates products, eg. Auclert (2019); Beraja et al. (2019); Eichenbaum et al. (2022); Garriga et al. (2017), among others.
- We study mortgage refinancing in the recent period of monetary tightening, using the UK setting.
  - Most products are offered at a discounted interest rate for 2 or 5 year fixed products, after which the rate reverts to a higher level. Borrowers typically refinance at the end of the discounted rate window
  - Identification: September 2022 mini-budget announcement $\rightarrow$ sudden and large increase in swap and mortgage rates; magnitude (approx. 200 basis points), and salience

Preview of results, after the mini-budget announcement:

- There is a large shift towards shorter fixation periods:
  - Borrowers are 20 percentage points more likely to select 2-year products instead of 5-year ones,
  - despite 2-year products becoming 10 basis points more expensive than 5-year ones.
  - Borrowers prioritize **financial flexibility**. $\rightarrow$ Implications for the future monetary transmission.
- Borrowers are less likely to switch lenders.
  - Higher likelihood of refinancing with the same lender.
  - Borrowers do not need to go through an affordability assessment when refinancing with the same lender $\rightarrow$ Implications for mortgage market competition.
- Deleveraging
  - Average decrease in loan to value of around 4 percentage points or roughly 8% of the pre-event value.

Preview of results, after the mini-budget announcement:

- Borrower heterogeneity:
  - Relation between borrower characteristics and mortgage contract choices
  - Higher incidence of lender switches among higher income households and those with a joint borrower.
  - Consistent with the notion that these less constrained households are more likely to pass the affordability assessment required at the time of a lender switch.
- Importance of financial flexibility
  - 2-year products are more flexible, in that they can be refinanced sooner and with lower early repayment charges in the fixed period.
  - Provide evidence on the exercise of flexibility by borrowers in shorter fixation loans (using a longer time period).
  - Trade-off between insurance (interest rate fixation) and flexibility.

Related literature

- Mortgages and the transmission of monetary policy.
  - Auclert (2019); Beraja et al. (2019); Eichenbaum et al. (2022); Garriga et al. (2017) among many others.
  - Fonseca and Liu (2023): In the context of rising interest rates many households prefer not to refinance, creating a lock-in.
- Mortgage choice literature:
  - Choice between fixed and adjustable rate mortgages (Campbell and Cocco (2003), Koijen et al. (2009), among others)
  - Role of moving risk in mortgage choice (Brueckner and Follain (1988), Dhillon et al. (1987), Stanton and Wallace (1998), Sa-Aadu and Sirmans (1995), among others).
- Recent papers that have analyzed several features of the UK mortgage market, including intermediaries' incentives and mortgage pricing.
  - Benetton (2021), Benetton et al. (2019), Robles-Garcia (2022), Best et al. (2020), Peydró et al. (2023), and Liu (2022).

Outline

1. Data and methodology
2. Mortgage choices: Rate fixation period, lender switches and deleveraging
3. Insurance vs. financial flexibility
4. Conclusion

Data and methodology

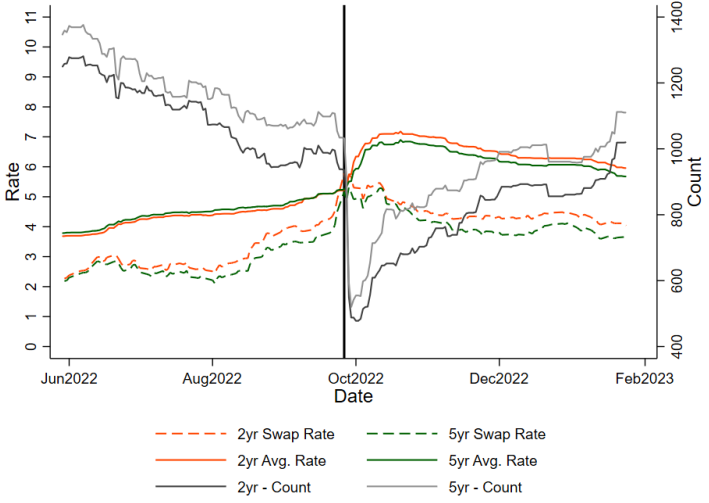
Data

- **Mortgage originations, PSD001**
  - For most of the analysis, administrative dataset covering the universe of UK originated residential mortgages
  - Focus on refinancing, excluding loans for property acquisition
  - Restrict to 2-year and 5-year fixed rate remortgages
  - Internal and external refinancing data available from 2021 Q2 onwards
  - Loan type, amount, interest rate, lender, property postcode, date of birth of the borrower etc.
- **Mortgages on offer in the market, Moneyfacts data**
  - Comprehensive view of available mortgage products at any point in time
  - Lender, loan type, interest rate, maximum LTV, etc.
- **Loan performance data, PSD007**
  - Administrative dataset with bi-annual snapshots of all outstanding mortgages
  - Loans on the books of lenders: status, amount, property postcode, date of birth of the borrower
  - For providing evidence on the use of flexibility by borrowers in 2-year and 5-year fixed rate loans

Mini-budget event and methodology

- **Mini-budget**:
  - Announced on 23 September 2022 as part of the UK Chancellor's Growth Plan
  - Large unfunded tax cuts proposed
  - Plan received with skepticism by markets
  - Large **unexpected** increase in swap and mortgage interest rates
- **Approach**:
  - Compare refinancing choices before and after Mini Budget announcement
  - Narrow +/-120 days window around the event (results robust to narrower windows)
  - How do the large differences in mortgage costs relate to refinancing outcomes?

The mini-budget event



Mortgage outcomes

Empirical methodology

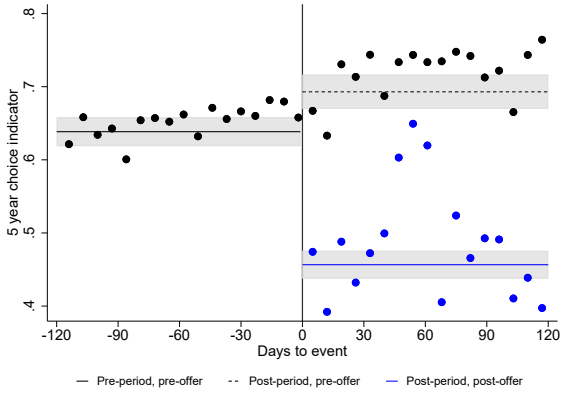
$$\text{Outcome}_{it} = \alpha + \beta_{\text{Post, Pre-offer}} \times \text{Post}_{it} \times \text{Pre-offer}_{it} +$$

$$\beta_{\text{Post, Post-offer}} \times \text{Post}_{it} \times \text{Post-offer}_{it} + \gamma X_{it} + \epsilon_{it},$$

where:

- Outcome_{it} refers to the outcome variable of interest for loan i refinanced on day t
- Post_{it} is a dummy equal to one for remortgages taking place after the event
- Pre-offer_{it} (Post-offer_{it}) refers to a dummy equal to one for pre-event (post-event) offers
- γX_{it} is a vector of controls, which include controls such as log income, joint mortgage status, age, and local area and lender fixed effects.

Fixation term: 5-year fixed rate choice indicator



Large shift from 5 year to 2 year fixation periods after the mini-budget

Fixation term and lender switches

	Pre-period level	Δ Post-period, Pre-offer			Δ Post-period Post-offer			No. Obs. & Adj. R^2		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
𝟙(5 year choice)	0.638***	0.055***	0.057***	0.043**	-0.182***	-0.173***	-0.182***	456,544	454,073	454,073
	(0.012)	(0.019)	(0.017)	(0.018)	(0.017)	(0.017)	(0.013)	[0.018]	[0.038]	[0.072]
𝟙(Same lender), 2 yr	0.699***	-0.009	-0.003	0.008	0.161***	0.135***	0.101**	162,465	161,775	161,775
	(0.052)	(0.081)	(0.070)	(0.072)	(0.059)	(0.051)	(0.045)	[0.016]	[0.130]	[0.223]
𝟙(Same lender), 5 yr	0.556***	-0.007	-0.005	-0.010	0.106	0.072	0.068	294,079	292,298	292,298
	(0.057)	(0.089)	(0.079)	(0.078)	(0.087)	(0.077)	(0.069)	[0.003]	[0.111]	[0.151]
Ln(Income)	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
𝟙(Joint mortgage)	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Age	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Local Authority FE	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Lender FE	No	No	No	Yes	No	No	Yes	No	No	Yes

Leverage

	Pre-period level	Δ Post-period, Pre-offer			Δ Post-period Post-offer			No. Obs. & Adj. R^2		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln(Loan amount), 2 yr	11.887***	0.078**	-0.007	0.047***	-0.150***	-0.065***	-0.054***	162,465	161,775	161,775
	(0.016)	(0.034)	(0.019)	(0.011)	(0.029)	(0.021)	(0.008)	[0.010]	[0.515]	[0.545]
Ln(Loan amount), 5 yr	11.944***	0.068**	-0.002	0.041***	-0.346***	-0.148***	-0.120***	294,079	292,298	292,298
	(0.015)	(0.033)	(0.015)	(0.009)	(0.022)	(0.015)	(0.011)	[0.019]	[0.564]	[0.591]
LTV, 2 yr	52.289***	0.189	-0.850	0.877	-4.108***	-3.399***	-2.996***	162,465	161,775	161,775
	(0.640)	(1.042)	(0.822)	(0.662)	(0.748)	(0.696)	(0.448)	[0.005]	[0.282]	[0.327]
LTV, 5 yr	50.545***	0.914	-0.400	1.439**	-5.038***	-3.834***	-2.704***	294,079	292,298	292,298
	(0.465)	(0.947)	(0.741)	(0.619)	(0.779)	(0.711)	(0.492)	[0.005]	[0.263]	[0.315]
Ln(Income)	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
𝟙(Joint mortgage)	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Age	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Local Authority FE	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Lender FE	No	No	No	Yes	No	No	Yes	No	No	Yes

Borrower heterogeneity

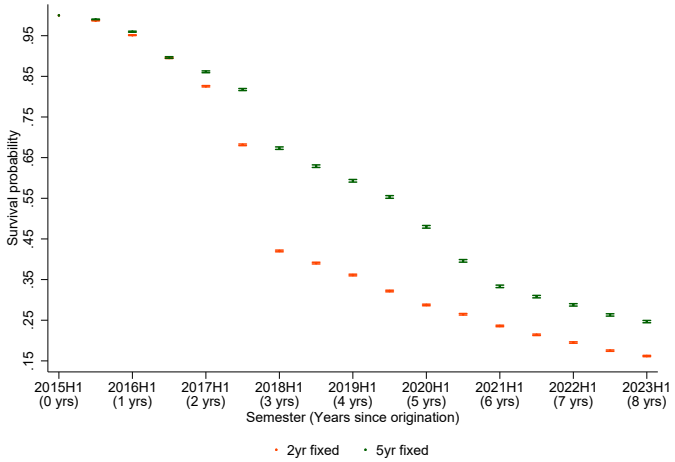
	Ln(Income)	**𝟙(Joint mortgage)**
	(1)	**(2)**
𝟙(5 year choice)	0.012**	0.071***
	(0.005)	(0.003)
𝟙(Same lender), 2 yr	-0.100***	-0.053***
	(0.008)	(0.009)
𝟙(Same lender), 5 yr	-0.123***	-0.090***
	(0.009)	(0.013)
Ln(Loan amount), 2 yr	0.646***	0.017**
	(0.019)	(0.008)
Ln(Loan amount), 5 yr	0.703***	0.006
	(0.015)	(0.006)
Local Authority FE	Yes	Yes
Lender FE	Yes	Yes

Financial flexibility and insurance

How to interpret the results?

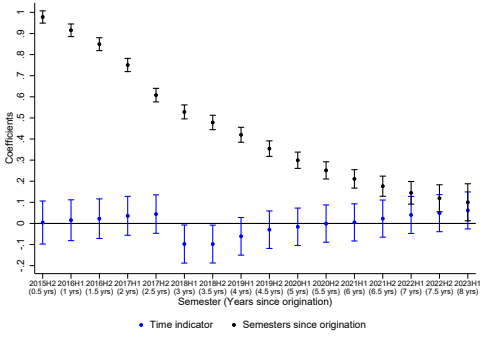
- Financial flexibility:
  - Products with shorter fixation terms are more flexible (lower early repayment charges)
  - Flexibility matters for borrowers who want to change the terms of the loan (home moves, equity extraction or loan repayment)
  - Use the loan performance data (PSD007) to show evidence on the use of flexibility by borrowers in different types of loans
  - Bi-annual snapshot of all loans in the portfolio of lenders. Use the combination of property postcode and date of birth of borrower to identify and track borrowers in a given property *a*cross all lenders.
  - Cohort analysis: first cohort, loans first originated in 2015H1.
  - Kaplan-Meier survival analysis for loan outcomes (home moves, equity extraction, loan repayments)
- Uncertainty
- Interest rate expectations

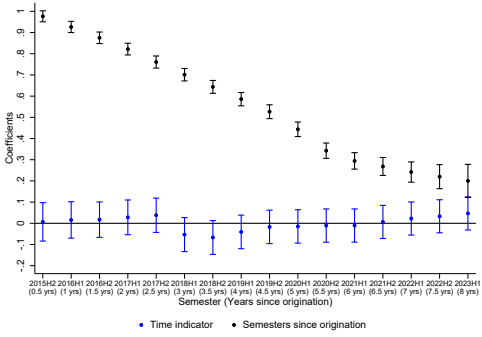
Demand for financial flexibility: Cohort 2015H1



Home moves, equity extraction, and loan repayments

All cohorts, semesters since origination and time fixed effects





2 year fixed 5 year fixed

Regress probability of home move/equity extraction/repayment on semester and time dummies $\rightarrow$ no change around mini-budget

Other results

Uncertainty

- Are mortgage choice results driven by uncertainty?
  $\rightarrow$ Mortgage choice results robust to estimating main specification splitting the first vs. second 60 days in post-period, where uncertainty is back to pre-period levels

Interest rate expectations

- For some evidence to separate financial flexibility motives from interest rate expectations, we:
  - Examine market interest rate expectations (rates rose more than expected at mini-budget, and expectation of decline after but only moderate) and household inflation expectations (2 vs. 5 year inflation expectations not significantly different)
  - Examine ARMs: rise in ARMs following mini-budget, however this is driven by tracker rather than discounted variable rate mortgages, the former having lower ERCs and offering more flexibility

Conclusion

Conclusion

- After an unexpected and significant interest rate rise:
  - borrowers are more likely to choose short-fixation (2-year fixed) loans
  - fewer borrowers switch lender
  - deleveraging
- Trade-off between interest rate exposure and financial flexibility:
  - borrowers prioritise flexibility $\rightarrow$ implications for the future monetary policy transmission

Auclert, A. (2019). Monetary Policy and the Redistribution Channel. *American Economic Review 109*(6), 2333–2367.

Benetton, M. (2021). Leverage Regulation and Market Structure: A Structural Model of the U.K. Mortgage Market. *The Journal of Finance 76*(6), 2997–3053.

Benetton, M., A. Gavazza, and P. Surico (2019). Mortgage pricing and monetary policy. Working paper.

Beraja, M., A. Fuster, E. Hurst, and J. Vavra (2019). Regional Heterogeneity and the Refinancing Channel of Monetary Policy. *Quarterly Journal of Economics 134*(1), 109–183.

Best, M. C., J. S. Cloyne, E. Ilzetzki, and H. J. Kleven (2020). Estimating the Elasticity of Intertemporal Substitution Using Mortgage Notches. *Review of Economic Studies 87*(2), 656–690.

Brueckner, J. K. and J. R. Follain (1988). The Rise and Fall of the Arm: An Econometric Analysis of Mortgage Choice. *The Review of Economics and Statistics*, 93–102.

Campbell, J. Y. and J. F. Cocco (2003). Household Risk Management and Optimal Mortgage Choice. *The Quarterly Journal of Economics 118*(4), 1449–1494.

Dhillon, U. S., J. D. Shilling, and C. F. Sirmans (1987). Choosing between Fixed and Adjustable Rate Mortgages: Note. *Journal of Money, Credit and Banking 19*(2), 260–267.

Eichenbaum, M., S. Rebelo, and A. Wong (2022). State-Dependent Effects of Monetary Policy: The Refinancing Channel. *American Economic Review 112*(3), 721–761.

Fonseca, J. and L. Liu (2023). Mortgage lock-in, mobility, and labor reallocation. *Working Paper*.

Garriga, C., F. E. Kydland, and R. Sustek (2017). Mortgages and Monetary Policy. *Review of Financial Studies 30*(10), 3337–3375.

Koijen, R. S., O. Van Hemert, and S. Van Nieuwerburgh (2009). Mortgage timing. *Journal of Financial Economics 93*(2), 292–324.

Liu, L. (2022). The Demand for Long-Term Mortgage Contracts and the Role of Collateral. *Working Paper*.

Peydró, J.-L., F. Rodriguez Tous, J. Tripathy, and A. Uluc (2023). Macroprudential policy, mortgage cycles and distributional effects: evidence from the united kingdom. *The Review of Financial Studies*.

Robles-Garcia, C. (2022). Competition and Incentives in Mortgage Markets: The Role of Brokers. *Working Paper*.

Sa-Aadu, J. and C. F. Sirmans (1995). Differentiated Contracts, Heterogeneous Borrowers, and the Mortgage Choice Decision. *Journal of Money, Credit and Banking 27*(2), 498–510.

Stanton, R. and N. Wallace (1998). Mortgage choice: What's the point? *Real Estate Economics 26*(2), 173–205.

Appendix

Other results

Mortgage choices - Within-borrower differences

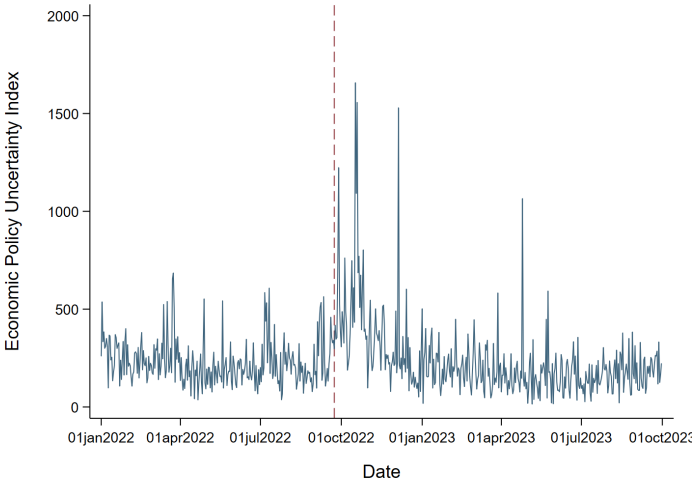
	Pre-period level	Δ Post-period, Pre-offer	Δ Post-period, Post-offer	No. Obs. & Adj. R^2
	(1)	(2)	(3)	(4)
𝟙(5 year choice | Lag 2 year)	0.538***	0.074***	-0.215***	513,705
	(0.006)	(0.014)	(0.015)	[0.024]
𝟙(5 year choice | Lag 5 year)	0.786***	0.030***	-0.174***	513,705
	(0.007)	(0.009)	(0.018)	[0.017]
𝟙(Internal | Lag external), 2 yr	0.744***	-0.020	0.145***	513,705
	(0.046)	(0.069)	(0.051)	[0.013]
𝟙(Internal | Lag external), 5 yr	0.629***	-0.046	0.097	513,705
	(0.049)	(0.076)	(0.071)	[0.005]
𝟙(Broker | Lag broker), 2 yr	0.695***	0.027	-0.090***	513,705
	(0.015)	(0.024)	(0.024)	[0.006]
𝟙(Broker | Lag broker), 5 yr	0.729***	0.030	-0.114***	513,705
	(0.015)	(0.024)	(0.021)	[0.005]
Balance diff (% property value), 2 yr	1.082**	-0.555	-1.257**	513,705
	(0.497)	(0.610)	(0.555)	[0.003]
Balance diff (% property value), 5 yr	1.483***	-0.614	-0.817	513,705
	(0.532)	(0.652)	(0.702)	[0.001]
Term difference, 2 yr	2.264***	2.732***	2.415***	513,705
	(0.533)	(0.987)	(0.859)	[0.003]
Term difference, 5 yr	2.671***	2.701***	5.995***	513,705
	(0.612)	(0.962)	(1.303)	[0.003]

Uncertainty

Uncertainty

- The event triggered significant uncertainty
- Uncertainty $\rightarrow$ demand for flexibility
- Are the effects driven by higher interest rates (first moments) or higher uncertainty (second moments)?
- The two are not mutually exclusive, and generally hard to separate them, but it is not only about second moments:
  - No significant increase in the number of borrowers on reversion at around the time of the event (greatest flexibility)
  - The uncertainty soon subsided, but mortgage refinancing outcomes are similar.

Economic policy uncertainty index



Results by first vs. second 60 days in post-period (1/2)

	𝟙(5 year choice)	𝟙(Same lender), 2 yr	𝟙(Same lender), 5 yr
	(1)	(2)	(3)
Constant	0.390***	1.065***	1.349***
	(0.058)	(0.082)	(0.108)
Δ Post-period, Pre-offer	0.043**	0.008	-0.010
	(0.018)	(0.072)	(0.078)
Δ Post-period, Post-offer (1-60 days after)	-0.116***	0.132***	0.128*
	(0.014)	(0.048)	(0.068)
Δ Post-period, Post-offer (61-120 days after)	-0.200***	0.093*	0.048
	(0.013)	(0.048)	(0.082)
Controls			
Ln(Income)	Yes	Yes	Yes
𝟙(Joint mortgage)	Yes	Yes	Yes
Age	Yes	Yes	Yes
Local Authority FE	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes
Observations	454,073	161,775	292,298
R^2	0.072	0.224	0.152

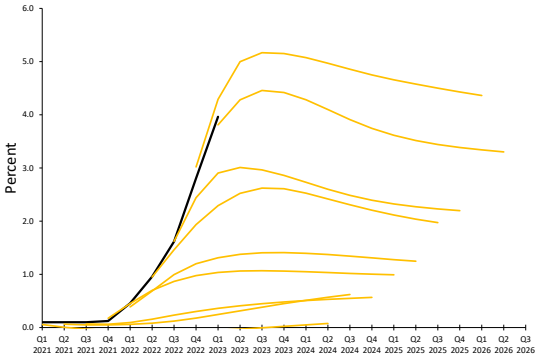
Results by first vs. second 60 days in post-period (2/2)

	Ln(Loan amount), 2 yr	Ln(Loan amount), 5 yr	LTV, 2yr	LTV, 5yr
	(1)	(2)	(3)	(4)
Constant	4.961***	4.357***	-2.654	-11.858***
	(0.201)	(0.162)	(2.836)	(2.973)
Δ Post-period, Pre-offer	0.047***	0.041***	0.878	1.439**
	(0.011)	(0.009)	(0.663)	(0.619)
Δ Post-period, Post-offer (1-60 days after)	-0.101***	-0.142***	-4.351***	-3.263***
	(0.009)	(0.017)	(0.444)	(0.476)
Δ Post-period, Post-offer (61-120 days after)	-0.042***	-0.113***	-2.671***	-2.524***
	(0.007)	(0.013)	(0.433)	(0.564)
Controls				
Ln(Income)	Yes	Yes	Yes	Yes
$\mathbb{1}$(Joint mortgage)	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes
Local Authority FE	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes
Observations	161,775	292,298	161,775	292,298
R^2	0.545	0.591	0.327	0.315

Expectations

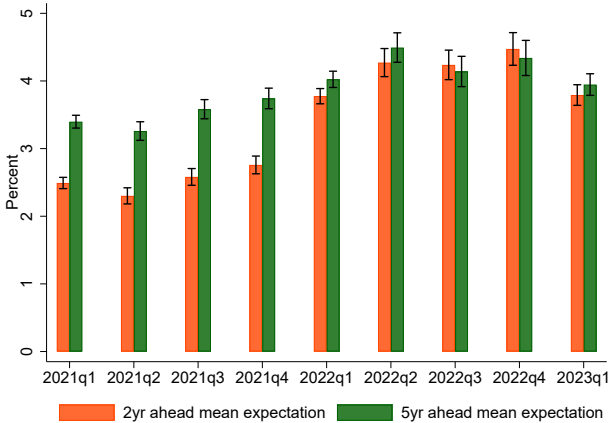
- Are the results driven by an expectation of a decline in interest rates?
- If interest rates are expected to decline, then flexibility to change the loan terms is more valuable.
- Limited data on household expectations, the one that exist on inflation expectations

Market interest rate expectations



Office of Budget Responsibility's Fiscal Risks and Sustainability Report

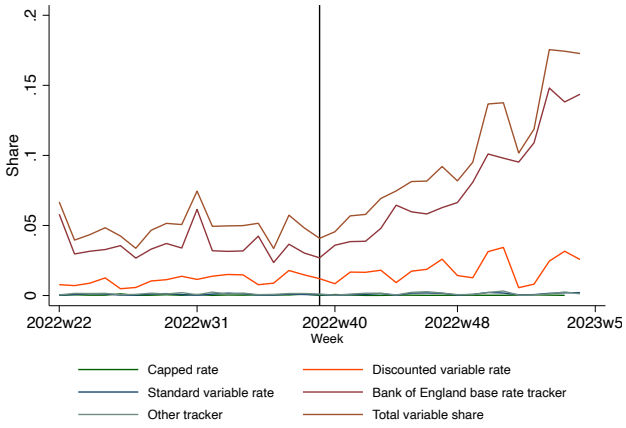
Household inflation expectations



Bank of England Inflation Attitudes Survey

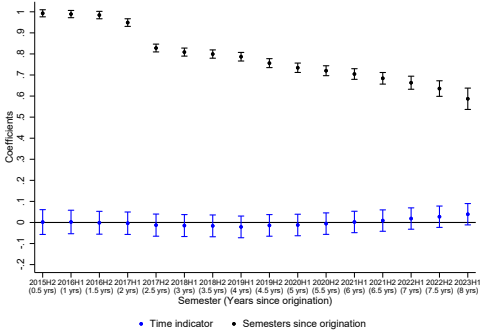
ARMs

ARM trend

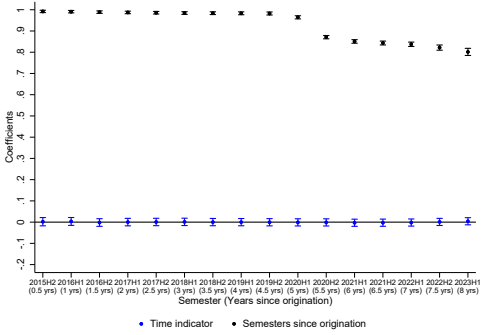

Share
0
.05
.1
.15
.2
2022w22
2022w31
2022w40
2022w48
2023w5
Week
Capped rate
Discounted variable rate
Standard variable rate
Bank of England base rate tracker
Other tracker
Total variable share

Inaction

Inaction: First time on reversion



2 year fixed



5 year fixed

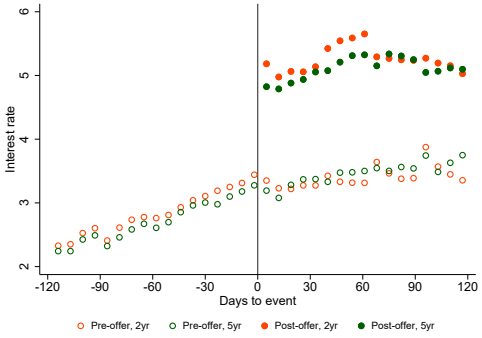
Mini-budget methodology

Mini-budget event and methodology

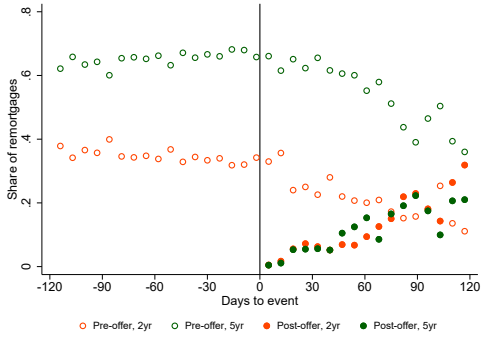
- **Challenge**:
  - Many post-event remortgages based on pre-existing offers
  - Borrowers may request an offer from lenders prior to the refinancing date
  - Offers typically remain valid for 3 months
- **Solution**:
  - Use Moneyfacts data to distinguish between pre- and post-offers among the post remortgagors
  - For each (lender $\times$ LTV $\times$ mortgage type) combination, calculate the *maximum* rate offered pre Mini Budget and the *minimum* rate post Budget
  - For most cases, *maximum* rate offered pre Mini Budget $<$ *minimum* rate offered post Budget

  $\rightarrow$ use the product type, lender identity, loan interest rate to distinguish pre-event offers ($=$ lower rates) from post-event offers.

Mini-budget event and methodology



Loan interest rate



Share of remortgages