

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

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Abstract

We study the mortgage refinancing behavior of United Kingdom households around the large unanticipated increase in interest rates resulting from the September 2022 mini-budget announcement. We uncover sizeable effects in the choice of interest rate fixation term, with a greater proportion of borrowers opting for loans with shorter fixation terms that offer greater flexibility. Fewer borrowers switch lenders when refinancing as it requires passing an affordability assessment. Loan amounts decrease on average, contributing to household deleveraging. We discuss these decisions in the context of the trade-off between interest rate insurance and flexibility. Our results have implications for monetary policy transmission.

Keywords: Mortgages, deleveraging, monetary policy, flexibility, equity extraction.

JEL Classification: E31, E52, G5, G51.

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1 Introduction

Mortgages play a central role in the transmission of monetary policy. For many households, mortgage debt is the most important liability and fluctuations in interest rates and required debt servicing can have a large impact on the cash available for non-housing consumption. Fixed-rate mortgages protect borrowers against increases in required mortgage payments from interest rate rises, but they tend to be more expensive than adjustable-rate ones (Stanton and Wallace (1998), Campbell and Cocco (2003)).¹ The speed of transmission and magnitude of the monetary policy effects depend on the type of mortgages held by different borrowers and on their refinancing activity (Auclert (2019); Beraja et al. (2019); Eichenbaum et al. (2022); Garriga et al. (2017)).

In this paper we study mortgage refinancing in the recent period of monetary tightening, using the UK setting. We investigate borrower choices regarding mortgage fixation length, lender switches and leverage. The nature of the mortgage products in the UK makes the analysis particularly interesting. Most have an introductory period, usually 2 or 5-years, during which the interest rate is fixed and significantly discounted. At the end of this period, the loan interest rate reverts to a much higher variable rate. Most borrowers refinance at the end of the initial fixation period, allowing us to study the different dimensions of borrower responses to interest rate increases.

Our identification strategy relies on the unexpected large rise in interest rates from the 23 September 2022 announcement of the UK Chancellor’s Growth Plan, commonly known as the mini-budget (which we will refer to as “the event”). The Growth Plan, which was comprised of large unfunded tax cuts as a means to stimulate growth, was received with scepticism by markets. It triggered a sudden and large increase in swap and mortgage rates. Our analysis compares outcomes between those borrowers who refinanced prior and post the interest rate rise.

A challenge is that some of those who refinance after the event will have requested and received the mortgage offer prior to it. Mortgage offers typically remain valid for 3 months. Our administrative data records the date of loan origination, but not when the offer was requested/received by the borrower. However, using time-series daily information on all products

¹This is due to the usually upward slope of the term structure and the compensation that lenders require for the option that borrowers have to refinance their fixed-rate loans.

available in the mortgage market, and exploiting the discontinuity in interest rates following the event, we are able to identify pre-event offers amongst the post-event refinances. Therefore we have three groups of borrowers, whose remortgaging outcomes we compare in an event window centered around the event date: pre-event, post-event/pre-offer, and post-event/post-offer. While the choices of post-event/pre-offer remortgagors are fairly similar to those remortgaging just prior to the event, there are significant differences for those remortgaging post-event without a pre-existing offer.

Our empirical results on the refinancing decisions around the event are threefold. First, there is a large shift towards shorter fixation periods by borrowers exposed to the unanticipated rise in mortgage rates, who are 20 percentage points more likely to select 2-year products instead of 5-year ones. This shift occurs despite 2-year products offering less protection against the risk of rising interest rates and becoming approximately 10 basis points more expensive than 5-year ones during this period.

Second, post-event/post-offer borrowers are less likely to switch lenders. This is reflected in a lower likelihood of making use of the services of a broker during the remortgaging process, and a higher likelihood of remortgaging with the same lender. The process of remortgaging with the same lender without equity extraction is much simpler, in that borrowers do not need to go through an affordability assessment. Higher interest rates makes passing the affordability assessment harder, so that borrowers turn to their existing lender, with implications for mortgage market competition.

Third, we use the discrete shift up in mortgage rates from the mini-budget announcement to estimate the elasticity of the loan level to changes in mortgage prices. We find evidence of deleveraging in response to the 200 basis points interest rate increase, with an average decrease in loan to values of around 4 percentage points or roughly 8% of the pre-event value.

A dimension of selection is that those individuals who remortgaged after the event with pre-existing offers are likely to be different than those who remortgaged after without such offers. While the event itself was unanticipated, some particular types of borrowers may have taken action sooner, and these types may also be related to remortgaging decisions such as the choice of interest rate fixation period. To address this selection, we use our origination data to compare the characteristics of those who remortgage with and without pre-offers. Borrowers without pre-offers tend to have lower income and they are less likely to have a joint borrower in the loan. Controlling for these observable dimensions of borrower selection, as well as local

authority and lender fixed effects, we find that our previous results are robust. For part of the sample, we are able to observe the previous loan taken by the same borrower, allowing us to show that our results also hold when considering within borrower changes.

We also explore how borrower characteristics relate to mortgage contract choices, to find a higher incidence of lender switches and the use of a broker among higher income households and those with a joint borrower on the mortgage contract. This is 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.

In the second part of the paper we analyze these mortgage choices of households in response to the mini-budget announcement in the context of the trade-off between interest rate *insurance* and product *flexibility*. Our analysis shows that an important reason for the shift towards products with shorter fixation periods, in spite of them becoming more expensive, is loan flexibility.

We collect data on all mortgage products on offer in the market to show that early repayment charges are significant and widespread during the initial period of interest rate fixation, but not after this period ends.² Therefore, 2-year products can be refinanced sooner at a lower cost, providing evidence on the differential flexibility of the products.

There are several reasons why borrowers may value product flexibility. First, because they may expect interest rates to decline and mortgages with a shorter fixation period may allow them to take advantage of such declines (although they also mean more exposure to the risk of future rate rises). Second, because borrowers may expect to move house in the near future. Third, because borrowers may want to extract equity or pay down their debt in the near future in response to future interest rate movements or other shocks.

We provide evidence for the exercise of this flexibility using an administrative dataset that includes loan level bi-annual information of the mortgage portfolios of *all* lenders from 2015 until 2023. Because we have information on the universe of loans, we are able to identify new loans taken by the same borrower in the same property, even if the loan is taken from a *different* lender. It allows us to identify events of loan termination, due to a house move or prepayment, and to calculate equity extraction.

A loan survival analysis shows that borrowers in 2-year fixed rate loans are much more likely

²For instance, in the first period of the loan, their median value is 3% (5%) for 2-year (5-year) mortgages. In the third year of the loan, the median values are 0% (3%), respectively.

to move houses (and prepay their loans) than those in 5-year products, and that the differences in the Kaplan-Meier estimates are largest between 2 and 5-years after origination. In addition, borrowers in 2-year loans are much more likely to refinance earlier to extract equity, with particularly large differences between 2 and 5-years after origination. These results show that borrowers in 2-year products make use of their flexibility for moving and for equity extraction.

Finally, we investigate the degree of borrower inaction following the mini-budget announcement. More specifically, we investigate whether borrowers change their propensity to refinance in a timely manner following the end of the interest rate fixation term. We find that the mini-budget announcement does not meaningfully change the proportion of inactive borrowers who move to the reversion rate.

Related literature. Our analysis contributes to the growing literature on mortgages and the transmission of monetary policy (Auclert, 2019; Beraja et al., 2019; Eichenbaum et al., 2022; Garriga et al., 2017). Most of this literature has focused on the United States (US), where 30-year fixed rate mortgages are the predominant type of contract, which in the case of a refinance are repaid at face value. This means that in the context of rising interest rates many households prefer not to refinance, creating a lock-in (Fonseca and Liu (2023)). The UK products, with an initial period of significantly discounted rates at the end of which most borrowers refinance, allow us to study borrower responses to the higher interest rates. In addition, the co-existence of several types of products allow us to study borrower reactions along several dimensions of the mortgage contract choice.

Some of the effects that estimate are consistent with the US evidence. For instance, we find that borrowers are more likely to switch to 2-year fixed rate products post-event. This result is consistent with the findings of Koijen et al. (2009) for the US, who show that borrowers are relatively more likely to refinance into an ARM (relative to a 30-year FRM) in a period of rising rates. We present within borrower results that show this to be the case even for borrowers who had previously chosen a product with a longer fixation period.

Our paper is also related to literature on mortgage choice. Particular relevant among the former are papers that focus on the choice between fixed and adjustable rate mortgages (Campbell and Cocco (2003), Koijen et al. (2009), among others) and in particular on the 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). We highlight several dimensions of mortgage flexibility that borrowers may consider when choosing mortgage fixation period,

including moving risk, but also equity extraction and loan prepayment.

There are a number of recent papers that have analyzed several features of the UK mortgage market, including intermediaries' incentives and mortgage pricing. They include, among others, [Benetton \(2021\)](#), [Benetton et al. \(2019\)](#), [Robles-Garcia \(2022\)](#), [Best et al. \(2020\)](#), [Peydró et al. \(2023\)](#), and [Liu \(2022\)](#). Particularly relevant for our analysis is [Liu \(2022\)](#) who shows how the choice of a shorter fixation period for more leveraged households may be driven by an expectation of being able to refinance in the near future at a lower loan-to-value and credit spread. While these effects can also be at work in our data, the vast majority of the refinances in our sample are characterized by low loan to values and small credit spreads. We also contribute to this literature by highlighting how less constrained households, those with higher income and more likely to have joint status, are more likely to have pre-offer mortgages around the mini-budget event, and also face fewer constraints when it comes to external refinancing. This means these households have a larger menu of potential options to select from, highlighting potential implications of monetary policy for household inequality.

The rest of the paper proceeds as follows. Section 2 describes the UK mortgage market structure and summarizes the data. Section 3 describes our main identification strategy and results on mortgage fixation period choice, lender switches and deleveraging are presented in Section 4. Next, we discuss the trade-off between financial flexibility and interest rate insurance faced by households in Section 5. Section 6 concludes.

2 Background and data sources

In this section we provide background information on the UK mortgage market and the data sources.

2.1 The UK mortgage market

Most UK mortgages have an initial period of interest rate fixation that can vary between two and ten years, with two or five years being the most frequent. During this initial period the interest rate is significantly discounted. After it ends, borrowers who do not remortgage revert to a floating rate (the reversion rate) equal to the prevailing base rate plus a spread. The reversion rate tends to be significantly higher than the initial rate due to the much higher

margin. There are prepayment penalties during the initial fixed-rate discounted period, but not after it ends.

The majority of borrowers remortgage at the end of the period of discounted rates. Frequent mortgage refinancing is a distinctive feature of the UK market. This means that at each point in time, there are many borrowers whose discounted rate period comes to an end and who refinance their loans.

In the UK mortgage market there are many products on offer, by different lenders. The pricing of these products varies by LTV band, and jumps as the LTV moves to a higher band. Therefore, borrowers tend to bunch at the upper threshold of the lower LTV band. The affordability assessment and borrower credit risk determines whether the borrower qualifies for the loan, but conditional on borrowers qualifying, it does not affect loan interest rate (see, among others, [Benetton \(2021\)](#), [Best et al. \(2020\)](#)).

Refinancing borrowers can take the new loan from their existing lender (internal remortgaging) or from a new lender (external remortgaging). Internal remortgaging without a change in loan terms (such as amount outstanding) is a simpler process; it does not require either a full property valuation, an affordability assessment, or proof of income. Lenders still carry out a property valuation, but do so using the property value when the previous loan was originated, updated using the evolution of local house price indices. This means that absent local house price declines, all borrowers (including those whose income has dropped) are able to remortgage with the same lender without equity extraction (this is often called a product transfer). On the other hand, remortgaging with the same lender with equity extraction or remortgaging with a different lender requires a full property valuation and an affordability assessment.³

Lenders are required to notify borrowers in advance of the end of the initial period of discounted rates. In particular, the Financial Conduct Authority (FCA) requires lenders to give *reasonable notice* of a change in the loan interest rate and mortgage payments due. The interpretation of reasonable notice varies across lenders, and timings of notification may vary from 4 months to 1 month in advance. The notification is frequently done by post, but not all borrowers may pay sufficient attention to the correspondence they receive.

³When remortgaging, borrowers can take the loan directly from a lender (direct channel) or through a mortgage broker (intermediated channel) ([Robles-Garcia, 2022](#)). Brokers help borrowers search among the products on offer by different lenders and provide advice. They benefit from the frequent refinancing activity since they receive a fee for their services (paid by the lender) if consumers use them for the refinancing.

The process of remortgaging with the same lender without a change in loan terms is straightforward and has few requirements, but borrowers must still actively request an offer from their existing lender, which can often be done easily online. Remortgaging offers typically remain valid for 3 months, and must be accepted by borrowers for the remortgaging to take place.

This mortgage market structure, with large increases in mortgage payments when the initial period of discounted rates ends, has the potential to create instability, particularly if borrowers are unable to refinance at the end of the initial period. Despite rising interest rates, the period of our analysis was characterized by house price increases. This means that most borrowers in our sample, including those whose income has dropped, are able to remortgage with the same lender. It is of course possible that if there are future significant declines in house prices some borrowers may be unable to remortgage. The fixation of the mortgage rate for a longer period provides protection against such a scenario.

2.2 Data sources

We use data from several sources that we briefly describe. The Internet Appendix [A](#) provides additional details on the data and sample construction.

2.2.1 Origination data

Our first main data source is the Product Sales Data (PSD001), an administrative dataset which covers UK residential mortgages *originated* for both home purchase and remortgaging. We focus on the latter since they do not involve a contemporaneous house transaction. PSD001 has been available since 2005 when the Financial Conduct Authority (FCA) introduced the requirement that lenders report all new sales of regulated mortgage contracts, and it has been used by several papers in the literature ([Best et al. \(2020\)](#), [Cloyne et al. \(2019\)](#) and [Benetton \(2021\)](#), among others).

Prior to April 2021, PSD001 covers all new loans for home purchase, external remortgages, and some but not all internal remortgages, where borrowers refinance with the same lender. Several lenders did not treat internal remortgages as a new loan and did not report them. This changed in April 2021 after which date all internal remortgages are also recorded. Hence, our analysis benefits from having complete administrative data on the universe of refinancing transactions.

The data includes a variety of origination information, including mortgage type (e.g. 2-year fixed, 5-year fixed, etc), initial interest rate, loan amount, loan term, the identity of the lender and remortgaging type (internal versus external). The data also contains a variety of borrower information, including the date of birth, property postcode, property value, income, whether there is a joint borrower in the loan, number of dependent children, among others. For some of the internal remortgages in our sample borrower income and property value information are missing. Such remortgages do not involve an affordability assessment and some lenders do not collect income information.

Panel Data. The main focus of our analysis are the remortgages that took place in an event window around the mini-budget announcement. For these remortgages, we can use the origination data to identify the previous loan (either for property acquisition or remortgage) taken by the same borrower. More precisely, we search in the data for a previous mortgage for the same combination of property postcode and date of birth of the main borrower. In the UK, a typical property postcode comprises only 15 properties which together with a birth date makes our match quite precise, and we are able to identify previous loans taken by the same borrower even if those were from a different lender. The main advantage of this panel data is that it allows us to study *within* borrower changes.

A shortcoming of the panel data is that we are not always able to identify the previous loan taken by the same borrower. Recall that not all internal remortgages are recorded in the data prior to April 2021, so that the sample of loans for which we can identify the previous loan is a selected one, in which the previous loan typically involved a house purchase, equity extraction, or was an external remortgage. It is also possible that a previous internal remortgage was not recorded in the data and we miss it, but that in our search for the previous loan we are able to match it to an older loan to the same borrower. To minimize the risk of this latter issue, in matching to previous loans of the same borrower, we only keep previous loans for which we are reasonably confident that it is indeed the most recent previous loan. More precisely, we keep previous loans that were taken at most three (six) years ago, when that loan was a 2-year (5-year) fixed-rate loan.

2.2.2 Loan performance data

A second data source is PSD007 which has bi-annual information on the performance of all outstanding mortgages. The data starts in the first semester of 2015 and it has recently been used by Fisher et al. (2021) to study refinancing cross-subsidies in the UK mortgage market. Each semester lenders must report to the regulator loan level information on all the loans in their portfolios, including their status (performing, in arrears, etc), the outstanding amount, property postcode, date of birth of the main borrower, among other items. The information included is less comprehensive than that in the origination data, as detailed borrower demographic data is unavailable. We use the PSD007 data to identify loans that have not been refinanced after the end of the initial period of discounted rates.⁴ The specific question that this data allows us to address is whether the proportion of inactive borrowers changes after the mini-budget announcement. We also use these data to study the use of financial flexibility by borrowers on different interest rate period fixation terms.

2.2.3 Moneyfacts data

The Moneyfacts data contains detailed information on all the products *on offer* in the market including the identity of the lender, product type (loan for property acquisition or remortgaging, period of interest rate fixation), interest rates (initial and follow on), maximum LTV, early repayment charges (ERCs), among other. We use the Moneyfacts data for two purposes. First, to identify, from mortgages originated after the mini budget announcement, offers received by borrowers before the mini-budget event. Second, to provide evidence on how the ERCs vary over time for products with different periods of interest rate fixation.

3 Identification

In this section we describe the event that we use to identify the effects and the empirical methodology.

⁴As PSD001 only reports new originations, PSD007 is necessary to identify borrowers who are due to refinance but do not originate a new loan.

3.1 The mini-budget event

For identification, we use the mini-budget event which led to a large unanticipated increase in mortgage interest rates. In order to provide the context in which it took place, Figure 1a plots the evolution of several macroeconomic variables and mortgage interest rates since January 2018. After a period of stable inflation and low interest rates, inflation started rising rapidly in January 2021. This was followed, towards the end of the year, by an increase in the Bank of England base rate and mortgage interest rates.

[Insert Figure 1 here]

In Figure 1a, we plot the average initial interest rate on 2-year and 5-year fixed interest rate 75% LTV loans. While 5-year mortgage rates were higher than 2-year ones during the initial part of the sample, they converged and became almost identical in late 2021, with 2-year rates becoming higher than 5-year ones towards the end of the sample period. The relation between 2-year and 5-year rates observed during the initial part of the sample is the one most commonly observed. The term structure usually is upwards sloping and there is a term premium. This means that products with longer fixation periods provide insurance against cash-flow risk, but they tend to be more expensive than loans with shorter fixation periods (and adjustable-rate loans). In the latter part of the sample, 5-year products became cheaper than 2-year ones.

The vertical line in Figure 1a represents the announcement of the UK Chancellor’s 2022 Growth Plan, commonly referred to as the mini-budget, on Friday, September 23, 2022. This announcement included controversial policies to reduce taxes financed by increasing government debt.⁵ The plans were unanticipated by the market and resulted in large increases in both the level and volatility of gilt yields. On Monday, September 26, the Bank of England reiterated their goal to reduce inflation through increasing interest rates in reference to the mini-budget announcement.⁶ The market responses and political pressure eventually led to the resignation

⁵The 2022 Growth Plan is available at <https://www.gov.uk/government/topical-events/the-growth-plan>. For example, the mini-budget planned to reduce the basic income tax rate from 20% to 19%, with a complete removal of additional tax rates for top earners including on dividend income, increase the nil-rate stamp duty tax threshold, reverse the planned increase in the corporate tax rate and national insurance contributions, among other items.

⁶See Bank of England, “Statement from the Governor of the Bank of England,” September 26, 2022, <https://www.bankofengland.co.uk/news/2022/september/statement-from-the-governor-of-the-boe>

of Liz Truss as Prime Minister on 25 October 2022, after less than 50 days in the role. While many of the most contentious policies of the mini-budget were eventually withdrawn and market volatility decreased, gilt yields remained significantly higher than pre-mini-budget levels.

Figure 1b focuses on an event window of +/- 120 days around the event, again represented by a vertical line. It uses Moneyfacts data to plot the number of different 2-year (5-year) products on offer in the market. There was a large reduction as lenders withdrew products. While the number of products on offer began to recover soon after, there was a major repricing, with interest rates shifting up by approximately 2 percentage points on average, effects that were more persistent than those on swap rates. The spread on mortgage rates relative to swap rates also widened, and 5-year products became cheaper than 2-year ones. Products with longer fixation periods provide insurance against cash-flow risk for longer, and after the event they did so at a lower interest rate.

The mini-budget and its effects were unanticipated by mortgage borrowers, but once the events unfolded they would most likely have been aware as they were covered extensively in the news. Our approach will compare remortgages originated in the 120 days prior to the cutoff date of Monday, September 26, 2022 to those originated in the 120 days after this date.⁷ Table 1 shows summary statistics for this sample. All continuous variables are winsorized at the 99% percentile. The average LTV of the remortgaged loan in the pre-mini-budget period is around 51%, but there is significant heterogeneity, ranging from 22% for percentile 10 to 75% for percentile 90. These are remortgaged loans originated after a period of house price increases, which explain why we do not observe higher LTVs at the top percentiles. There also is significant heterogeneity in LTIs, ranging between 1.2 (p10) and 4.3 (p90). The values are generally similar for loans originated in the post-event period.

[Insert Table 1 here]

3.2 Identifying pre-offers

When comparing borrowers who remortgaged before and after the event we need to take into account that some of those who remortgaged after may have had pre-offers, i.e. they may have had a remortgage offer in hand. Offers are usually valid for up to 4 months, and the

⁷The results are not very sensitive to the time window chosen, and in particular +/-90 and +/-150 days.

data includes the date when the loan was originated, but not the date of the offer. We use Moneyfacts data to identify pre-offers.

The Moneyfacts data includes information on *all* products on offer by all lenders on each day, including lender identity, product type (2-year fixed, 5-year fixed, etc), initial interest rate, and LTV band for the product (maximum LTV 65, maximum LTV 75, etc). To identify pre-offers, in a first step, we calculate, for the combination of lender, product type and LTV bucket the maximum interest rate among all products on offer in the four weeks prior to the mini-budget announcement.⁸ We focus on this period since interest rates were increasing in the weeks leading to the event, so that the maximum rates on offer during this period will represent an upper bound for the interest rate on offers received before the mini-budget announcement.

The event triggered very large interest rate rises. This means that for the products on offer after the event, the maximum interest rate pre-event (for the combination of lender, product type and LTV bucket) is almost always lower than the minimum interest rate for products on offer after the event (again for the same combination of lender, product type and LTV bucket). This, together with the interest rate on the loans originated post-event by different lenders, allows us to separate pre- and post-event offers.⁹

Thus, we have three groups of borrowers whose loans we compare. First, our base case is borrowers with pre-event offers who remortgaged before the event. Second, those with pre-event offers (and interest rates) who accepted the offer and remortgaged only after the event. Finally, those with post-event offers and interest rates. Figure 2a plots the average weekly interest rates for 2-year and 5-year products for these three groups. The figure confirms the validity of our strategy for identifying pre-offers and the large quantitative impact of the mini-budget announcement on mortgage rates, an average increase of almost 200 basis points.¹⁰

[Insert Figure 2 here]

⁸There are several different products for each combination of lender, product type and LTV band that differ in the initial product fees and interest rate. The initial product fees typically are between £0 and £999, and information on fees is not always available in the origination data (Benetton et al., 2019).

⁹There are a few exceptions for loans offered by small specialist lenders for whom the maximum interest rate pre-event is higher than the lowest interest rate post-event. For borrowers remortgaging with these lenders post-event, we cannot tell whether their offer is pre- or post-event. We remove them from the sample.

¹⁰The average interest rates in Figure 2a are lower than those in Figure 1b since the latter are calculated as an average across all products on offer in the market, including products with high LTVs. The remortgaged loans tend to have lower LTVs.

Figure 2b plots the share of 2-year and 5-year fixed rate loans originated in each week, separating by pre- and post-offer. Most of those who refinanced in the first few weeks after the mini-budget announcement did so using pre-offers. This is not surprising for two reasons. First, inflation and interest rates were already rising prior to the event, which may have led borrowers to request offers sooner. Second, the event triggered a significant decline in the number of mortgages on offer, which may have led to a delay in the remortgaging by those without an offer. However, as time passes, the share of pre-offers declines.

It is important to note that, although the event was unanticipated, there may be borrower selection in that those borrowers with pre-offers may be different than those without them. The process for requesting an offer from the current lender is straightforward and can be done online at the click of a button, provided that there are no changes in loan terms (e.g. increases in loan amount). In spite of this, borrowers must still take action and request the offer, and some may do so this earlier than others. The literature on inaction in household finance shows that inaction is often related meaningfully to borrower characteristics (Andersen et al., 2020). In the analysis that follows we study these selection effects.

Another less likely source of selection is if some of the borrowers with pre-offers shop around and secure another offer after the event. We think that this is very unlikely since the post-event offer would be at a much higher interest rate than the existing one.

3.3 Empirical methodology

To examine the effect of the event on mortgage refinancing outcomes, we estimate:

$$\text{Outcome}_{it} = \alpha + \beta_{\text{Post, Pre-offer}} \times \text{Post}_{it} \times \text{Pre-offer}_{it} + \beta_{\text{Post, Post-offer}} \times \text{Post}_{it} \times \text{Post-offer}_{it} + \gamma X_{it} + \epsilon_{it} \quad (1)$$

where Outcome_{it} refers to the outcome variable of interest for loan i remortgaged in day t . Post_{it} is a dummy variable equal to one for remortgages that take place after the event and Pre-offer_{it} (Post-offer_{it}) is a dummy variable equal to one for pre-event (post-event) offers. The estimated α gives us the average value for those who remortgage prior to the event, $(\alpha + \beta_{\text{Post, Pre-offer}})$ is the value for those who remortgage after the event with a pre-offer, and $(\alpha + \beta_{\text{Post, Post-offer}})$ is the value for those remortgaging post with a post-offer. The vector X_{it} includes controls and ϵ_{it} is the residual. In our analysis, the event window is +/-120 days, but the results are not sensitive to considering slightly shorter (+/-90 days) or longer (+/-150 days) windows.

4 Effects of the interest rate shock

This section studies mortgage refinancing outcomes around the event along several dimensions, including interest rate fixation period, lender switches and leverage.

4.1 Baseline estimates

We estimate Equation (1) for several outcome variables. In the regressions, each loan corresponds to one observation which is the level at which coefficients are estimated; in the background of the figures, we plot weekly averages of the variables of interest for each of the groups. The standard errors are clustered at the daily frequency. We first show regression results without additional controls.

4.1.1 Fixation term

Figure 3 plots the estimated regression coefficients for the indicator variable for 5-year fixation period choice as the outcome of interest. There are several interesting patterns. First, for pre-offer loans, we observe a heightened probability of selecting a 5-year mortgage following the mini-budget announcement, increasing from 64% to 69%. This reflects borrower selection, namely that those borrowers looking to remortgage into a 5-year product are more likely to have secured an early remortgaging offer. Below we study the characteristics of the borrowers who seek an early offer, and estimate the effects controlling for selection.

[Insert Figure 3 here]

Second, we find that borrowers with post-mini-budget offers are significantly less likely to select a 5-year fixed rate mortgage compared to the pre-announcement average (the difference is roughly 20 percentage points). Therefore, the large increase in rates triggered a shift towards products with shorter fixation terms. This is in spite of the fact that during this period 2-year products were more expensive than 5-year ones (Figures 1b and 2a) and offer less protection against the risk of future rate rises. In addition, this shift towards 2-year fixation periods occurs despite a slower recovery in the supply of these products (Figure 1b). This shift towards shorter fixation periods is consistent with the evidence of [Kojen et al. \(2009\)](#) for the US. They find that borrowers are relatively more likely to refinance into an ARM (relative to a 30-year FRM) in a period of rising rates.

In light of this evidence, the natural question is why borrowers are opting for products that are both more expensive and offer less protection against interest rate risk. A possible reason, that we investigate in section 5 below, is that at times of higher interest rates borrowers value the greater flexibility of products with shorter interest rate fixation periods.

4.1.2 Lender switches

During the global financial crisis many US borrowers were underwater which prevented them from refinancing and taking advantage of lower interest rates, leading to government interventions (Agarwal et al., 2023). Income shocks such as unemployment may also prevent borrowers from refinancing (DeFusco and Mondragon, 2020). Our setting is different along several important dimensions, but at the same time it can provide valuable evidence on the role of refinancing frictions and how they impact borrowers.

The event took place after a period of rising house prices, so that most borrowers in our sample have accumulated substantial amounts of home equity, meaning that LTV constraints are not binding. Second, the setting is one of an interest rate increase. US borrowers might not want to refinance in such a scenario (Fonseca and Liu (2023)), but UK borrowers revert to a higher variable rate if they do not do so. Refinancing with the same lender without equity extraction does not require an affordability assessment, but switching lenders does. Therefore, the comparison of the extent of lender switching before and after the event may provide a measure of its effects on refinancing frictions, and in particular on borrowers' ability to pass the affordability assessment at the higher interest rates.

Figure 4 plots estimates of Equation (1) with an indicator for same lender (internal) refinance as the outcome variable. The figure distinguishes between 2-year and 5-year loans, in Panels (a) and (b), respectively. Following the mini-budget, post-offer holders choosing 2-year fixation terms are 17 percentage points more likely to refinance with the same lender, a significant increase from the pre-event value of 70 percent. The difference is both economically and statistically significant.¹¹

[Insert Figure 4 here]

¹¹There are patterns in the weekly averages of the proportion of same lender refinances, with higher averages in particular weeks. This is due to the way in which internal refinances take place, with the refinanced products having a certain future year/month end of fixation period date, and groups of borrowers moved to the product at certain dates within the month.

This effect is attenuated when considering 5 year fixation period mortgages, with an increase relative to pre-event level that is economically meaningful but not statistically significant. The lack of statistical significance may be due to the smaller number of post-offer 5-year products.¹²

The results in this section have implications for mortgage market competition. At times of interest rates rises it may be more difficult for borrowers to pass affordability assessments as a result of the higher required mortgage payments, meaning that incumbent lenders may have some captive borrowers. Below we study how different borrower characteristics relate to lender switching.

4.1.3 Leverage

The question of how consumers respond to changes in interest rates is central in economics, and several papers in the literature have used different approaches to estimate the coefficient of inter-temporal substitution.¹³ Relatedly, [DeFusco and Paciorek \(2017\)](#) exploit the degree of bunching in response to a discrete jump in interest rates at the conforming loan limit to estimate the interest rate elasticity of mortgage demand among US borrowers. Our event can be used to estimate the response of households mortgage leverage to interest rates.

In [Figure 5](#) we plot coefficient estimates and weekly averages of log loan amount by 2 year and 5 year fixation periods in Panels (a) and (b), respectively. For those with pre-offers, the loan amount is similar to the average of those who remortgage prior to event. However, for post-offer holders, there are very significant declines of 15% (35%) in average loan size for 2 (5) year products. These are very large estimates, but as the results below show, they are partly the result of borrower selection. Once we control for it, the estimates become significantly smaller.

[Insert [Figure 5](#) here]

In Panels (c) and (d) of [Figure 5](#), we report results for leverage using loan to value as the outcome variable. In the pre-event period, the average LTV of the remortgaged loans is slightly

¹²In [Appendix Figure A1](#) we show results for the likelihood that the loan is intermediated. Following the mini-budget announcement, borrowers with post-offers are approximately 10 percentage points less likely to use the services of a broker, consistent with idea that the use of a broker facilitates lender switching.

¹³See for example a review in [Attanasio and Weber \(2010\)](#) and references therein. [Best et al. \(2020\)](#) use UK mortgage market data to measure the coefficient of inter-temporal substitution.

higher for 2-year than 5-year products, but around 50% for both. For post offer holders, the deleveraging that takes place corresponds to roughly 5% of property value, similar for 2-year and 5-year products. Given the interest rate rise of 2 percentage points, it implies a significant LTV reduction of roughly 2.5 percentage points per 1 percentage point increase in interest rates.¹⁴

A decrease in loan amount means immediate deleveraging. A second route through which the deleveraging process can take place is repayment term. A shortening of repayment terms leads to increases in monthly mortgage payments and a faster repayment of loan principal, meaning future deleveraging. Appendix Figure A2 plots the estimates for the logarithm of repayment term (in months) as dependent variable. Post-offer holders in 2-year (5-year) products reduce their mortgage term by an average of approximately 5 (9) months following the mini-budget announcement compared to the pre-announcement period, which translates to faster principal repayment. However, it is also the case that post-period/pre-offer remortgagors have longer mortgage terms than pre-period borrowers. This could result from selection, if borrowers looking to extend the term of their loans sought offers earlier.

4.2 Selection on pre-offers

The previous estimates showed the combined effect of treatment and selection on pre-offers. Several of them point towards economically meaningful borrower selection. This raises several questions that we address in this section. The first is on the nature of selection, of which borrowers are more likely to have pre-offers. The second is on how selection affects the previous estimates.

4.2.1 Nature of selection

We make use of the same regression framework as before to provide evidence on the nature of selection. More precisely, we estimate Equation (1) using the characteristics of borrowers who remortgaged with pre- and post offers as the outcome variables. Figure 6 presents the results for two borrower characteristics, income and joint borrower.

[Insert Figure 6 here]

¹⁴The deleveraging could be due to the higher cost of borrowing or a stronger precautionary savings motive due to the uncertainty triggered by the event. In Section 5 we investigate this.

The top panels show that post-offer remortgagors have on average lower income compared both to pre-period and post-period/pre-offer remortgagors. Furthermore, post-period/pre-offer borrowers tend to have slightly higher income than pre-period remortgagors. This shows that low income borrowers are less likely to have taken action and secured an offer prior to the event than high income ones. The two bottom panels show the results for the joint mortgage indicator. Solo borrowers are less likely to have secured an offer prior to the interest rate shock.¹⁵

4.2.2 Controlling for selection on observables

To control for the effects of selection into pre-offers, we estimate Equation (1) controlling for borrower characteristics (income, joint mortgage status, age, dependent children) and local authority fixed effects (by including these variables in X_{it}). England and Wales together have approximately 340 local authorities, which represent a geographic area of government through which many local governmental services are managed. These local authority fixed effects capture, for instance, differences in local house price levels and local employment opportunities. Tables 2 and 3 show the results.

For each outcome variable, in columns (1), (2) and (5) we report the estimated coefficients without any controls, previously shown in the figures. More precisely, column (1) shows the estimated pre-period level, column (2) the change relative to this pre-period level for the post-period/pre-offer group, and column (5) the change for the post-period/post-offer group, again relative to the pre-period level. Column (8) reports the number of observations and adjusted R-squared of the regression. In columns (3), (6) and (9) we report the results when we control for borrower characteristics and local area fixed effects. And in columns (4), (7) and (10) we expand the set of control variables to include lender fixed effects.¹⁶

[Insert Tables 2 and 3 here]

The first row of Table 2 shows the results for the dummy variable for 5-year interest rate fixation period. The estimated post-event changes are fairly insensitive to the the inclusion of

¹⁵Appendix Table A1 shows summary statistics distinguishing post-event remortgages into pre-offers, post-offers and those for which we cannot tell whether the offer is pre- or post-event.

¹⁶Lender fixed effects may matter for several reasons, the most important being that lenders differ in the pricing of their products, providing differential incentives for borrowers to switch lenders at the time of remortgaging.

controls, even though the controls help to explain outcomes, as measured by the increases in R-squared shown in columns (8) through (10). In the remaining rows of the table, we show the results for the probability of a lender switch for which the controls have more of an impact on the estimated coefficients. The estimated post-event/post-offer changes in probabilities are roughly one third lower when we include all the controls (column (7)) compared to the base estimates (column (5)). However, the estimated post-event/post-offer changes for 2-year products are still statistically significant and economically meaningful.

Table 3 shows the estimates for leverage, in a similar format to the one before. Focusing first on the logarithm of loan amount, we see that inclusion of the controls makes a large difference in magnitudes, with the estimated (absolute) changes in the log of loan amount for the post-period/post-offer dropping to roughly one third of the value when controls are not included. For instance, the first row shows an estimated 15% drop in column (5), but a drop of only 5.4% in column (7). This is the result of income-based borrower selection in pre-offers shown in Figure 6. These estimates imply that a 1 percent increase in interest rates reduces mortgage demand by 2.7%, a value that is similar to that estimated by [DeFusco and Paciorek \(2017\)](#) for the US.

The impact on the estimated coefficients of the inclusion of the controls is not as large in the LTV regressions. For instance for the 2-year loans, the change in LTV of the post-period/post-offer group is roughly -4 percentage points in column (5), compared to -3 percentage points in column (7), implying significant deleveraging in response to the event. It is also interesting to note that, for the explanatory power of the leverage regressions, borrower characteristics and local authority fixed effects are much more important than lender fixed effects.¹⁷

In Appendix B we report the estimated coefficients on the control variables, which tell us about the relation between borrower characteristics and remortgaging outcomes. We find that borrowers who are less likely to move tend to choose longer fixation periods ([Brueckner and Follain \(1988\)](#), [Dhillon et al. \(1987\)](#), [Stanton and Wallace \(1998\)](#), [Sa-Aadu and Sirmans \(1995\)](#), among others). Higher income borrowers and those with a joint borrower are less likely to remortgage with the same lender. Switching lenders (external remortgage) requires that borrowers pass an affordability assessment. Those with higher income and a joint borrower are in a better position to do so. Finally, controlling for income and joint borrower, older

¹⁷In Appendix Tables A2 and A3 we report results for broker usage and amortization term as outcome variables, controlling for borrower characteristics.

individuals are less likely to switch lenders when remortgaging.

4.2.3 Panel data and within-borrower differences

For a subset of the mortgages originated during the event window, we are able to identify the previous loan taken by the same borrower, allowing us to estimate within-borrower differences. It is important to note this exercise has some data limitations. Although all internal remortgages were recorded in the origination data during the event window, that was not the case prior to April 2021. This implies that our sample of loans for which we are able identify the previous loan taken by the same borrower tends to include mostly previous loans used for property acquisition and external remortgages (which were always recorded in the data).

In the first two rows of Table 4, we estimate Equation (1) for borrowers remortgaging pre- and post-period, with the indicator variable for 5-year fixed rate as outcome, distinguishing between cases in which the same borrowers previously took a 2-year and 5-year fixed rate loan (first and second rows). The estimates in the first column show that borrowers remortgaging pre-event were less likely to opt for a 5-year fixed (0.537) if they had previously taken a 2-year than if they had previously taken a 5-year fixed (0.785). Column (2) shows that those remortgaging post-period with pre-offers were slightly more likely to choose 5-year fixes, but the probabilities of such a choice decreased considerably, by roughly 1/5, among those remortgaging post-period with post-offers. This is the case for both previous 2-year and 5-year fixation.

[Insert Table 4 here]

The second set of two rows of Table 4 show the results for the likelihood of remortgaging with the same lender, conditional on a lender switch for the previous loan. Column (1) shows that pre-event the probability of remortgaging with the same lender is higher among those selecting 2-year products (0.744) than among those selecting 5-year products (0.630). For those remortgaging post-event with post-offers there are increases in the probabilities of staying with the same lender (0.140 and 0.111 for 2-year and 5-year, respectively, although the latter estimate is not statistically significant).

The final two rows of Table 4 show the results for the within-borrower difference in loan balances. They are calculated as the difference between the loan balance of the remortgaged loan and the outstanding loan balance of the previous loan at the time of the remortgaging (as a proportion of house value). The latter information is not included in our data and we need

to estimate it. This is not straightforward for loans that were not remortgaged straight after the end of the initial period of discounted rates (since we do not observe the interest rate to which borrowers reverted).

The balance difference rows show that those remortgaging pre-event were on average increasing the LTV of the remortgaged loans by 1.1 and 1.5% for those choosing 2-year and 5-year products, respectively. The estimated coefficients for the post-period/post-offer group are -1.2 and -0.9% for 2-year and 5-year products, consistent with deleveraging. However, the estimated magnitudes are roughly half of the previous estimates. This could be due to differences in the sample covered. The panel data, i.e. those borrowers for whom we can identify their previous loan, is more likely to include those whose previous loan was for property acquisition and who remortgaged externally. This subset of remortgagors may be more constrained than the overall population, and deleverage less in response to the event.

4.3 Uncertainty

The event was characterized by significant economic uncertainty. This raises the question of whether the effects that we have estimated in the previous section were due to the increase in interest rates or to higher uncertainty. Figure 7 plots the UK daily policy uncertainty index during the event window. The figure also plots the average daily values and corresponding confidence intervals for three different periods: pre-mini-budget, the first 60 days after the mini-budget announcement, and the following 60 days (i.e. days 61 to 120 after the announcement). The figure shows that there was a large increase in uncertainty in the 60 days after the mini-budget announcement, but that its average level decreased significantly after that, to levels similar to those in the pre-mini-budget period.

[Insert Figure 7 here]

With this in mind, we estimate a regression similar to the one that we have previously estimated, but letting the estimated coefficients on post-offers depend on whether the loan was refinanced in post-event days 1-60 when uncertainty was high or in post-event days 61-120:

$$\text{Outcome}_{it} = \alpha + \beta_{\text{Post, Pre-offer}} \times \text{Post}_{it} \times \text{Pre-offer}_{it} + \beta_{\text{Post, Post-offer}}^{1-60} \times \text{Post}_{it}^{1-60} \times \text{Post-offer}_{it} + \beta_{\text{Post, Post-offer}}^{61-120} \times \text{Post}_{it}^{61-120} \times \text{Post-offer}_{it} + \gamma X_{it} + \epsilon_{it} \quad (2)$$

where for instance Post_{it}^{1-60} is a dummy variable that takes the value of one for loans originated in days 1 to 60 after the event. As before the vector X_{it} includes borrower characteristics, local area and lender fixed effects.

Tables 5 and 6 show the estimated coefficients. The effects are similar in both post sub-periods, compared to the pre-event remortgages: there is a shift towards 2-year fixed rate products, borrowers are more likely to remortgage with the same lender, and they are more likely to deleverage. In terms of the estimated values, the increase in the likelihood of remortgaging with the same lender and the deleveraging that takes place are both smaller in the 61-120 days period compared to the 1-60 days period when uncertainty was higher. On the other hand, the likelihood of a shift to a 2-year product is higher in the latter period.

One potential identification concern is that the interest rate shock was the result of the mini-budget announcement of large unfunded tax cuts. Therefore, one may question whether the mortgage effects that we estimate were the result of the interest rate increase or of an expected decline in taxes. Most of the policies of unfunded tax cuts were reversed within a month of their announcement, which combined with the estimates in this section, shows that the reason for the estimated effects is the higher cost of borrowing (and not lower future taxes).

5 Insurance versus flexibility

Products with a longer interest rate fixation period offer borrowers more protection against the risk of rising interest rates. But, due to the typical upward slope of the term structure, they usually are more expensive than those with shorter fixation periods. In this case, the latter allow borrowers to minimize their initial payments, which is valuable for consumers facing binding liquidity constraints, even if at the expense of higher interest rate risk exposure (Cocco (2013); Ehrmann and Ziegelmeyer (2017); Piskorski and Tchisty (2010)).

In our event window, as Panel (a) of Figure 2 shows, 2-year rates were in fact marginally higher than 5-year ones. This means that products with longer interest rate fixation period offered not only more insurance against rising rates, but they were also cheaper. This raises the question of why borrowers switch to the more expensive shorter fixation products. In this section, we show that an explanation is that 2-year products are more flexible than 5-year ones, in that the loan terms can be adjusted sooner at a lower cost. We frame the analysis in terms of a trade-off between insurance against interest rate risk and flexibility and provide evidence

on the reasons why borrowers value loan flexibility.

5.1 Measure of product flexibility

In the UK, most 2-year and 5-year fixed rate mortgages have early repayment charges (ERCs) that apply during the initial period of interest rate fixation, but not once it ends. These early repayment charges are a measure of how costly it would be for borrowers to refinance and change loan terms.

Table 7 uses Moneyfacts data to quantify these costs, and reports several statistics on ERCs, calculated as a percentage of the outstanding loan balance. Panel A (Panel B) shows results for 2-year (5-year) fixed rate products. There are significant ERCs during the period of interest rate fixation. The charges are particularly large for the 5-year products in the first two years of the loans, with median values of 5% and 4%, respectively. These values are substantially larger than the costs of refinancing a fixed rate product in the United States (Berger et al. (2021), Chen et al. (2020)). 5-year products are also less flexible in that the charges exist for a longer period.

[Insert Table 7 here]

There are several reasons why borrowers may value product flexibility. First, because they may expect interest rates to decline and mortgages with a shorter fixation period may allow them to take advantage of such declines (although they also mean more exposure to the risk of future rate rises). Second, because borrowers may expect to move house in the near future, at which point the loan may have to be terminated.¹⁸ Third, because borrowers may want to

¹⁸We say may since if mortgages are portable, i.e. they can be brought to a new house, then the choosing of a mortgage with a longer fixation period does not necessarily imply the payment of significant charges in case of a house move. In theory, there is mortgage portability in the UK, but in practice there are a variety of reasons why it may be difficult to do so. Porting applications are subject to a property valuation and borrowers must qualify for the mortgage again. That is even though they have previously qualified for the mortgage they currently have, they may now fail to do so, either because their personal circumstances have changed or lenders changed the qualifying criteria. Although detailed data on porting is not available, the responses to the 2017 and 2020 FCA Financial Lives Survey suggest that among home movers, only approximately 20% bring their previous mortgage contracts to their new homes. This is consistent with several frictions that may arise in attempts to port mortgages.

extract equity or pay down their debt in the near future, and products with a shorter fixation period allow them to do so at a lower cost.

5.2 Interest rate expectations

Borrowers may prefer products with shorter fixation terms if they expect mortgage interest rates to decline. This could be result of a decline in either the credit spread or the base rate.

As recently studied by [Liu \(2022\)](#), short-term contracts allow borrowers to benefit from lower credit spreads at the time of refinancing, as they accumulate home equity and experience house price growth, and the LTV on their loan is reduced.¹⁹ This channel is likely to be more important for high LTV borrowers. However, in our sample of refinancing households it will have a limited impact. The average LTV of the remortgaged loans during our event window is slightly above 50%, in an LTV range where there are no significant differences in credit spreads.

Borrower expectations of future base rates may also play a role. Borrowers who expect interest rates to decline may prefer products with shorter fixation periods, so as to be able to take advantage of the expected future lower rates. It is important to note, however, that for this channel to be at play, it must be the case that borrower expectations differ from those of the market. After all, lenders use market swap rates to price mortgages with different fixation periods.

Figure 8a plots the market-implied and actual interest rate path over time. It shows that at time of the mini-budget announcement interest rates rose much more than what had been expected. It also shows that after the announcement and going forward markets expected interest rates to decline, but only moderately.

[Insert Figure 8 here]

Unfortunately, we do not have data on UK household interest rate expectations to compare to the market expectations. The only household expectations data that we have is on 2-year and 5-year ahead inflation expectations, from the Household Survey conducted by the Bank of England. Figure 8b plots the average values in each quarter and the corresponding confidence

¹⁹The argument requires that lenders do not take into account the expected decline on LTVs and credit risk over the life of the 5-year loan when pricing the loans compared to the sequence of several 2-year ones. Or alternatively, that borrowers have more aggressive expectations of future house price growth than lenders.

intervals. In 2022q4, the quarter after the event, the 2-year ahead average inflation expectation is slightly larger, but not significantly different than the 5-year one. There was however a significant decline in both measures of inflation expectations in 2023q1 relative to the previous quarter. This decline could impact mortgage choices.

5.2.1 Adjustable-rate loans

Our previous analysis focused exclusively on 2-year and 5-year fixed rate loans, which represented over ninety percent of the loans originated prior to the mini-budget announcement. In this section, we study the likelihood that borrowers refinance into an adjustable-rate mortgage (ARM) around the mini-budget announcement, which can be informative about borrowers' interest rate expectations. If borrowers expect interest rates to decline, then they may refrain from taking a fixed rate loan and locking-in a high interest rate.

Panel (a) of Figure 9 plots the weekly count and share of adjustable-rate loans as a proportion of total refinancing activity. Their share was fairly stable at around 5% of the total prior to the event, but increased steadily after to over 15% of the total by the end of the sample period.

[Insert Figure 9 here]

Panel (b) of Figure 9 decomposes the rise in ARMs into the different types of ARMs available in the market. The only two which are quantitatively relevant are those that track the Bank of England base rate and discounted variable rate mortgages (that track the lender standard variable rate). Both the tracker and discounted variable rate mortgages have an introductory period, of 2 or 5 years, during which the spread relative to the base rate is lower than in the follow-on period. Figure 9 shows that the rise in ARM refinancing activity after the mini-budget event is driven almost entirely by a rise in tracker mortgages. Although not shown in the figure, almost all of the ARMs originated have a 2-year introductory period.

Panel (c) of Figure 9 plots the initial weekly average interest rate for 2-year fixed, 5-year fixed, 2-year tracker, 2-year and 5-year discounted variable rate loans. We use the Moneyfacts to calculate these averages, so that they capture the interest rate on the loans on offer, not necessarily those taken by borrowers. In the same figure we plot the Bank of England Base rate. After the event, 5-year fixed rate products became on average cheaper than 2-year fixed rate ones. But the cheapest ones are ARMs. Borrowers expecting interest rates to increase but

not reach the level of those of the fixed rate loans, and willing to bear interest rate risk, may prefer the floating rate loans.

This still leaves the question of why borrowers opt almost exclusively for the 2-year tracker loans instead of the 2-year or 5-year discounted variable rate. Table 8 sheds some light on this. It shows data on the ERCs for the different loans. They are significantly lower both on average and at the median for the tracker than the discounted variable rate loans, so that the former are much more flexible than the latter.

[Insert Table 8 here]

Therefore, although tracker mortgages expose borrowers to the risk of future interest rate rises, they offer flexibility (low ERCs) at a lower initial interest rate. Although the choices of the borrowers who opt for tracker mortgages are consistent with the expectation that interest rates will not rise to the levels of the fixed rate loans, they are also consistent with the borrowers valuing the flexibility that the loans provide more than it cost lenders to provide the flexibility. If it was purely about interest rate expectations, one might not expect to see such a large difference in the uptake of trackers and discounted variable rate loans.

5.3 Evidence on the use of flexibility

In this section, we present direct evidence on the use of financial flexibility by borrowers in 2-year fixed rate loans compared to 5-year ones. This evidence sheds light on why flexibility matters. We perform the analysis for several cohorts of borrowers, including those who have taken loans prior to our event window. It has the advantage of being able to observe outcomes for a longer period after origination. We primarily use the Mortgage Performance Sales Data (PSD007), available since the beginning of 2015, and until June/30/2023.

5.3.1 Methodology

Twice a year, on June 30th and December 31st, all lenders must report loan level information on the mortgages in their books to the regulatory authority. The reporting includes the date the mortgage account was opened, currently outstanding loan amount, product type (e.g. 2-year fixed), the date on which the initial period of discounted rate ends, property postcode, date of birth of the main borrower, among others. The date of account opening refers to the initial

loan taken by the borrower with the lender. For borrowers who subsequently refinance with the same lender (product transfer), the account opening date remains unchanged but the mortgage information is updated to reflect the changes in loan terms.

We define cohorts of borrowers based on “new accounts” (new borrowers in a newly acquired property) of 2-year and 5-year loans in each semester. For instance, our first cohort, those who acquired a property in the first semester of 2015, includes a total of 315,653 new accounts. We identify new accounts using the combination of date of birth of the main borrower and the property postcode. Recall that a typical UK postcode contains only 15 addresses, so that the combination of date of birth and postcode is an accurate way to identify information in our data.²⁰ Our second cohort are accounts opened in the second semester of 2015 (and so on for subsequent cohorts). We are able to track these cohorts until June/30/2023.

We study whether borrowers in 2-year loans make use of loan flexibility differently than those in 5-year loans, and the reasons for the use of the flexibility. The first reason is a house move, i.e. borrowers prefer more flexible loans, with lower early repayment charges, because they are more likely to move houses in the near future. For each cohort and each semester after origination, we identify those accounts that are still open. By open, we mean that there still exists in the portfolio of *all* lenders a mortgage loan with the same combination of borrower date of birth and property postcode. Therefore, in our analysis, a remortgage (without a house move) either with the same or with a *different* lender than the one used at origination is not identified as an account closure or a move.

In this analysis, the most likely reason for the account to be closed is a house move (the property postcode changes). However, the account will also be considered closed (without a house move) if the loan is fully repaid (the loan disappears from the portfolio of *all* lenders) or the main borrower changes (the date of birth changes). Although the latter do not imply a house move, they still reflect reasons why borrowers may value loan flexibility. It should be noted that although we initially restrict the sample to 2-year and 5-year loans, we subsequently look for the combination of postcode and date of birth among *all* mortgage types in the portfolios of *all* lenders. We conduct a survival analysis and estimate a Kaplan-Meier curve (Kaplan and Meier (1958)) using the closure of the account as the event. After this analysis, we investigate other reasons why borrowers may value loan flexibility, including equity extraction and repayment.

²⁰PSD007 does not include buy-to-let mortgages, so that investor purchases are not included in the analysis.

5.3.2 Results

Figure 10a shows the estimates for our first cohort, i.e. the 2015H1 cohort. More precisely, the figure plots survival probabilities as a function of time, distinguishing between 2-year and 5-year fixed rate loans. In addition to the point estimates, the figure plots the confidence intervals, but these are narrow and not clearly visible. 2-year loans are much more likely to be terminated than 5-year ones. The difference becomes particularly large five semesters after origination, which coincides with the end of fixed rate period for 2-year loans, after which early repayment charges no longer apply. At this time, the estimated survival rates are 0.824 (0.945) for 2-year (5-year) products. This is direct evidence that those fixing the rate for shorter periods of time are more likely to move houses (or fully repay their loan).

Interestingly, the difference between the two lines narrows 10 semesters after origination. At this time early repayment charges no longer apply to the 5-year products. These findings are consistent with the US literature on the role moving risk in mortgage choice. In the UK setting, while the timing of refinancing is quasi-exogenous as the fixed rate is locked-in typically for either 2 or 5 years, our findings show the importance of future moving probability as a determinant of the fixed rate period choice households make; households expecting to move in the near future fix interest rates for fewer years.

The mini-budget announcement took place in 2022/H2. Focusing on the reporting periods around this date, Figure 10a does not reveal economically significant differences in account closure activity around this date.

[Insert Figure 10 here]

Another reason why borrowers may value the flexibility of 2-year loans is to change the loan amount (equity extraction or loan repayment). We extend our previous analysis and now also consider as account closure, in addition to a house move, those instances in which the combination of postcode and date of birth is still in the data, but the loan amount outstanding is either larger or significantly smaller (reduction of more than 20%) than that at the end of the previous reporting period. This reflects situations in which borrowers do not move houses, but refinance to extract equity or pay down significant amounts of their loans. The fact that we observe the universe of loans across all lenders, and that a given postcode covers such a small set of properties, allows us to carry out the analysis with a degree of precision that is not possible in other mortgage data.

Figure 10b shows the estimated survival functions. There is a very large increase in the gap between 2-year and 5-year loans five semesters after origination. The differences relative to the case in which equity extraction and loan repayments were not considered as termination events are large. For example, by semester six, 20% of the 2-year fixed rate loans were terminated as a result of a house move (or full repayment or change in the main borrower), but this percentage increases to roughly 54% when changes in loan amount are also included as termination events. This shows that loan flexibility is important for borrowers for equity extraction and loan repayment motives.²¹ As before, for this cohort, there do not appear to be significant differences in account closure around 2022/H2.

In order to estimate whether there are significant changes around the mini-budget date, we merge the data for all cohorts and regress the probability of account closure on dummies for semesters since account opening and time (semester) dummies. Semester since origination and time dummies are perfectly co-linear with cohort dummies, so that we cannot control for the latter in the regressions. Figure 11 shows the estimated coefficients on the semesters since origination (black) and time (blue) dummies. The base case are the first cohort and the first reporting period.

[Insert Figure 11 here]

Borrowers in 2-year loans are more likely to move houses and to change loan amounts sooner than those in 5-year ones. Although the estimated time dummies show a slight increase around the mini-budget period, the differences are not statistically different from zero. However, we should note that these time-series estimates reflect the choices of all borrowers with outstanding loans, including those whose period of discounted rate has not yet ended.

5.4 Inaction

In the UK mortgage market, in case borrowers do not remortgage at the end of the initial period of discounted rates and remain inactive, they move to the reversion rate. While on the reversion rate, borrowers do not face early repayment charges, providing flexibility. But this

²¹We have investigate the importance of equity extraction versus repayment. For this cohort almost all of differences arise from equity extraction. Appendix Figure A3 plots the estimates for all cohorts to show that again the main conclusions are similar to those that we have emphasized in this section.

flexibility is costly due to the much higher mortgage spread and exposes borrowers to interest rate risk.

The Kaplan-Meier survival framework can be used to study the likelihood that borrowers remain inactive at the end of the initial period of discounted rates and move to the reversion rate. We take the termination event to be the first time (as reported in the PSD007 data) that the borrower does not take action and moves to the reversion rate. Of particular interest are the past loans for which the initial period of discounted fixed rate ends around the event date, namely loans originated in 2017/H1 and 2020/H1.²² These are the cohorts for which the initial period of discounted rates ends just before the mini-budget announcement, for 5-year (for the 2017/H1 cohort) and 2-year products (for the 2020/H1 cohort).

Figure 12 show that there are indeed borrowers who move to the reversion rate when their fixation period ends, both for the 2-year and 5-year products. In terms of magnitudes, the likelihood of a move to reversion is higher for 2-year products, consistent with these borrowers valuing the flexibility that comes with being on the reversion rate more (albeit at a cost in the form of a higher loan rate).

[Insert Figure 12 here]

The right hand side charts of 12 show that the moves to reversion happen disproportionately in 2022/H2 for the 5-year 2017/H1 and 2-year 2020/H1 cohorts. However, in the left-hand charts we plot the estimates for cohorts of borrowers whose initial period of discounted rates ends one-year earlier. The proportions of borrowers who move to the reversion rate at the end of their respective initial periods are similar. This shows that, at least for these cohorts, the mini-budget announcement did not translate into unusual levels of inaction.

We combine data for all cohorts and regress the probabilities of a move to reversion on semesters since origination and time dummies. Figure 13 plots the estimated coefficients. None of the estimated time dummies are significantly different from zero, so that the mini-budget announcement, in 2022/H2, is not reflected in higher levels of inaction. Remaining inactive and moving to the reversion rate means more flexibility going forward (borrowers could adopt a “wait and see” approach to the remortgaging decision), but at the same time it exposes borrowers to interest rate risk and it is a costly alternative (due to the higher interest rate spread relative to the base rate).

²²See Figure A4 in the Internet Appendix for results for all other cohorts from 2015/H1 to 2023/H1.

6 Conclusion

This paper studies the response of borrowers to an unexpected rise in mortgage rates that resulted from the September 2022 mini-budget announcement. We uncover three primary findings. First, borrowers increasingly choose shorter mortgage interest rate fixation periods when exposed to the unanticipated rise in mortgage rates, with a notable 20-percentage-point increase in the likelihood of selecting 2-year products over 5-year ones post-announcement. This pattern persists despite the increase in 2-year product interest rates during this period, and reflects a demand by borrowers for increased financial flexibility, at the cost of interest rate insurance. Second, borrowers reduce the rate at which they switch lenders at refinancing, consistent with affordability issues at the higher interest rates, as lender switches require an affordability assessment. Third, borrowers respond to the mini-budget by deleveraging, evidenced by average decreases in loan amounts.

We frame the decisions of borrowers in the context of the trade-off between interest rate insurance, which longer fixation period products offer, and financial flexibility, which is more accessible through products with shorter fixation periods. We provide evidence on the motives for financial flexibility, including mobility and moving risk, but also equity extraction and loan prepayments.

Our findings have important implications for the transmission of subsequent monetary policy decisions. In particular, the heterogeneous responses of borrowers along the interest rate fixation period and loan amount dimensions implies heterogeneous effects on the required debt servicing and leads to changes in the composition of households through which subsequent monetary policy is transmitted.

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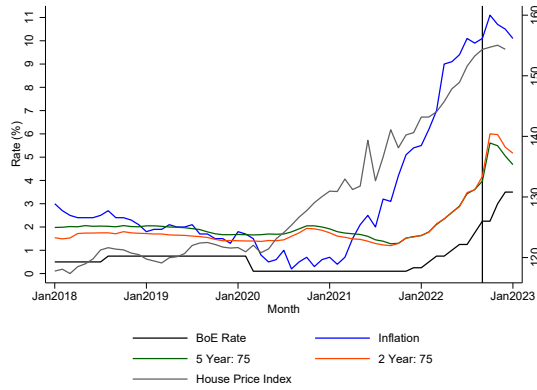
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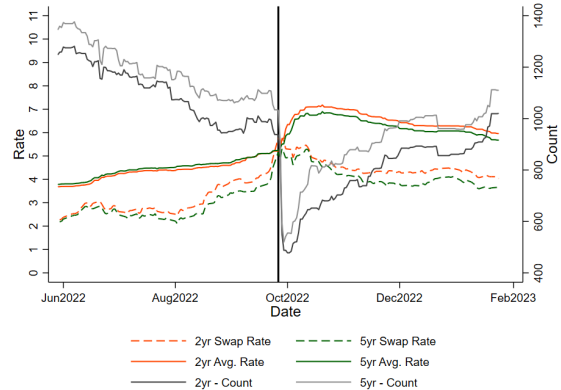
I Figures

Figure 1: UK Macroeconomic Context and the Mini-Budget

This figure plots the monthly time series of several macroeconomic variables from January 2018 to January 2023 in Panel (a), and the the interest rate and quantity of mortgage products around the mini-budget in Panel (b). The following series are plotted in Panel (a): the Bank of England base rate (black), the year-over-year consumer price inflation (CPI) change (blue), the 5-year fixed rate for 75% LTV mortgages (green), the 2-year fixed rate for 75% LTV mortgages (orange) and the UK National House Price Index (gray) which is plotted on the right vertical axis. The vertical black line at September 2022 represents the month of the mini-budget announcement. Panel (b) plots the daily average interest rate for 2 and 5 year mortgage products on offer, as well as the count of 2 and 5 year products on offer. The vertical black line indicates the event date, which refers to Monday, September 26, 2022, the Monday after the mini-budget announcement on Friday, September 23, 2022. Data for Panel (b) are from MoneyFacts.



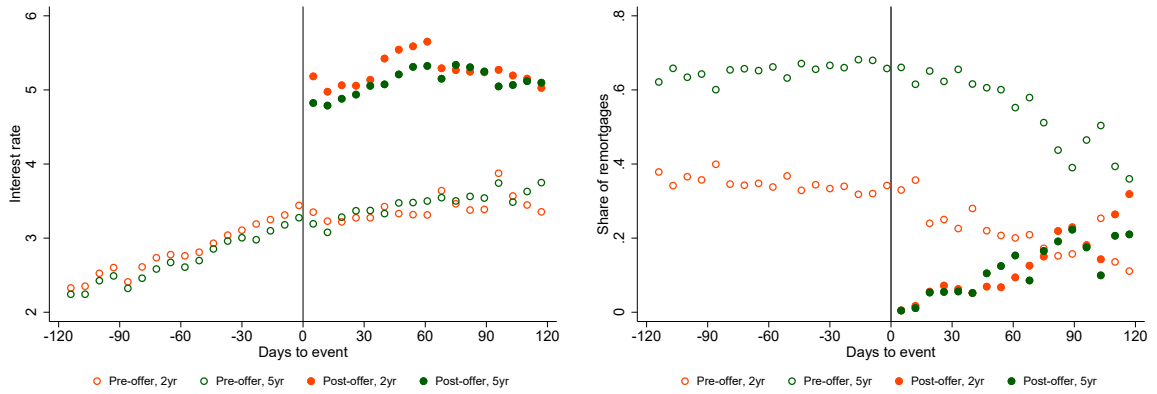
(a) UK Macroeconomic Activity



(b) Mini-Budget Announcement

Figure 2: Interest Rates

This figure plots the weekly average interest rate and share of for 2 and 5 year mortgage products, grouped by pre-offer or post-offer, in Panel (a). Panel (b) plots the share borrowers who select 2 year or 5 year fixation periods, grouped by pre-offer or post-offer holders.



(a) Interest rate

(b) Share of mortgages

Figure 3: Fixation Term

This figure plots regression coefficients of our main specification, Equation (1), with fixation period choice as the outcome. Weekly averages of each outcome are plotted behind the coefficients. 90% confidence intervals are in gray and robust standard errors are clustered at the origination-day level.

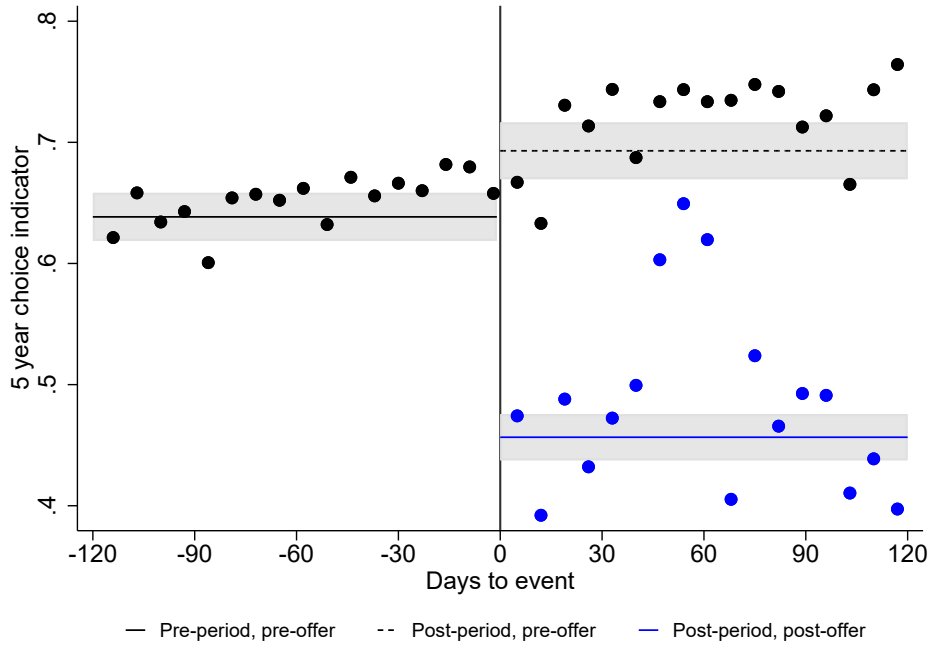


Figure 4: Lender Switches

This figure plots regression coefficients of our main specification, Equation (1), with internal indicator, equal to one when a borrower refinances with the same lender, as the outcome. All panels are run on the origination data. Weekly averages of each outcome are plotted behind the coefficients. 90% confidence intervals are in gray and robust standard errors are clustered at the origination-day level.

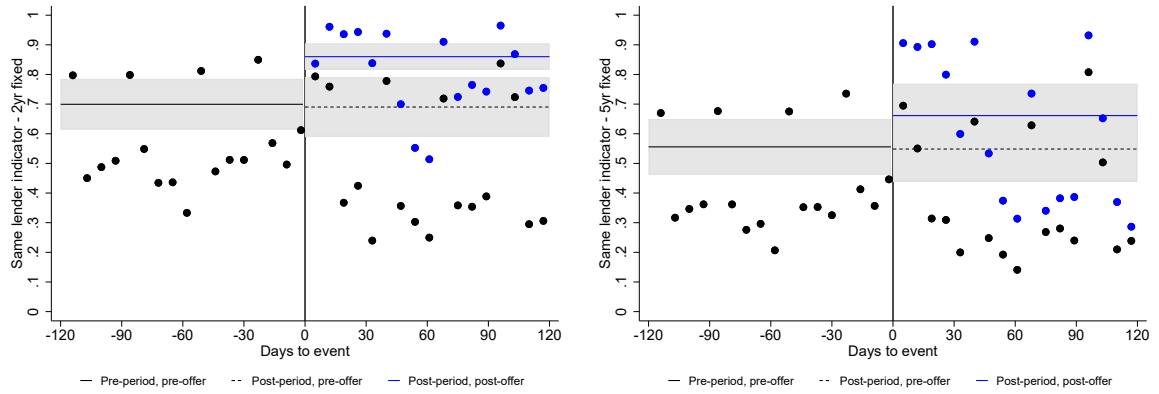
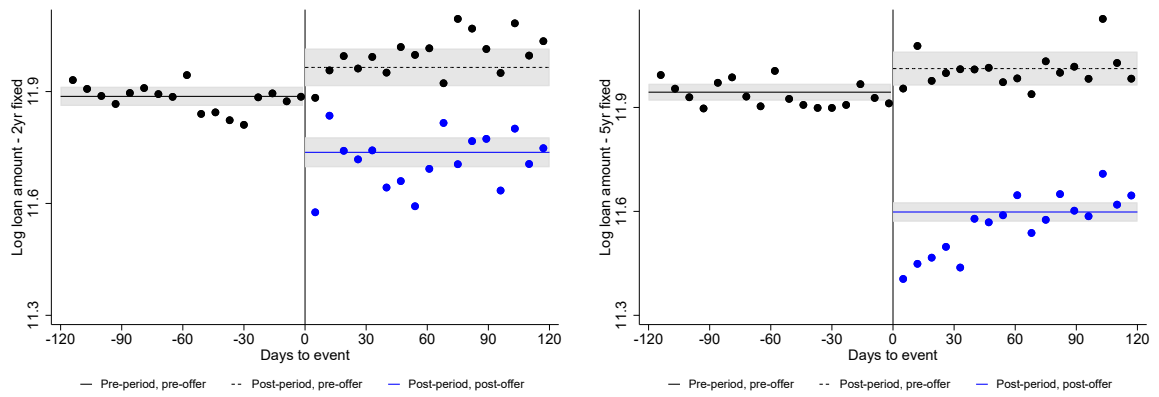


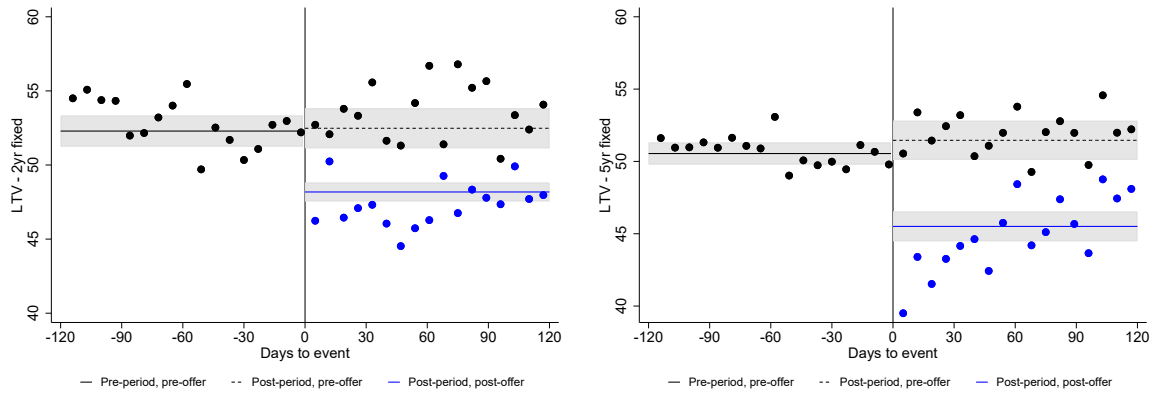
Figure 5: Leverage

This figure plots regression coefficients of our main specification, Equation (1), with loan amount and LTV as outcomes. Panels (a)-(d) are run on the origination data. Weekly averages of each outcome are plotted behind the coefficients. 90% confidence intervals are in gray and robust standard errors are clustered at the origination-day level.



(a) Log loan amount - 2-year fixed

(b) Log loan amount - 5-year fixed

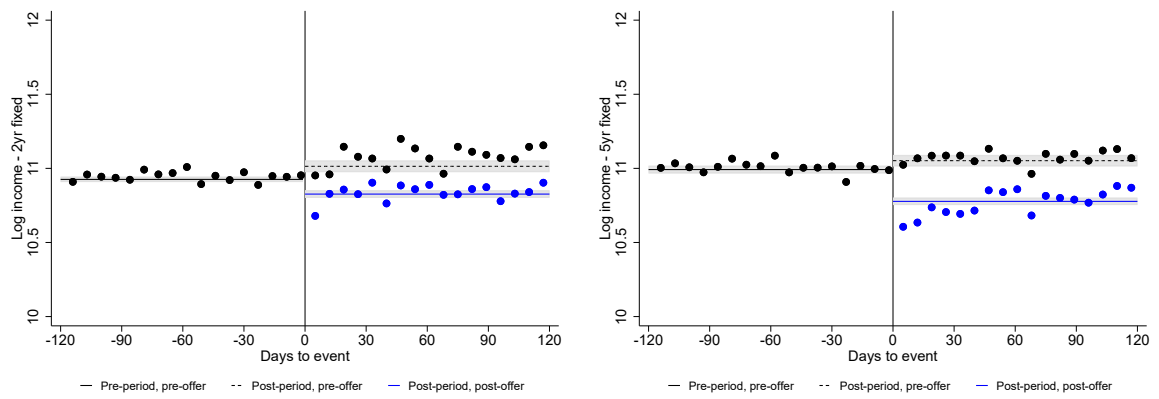


(c) LTV - 2-year fixed

(d) LTV - 5-year fixed

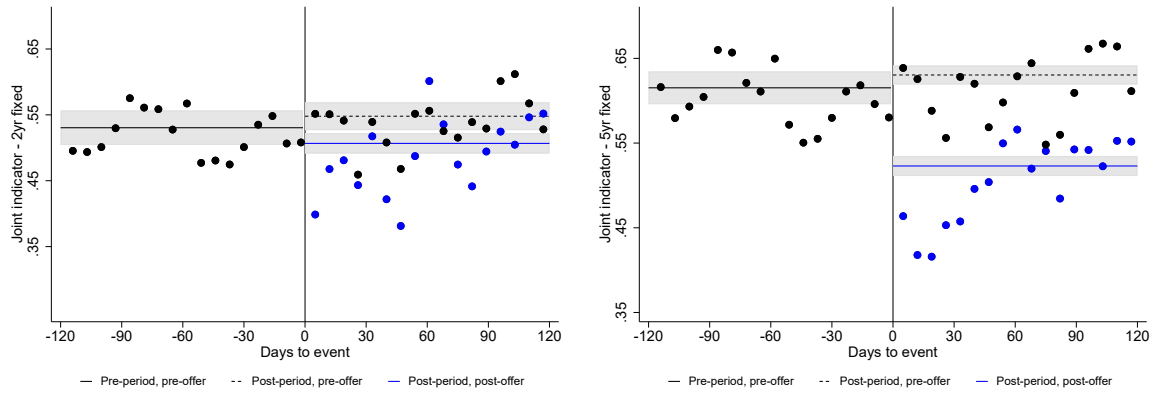
Figure 6: Nature of Selection on Pre-offers

This figure plots regression coefficients of our main specification, Equation 1, on the origination data, with log borrower income and an indicator for joint mortgage status as outcomes. Weekly averages of each outcome are plotted behind the coefficients. 90% confidence intervals are in gray and robust standard errors are clustered at the origination-day level.



(a) Log income - 2-year fixed

(b) Log income - 5-year fixed



(c) Joint mortgage indicator - 2-year fixed

(d) Joint mortgage indicator - 5-year fixed

Figure 7: UK Daily Policy Uncertainty Index

This figure plots the daily UK policy uncertainty index, with mean and 95% confidence intervals for the pre-mini-budget period, the first 60 days after, and the following 60 days after. Data are taken from https://www.policyuncertainty.com/uk_daily.html.

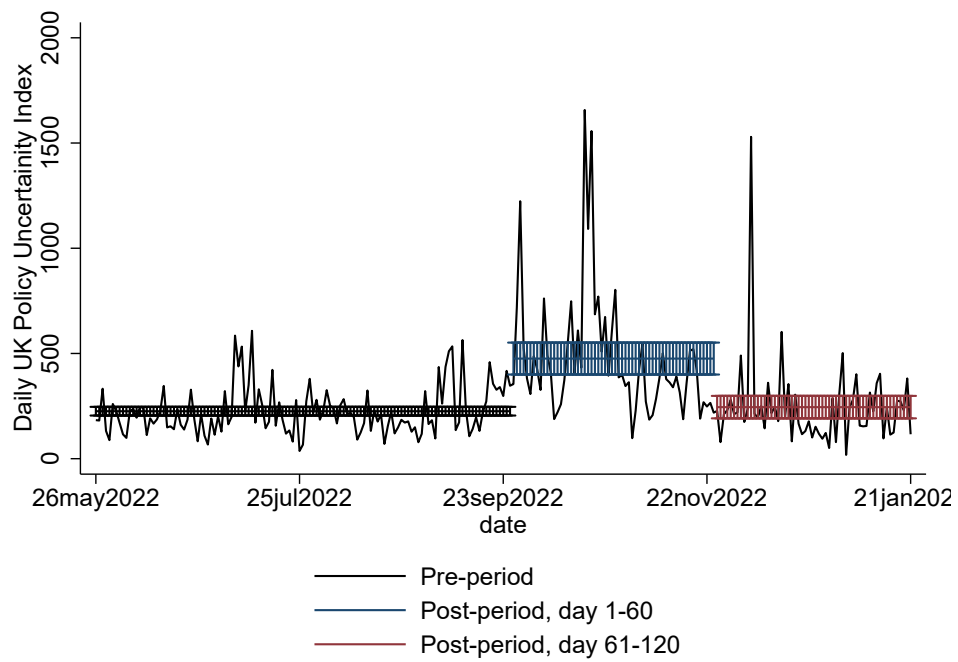
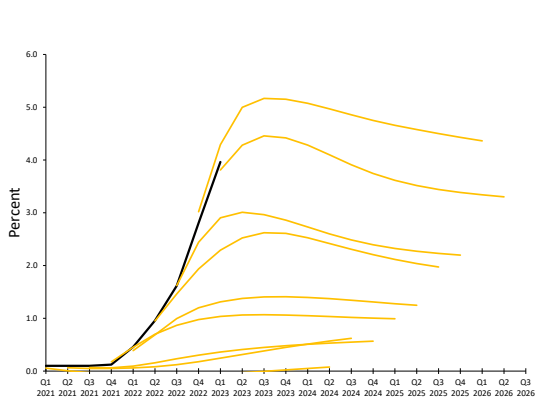
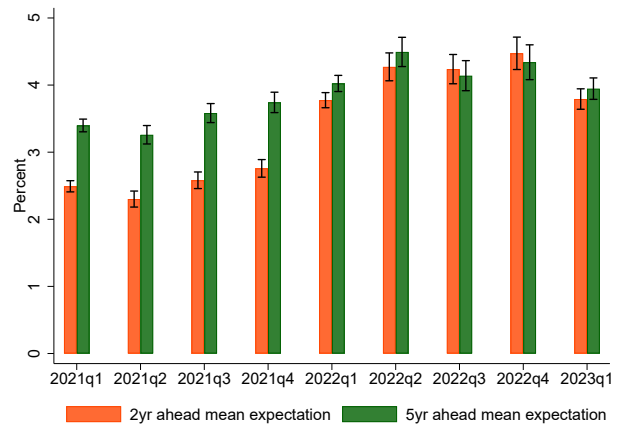


Figure 8: Interest Rate and Inflation Expectations

This figure plots the market-implied and actual interest rate path in Panel (a), and the mean 2 and 5 year ahead inflation expectations, along with 95% confidence intervals, in Panel (b). Data for Panel (a) are from the Office of Budget Responsibility's Fiscal Risks and Sustainability report, while data for Panel (b) are from the Bank of England/Ipsos Inflation Attitudes Survey.



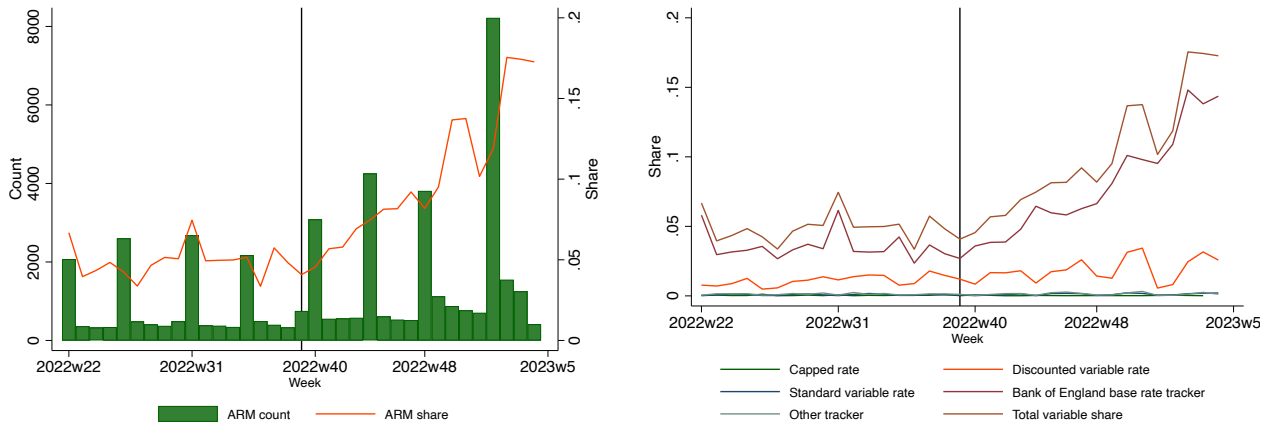
(a) Interest rate expectations



(b) Inflation expectations

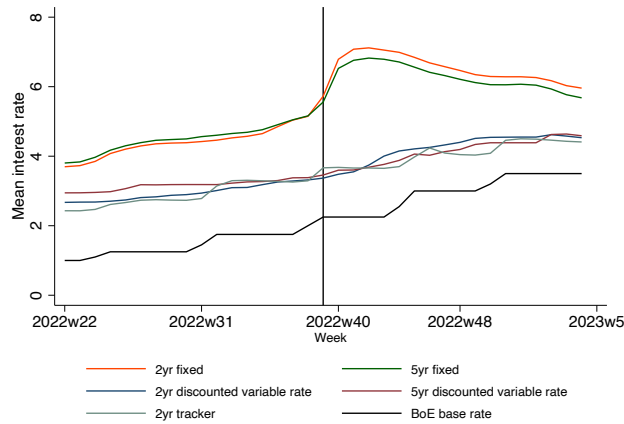
Figure 9: Adjustable-Rate Mortgage Originations

This figure plots trends in adjustable-rate mortgage (ARMs) around the mini-budget event. Panel (a) plots the count of ARMs on the left vertical axis, and the share of ARMs as a percent of all remortgages originated on the right vertical axis, at a weekly frequency. Panel (b) plots the share of ARMs originated by ARM type. The data for Panels (a) and (b) is from PSD. Panel (c) plots the weekly average interest rate on offer calculated from Moneyfacts data for 2 and 5 year fixed mortgages and discount variable rate ARMs, 2 year tracker ARMs, and the Bank of England base rate. The week of the mini-budget event date is indicated by the black vertical line.



(a) ARM Trend

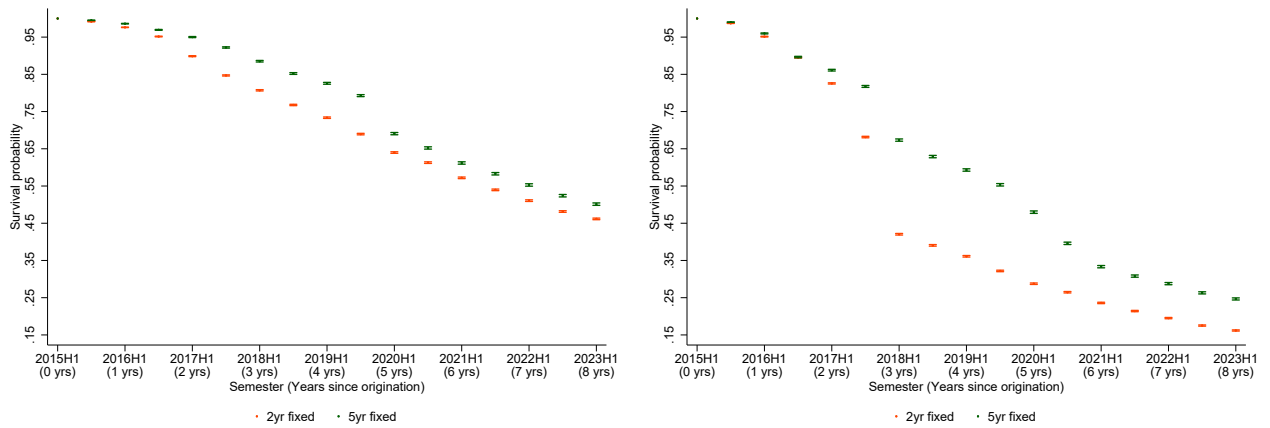
(b) ARM Trend by ARM Type



(c) Mean Interest Rates on Offer on Fixed and ARM mortgages (Moneyfacts data)

Figure 10: Kaplan-Meier Analysis: 2015H1 Cohort

This figure plots Kaplan-Meier survival curves for borrowers who originated a mortgage in the first semester of 2015 by the fixation period. Panel (a) considers terminations as account closures, Panel (b) additionally considers equity extractions as terminations, and Panel (c) additionally considers loan repayments as terminations. 95% confidence intervals are plotted.

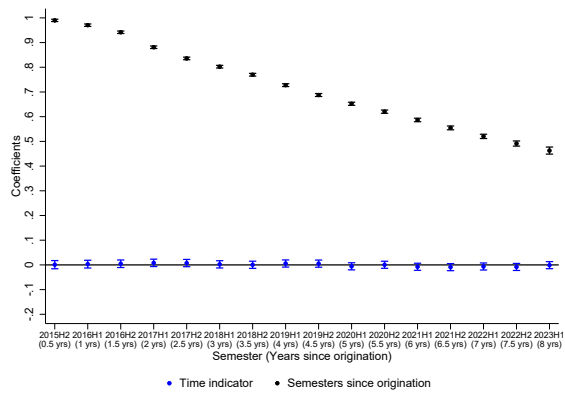


(a) House moves

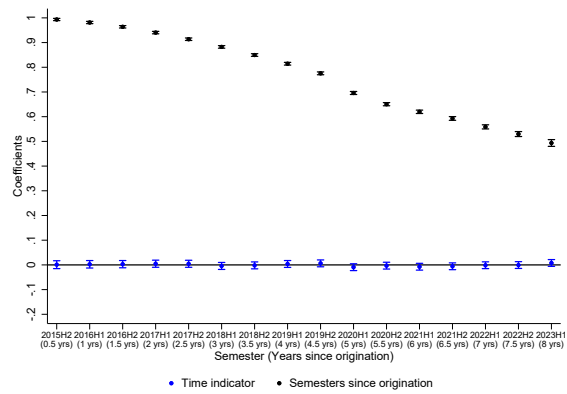
(b) House moves, equity extraction, and repayment

Figure 11: Kaplan-Meier Analysis, All Cohorts, Regression Coefficients

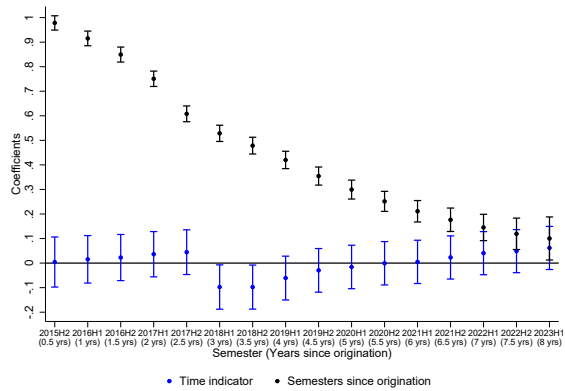
This figure plots regression coefficients of Kaplan-Meier survival estimates, on all cohorts that originate a mortgage from 2015 H1 to 2023 H1, on indicators for current semester (in blue) and indicators for semesters since origination (in black). Panels (a) and (c) plot 2 year fixed mortgages, while Panels (b) and (d) plot 5 year fixed mortgages. Panels (a) and (b) refer to account closures only as terminations, while Panels (c) and (d) additionally refer to equity extraction and repayment as terminations. 95% confidence intervals are plotted, along with a black horizontal line at 0.



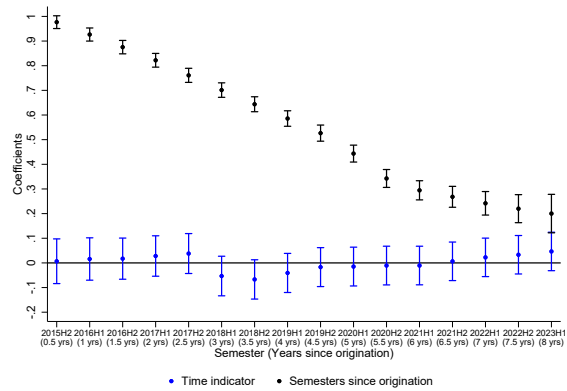
(a) 2 year fixed - House moves



(b) 5 year fixed - House moves



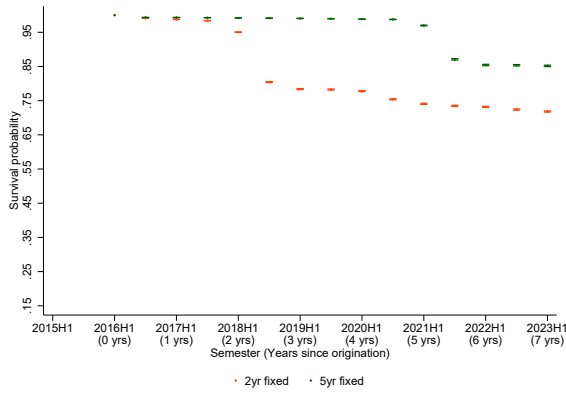
(c) 2 year fixed - House moves, equity extraction, and repayment



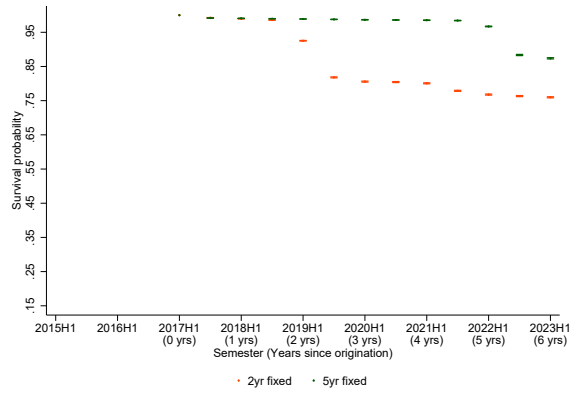
(d) 5 year fixed - House moves, equity extraction, and repayment

Figure 12: Inactive Borrowers (First Time on Reversion)

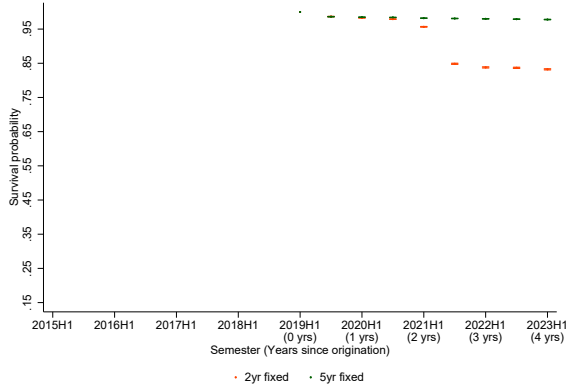
This figure plots Kaplan-Meier survival curves for borrowers who originated a mortgage in the first semester of 2016, 2017, 2019 and 2021 by the fixation period. The outcome variable is the first time that borrowers are on the reversion rate, meaning that they remain inactive at the end of the period of discounted rates and do not remortgage, as reported on PSD007. 95% confidence intervals are plotted.



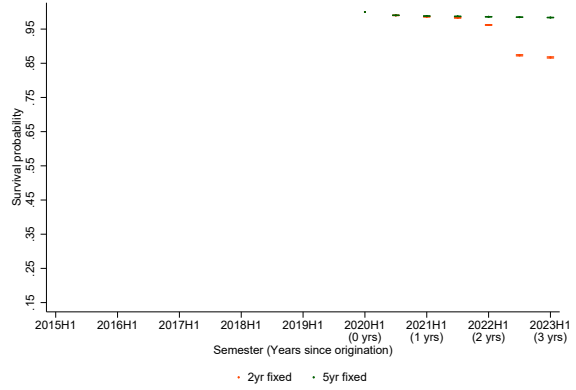
(a) 2016 H1



(b) 2017 H1



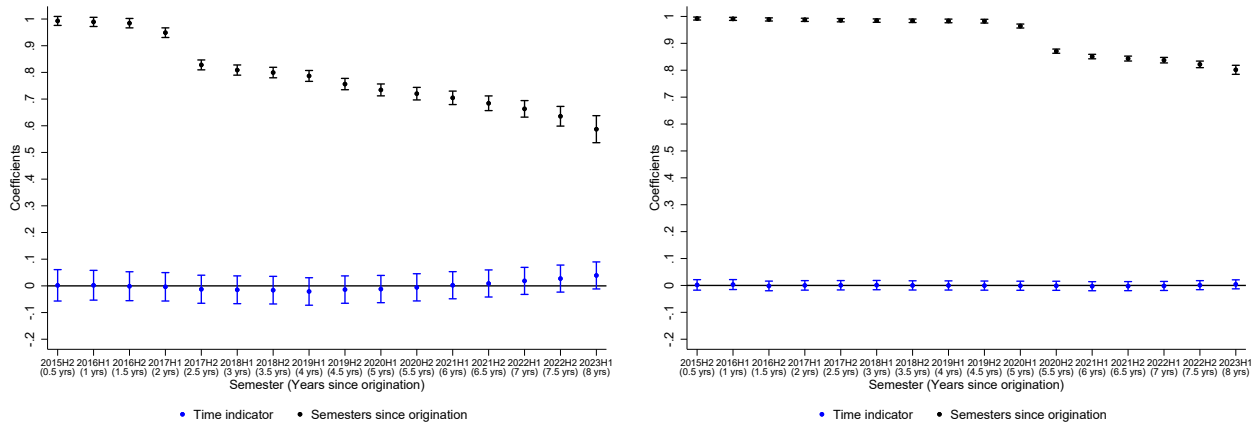
(c) 2019 H1



(d) 2020 H1

Figure 13: Inactive Borrowers, All Cohorts, Regression Coefficients

This figure plots regression coefficients of Kaplan-Meier survival estimates, on all cohorts that originate a mortgage from 2015 H1 to 2023 H1, on indicators for current semester (in blue) and indicators for semesters since origination (in black). Terminations here refer to the first time a borrower is observed going on the reversion rate. Panel (a) plots 2 year fixed mortgages, while Panels (b) plots 5 year fixed mortgages. 95% confidence intervals are plotted, along with a black horizontal line at 0.



(a) 2 year fixed

(b) 5 year fixed

II Tables

Table 1: Summary Statistics

This table presents summary statistics on mortgage refinancing covering the 120 days before and after the event date of September 26, 2022 for the universe of remortgages. The data are from PSD001. All continuous variables and age are winsorized at 99 percent.

	Mean	Sd	p10	p25	p50	p75	p90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Pre Mini-Budget Announcement (N = 230,805)							
Loan amount (£)	190,004	133,657	61,641	99,818	156,174	242,167	355,714
Property value (£)	395,210	270,502	160,000	220,913	325,000	475,000	700,000
LTV (%)	51.18	19.89	21.57	36.98	54.15	66.77	75.00
LTI	2.89	1.10	1.33	2.09	2.98	3.76	4.27
Income (£)	69,305	48,874	28,413	39,417	56,026	81,771	122,100
1(Joint mortgage)	0.58	0.49	0.00	0.00	1.00	1.00	1.00
Main borrower age (years)	41.73	9.39	30.00	34.00	41.00	48.00	55.00
Post Mini-Budget Announcement (N = 276,185)							
Loan amount (£)	194,522	136,540	62,698	100,539	160,000	248,838	367,132
Property value (£)	410,024	274,135	166,405	230,488	340,000	498,000	724,801
LTV (%)	50.13	19.34	21.43	36.36	53.09	65.40	73.16
LTI	2.86	1.09	1.31	2.07	2.95	3.73	4.24
Income (£)	71,421	49,770	28,954	40,176	57,963	85,000	126,981
1(Joint mortgage)	0.59	0.49	0.00	0.00	1.00	1.00	1.00
Main borrower age (years)	41.30	9.21	30.00	34.00	40.00	48.00	54.00

Table 2: Fixation Term and Lender Switches

This table presents regression coefficients of our main specification, Equation 1, with the outcomes of fixation period choice and same lender refinancing indicator in the rows. Column 1 refers to the pre-period, pre-offer average of the outcomes, without any controls. Columns 2-4 refer to the marginal difference between the pre-period, pre-offer group and the post-period, pre-offer group, while Columns 5-8 refer to the marginal difference between the pre-period, pre-offer group and the post-period, post-offer group. Columns 3-4 and 6-7 include controls for log income, joint status, age groups, as well as local authority fixed effects. Columns 4 and 7 additionally include lender fixed effects. Age group controls are $\mathbb{1}(30 < \text{Age} \leq 40)$, $\mathbb{1}(40 < \text{Age} \leq 50)$, and $\mathbb{1}(\text{Age} > 50)$, with the omitted category being $\mathbb{1}(30 \leq \text{Age})$. Robust standard errors are in parentheses and are clustered at the origination-day level. Columns 8-10 report the number of observations and adjusted R^2 in square brackets for each of the three corresponding specifications for each outcome. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

	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)
$\mathbb{1}(\text{5 year choice})$	0.638*** (0.012)	0.055*** (0.019)	0.057*** (0.017)	0.043** (0.018)	-0.182*** (0.017)	-0.173*** (0.017)	-0.182*** (0.013)	456,544 [0.018]	454,073 [0.038]	454,073 [0.072]
$\mathbb{1}(\text{Same lender}), 2 \text{ yr}$	0.699*** (0.052)	-0.009 (0.081)	-0.003 (0.070)	0.008 (0.072)	0.161*** (0.059)	0.135*** (0.051)	0.101** (0.045)	162,465 [0.016]	161,775 [0.130]	161,775 [0.223]
$\mathbb{1}(\text{Same lender}), 5 \text{ yr}$	0.556*** (0.057)	-0.007 (0.089)	-0.005 (0.079)	-0.010 (0.078)	0.106 (0.087)	0.072 (0.077)	0.068 (0.069)	294,079 [0.003]	292,298 [0.111]	292,298 [0.151]
Ln(Income)	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
$\mathbb{1}(\text{Joint mortgage})$	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

Table 3: Leverage

This table presents regression coefficients of our main specification, Equation 1, with the outcomes of log loan amount and LTV in the rows. Column 1 refers to the pre-period, pre-offer average of the outcomes, without any controls. Columns 2-4 refer to the marginal difference between the pre-period, pre-offer group and the post-period, pre-offer group, while Columns 5-8 refer to the marginal difference between the pre-period, pre-offer group and the post-period, post-offer group. Columns 3-4 and 6-7 include controls for log income, joint status, age groups, as well as local authority fixed effects. Columns 4 and 7 additionally include lender fixed effects. Age group controls are $\mathbb{1}(30 < \text{Age} \leq 40)$, $\mathbb{1}(40 < \text{Age} \leq 50)$, and $\mathbb{1}(\text{Age} > 50)$, with the omitted category being $\mathbb{1}(30 \leq \text{Age})$. Robust standard errors are in parentheses and are clustered at the origination-day level. Columns 8-10 report the number of observations and adjusted R^2 in square brackets for each of the three corresponding specifications for each outcome. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

	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*** (0.016)	0.078** (0.034)	-0.007 (0.019)	0.047*** (0.011)	-0.150*** (0.029)	-0.065*** (0.021)	-0.054*** (0.008)	162,465 [0.010]	161,775 [0.515]	161,775 [0.545]
Ln(Loan amount), 5 yr	11.944*** (0.015)	0.068** (0.033)	-0.002 (0.015)	0.041*** (0.009)	-0.346*** (0.022)	-0.148*** (0.015)	-0.120*** (0.011)	294,079 [0.019]	292,298 [0.564]	292,298 [0.591]
LTV, 2 yr	52.289*** (0.640)	0.189 (1.042)	-0.850 (0.822)	0.877 (0.662)	-4.108*** (0.748)	-3.399*** (0.696)	-2.996*** (0.448)	162,465 [0.005]	161,775 [0.282]	161,775 [0.327]
LTV, 5 yr	50.545*** (0.465)	0.914 (0.947)	-0.400 (0.741)	1.439** (0.619)	-5.038*** (0.779)	-3.834*** (0.711)	-2.704*** (0.492)	294,079 [0.005]	292,298 [0.263]	292,298 [0.315]
Ln(Income)	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
$\mathbb{1}$ (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

Table 4: Mortgage Choices - Within-Borrower Differences

This table presents regression coefficients of our main specification, Equation (1). Robust standard errors are in parentheses and are clustered at the origination-day level, while the adjusted R^2 is reported in square brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

	Pre-period level	Δ Post-period, Pre-offer	Δ Post-period Post-offer	No. Obs. & Adj. R^2
	(1)	(2)	(3)	(4)
$\mathbb{1}(\text{5 year choice} \mid \text{Lag 2 year})$	0.537*** (0.006)	0.076*** (0.014)	-0.206*** (0.014)	235,264 [0.025]
$\mathbb{1}(\text{5 year choice} \mid \text{Lag 5 year})$	0.785*** (0.007)	0.036*** (0.010)	-0.162*** (0.018)	104,127 [0.018]
$\mathbb{1}(\text{Same lender} \mid \text{Lag diff. lender}), 2 \text{ yr}$	0.744*** (0.046)	-0.024 (0.076)	0.140*** (0.051)	45,334 [0.014]
$\mathbb{1}(\text{Same lender} \mid \text{Lag diff. lender}), 5 \text{ yr}$	0.630*** (0.049)	-0.042 (0.082)	0.111 (0.073)	75,015 [0.006]
Balance diff (% property value), 2 yr	1.077** (0.503)	-0.664 (0.637)	-1.223** (0.567)	146,318 [0.003]
Balance diff (% property value), 5 yr	1.485*** (0.535)	-0.676 (0.683)	-0.891 (0.718)	243,640 [0.002]

Table 5: Fixation Term and Lender Switches - Splitting Post-Period, Post-Offer

This table presents regression coefficients of our main specification, Equation (1), with an additional indicator variable estimated to split to the post-period in the first 60 days, and the subsequent 60 days. The outcome variables, an indicator for a 5 year fixed choice and indicators for internally refinanced mortgages with the same lender, are in the columns. All regressions control for log income, joint status, age groups, as well as local authority and lender fixed effects. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

	<u>1(5 year choice)</u>	<u>1(Same lender), 2 yr</u>	<u>1(Same lender), 5 yr</u>
	(1)	(2)	(3)
Constant	0.390*** (0.058)	1.065*** (0.082)	1.349*** (0.108)
Δ Post-period, Pre-offer	0.043** (0.018)	0.008 (0.072)	-0.010 (0.078)
Δ Post-period, Post-offer (1-60 days after)	-0.116*** (0.014)	0.132*** (0.048)	0.128* (0.068)
Δ Post-period, Post-offer (61-120 days after)	-0.200*** (0.013)	0.093* (0.048)	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

Table 6: Leverage - Splitting Post-Period, Post-Offer

This table presents regression coefficients of our main specification, Equation (1), with an additional indicator variable estimated to split to the post-period in the first 60 days, and the subsequent 60 days. The outcome variables, log loan amount and LTV, are in the columns. All regressions control for log income, joint status, age groups, as well as local authority and lender fixed effects. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

	<u>Ln(Loan amount), 2 yr</u>	<u>Ln(Loan amount), 5 yr</u>	<u>LTV, 2yr</u>	<u>LTV, 5yr</u>
	(1)	(2)	(3)	(4)
Constant	4.961*** (0.201)	4.357*** (0.162)	-2.654 (2.836)	-11.858*** (2.973)
Δ Post-period, Pre-offer	0.047*** (0.011)	0.041*** (0.009)	0.878 (0.663)	1.439** (0.619)
Δ Post-period, Post-offer (1-60 days after)	-0.101*** (0.009)	-0.142*** (0.017)	-4.351*** (0.444)	-3.263*** (0.476)
Δ Post-period, Post-offer (61-120 days after)	-0.042*** (0.007)	-0.113*** (0.013)	-2.671*** (0.433)	-2.524*** (0.564)
Controls				
Ln(Income)	Yes	Yes	Yes	Yes
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

Table 7: Early Repayment Charges by Mortgage Fixed Length Period

This table summarizes early repayment charges as a percentage of the outstanding loan amount for 2-year (Panel A) and 5-year (Panel B) fixed rate loans. Data are from Moneyfacts and cover the period from May 29, 2022 to January 24, 2023. The columns represent the year of the mortgage.

	Year 1	Year 2	Year 3	Year 4	Year 5
	(1)	(2)	(3)	(4)	(5)
Panel A: 2-Year Fixed					
Mean	2.61	1.69	0.00	0.00	0.00
Sd	0.63	0.64	0.00	0.00	0.00
p25	2.00	1.00	0.00	0.00	0.00
p50	3.00	2.00	0.00	0.00	0.00
p75	3.00	2.00	0.00	0.00	0.00
Panel B: 5-Year Fixed					
Mean	4.61	4.01	3.06	2.32	1.50
Sd	0.57	0.62	0.66	0.67	0.76
p25	4.00	4.00	3.00	2.00	1.00
p50	5.00	4.00	3.00	2.00	1.00
p75	5.00	4.00	3.00	3.00	2.00

Table 8: Early Repayment Charges for Adjustable-Rate Mortgages

This table summarizes early repayment charges as a percentage of the outstanding loan amount for 2-year and 5-year tracker and discounted variable rate ARM products. Data are from Moneyfacts and cover the period from May 29, 2022 to January 24, 2023. The columns represent the year of the mortgage.

	Year 1	Year 2	Year 3	Year 4	Year 5
	(1)	(2)	(3)	(4)	(5)
Panel A: 2-Year Tracker					
Mean	0.72	0.55	0.00	0.00	0.00
Sd	0.52	0.62	0.00	0.00	0.00
p25	0.50	0.25	0.00	0.00	0.00
p50	0.50	0.25	0.00	0.00	0.00
p75	0.50	1.00	0.00	0.00	0.00
Panel B: 2-Year Discounted Variable Rate					
Mean	1.98	1.65	0.00	0.00	0.00
Sd	0.84	0.83	0.00	0.00	0.00
p25	1.00	1.00	0.00	0.00	0.00
p50	2.00	2.00	0.00	0.00	0.00
p75	3.00	2.00	0.00	0.00	0.00
Panel C: 5-Year Discounted Variable Rate					
Mean	3.82	3.33	2.67	1.96	1.60
Sd	1.46	1.11	0.68	0.32	0.66
p25	2.00	2.00	2.00	2.00	1.00
p50	5.00	4.00	3.00	2.00	1.50
p75	5.00	4.00	3.00	2.00	2.00

Internet Appendix for
“Mortgage refinancing during tightening monetary policy”

A Data description and sample construction

Our dataset on refinancing activity cover the 120 days preceding and following our event date for the mini-budget, September 26, 2022, and restricts the sample to observations with more than 2 year remaining on the mortgage term. All presented variables are winsorized at 1% and 99%.

The data includes, among other, information on the loan amount, interest rate, type (variable rate, 2-year fixed, 5-year fixed, etc.), lender, property postcode, and whether the loan is intermediated or direct. External remortgages include information on property value and borrower income, but such information is missing for the vast majority of internal remortgages. This happens because a full property valuation and an affordability assessment are not carried out at the time of remortgaging. We partially overcome this data limitation by estimating property value, in a similar way to what lenders do.

We take the sample of remortgages that took place between after May 29, 2022 and look for the previous loan taken by the same borrower. We do using two variables in the origination data, the combination of property postcode and date of birth of the main borrower. A typical UK postcode contains only 15 addresses so that together with the borrower birth date it is a fairly accurate way to match mortgages originated at different times, even if those were originated by different lenders. Recall that we focus on remortgages (excluding loans for property acquisition). Given that the maximum fixed length period is typically 5 years and our sample starts in April 2021, we use 2015 as a cut-off for matching borrowers to their previous mortgage choice.

For the majority of remortgages, we are able to identify the previous loan. There may be several reasons why we may not be able to find a previous loan. The most likely reason is that the previous loan was an internal remortgage which prior to April 2021 were not always recorded in the origination data. But it is also possible that the main borrower in the loan has changed, in which case we do not match the two observations. Out of the previous loans, roughly 95% have information on property value. We use the information on the date and property value of the previous loan and the subsequent evolution of local authority house prices indices to estimate property values at the point of remortgaging. This is similar to the calculations that lenders carry out and it allows us to estimate the loan to value (LTV) of the remortgaged loan.

Most internal remortgages have missing information for borrower income. Therefore, we rely on the information in the previous loan. Most of the loans that we identify have information

on previous borrower income (roughly 95%). We use this previous income measure to calculate the loan to income (LTI) for the loans that are remortgaged internally. But naturally, these LTI measures should be interpreted with caution. The origination data includes several other household characteristics that we use in the analysis.

Panel analysis. The ability to identify previous loans taken out by the same borrower allows us to build a panel of mortgage choices and measure within-borrower changes over time, for instance those who previously took a 2-year fixed rate mortgage and now changed to a 5-year fixed. We impose the condition that the previous mortgage choice was made after 2015. This is because complete mortgage data on internal re-mortgages has only been available since April 2021. By imposing this restriction, we are limiting cases of missing internal refinancing observations. Second, we impose the condition that, if the previous loan we identify was a 2 year (5 year) fixation period loan, the current loan for that borrower cannot start more than 3 years (6 years) after the end of the fixation period of the previous loan. Again, this helps limit the possibility of missing internally refinanced intermediate loans.

B Selection on observables

In the main text we have estimated our specification controlling for borrower characteristics, local area and lender fixed effects. The estimated coefficients on these control variables tell us about the relation between borrower characteristics and remortgaging outcomes, which we study in this appendix.

Several papers in the literature have emphasized the role of moving risk in mortgage decisions (Brueckner and Follain (1988), Dhillon et al. (1987), Stanton and Wallace (1998), Sa-Aadu and Sirmans (1995), among others). Loans with a fixed rate (or an interest rate that is fixed for longer) tend to have larger prepayment penalties. Therefore, borrowers who are more likely to move may prefer shorter fixation periods. The first row of Table A4 shows the estimated coefficients on the borrower controls in the previous estimation of the choice of 5-year fixation period, for the specification that includes lender fixed effects.

Those who choose 5-year fixed rate products tend have higher income, a joint applicant in their mortgage, and be older (less than 30 years old is the omitted category). These variables are likely to be correlated with how settled the household is, in terms of location and the

house in which they live in, meaning a lower likelihood of moving. It is important to note that although the literature has focused on the role of moving risk, the argument extends beyond moving risk. Joint borrowers and older individuals may be more settled in their finances and be less likely to wish to refinance the mortgage for reasons other than a house move, namely for equity extraction.

The second and third rows of Table [A4](#) show that higher income borrowers and those with a joint borrower are less likely to remortgage with the same lender. Switching lenders (external remortgage) requires that borrowers pass an affordability assessment. Those with higher income and a joint borrower may be in a better position to do so. Controlling for income and joint borrower, older individuals are less likely to switch lenders when remortgaging.

The services of a broker are particularly useful when switching lenders. It is therefore not surprising to see that those borrowers who are more (less) likely to use the services of a broker are also those less (more) likely to remortgage with the same lender, namely higher income and joint (older) borrowers.

Table [A5](#) shows the estimated coefficients on the borrower controls for the remaining outcome variables. The results are as expected. Higher income and joint borrowers tend to have larger loan amounts. Loan amounts, LTV and mortgage repayment terms tend to be significantly smaller for older borrowers.

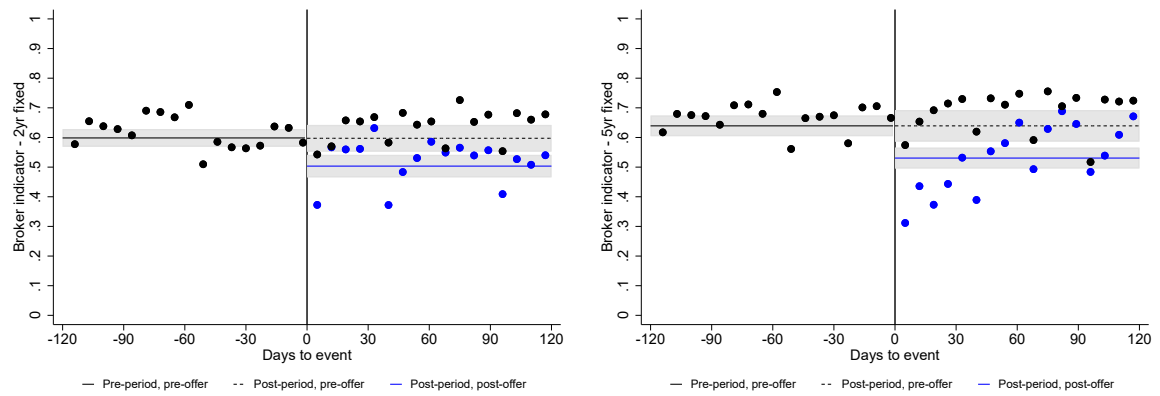
C Narrower event window

In Figures [A6](#) to [A10](#) we show the results for a narrower 60 day window before and after the mini-budget event. The several tables show that the results that we emphasized in the main paper are robust to this narrower window.

D Appendix Figures

Figure A1: Broker

This figure plots regression coefficients of our main specification, Equation (1), with broker indicator as outcomes. All panels are run on the origination data. Weekly averages of each outcome are plotted behind the coefficients. 90% confidence intervals are in gray and robust standard errors are clustered at the origination-day level.

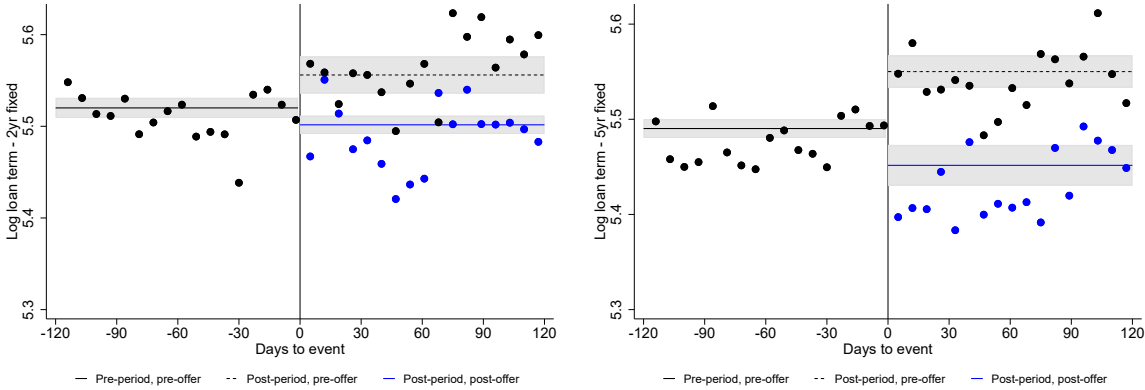


(a) Broker indicator - 2-year fixed

(b) Broker indicator - 5-year fixed

Figure A2: Mortgage Amortization Term

This figure plots regression coefficients of our main specification, Equation (1), with loan term as the outcome variable. Panels (a) and (b) are run on the origination data. Weekly averages of each outcome are plotted behind the coefficients. 90% confidence intervals are in gray and robust standard errors are clustered at the origination-day level.



(a) Log term (months) - 2-year fixed

(b) Log term (months) - 5-year fixed

Figure A3: Kaplan-Meier Analysis: All Cohorts

This figure plots Kaplan-Meier survival curves for all cohorts, which are indicated by a particular color. Panels (a) and (c) plot 2 year fixed mortgages, while Panels (b) and (d) plot 5 year fixed mortgages. Panels (a) and (b) refer to account closures only as terminations, while Panels (c) and (d) additionally refer to equity extraction and loan repayment as terminations

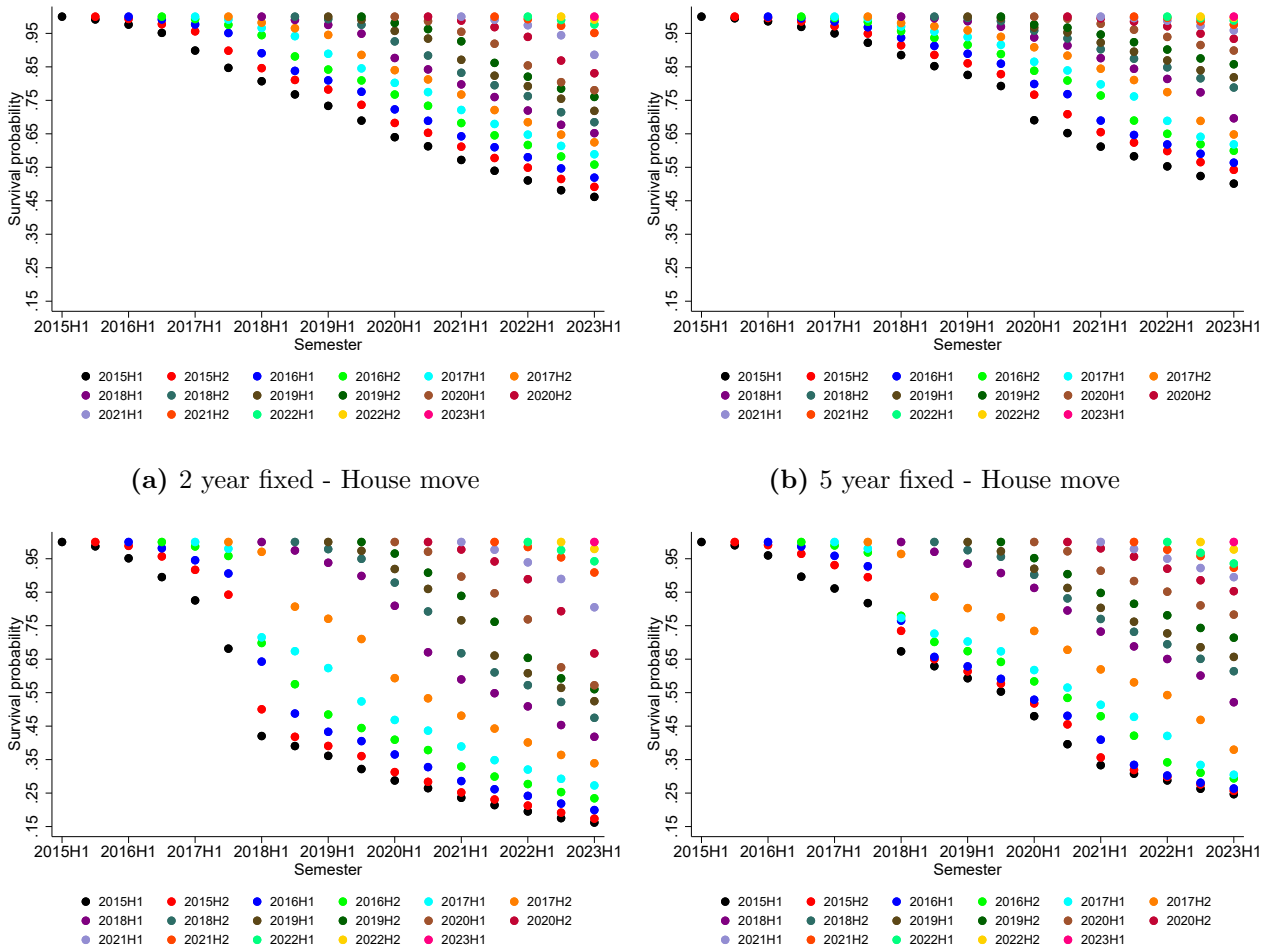
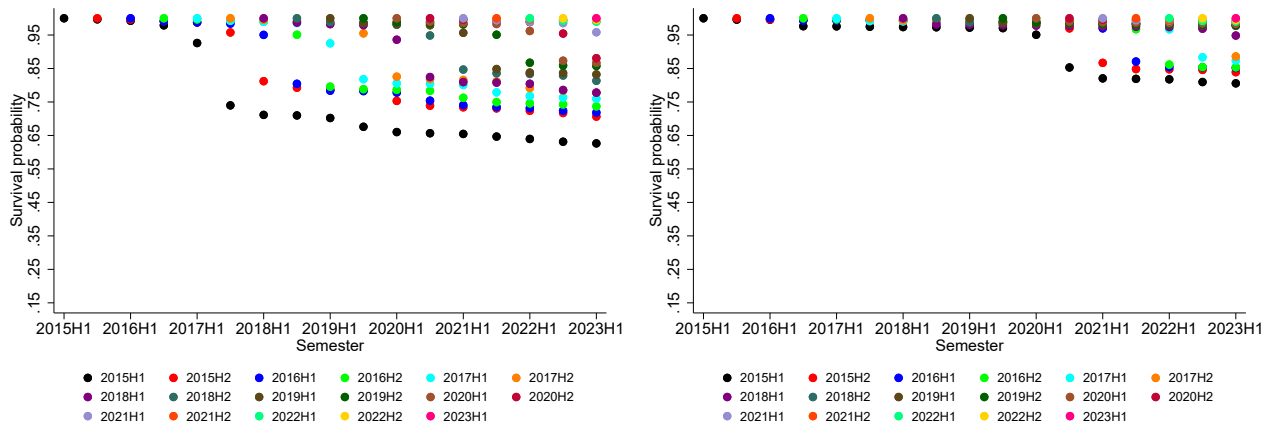


Figure A4: Kaplan-Meier Analysis: First Reversion for All Cohorts

This figure plots Kaplan-Meier survival curves for all cohorts, which are indicated by a particular color. A termination here is considered as when a borrower first goes on the reversion rate. Panel (a) plots the curves for 2 year fixed mortgages, while Panel (b) plots the curves for 5 year fixed mortgages.



(a) 2 year fixed

(b) 5 year fixed

E Appendix Tables

Table A1: Summary Statistics by Offer Type

This table presents summary statistics on mortgage refinancing covering the 120 days before and after the event date of September 26, 2022 for the universe of remortgages by groups of offer types. The data are from PSD001. All continuous variables and age are winsorized at 99 percent.

	Mean	Sd	p10	p25	p50	p75	p90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Pre-period, Pre-offer (N = 230,805)							
Loan amount (£)	190,004	133,657	61,641	99,818	156,174	242,167	355,714
Property value (£)	395,210	270,502	160,000	220,913	325,000	475,000	700,000
LTV (%)	51.18	19.89	21.57	36.98	54.15	66.77	75.00
LTI	2.89	1.10	1.33	2.09	2.98	3.76	4.27
Income (£)	69,305	48,874	28,413	39,417	56,026	81,771	122,100
1(Joint mortgage)	0.58	0.49	0.00	0.00	1.00	1.00	1.00
Main borrower age (years)	41.73	9.39	30.00	34.00	41.00	48.00	55.00
Post-period, Pre-offer (N = 184,600)							
Loan amount (£)	204,643	141,905	66,595	106,249	169,147	261,644	386,462
Property value (£)	418,513	281,388	170,000	235,000	345,008	503,448	744,478
LTV (%)	51.77	19.46	22.25	38.10	55.88	66.91	73.83
LTI	2.90	1.09	1.33	2.12	3.01	3.77	4.26
Income (£)	74,498	51,995	30,000	41,710	60,168	88,706	133,491
1(Joint mortgage)	0.61	0.49	0.00	0.00	1.00	1.00	1.00
Main borrower age (years)	40.82	9.01	30.00	34.00	40.00	47.00	54.00
Post-period, Post-offer (N = 41,139)							
Loan amount (£)	146,835	101,337	49,004	78,040	122,832	189,314	270,523
Property value (£)	333,376	209,464	145,000	195,000	282,724	406,699	569,563
LTV (%)	46.96	19.53	18.13	32.21	49.80	62.27	70.19
LTI	2.69	1.11	1.13	1.86	2.75	3.57	4.12
Income (£)	57,639	37,917	25,000	34,255	48,328	68,624	97,427
1(Joint mortgage)	0.51	0.50	0.00	0.00	1.00	1.00	1.00
Main borrower age (years)	41.63	9.72	30.00	34.00	40.00	49.00	55.00
Others (N = 50,446)							
Loan amount (£)	196,379	133,316	66,606	105,999	162,999	249,746	363,577
Property value (£)	441,465	282,611	183,346	253,294	370,000	537,343	775,000
LTV (%)	46.70	17.90	21.83	34.41	47.82	57.94	72.45
LTI	2.88	1.07	1.40	2.08	2.92	3.72	4.27
Income (£)	71,414	48,001	29,708	41,128	58,771	85,052	126,000
1(Joint mortgage)	0.57	0.49	0.00	0.00	1.00	1.00	1.00
Main borrower age (years)	42.78	9.33	31.00	36.00	42.00	49.00	56.00

Table A2: Broker

This table presents regression coefficients of our main specification, Equation (1), with broker indicator in the rows. Column 1 refers to the pre-period, pre-offer average of the outcomes, without any controls. Columns 2-4 refer to the marginal difference between the pre-period, pre-offer group and the post-period, pre-offer group, while Columns 5-8 refer to the marginal difference between the pre-period, pre-offer group and the post-period, post-offer group. Columns 3-4 and 6-7 include controls for log income, joint status, age groups, as well as local authority fixed effects. Columns 4 and 7 additionally include lender fixed effects. Age group controls are $\mathbb{1}(30 < \text{Age} \leq 40)$, $\mathbb{1}(40 < \text{Age} \leq 50)$, and $\mathbb{1}(\text{Age} > 50)$, with the omitted category being $\mathbb{1}(30 \leq \text{Age})$. Robust standard errors are in parentheses and are clustered at the origination-day level. Columns 8-10 report the number of observations and adjusted R^2 in square brackets for each of the three corresponding specifications for each outcome. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

	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)
$\mathbb{1}(\text{Broker}), 2 \text{ yr}$	0.599*** (0.018)	-0.001 (0.033)	-0.013 (0.028)	0.023 (0.022)	-0.095*** (0.029)	-0.077*** (0.027)	-0.064*** (0.018)	162,465 [0.004]	161,775 [0.052]	161,775 [0.150]
$\mathbb{1}(\text{Broker}), 5 \text{ yr}$	0.639*** (0.021)	0.000 (0.039)	-0.007 (0.035)	0.026 (0.030)	-0.109*** (0.030)	-0.083*** (0.028)	-0.065*** (0.024)	294,079 [0.003]	292,298 [0.033]	292,298 [0.138]
Ln(Income)	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
$\mathbb{1}(\text{Joint mortgage})$	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

Table A3: Amortization Term

This table presents regression coefficients of our main specification, Equation (1), with the outcome of log amortization term in months in the rows. Column 1 refers to the pre-period, pre-offer average of the outcomes, without any controls. Columns 2-4 refer to the marginal difference between the pre-period, pre-offer group and the post-period, pre-offer group, while Columns 5-8 refer to the marginal difference between the pre-period, pre-offer group and the post-period, post-offer group. Columns 3-4 and 6-7 include controls for log income, joint status, age groups, as well as local authority fixed effects. Columns 4 and 7 additionally include lender fixed effects. Age group controls are $\mathbb{1}(30 < \text{Age} \leq 40)$, $\mathbb{1}(40 < \text{Age} \leq 50)$, and $\mathbb{1}(\text{Age} > 50)$, with the omitted category being $\mathbb{1}(30 \leq \text{Age})$. Robust standard errors are in parentheses and are clustered at the origination-day level. Columns 8-10 report the number of observations and adjusted R^2 in square brackets for each of the three corresponding specifications for each outcome. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

	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(Term), 2 yr	5.520*** (0.007)	0.036** (0.014)	0.010 (0.010)	0.026*** (0.008)	-0.018** (0.009)	-0.008 (0.008)	-0.005 (0.005)	162,465 [0.002]	161,775 [0.492]	161,775 [0.511]
Ln(Term), 5 yr	5.490*** (0.006)	0.060*** (0.012)	0.022*** (0.007)	0.036*** (0.006)	-0.039*** (0.014)	-0.012** (0.006)	-0.007 (0.006)	294,079 [0.006]	292,298 [0.491]	292,298 [0.505]
Ln(Income)	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
$\mathbb{1}$ (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

Table A4: Borrower Characteristics - Fixation Term and Lender Switches

This table presents regression coefficients of our main specification, Equation (1), with the coefficients of the control variables in the columns, and the outcomes of fixation period choice, internal indicator for mortgages refinanced with the same lender, and broker indicator in the rows. All columns include local authority and lender fixed effects. Robust standard errors are in parentheses and are clustered at the origination-day level. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively. For the number of observations and the adjusted R^2 , refer to column 10 of Table 2.

	Ln(Income)	1(Joint mortgage)	1(30 < Age ≤ 40)	1(40 < Age ≤ 50)	1(Age > 50)
	(1)	(2)	(3)	(4)	(5)
1(5 year choice)	0.012** (0.005)	0.071*** (0.003)	0.064*** (0.003)	0.130*** (0.005)	0.109*** (0.005)
1(Same lender), 2 yr	-0.100*** (0.008)	-0.053*** (0.009)	0.021*** (0.004)	0.029*** (0.007)	0.055*** (0.010)
1(Same lender), 5 yr	-0.123*** (0.009)	-0.090*** (0.013)	0.009 (0.005)	-0.004 (0.010)	-0.003 (0.013)
1(Broker), 2 yr	0.087*** (0.003)	0.024*** (0.004)	-0.049*** (0.006)	-0.084*** (0.008)	-0.175*** (0.007)
1(Broker), 5 yr	0.086*** (0.005)	0.028*** (0.006)	-0.041*** (0.006)	-0.066*** (0.009)	-0.096*** (0.008)
Local Authority FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes

Table A5: Borrower Characteristics - Leverage and Amortization Term

This table presents regression coefficients of our main specification, Equation (1), with the coefficients of the control variables in the columns, and the outcomes of log loan amount, LTV, and log amortization term in months in the rows. All columns include local authority and lender fixed effects. Robust standard errors are in parentheses and are clustered at the origination-day level. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively. For the number of observations and the adjusted R^2 , refer to column 10 of Table 3.

	Ln(Income)	1(Joint mortgage)	1(30 < Age ≤ 40)	1(40 < Age ≤ 50)	1(Age > 50)
	(1)	(2)	(3)	(4)	(5)
Ln(Loan amount), 2 yr	0.646*** (0.019)	0.017** (0.008)	-0.039*** (0.009)	-0.173*** (0.014)	-0.558*** (0.021)
Ln(Loan amount), 5 yr	0.703*** (0.015)	0.006 (0.006)	-0.041*** (0.007)	-0.193*** (0.011)	-0.464*** (0.012)
LTV, 2 yr	7.572*** (0.257)	-0.129 (0.161)	-5.258*** (0.297)	-14.310*** (0.434)	-29.459*** (0.449)
LTV, 5 yr	8.206*** (0.291)	-0.259 (0.157)	-5.874*** (0.212)	-15.423*** (0.314)	-27.000*** (0.265)
Ln(Term), 2 yr	0.024*** (0.003)	-0.033*** (0.003)	-0.103*** (0.003)	-0.388*** (0.004)	-0.999*** (0.011)
Ln(Term), 5 yr	0.028*** (0.002)	-0.032*** (0.002)	-0.110*** (0.003)	-0.398*** (0.004)	-0.874*** (0.005)
Local Authority FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes

Table A6: Fixation Term and Lender Switches - 60 Day Window

This table presents regression coefficients of our main specification, Equation 1, with the outcomes of fixation period choice, an indicator for mortgages refinanced internally with the same lender, and broker indicator in the rows. This sample is restricted to 60 days before and after our event date of September 26, 2022. Columns 1 refers to the pre-period, pre-offer average of the outcomes, without any controls. Columns 2-4 refers to marginal difference between the pre-period, pre-offer group and the post-period, pre-offer group, while Columns 5-8 refers to the marginal difference between the pre-period, pre-offer group and the post-period, post-offer group. Columns 3-4 and 6-7 include controls for log income, joint status, age groups, as well as local authority fixed effects. Columns 4 and 7 additionally include lender fixed effects. Age group controls are $\mathbb{1}(30 < \text{Age} \leq 40)$, $\mathbb{1}(40 < \text{Age} \leq 50)$, and $\mathbb{1}(\text{Age} > 50)$, with the omitted category being $\mathbb{1}(30 \leq \text{Age})$. Robust standard errors are in parentheses and are clustered at the origination-day level. Columns 8-10 report the number of observations and adjusted R^2 in square brackets for each of the three corresponding specifications for each outcome. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

	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)
$\mathbb{1}$ (5 year choice)	0.658*** (0.010)	0.022 (0.010)	0.023 (0.020)	0.008 (0.016)	-0.141*** (0.019)	-0.134*** (0.017)	-0.134*** (0.014)	225,312 [0.004]	224,056 [0.019]	224056 [0.062]
$\mathbb{1}$ (Same lender), 2 yr	0.708*** (0.064)	-0.014 (0.109)	-0.006 (0.106)	0.025 (0.083)	0.147* (0.076)	0.132* (0.073)	0.112** (0.054)	75,999 [0.006]	75,666 [0.033]	75,666 [0.220]
$\mathbb{1}$ (Same lender), 5 yr	0.568*** (0.073)	-0.027 (0.120)	-0.020 (0.116)	-0.010 (0.094)	0.145 (0.102)	0.112 (0.099)	0.110 (0.074)	149,313 [0.004]	148,390 [0.038]	148,390 [0.163]
$\mathbb{1}$ (Broker), 2 yr	0.572*** (0.026)	0.010 (0.042)	-0.002 (0.039)	0.032 (0.030)	-0.094* (0.054)	-0.077 (0.053)	-0.054 (0.039)	75,999 [0.002]	75,666 [0.035]	75,666 [0.152]
$\mathbb{1}$ (Broker), 5 yr	0.622*** (0.034)	0.016 (0.053)	0.007 (0.050)	0.031 (0.041)	-0.152*** (0.049)	-0.130** (0.049)	-0.103** (0.041)	149,313 [0.004]	148,390 [0.019]	148,390 [0.134]
Ln(Income)	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
$\mathbb{1}$ (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

Table A7: Leverage and Amortization Term - 60 Day Window

This table presents regression coefficients of our main specification, Equation 1, with the outcomes of log loan amount, LTV, and log amortization term in months in the rows. This sample is restricted to 60 days before and after our event date of September 26, 2022. Column 1 refers to the pre-period, pre-offer average of the outcomes, without any controls. Columns 2-4 refers to marginal difference between the pre-period, pre-offer group and the post-period, pre-offer group, while Columns 5-8 refers to the marginal difference between the pre-period, pre-offer group and the post-period, post-offer group. Columns 3-4 and 6-7 include controls for log income, joint status, age groups, as well as local authority fixed effects. Columns 4 and 7 additionally include lender fixed effects. Age group controls are $\mathbb{1}(30 < \text{Age} \leq 40)$, $\mathbb{1}(40 < \text{Age} \leq 50)$, and $\mathbb{1}(\text{Age} > 50)$, with the omitted category being $\mathbb{1}(30 \leq \text{Age})$. Robust standard errors are in parentheses and are clustered at the origination-day level. Columns 8-10 report the number of observations and adjusted R^2 in square brackets for each of the three corresponding specifications for each outcome. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

	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	11.869*** (0.026)	0.072* (0.041)	-0.003 (0.025)	0.055*** (0.013)	-0.184*** (0.037)	-0.099*** (0.026)	-0.084*** (0.010)	75,999 [0.007]	75,666 [0.470]	75,666 [0.549]
Ln(Loan amount), 5 yr	11.924*** (0.024)	0.081** (0.039)	-0.007 (0.018)	0.043*** (0.008)	-0.372*** (0.032)	-0.189*** (0.024)	-0.134*** (0.019)	149,313 [0.013]	148,390 [0.528]	148,390 [0.599]
LTV, 2 yr	51.342*** (0.870)	1.158 (1.347)	0.056 (1.237)	2.117** (0.826)	-4.728*** (1.092)	-3.586*** (1.121)	-3.210*** (0.475)	75,999 [0.004]	75,666 [0.261]	75,666 [0.340]
LTV, 5 yr	49.872*** (0.708)	1.627 (1.208)	0.124 (1.127)	2.368*** (0.694)	-5.495*** (0.850)	-3.756*** (0.859)	-2.345*** (0.579)	149,313 [0.005]	148,390 [0.230]	148,390 [0.324]
Ln(Term), 2 yr	5.512*** (0.010)	0.040*** (0.014)	0.015 (0.012)	0.033*** (0.011)	-0.041*** (0.015)	-0.018 (0.016)	-0.014 (0.012)	75,999 [0.002]	75,666 [0.491]	75,666 [0.519]
Ln(Term), 5 yr	5.492*** (0.006)	0.052*** (0.010)	0.017** (0.008)	0.033*** (0.006)	-0.059*** (0.017)	-0.033*** (0.008)	-0.016** (0.007)	149,313 [0.005]	148,390 [0.483]	148,390 [0.507]
Ln(Income)	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
$\mathbb{1}$ (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

Table A8: Borrower Characteristics - Fixation Term and Lender Switches - 60 Day Window

This table presents regression coefficients of our main specification, Equation 1, with the coefficients of the control variables in the columns, and the outcomes of fixation period choice, an indicator for mortgages refinanced internally with the same lender, and broker indicator in the rows. This sample is restricted to 60 days before and after our event date of September 26, 2022. All columns include local authority and lender fixed effects. Robust standard errors are in parentheses and are clustered at the origination-day level. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively. For the number of observations and the adjusted R², refer to column 10 of Table A6.

	Ln(Income)	1(Joint mortgage)	1(30 < Age ≤ 40)	1(40 < Age ≤ 50)	1(Age > 50)
	(1)	(2)	(3)	(4)	(5)
1(5 year choice)	0.016*** (0.006)	0.072*** (0.003)	0.071*** (0.004)	0.132*** (0.006)	0.106*** (0.006)
1(Same lender), 2 yr	-0.109*** (0.011)	-0.057*** (0.013)	0.020*** (0.006)	0.027** (0.011)	0.059*** (0.015)
1(Same lender), 5 yr	-0.124*** (0.012)	-0.098*** (0.020)	0.005 (0.007)	-0.008 (0.012)	-0.008 (0.017)
1(Broker), 2 yr	0.095*** (0.005)	0.022*** (0.006)	-0.051*** (0.007)	-0.088*** (0.010)	-0.183*** (0.009)
1(Broker), 5 yr	0.088*** (0.007)	0.023*** (0.008)	-0.042*** (0.009)	-0.067*** (0.013)	-0.093*** (0.013)
Local Authority FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes

Table A9: Borrower Characteristics - Leverage and Amortization Term - 60 Day Window

This table presents regression coefficients of our main specification, Equation 1, with the coefficients of the control variables in the columns, and the outcomes of log loan amount, LTV, and log amortization term in months in the rows. All columns include local authority and lender fixed effects. Robust standard errors are in parentheses and are clustered at the origination-day level. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively. For the number of observations and the adjusted R², refer to column 10 of Table A7.

	Ln(Income)	1(Joint mortgage)	1(30 < Age ≤ 40)	1(40 < Age ≤ 50)	1(Age > 50)
	(1)	(2)	(3)	(4)	(5)
Ln(Loan amount), 2 yr	0.659*** (0.028)	0.010 (0.012)	-0.043*** (0.012)	-0.187*** (0.021)	-0.578*** (0.030)
Ln(Loan amount), 5 yr	0.715*** (0.022)	0.002 (0.009)	-0.045*** (0.010)	-0.197*** (0.015)	-0.466*** (0.017)
LTV, 2 yr	7.818*** (0.398)	-0.206 (0.227)	-5.046*** (0.468)	-14.245*** (0.725)	-29.701*** (0.793)
LTV, 5 yr	8.358*** (0.341)	-0.095 (0.155)	-5.689*** (0.328)	-15.083*** (0.504)	-26.680*** (0.444)
Ln(Term), 2 yr	0.025*** (0.004)	-0.040*** (0.003)	-0.104*** (0.005)	-0.394*** (0.007)	-1.013*** (0.015)
Ln(Term), 5 yr	0.027*** (0.003)	-0.032*** (0.003)	-0.111*** (0.004)	-0.398*** (0.006)	-0.873*** (0.006)
Local Authority FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes

Table A10: Mortgage Choices - Within-Borrower Differences - 60 Day Window

This figure plots regression coefficients of our main specification, Equation 1. Robust standard errors are in parentheses and are clustered at the origination-day level, while the adjusted R² is reported in square brackets. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

	Pre-period level	Δ Post-period, Pre-offer	Δ Post-period Post-offer	No. Obs. & Adj. R²
1(5 year choice Lag 2 year)	0.543*** (0.010)	0.051*** (0.017)	-0.157*** (0.015)	108,614 [0.008]
1(5 year choice Lag 5 year)	0.781*** (0.009)	0.040*** (0.014)	-0.096*** (0.020)	53,901 [0.005]
1(Same lender Lag diff. lender), 2 yr	0.761*** (0.055)	-0.021 (0.097)	0.125** (0.063)	20,587 [0.006]
1(Same lender Lag diff. lender), 5 yr	0.649*** (0.060)	-0.046 (0.106)	0.172** (0.078)	36,349 [0.007]
1(Broker Lag broker), 2 yr	0.669*** (0.021)	0.039 (0.034)	-0.090* (0.055)	50,718 [0.004]
1(Broker Lag broker), 5 yr	0.708*** (0.021)	0.045 (0.035)	-0.170*** (0.033)	90,326 [0.007]
Balance diff (% property value), 2 yr	1.323*** (0.509)	-0.654 (0.797)	-0.984 (0.607)	67,917 [0.002]
Balance diff (% property value), 5 yr	1.786*** (0.566)	-0.636 (0.871)	-1.380** (0.651)	122,732 [0.002]
Term difference, 2 yr	2.958*** (0.778)	2.309 (1.540)	1.912 (1.489)	39,219 [0.002]
Term difference, 5 yr	3.341*** (1.028)	2.127 (1.584)	3.873** (1.683)	84,225 [0.002]