Individual Landlords in the Mortgage Market[*]

João F. Cocco[†]   S. Lakshmi Naaraayanan[‡]   Jagdish Tripathy[§]

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Abstract

We use administrative data on the universe of mortgage originations to individual landlords in the United Kingdom to study their asset and financing choices around a large unexpected credit tightening event. This event led to an increase in rental yields driven by a decline in property values, despite rents continuing to increase. Loan originations become more concentrated among specialist lenders, who facilitate credit access through contracts with less-stringent stress testing requirements, increasing mortgage rates less for larger landlords, and substituting for these changes with higher upfront fees.

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[†]London Business School and CEPR, jcocco@london.edu.
[‡]London Business School, lnaaraayanan@london.edu.
[§]Bank of England, Jagdish.Tripathy@bankofengland.co.uk

1 Introduction

Residential rental markets facilitate workers' mobility and better job matches. They allow young borrowing constrained households to rent a home while they save for a downpayment. The demand for rental housing has to be met by a supply side in which private landlords often play a dominant role. In 2022, in the United Kingdom (UK), roughly 20% of all residential properties were privately rented.[1] The assets are often financed with debt. In 2022 alone, roughly £41 billion worth of residential mortgage loans were granted to UK landlords, corresponding to roughly 13% of all residential mortgage loans to individuals (including those to homeowners).[2] This translates into important linkages between credit and real estate markets, partly operating through the banking sector, evident during the global financial crisis (See, Mian and Sufi (2011), Corbae and Quintin (2015), among others).

We study the property investments of individual landlords and the loans used to finance them. Our main data source is an administrative dataset covering the universe of UK buy-to-let (BTL) mortgages originated since 2018, roughly 1.2 million loans. To help us identify the links between credit and real estate markets, as well as the responses of lenders and borrowers to tighter credit conditions, we leverage the UK Chancellor's mini-budget announcement of 23 September 2022 (the "event"). The proposed unfunded tax cuts were received with skepticism by markets and led to a sudden and unexpected deterioration in credit conditions, including a large increase in interest rates. For instance, the 2-year swap rate increased from 4.44% the day before to 5.56% the day after the announcement. The effects on costs of the borrowing persisted for several months thereafter.

For real estate investors, the spread between property yield and loan interest rate is an important metric. It affects their ability to service the debt and the expected equity returns. Our analysis shows how, after a long period of stable rental yields and mortgage interest rates of roughly 5.5% and 3% respectively, the event triggered sharp increases in mortgage rates followed by (smaller) increases in rental yields. A decomposition of rental yields into rents and property values reveals the cash-flow and discount rate channels at work. Prior to the event, rents and property values moved in tandem generating stable yields. After the event, rents kept increasing but property values stabilized (and even declined slightly). The co-movement that

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[1]This is roughly 5 million properties out of a 25 million housing stock (https://www.statista.com/statistics/286444/england-number-of-private-rented-households/). Most properties in the private rental sector (PRS) are rented out by individual landlords, but companies also play a role.

[2]This includes both loans for property acquisition and refinances. The data are from the Bank of England and Financial Conduct Authority, MLAR Table 1.33.

characterized changes in rents and property values prior to the event broke down temporarily, as the higher discount rates offset the positive cash-flow effects of higher rents.

Our analysis of rental yields uncovers interesting differences across landlords of different sizes and sophistication. The largest landlords, who own four or more mortgaged rental properties, achieve yields that are 76 basis points higher than accidental landlords, those who typically own only one rental property that was not initially acquired for renting.[3] The location of the rental property is the most important variable that explains the difference in yields. Large landlords tend to invest in lower-priced local housing markets. However, even after accounting for location and other fixed effects, we estimate an average yield difference of 38 basis points.

We then examine the debt financing of rental properties and how its characteristics changed in response to the deterioration of credit conditions. We use a difference-in-differences analysis and compare loans across landlord types and the lenders granting them. On the lenders' side, we distinguish between those lenders which ex-ante have high and low exposure to the BTL mortgage market relative to the owner-occupied sector, which we call specialist and non-specialist lenders, respectively.[4] Our empirical specifications control for several time-varying regional, property, and lender characteristics, through the inclusion of high-dimensional interactive fixed effects.

We find that, after the event, there is significant deleveraging by all landlord types, and loan originations become increasingly concentrated among specialist lenders. The large increases in mortgage interest rates lead to steep declines in Interest Coverage Ratios (ICRs). Focusing on the differences between landlord and lender types, we find that loan interest rates increase significantly less for large landlords than accidental ones, both within specialist and non-specialist lenders. Although the increase in loan interest rates is similar across lender types, there are important differences in their underwriting, which suggest that specialist lenders facilitate credit access to larger landlords.

As part of the underwriting process, lenders must calculate a stress tested ICR. After the event, we find that, non-specialist lenders increase the stress test interest rate that they use for larger landlords relatively more than the one they use for accidental landlords, whereas the reverse is true for specialist lenders. In addition, specialist lenders increase the initial loan fees relatively more for portfolio landlords than non-specialist lenders. The substitution of interest

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[3]The property was initially acquired for the landlord or a family member to live in it.

[4]All of our results are robust to an alternative classification of lenders into non-high-street and high-street. High-street lenders are the main lenders which are designated as such because they typically have a branch located in the high-street.

rates by higher upfront loan fees that lenders receive improves interest coverage ratios, and facilitates the meeting of underwriting regulatory thresholds.

After the event, we observe that non-specialist lenders increase the stress test interest rate applied to larger landlords more than the rate applied to accidental landlords, while the opposite is true for specialist lenders. Additionally, specialist lenders raise the initial loan fees more for portfolio landlords than non-specialist lenders do. This substitution of interest rates with higher loan fees enhances interest coverage ratios, allowing lenders to better meet underwriting regulatory thresholds and maintain credit access for larger landlords.

In the last part of the paper, we study differential changes in the *menu* of contracts and risk management by lenders around the event. To do so, we leverage the universe of loans *on offer* each day in the mortgage market. Consistent with the origination data, we find that in the twelve months after the event, as uncertainty reduced and lenders repriced the loans, the number of product offerings increased. However, interestingly, among non-specialist lenders the relative importance of 5-year and 2-year loans remained similar to that prior to the event, with a larger number of the former. On the other hand, among non-specialist lenders we see a reversal, with a larger increase in the number of 2-year products, whose count becomes larger than that of 5-year ones. This shows how specialist lenders favor relatively more 5-year products for which the regulatory ICR stress testing requirements are less stringent.

We then examine changes in minimum ICR for loans offered by lenders. Prior to the event, minimum ICRs were on average higher for specialist lenders, but the differences are relatively small, on average around 2 percentage points for the loans for the intentional/portfolio landlords only. These differences disappeared after the event, due to the decline in ICR for specialist lenders. Further, the event triggered an increase in the average premia over the loan interest rates used in ICR calculations, for both specialist and non-specialist lenders. However, specialist lenders used a fairly low premia for 5-year products aimed at larger landlords, as the regulatory framework does not prescribe a minimum stress interest rate for these products.

The data also allows us to study fees for products on offer and distinguish between lender and landlord type. We find that the average fees are relatively stable over time. They are on average higher for those in the let-to-buy segment borrowing from both specialist and non-specialist lenders. Prior to the event, when interest rates were already increasing, specialist lenders increased the fees on intentional/portfolio landlords from 1.0% to around 1.2% where non-specialist lenders kept them relatively stable at around 0.6%. After the event, specialist lenders increased them further to around 1.4%. It was only later that non-specialist lenders

increased their percentage fees to bring them closer to those of specialists.

An important question is whether specialist lenders have risk management in place as they facilitate access to credit for larger landlords in the riskier buy-to-let sector. The data on loan offers allow us to study risk management undertaken by lenders on two key dimensions. First, we observe whether lenders impose restrictions on the maximum number of landlord properties that they are willing to finance. Among the specialist lenders, after the event, we see an increase in the proportion of loans with such restrictions. Second, we observe whether lenders impose restrictions on the maximum advance amount, which captures their exposure to larger landlords. After the event, both lender types lower the advance amount conditional on imposing any such restriction. These results show how specialist lenders use the maximum amount that they lend to each landlord so as to limit their exposure to each individual borrower.

Taken together, these results complement findings from the origination data, showing that specialist lenders facilitate credit access for larger landlords, by offering longer fixation terms, and substituting interest rates for higher upfront fees. At the same time, these lenders have adequate risk management in place and limit their exposure to larger landlords, allowing them to mitigate idiosyncratic borrower risk but not necessarily aggregate sector risk.

Related Literature. Our paper is related to the growing literature at the intersection of finance and real estate that explores the role of investor composition in rental markets. Most of this work focuses on institutional investors. For instance, Gurun, Wu, Xiao, and Xiao (2023) show that large institutional investors use their local market power to extract renter surplus, but that they also contribute to enhancing neighborhood safety. Austin (2022) also finds that higher institutional ownership in a local area leads to higher rents, but that it increases population diversity, in part due to the crowding out of predominantly white individual home ownership. Garriga, Gete, and Tsouderou (2020) find that institutional investors' purchases increase the local area price-to-income ratio, with a negative impact on housing affordability.[5] LaPoint (2022) studies how property tax delinquencies facilitate institutional real estate investment in major U.S. metro areas with gentrification effects. The landlords that we study are different from these institutional investors; they are the so called "mom and pop" landlords and unlikely have significant local market power.

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[5]See also Francke, Hans, Korevaar, and van Bekkum (2023) who examine a Dutch legal ban on buy-to-let investments that led to an increase in the share of first-time buyers, but did not have a significant impact on house prices. On the theory side, Favilukis and Van Nieuwerburgh (2021) develop an equilibrium model to study welfare effects of house purchases by out of town buyers. They find substantial increases in house prices and rents, which benefit owners but are detrimental for renters.

In this dimension our paper is closer to the small literature that focuses specifically on the role of individuals, as opposed to institutional or professional investors. Among these, Levy (2021) studies housing policy in a model with home biased landlords. In the model, the strength of the home bias plays an important role in regulating the heterogeneous housing market responses to place-based subsidies. Gargano and Giacoletti (2022) use empirical tests and a survey of Australian landlords to show how they value the income paying nature of the assets, and how the low interest rate environment that prevailed between 2016 and 2019 has coincided with a substantial increase in the share of landlords.

Our analysis also speaks to the interactions between interest rates and landlord investment choices by exploiting the large unanticipated interest rate increase triggered by the mini-budget announcement for identification. Furthermore, our focus is on landlords who finance their assets with debt,[6] and uncover substantial heterogeneity in the pass-through of the interest rate shock to different landlords based on their underlying portfolio holding. Crucially, although the interest rate shock was not the result of monetary policy tightening, our analysis speaks to the role of mortgages in the transmission of monetary policy (Garriga, Kydland, and Sustek (2017)), on the less-studied market for mortgages among individual landlords who are significantly exposed to interest rate shocks.

Our paper is related to the literature on mortgage pricing strategies in the mortgage markets. Specifically, we show that in the riskier buy-to-let sector, lenders facilitate credit access for larger landlords, by offering longer fixation terms, and substituting interest rates for higher upfront fees. These lenders have adequate risk management in place and limit their exposure to larger landlords, allowing them to mitigate idiosyncratic borrower risk but not necessarily aggregate sector risk. In doing so, we complement work by Benetton et al. (2024), who in the context of UK residential mortgage sector, show that lenders price discriminate by offering menus of two-part tariffs of interest rates and origination fees, during periods of unconventional monetary policy.

Lastly, our work contributes to the role of lenders in the underwriting process and regulatory arbitrage in mortgage markets. Several papers in this literature have focused on non traditional lenders such as non-bank mortgage originators (Demyanyk and Loutskina (2016);

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[6]In this respect, our paper is also related to the extant literature on mortgages but with a focus on direct investment in the rental market by individuals and households who finance their properties using debt. In the residential mortgage markets, several papers have studied the household choice of mortgage fixation (Koijen, Van Hemert, and Van Nieuwerburgh, 2009; Campbell and Cocco, 2003), role of house prices for household behaviour in the mortgage market (Palmer, 2015; Fuster and Willen, 2017; Ganong and Noel, 2020), among others.

Ganduri (2023)) and fintech firms (Buchak, Matvos, Piskorski, and Seru (2018)).[7] Our analysis shows how specialist lenders, when granting loans to larger landlords, substitute lower mortgage interest rates for higher loan fees, allowing a reduction in interest coverage ratios. This and other margins of adjustment through which lenders respond to changes in the interest rate environment have important implications for policymakers concerned about financial stability risks emanating from the participation of buy-to-let investors in the mortgage markets.[8]

Our paper is organized as follows. Section 2 describes the data and the institutional setting. Section 3 focuses on the mini-budget announcement, that led to a sudden large and unanticipated deterioration in credit conditions, and helps us identify the reactions of landlords and lenders to tighter credit. Section 3.2 studies the assets, with a focus on rental yields, and landlord entry and exit. Section 4 is on the financing, and in particular how the debt financing changed in response to the unexpected interest rate increase in the cross-sections of landlords and lenders. The final section concludes.

2 The data and underwriting criteria

2.1 Data sources

Our first main data source is the buy-to-let lending data, an administrative dataset that includes loan level buy-to-let mortgage *originations* in the UK. Our second main data source is the Moneyfacts data that includes detailed information on buy-to-let mortgages *on offer* in the market in each day.

Buy-to-let (BTL) loan originations. The information is reported by lenders to the Bank of England and there were several phases in the data collection process. Phase 1 started in 2017 Q3. It was followed by phase 2, effective 2018 Q1, during which significantly more information was added to the data. We use data starting in 2018 Q1 and until the end of 2023 Q3.

The BTL data includes comprehensive information on all loans granted to individuals but not property companies. Because of this, and the focus of the analysis on individual landlords, we restrict the sample to those classified as "Individual" as identified in the data by the borrower

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[7]Gete and Reher (2021) show how mortgage securitization can have an impact on the size of the nonbank lending sector.

[8]One dimension along which landlords may be different than homebuyers is in the costs that they face in case of mortgage default, which are smaller for the former (Diamond, Guren, and Tan (2020)). This has financial stability implications (Zemaityte, Elle, and Katherine, 2023).

sector variable. We also remove a small proportion (0.4%) of foreign currency (non-GBP) loans, entries with a zero interest rate (9 observations) and loans with a capped interest rate (48 observations). After removing these observations, the data includes roughly 1.2 million loan originations.

Figure 1 plots the time series evolution of the number of loans originated in each quarter. There was a significant decline in the second quarter of 2020, the result of Covid-19.[9] The decline in loan origination was significantly larger in the period after the mini-budget announcement, from roughly sixty thousand in 2022 Q3 to roughly half of this value in 2023 Q3.

[Insert Figure 1 here]

During our sample period, roughly two thirds of the loans are remortgages. Most UK mortgages have an initial period (typically between 2 and 5 years) of fixed and discounted interest rate, at the end of which it reverts to a higher variable rate. It is fairly common for borrowers to refinance at the end of this initial period. The second largest category are loans for property acquisition, with roughly three hundred thousand entries (25% of the total). Other quantitatively less important but still relevant types are further advances (additional borrowing from existing lender, roughly 5% of the total) and let-to-buy loans —loans taken by those who decide to rent out their current home (roughly 4% of the total).

The BTL data does not include the exact property address, however, it does include its postcode and a typical UK postcode only includes 15 properties. The sample includes roughly 490,000 unique property postcodes, which is a lower bound for the number of unique properties covered by the data. It corresponds to roughly 10% of the total number of private rental properties in the UK.

Buy-to-let (BTL) loans on offer. The Moneyfacts data includes loan-level daily information on all loans available in the market, including the identity of the lender offering the product, loan type (e.g. initial period of interest rate fixation), interest rate, the maximum loan-to-value and other qualifying criteria, loan fees, among other. We have data from the beginning of September 2021 to the end of our sample period. In the UK mortgage market there are many different loans on offer, by different lenders, with different interest rates and loan fees, and maximum LTV. The underwriting criteria that we explain below determines whether borrowers qualify for the loan, but conditional on borrowers qualifying, it does not affect the loan interest rate.

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[9]In the UK, the first lockdown was announced on 23 March 2020 and most legal restrictions ended by March 2022.

2.2 Buy-to-let loan originations

The origination data includes a variety of property, loan and borrower information. We describe the information that is relevant for the analysis.

Property. The data includes information on property value. Among loans that were originated for property acquisition, the property value is equal to the purchase price and for the remainder loan types, it is a value determined through an appraisal. The average (median) property in our sample is worth £270 (£210) thousand. The mean (median) monthly rental income is £1,050 (£850). We calculate rental yields by multiplying monthly rent by twelve and dividing by property value:

$$\text{Rental yield} = \frac{\text{Annual rental income}}{\text{Property value}}, \tag{1}$$

The mean (median) rental yield is 5.3% (5%), but there is significant heterogeneity. Percentiles 10 and 90 are 3.8% and 7.2%, respectively.

[Insert Table 1 here]

There is information on several property characteristics, including type (detached house, semi-detached house, flat, etc), whether it is a new or existing dwelling, number of bedrooms (the mean (median) number is 2.47 (2)), and whether the property is in multiple occupation (multiple tenants, each renting a room directly from the landlord).

Loan. In addition to the previously mentioned origination date and loan type (property acquisition, remortgage, etc), the data includes information on the regulatory framework that applies —Financial Conduct Authority (FCA) or Prudential Regulation Authority (PRA) regulated, the implications of which are discussed in section 2.3.[10] The mean (median) loan amount is £155 (£124) thousand.

For each loan, we calculate the loan-to-value (LTV) ratio by dividing loan amount by property value:

$$\text{LTV} = \frac{\text{Loan amount}}{\text{Property value}}. \tag{2}$$

The typical maximum LTV on BTL loans is 75%, and this is reflected in its distribution. The

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[10]The FCA regulates the UK financial services industry with a focus on consumer protection. The PRA is part of the Bank of England and it is responsible for the regulation of banks, building societies, credit unions, insurers and major investment firms. In our sample, there is small but increasing number of loans provided by lenders that do not fall under the supervision of either the FCA or the PRA. We give further details below.

mean (median) LTV is 61% (66%), percentile 75 is 75%, and percentile 90 is 75.7%. The initial loan fees (on average equal to £1,317) may be added to the outstanding loan balance (capitalized), leading to LTVs just above the 75% threshold.[11]

The typical BTL loan is characterized by an initial period of significantly discounted and fixed interest rate, at the end of which it reverts to a higher variable rate (the reversion rate, equal to an index plus a premium). The mean (median) discounted rate in our sample is 2.63% (2.34%), reflecting the low interest rate environment that characterizes the early part of the sample period. The corresponding values for the reversion rate —calculated at loan origination, i.e. using the values of the index at this point —are 5.10% (4.99%).

The vast majority of BTL borrowers (roughly 96%) take loans with an interest rate that is fixed during the discounted period (the remainder 4% opt for floating rate). The typical length of this initial period is between 2 and 5 years: percentile 25 of the distribution of fixation term is 2.08 years increasing to 4.9 at the median (and to 5.18 years for percentile 90). Roughly 4 in 5 loans are interest only (IO), i.e. they involve no amortization of principal. The average mortgage term is roughly 21 years, but there is considerable heterogeneity; percentile 10 is only 12 years and percentile 90 is 30 years.[12]

There are at least two key reasons why most borrowers opt for IO loans. First, landlords benefit from mortgage interest tax deductibility. Prior to April 2017, they did so at their marginal tax rate. But a reduction in tax benefits was phased in over the following three years, and from April 2020 landlords only benefit from interest tax deductibility at the basic tax rate of 20%.[13] Second, IO loans have lower debt servicing requirements, releasing capital for other uses.

Roughly one-third of BTL borrowers extract equity when remortgaging. Among these, 18.9% do so to make improvements to the rental property and 28.1% to expand or re-leverage their portfolio. The remaining 53% obtain extra funds for other use —not specified in the data, but which include consumption or investments other than in property.

Borrower. BTL borrowers are on average (at the median) 47.1 (46) years old, but there is considerable heterogeneity. Percentile 10 (90) of the age distribution is 33 (63) years. There

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[11]The average value of the loan fees that are capitalized is £932, reflecting the fact that they are indeed capitalized for a large proportion of loans.

[12]Note that the term only has a direct impact on the required debt servicing for the 20% of principal repayment loans.

[13]This change implies a reduction in the benefits of debt financing for those in the 40% and 45% tax brackets. See https://www.gov.uk/government/news/changes-to-tax-relief-for-residential-landlords.

is information on borrower income and tax rate, but it is not comprehensive and available for 42.7% and 50.4% of the observations, respectively. The average (median) income is £65,503 (£42,561). The average (median) tax rate is 28.1% (20%).

The data also has information on credit scores. For the majority (71%) of loans, lenders use internal scores to assess credit risk. External agencies such as Equifax, Experian and Callcredit (now TransUnion) are used in 7.9%, 9.1% and 2.2% of the originations, respectively.[14] Since lenders and agencies rely on their own specific scoring system and scale, the credit score values included in the data are not directly comparable across providers. For this reason, we rely primarily on default probabilities to measure credit risk of the borrowers. The average default probability in our sample is 1.8% but percentile 75 is only 0.32% and percentile 90 is 1.83%. These values reflect the skewed nature of the distribution, with a small proportion of borrowers with high default probabilities. Roughly 0.34% of the loans are granted to borrowers who have been in arrears on a previous or current mortgage or another loan within the last 2 years, where arrears is defined as three or more months of missed payments.[15]

In addition to the rental property postcode, the data includes the borrower's residence postcode, which we use to calculate distance. Recall that a typical postcode only includes 15 properties, so that we are able to do so with a high degree of precision. We use the Office of National Statistics Geographical data and calculate distance as "the crow flies," following Vincenty (1975). The median value is only 6.3 kms. Percentiles 25 (75) are 2 (23.6) kms. Therefore, the vast majority of landlords invest locally and hold geographically undiversified real estate investments.

Lender. The data identifies the lender for each loan that we use to construct two groups of lenders according to their exposure to the BTL segment of the mortgage market. First, for each unique lender in the BTL origination data, we obtain its loan origination volume in the owner-occupied segment of the residential mortgage market.[16] We then calculate, for each lender, and for loans originated between January 2018 and December 2019, the total BTL loan volume as a share of the total residential mortgage loans (including the BTL and owner-occupied segments). The median share calculated across all lenders is 28.14%.

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[14] For the remaining roughly 10% loans a credit score is not used.

[15] There are a further 17 loans to borrowers who have been subject to a bankruptcy or debt relief order in the last 3 years (0.0014% of the total) and 40 loans to borrowers who have been subject to an individual voluntary arrangement within the last 3 years (0.0033% of the total).

[16] In the BTL data, there are 57 unique lenders over the whole sample period. In order to measure their loan originations in the owner-occupied segment of the residential mortgage market, we use the Product Sales Data (PSD001), an administrative dataset collected by the FCA.

We designate lenders with an above median share as specialist, reflecting their specialization in the BTL sector, and the remainder as non-specialist.[17] The specialist lenders are responsible for 29.7% of the BTL loan volume during the first two years of the sample. Among the specialist lenders, shadow banks are responsible for 4.84% of the BTL origination volume. Among the non-specialist ones, the corresponding fraction is negligible (0.67%).[18]

We are interested in studying how specialist and non-specialist lenders respond to the events triggered by mini-budget announcement in September 2022. Thus, we use loans originated early on, and several years before the event, to classify lenders. As further robustness, we show that the results are not sensitive to the specific definition but holds more broadly when we classify lenders into high-street (large lenders with a high-street branch presence) and non-high-street.

2.3 Underwriting criteria and the importance of landlord type

The main underwriting criteria are LTV and an affordability assessment. The typical maximum LTV is 75%. The affordability assessment examines interest coverage ratios, borrowers' credit history and it may also take into account borrowers' other income.

The underwriting criteria depends on the type of loan/borrower and the regulations that apply. In our data, roughly one in five loans are classified as Consumer buy-to-let mortgages and are regulated by the FCA. Most of the remaining four-fifths fall under the supervision of the PRA, except for those originated by shadow lenders.[19] There are three types of loans/landlords, as follows.

Accidental landlords. Consumer buy-to-let mortgages are subject to FCA regulations. They are for "accidental" landlords, meaning individuals who have become a landlord as a consequence of events. The rented property has been lived in by the borrower or by a member of his/her family (or has been inherited), and has not been purchased by the landlord with the intention of renting it out. The rental income from the property is not intended to be the main source of borrower income, and personal income (other than rental income) may be taken into consideration in the underwriting process, similar to a residential mortgage. Mortgage brokers involved in the consumer buy-to-let market are regulated by the FCA.

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[17]During the January 2018 to December 2019 period, 48 out of the 57 unique lenders originated at least one BTL mortgage. We do not classify the 9 lenders that did not originate any BTL mortgage during these initial two years of our sample.

[18]The corresponding fractions for shadow banks over the full sample period are 8.1% (specialist) and 0.58% (non-specialist), reflecting an increased importance of shadow banks in the latter part of the sample.

[19]There is a residual category of less than one percent of other loans that we drop from the sample.

Intentional landlords. Landlords who bought a property with the intent of renting it out are considered by the regulatory framework to be "professional" landlords. Therefore the main distinction relative to accidental landlords is their intent. Although they are called "professional," most are the so called mom-and-pop landlords and we refer to them as intentional.

The Supervisory Statement SS13/16 of September 2016 sets minimum underwriting standards for BTL mortgages that are not classified as consumer buy-to-let. In particular, the document gives guidance on the underwriting affordability criteria that must be used by lenders operating in this segment of the market, including interest coverage-ratio (ICR) tests, stress testing of the loan interest rate. ICRs are calculated from rental income, interest rates and loan amount using:

$$\text{ICR} = \frac{\text{Annual rental income}}{\text{Interest rate} \times \text{Loan amount}}. \tag{3}$$

The industry standard is to set the minimum ICR threshold to 125% for lower rate tax payers (20% tax rate) and 145% for higher tax rate payers (40% tax rate). The PRA does not prescribe a minimum ICR, but states that it does not expect it to be lower than this industry standard.

When assessing affordability, lenders should take into account the effects of likely future increases in interest rates (using market expectations) over a minimum period of five years (unless the interest rate is fixed or capped for a period of five years or more). They should do so by using a stress test interest rate that takes into account market expectations of future interest rates and a minimum 200 basis points increase in mortgage rates. A minimum stress test interest rate of 5.5% should be used (unless the interest rate is fixed or capped for a period of five years or more).

Portfolio landlords. Those borrowers who own (wholly or in part) four or more mortgaged rental properties (across all lenders) are classified as "Portfolio landlords" (Supervisory Statement SS13/16). Therefore, portfolio landlords are essentially large landlords who finance their property investments with debt. Roughly one in five of the loans originated in our sample are for portfolio landlords, who are subject to additional underwriting tests. In particular, SS13/16 point 4 specifies that lenders should have adequate risk management and controls for lending to portfolio landlords, and actively manage maximum LTV and minimum ICR, portfolio concentration and exposure to high risk segments.

Figure 1, in addition to the number of loans originated in each quarter, plots the proportions of loans granted to each landlord type. They remained relatively stable throughout, with

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roughly 60% granted to intentional landlords, and 20% to accidental and portfolio landlords each.

With the information on underwriting criteria in mind, we consider the type of affordability assessment used by lenders in practice. For the majority of loans (83%), lenders rely solely on ICRs. For an additional 8.6%, they rely both on ICRs and borrowers' income. For 6.4% they rely solely on borrowers' income. Finally, for 1.9% of the entries the affordability of the mortgage is assessed more widely. Therefore, ICRs have a prominent role in the process.

The mean origination ICRs are fairly high, a reflection of the low-interest rate environment that characterized the early part of our sample (471% for accidental, 437% for intentional and 440% for portfolio landlords). The corresponding percentile 10 values are 205%, 208% and 190%, respectively. Naturally, the values will be considerably lower in the more recent period.

[Insert Table 2 here]

The data has information on the stress tested interest rate used by the lender, that we use to calculate stress tested ICRs. The mean stress tested interest rate is 5.23% for accidental, 5.19% for intentional, and 4.96% for portfolio landlords. The respective mean stress tested ICRs are 218%, 214% and 253%, respectively. (The percentile 10 values are 124%, 125% and 139%). Therefore, loans to portfolio landlords have on average higher stress tested ICRs, even though they have lower origination ICRs.

Portfolio landlords are on average older, have higher income and face higher marginal tax rates than intentional landlords. The same patterns hold when comparing intentional and accidental landlords, but the differences are smaller. Accidental landlords own on average 1.42 (median 1) mortgaged properties, intentional landlords own on average 1.73 (median 2) mortgaged properties, and portfolio landlords own on average 8.5 mortgaged properties (median 6, percentile 90 equal to 13). Therefore, portfolio landlords own on average a significantly larger number of properties than other landlord types.

The distances between rental property and landlord home are consistently small for all landlord types. For instance, the median distances are 7.6, 5.9 and 6.4 kms for accidental, intentional and portfolio landlords, respectively. We report additional descriptive statistics by landlord type in Online Appendix A.

2.4 Bank capital requirements

Banking regulations typically view the BTL segment of the mortgage market as being riskier than the owner-occupied sector. In particular, Basel III assigns risk weights that depend on the LTV of the loan and on whether the loan is secured by an owner-occupied property or an investor property (the latter is defined as a "real estate mortgage that is dependent on the cash-flows of the real estate"). Loans secured by investor properties are assigned risk weights 10 to 35 percent higher than loans secured by owner-occupied properties. For example, for a 75% LTV loan the risk weight is 30% for a loan secured by a owner-occupied property and 45% for one secured by a rental property. This translates into capital requirements of 3.15% and 4.73%, respectively (see for example Goodman and Zhu (2023)). This may affect different lenders' willingness to participate on each segment of the residential mortgage market.

Within the BTL segment, Basel III does not distinguish between loans granted to accidental, intentional and portfolio landlords. However, as explained in previous section, the PRA regulations do so, which may affect different lenders' willingness to grant loans, particularly in a context of rising interest rates.

3 Tighter credit, asset values and yields

3.1 The mini-budget event

In order to identify the effects of tighter credit conditions, we rely on the mini-budget announcement of September 23, 2022. This was in a first instance a fiscal event: the UK chancellor unexpectedly announced a "Growth Plan" that consisted of large unfunded tax cuts to promote economic growth.[20]

Panel (a) of Figure 2 plots the time series of several economic variables over the sample period, that show the backdrop against which the mini-budget announcement took place. After a period of low inflation and interest rates, inflation started increasing rapidly in early 2021. This was followed in early 2022 by increases in the Bank of England base rate and mortgage rates. The vertical line in the figure marks the mini-budget date. The plan was received with skepticism by markets and it quickly translated into an unexpected large increase in yields and a deterioration in credit conditions.

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[20]The tax cuts included bringing forward the planned decrease in the basic rate of income tax from 20% to 19%, abolishing the highest marginal rate of income tax of 45%, reversing planned increases in corporation tax and national insurance, and abolishing a proposed Health and Social Care Levy.

This is visible in several metrics. Panel (b) of Figure 2 plots the daily number of different BTL mortgage products on offer by all lenders and the average initial interest rate on these products (both calculated from the Moneyfacts data), for the 12 months before and after the event. Mortgage interest rates were already increasing and the number of products on offer declining prior to the event, more so for 2-year than 5-year products. But the event itself led to significantly tighter credit conditions, with sudden steep declines in the number of BTL products on offer and steep increases in mortgage interest rates. While the number of products on offer began to increase soon after, the costs of borrowing remained significantly higher than those pre-event.

Panel (c) of Figure 2 plots a Google trends search of the term "Mini-budget." While mini-budgets tend to occur every six months, they do not attract nearly as much attention as the one that we exploit. Furthermore, the large spike in Google searches exactly at the time of the event reveals its unanticipated nature.

In addition to an unexpected deterioration in credit conditions, the event led to significant economic uncertainty. Panel (d) of Figure 2 plots the daily UK policy uncertainty index. Although the period after the event was characterized by significant uncertainty, within 90 days of the event it was back to pre-event levels. The UK Chancellor resigned on October 14 and this was followed by the resignation of Liz Truss as Prime Minister on October, 25. Over the weeks that followed the new UK chancellor announced a reversal of the mini-budget policies. Even though the uncertainty reduced, mortgage interest rates remained significantly higher than their pre-event levels.

Our empirical approach will compare loans originated before and after the event to different landlord types and lenders using an event-study specification. For parts of the analysis, we use the whole sample but for others we focus on the loans originated in the 12 months before and after the event. It is important to note that interest rates were already increasing before the event, which will be reflected in the loans originated in the pre-event period. But as Figure 2 makes clear, the event triggered a sudden unanticipated and large deterioration in credit conditions, on which we rely for identifying the different dimensions of response by lenders and borrowers.

A limitation of the origination data is that it includes the date in which the loan was originated, but not the date on which the mortgage offer was received by the borrower. Mortgage offers are typically valid for up to three months after they are received, with borrowers choosing whether or not to accept them. This means that many of the loans originated in the immediate

period after the event will be based on pre-event terms, and it may take up to a quarter for the credit effects of the event to be fully reflected on new originations. This is also the reason why, as Figure 1 shows, the more significant decline in the number of loan originations takes place only in the first quarter of 2023. The Moneyfacts data on the loans on offer on each day overcomes this limitation.

3.2   Asset values and yields

Landlords typically use the rental income generated by the property to service the loans. In addition, mortgage loans use the properties as collateral. The evolution of both rental income and property values impact the ICRs and LTVs used by lenders in the underwriting process. In this section, we study the evolution of rental yields and property values around the event.

Panel (a) of Figure 3 plots the times series evolution of average rental yields (in percent), by landlord type. Rental yields were fairly stable throughout the sample period until the event quarter, after which they started increasing. In the cross-section of landlord types, rental yields are on average lower for accidental landlords, followed by intentional landlords, and highest for the larger portfolio landlords. This suggests that, ceteris paribus, portfolio landlords are in a better position to service the loans, and this was the case both pre- and post-event.

[Insert Figure 3 here]

Further, we study the time-series and cross-sectional variation in rental yields in a regression framework to better control for heterogeneity on several dimensions that might help explain the evolution. The unit of observation is the rental yield on property i, located in local-area l, and used as collateral for the loan originated at time t. We construct indicator variables for landlord type, Intentional$_{ilt}$ and Portfolio$_{ilt}$, and estimate regressions of rental yield on these dummies and other control variables:

$$\text{Yield}_{ilt} = \alpha + \beta^{\text{Intentional}}\text{Intentional}_{ilt} + \beta^{\text{Portfolio}}\text{Portfolio}_{ilt} + \gamma X_{ilt} + \omega_{lt} + \epsilon_{ilt}, \qquad (4)$$

where ϵ_{ilt} is the error term. The estimated coefficients on the landlord type dummies show the additional yield achieved by each of these landlord types relative to the base group which is accidental landlords. Additionally, in our analysis, we progressively control for several dimensions of heterogeneity across property, and time-varying regional and lender characteristics, by way of inclusion of high-dimensional interactive fixed effects (the X_{ilt} and ω_{lt} terms). Further, to better

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understand which of these factors drive significant variation in the underlying rental yields, we also compare the Adjusted-R^2 and changes in coefficient estimates across specifications.

In the first column of Table 3 we do not include any controls, so that the estimated coefficients on the landlord type dummies capture differences in unconditional averages and the constant the mean for the base group. They imply average rental yields of 4.87% for accidental landlords, 5.33% for intentional landlords, and 5.62% for portfolio landlords. These differences are economically meaningful and statistically significant.

We attempt to shed light on the drivers generating yield differences across landlord type. First, there may be differences in yields across property types, with different landlords selecting into different types. In column (2) we add indicator variables for property type (Detached, Terraced, and Other, with flats as base group) and number of bedrooms (one is the base group). There are small decreases in the estimates for portfolio and intentional dummies, reflecting the fact that different landlord types select properties with different characteristics. Although not reported in the table, our estimates imply rental yields that are roughly 90 basis points lower for detached houses than flats.

[Insert Table 3 here]

Second, there may also be differences in yields across property location, with different landlords selecting into different locations. In column (3) we add local area fixed effects to the set of explanatory variables. The geographical unit we consider is a local authority, with 400 local authorities in the whole of the UK. There is a very large increase in the explanatory power of the regression, as measured by Adjusted-R^2, from 0.06 in column (2) to 0.40 in column (3). This shows that geographical location is an important determinant of yields. Furthermore, the estimated coefficients on the landlord type dummies are roughly equal to sixty percent of the previous estimates, meaning that forty percent of the differences in yield are due to the differences in the geographical areas which different landlords select into.[21]

In column (4) of Table 3 we add time (quarter) fixed effects to the regressions, but excluding local area fixed effects. The estimates and explanatory power of the regression are similar to those in column (2). This shows that the cross-sectional variation in rental yields in our sample is significantly larger than the variation that resulted from the event. In order to understand

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[21]In Appendix Figure IA.A2 we plot average rental yields by geography and landlord type. Rental yields are lower in London and the South East, reflecting the higher level of house prices in these areas. There are interesting differences across landlord types. Portfolio landlords achieve significant higher yields on properties located in the North of the country than accidental landlords.

the nature of time-series variation, we estimate the following event-study specification:

$$\text{Yield}_{ilt} = \sum_{k \in \{2018Q1, 2023Q3\}} \beta_k^{Intentional} \cdot D_k \cdot \text{Intentional}_{ilt} +$$

$$\sum_{k \in \{2018Q1, 2023Q3\}} \beta_k^{Portfolio} \cdot D_k \cdot \text{Portfolio}_{ilt} + \gamma X_{ilt} + \omega_{lt} + \epsilon_{ilt}, \tag{5}$$

where as before i is the property used for collateral, l is the local-area of where the property is located, t origination quarter, X_{ilt} is a vector of other explanatory variables, ω_{lt} are local-area fixed effects and ϵ_{ilt} is the residual. The estimated coefficients on the landlord type dummies show the additional yield achieved by each of these landlord types relative to the base group, which is accidental landlords, in event time.

Column (5) of Table 3 shows the results and Panel (b) of Figure 3 plots the estimated regression coefficients and corresponding confidence intervals for the interaction terms. The base quarter is the mini-budget event date of 2022/Q3. The estimated coefficients post mini-budget announcement are not significantly different than the pre-event ones. Therefore, even though there are cross-sectional differences across landlord types, and portfolio landlords are able to achieve higher yields on their assets, the nature of these differences did not significantly change during the post-event period.

To study whether landlords of properties with higher or lower yields tend to take loans from certain lenders, in the last column of Table 3 we add lender fixed effects.. There is a small increase in the Adjusted-R^2 and a small decline in the estimated coefficients on the landlord type dummies suggesting that this is not economically very important. Put differently, lender selection effects are already captured by the other variables included in our empirical specification.

Rents versus property values. Rental yields may be higher because of higher rental income or because of lower property values (or a combination of the two). We investigate the reason for the increase in yields post event. We take the logarithm of rents and the logarithm of property values and regress these variables on property characteristics, local area and time (quarter) fixed effects using an event-study specification similar to before.

Figure 3 plots the estimated coefficients and corresponding confidence intervals on the time dummies. It shows that prior to the event both rents and values increase, reflecting a cash-flow channel in property valuation. However, in the quarters after the event, even though rental

income continues to grow at a rapid pace, property values stopped increasing. The increase in interest rates that operates through a discount rate channel more than offsets the positive valuation effects of higher rents. These collateral value effects imply additional risks for lenders.

[Insert Figure 3 here]

In terms of the cross-sectional differences, the average rental incomes for accidental, intentional and portfolio landlords are £1,145, £1,035, and £1,024, respectively. The corresponding figures for property value are £313k, £264k, and £245k. Therefore, even though larger landlords receive on average lower rental income (roughly 10% lower), they do so on significantly lower priced properties, generating the higher yields. These average differences are also reflected in the estimates shown in Panels (c) and (d) that include controls. There are significant larger differences in property values across landlord types than in rental income.

4 Loan originations

In this section, we turn our attention to the mortgages used by different landlord types, their costs and characteristics, and the lenders who provide the loans. Thus, this section makes use of the origination data. We are particularly interested in capturing the effects of a sudden and unanticipated interest rate increase on the loans.

4.1 Loan interest rates, LTVs and ICRs

In Panel (a) of Figure 4, in addition to the previously shown rental yields, we plot the time series evolution of the average interest rate for loans originated in each quarter. The vertical line corresponds to the event quarter, 2022/Q3. The figure shows that interest rates were fairly stable at an average below 3% prior to the event, generating spreads between rental yields and interest rates of between 250 and 300 basis points. This changed dramatically after the mini-budget announcement: interest rates increased rapidly leading to a significant narrowing of spreads. This is in spite of the increase in rental yields, which as the graph shows, was an order of magnitude smaller than that of mortgage rates. The narrower spreads makes the property investments less attractive for landlords and the loans riskier for lenders.

In terms of differences across landlord types, the figure shows that prior to the event, mortgage interest rates were on average higher for portfolio than for intentional landlords, which in turn were slightly higher than those charged to accidental landlords. After the event,

the differences appear to quickly narrow. It is important to note that, as the figure shows, there had been an increase in mortgage rates in the three months prior to the event. But the event itself and the large interest rate increases that it triggered were a surprise, which help us identify the effects of the interest rate shock.

[Insert Figure 4 here]

Panel (c) of Figure 4 plots the quarterly evolution of average LTVs. It shows that they were fairly stable before the event, at values slightly over 60% for portfolio and intentional landlords, and roughly 5 percentage points lower for accidental landlords (Recall that the maximum LTV for BTL is 75%). However, there is significant deleveraging after the event.

We estimate similar regressions to those previously estimated for rental yields, but with the initial loan interest rate as dependent variable:

$$\text{Interest rate}_{ilt} = \alpha + \beta^{\text{Intentional}}\text{Intentional}_{ilt} + \beta^{\text{Portfolio}}\text{Portfolio}_{ilt} + \gamma X_{ilt} + \omega_{lt} + \epsilon_{ilt} \qquad (6)$$

where ϵ_{it} is the error term. The estimated coefficients on the landlord type dummies show the additional interest rate that they pay relative to the base group (accidental landlords). In the UK mortgage market there are many products on offer, by different lenders. Loan pricing is mainly by LTV band. A credit risk assessment focused on interest coverage ratios is done to decide whether to grant the loan, but conditional on loan approval, the assessment does not have a large effect on price. Therefore, in all of the specifications that we estimate, we control for LTV using dummies (LTV less than 55, (55-65], (65-75] and greater than 75).

The first column of Table 4 shows that interest rates were on average 29 (7) basis points higher for portfolio (intentional) landlords than the base group of accidental landlords. When we control for property characteristics and local area fixed effects, these differences become slightly smaller, equal to 23 (6) basis points. Controlling for origination quarter significantly improves the explanatory power of the regression, but the estimated coefficient on the portfolio dummy is almost unchanged at 22 basis points (column 4). In column (5), we interact origination quarter with local area, and the interest rate differences become 19 (3) basis points for portfolio (intentional) landlords. Therefore, across all these specifications, we find that portfolio landlords pay on average higher interest rates than other landlords.

[Insert Table 4 here]

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In order to study the evolution of interest rates across landlord type over time, we use an event-study specification where we include interactions between these variables. Panel (b) of Figure 4 plots the estimated coefficients on the interactions and their corresponding 95% confidence intervals. They show that prior to the event interest rates were higher for portfolio landlords followed by intentional. However, post-event the interest rate differences became negative, with particularly large changes pre- and post-event for portfolio landlords.

In the last column of Table 4 we include lender fixed effects. There is a large increase in Adjusted-R^2 and the estimated coefficient on the portfolio dummy becomes significantly smaller and equal to only 3 basis points. This suggests that there is significant variation across lenders and across different landlord types that is correlated with the interest rates that they pay on their loans.

In order to understand the nature of this variation, in the next section we consider the two groups of lenders that we have previously defined: specialist lenders, with a high exposure to the BTL market as measured in 2018 and 2019, and the remainder (non-specialist).

Before we do so, Figure 5, Panel (a) plots the time series evolution of the average interest rate used in the stress test, along with the initial loan interest rates. The former increased much less. Panel (b), plots the time series evolution of the corresponding ICRs. Those calculated using the initial loan interest rate were above 400% for much the sample period, but declined steeply as interest rates rose. In contrast, the ICRs calculated using stress test interest rates remained relatively stable throughout, including after the mini-budget announcement. This is the result of the significantly lower increase in stress test interest rates compared with the loan rates (Panel (a) of the same figure) combined with the post-event reduction in leverage.

[Insert Figure 5 here]

4.2 Loan characteristics by lender type

To shed light on the variation in loan characteristics across lenders and landlord types, in a first step, we present summary statistics for several variables of interest dividing the sample between loans originated by specialist and non-specialist lenders, distinguishing between loans originated in the 12 months before and the 12 months after the event.[22]

Panel A of Table 5 shows the results for the pre-event period. The first column shows that a smaller proportion of the loans originated by non-specialist lenders (15%) are granted

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[22]The conclusions are similar if we include the full sample in the pre-event data.

to portfolio landlords than the corresponding figure for loans originated by specialist lenders (35%). Specialist lenders charge on average higher interest rates to all landlord types but the average LTVs are broadly similar across across lender types (for each landlord type).

[Insert Table 5 here]

As part of the underwriting process, lenders carry out an affordability assessment calculating ICRs with the initial loan interest rate and a stress tested one. The average values of the stress test interest rates are shown in the third column of Panel A of Table 5. Calculating their difference relative to the loan interest rate, gives values for non-specialist lenders of 2.75%, 2.86% and 2.44% for accidental, intentional and portfolio landlords. The corresponding differences for specialist lenders are 2.22%, 1.98% and 1.83%, respectively. Therefore, specialist lenders use less stringent stress testing, which can be partly explained by the longer fixation terms of the loans that they grant. As explained in section 2.3, a less stringent stress testing is required for loans with an interest rate that is fixed for 5-years or longer.

Lenders are compensated through the interest rate premium and loan fees. Panel A of Table 5 shows that, within lender type, and in the pre-event period loan fees are higher for intentional than accidental landlords, and they are highest for portfolio landlords. Loan fees are significantly higher for loans granted by specialist than non-specialist lenders. One potential reason for higher fees among specialist lenders is that loan fees (or points) can be used to screen borrowers. However, they serve as a useful tool for lenders when used as substitute to a higher loan interest rate, as they improve ICRs and facilitate loan underwriting.

At the same time, a key disadvantage from a borrower's perspective is that when used as a substitute, the higher origination fees paid upfront reduces the cash-flows that they receive. A feature, in the BTL market is that the origination fees are often capitalized i.e., added to the outstanding loan balance, and many borrowers do so. In our sample, over the whole time period, the proportions of loans with capitalized fees are 0.58 for accidental, 0.59 for intentional, and 0.67 for portfolio landlords, suggesting their prevalence in this market.

Panel B of Table 5 shows similar averages for loans originated post-event, and Panel C shows the differences (Δ) between pre- and post-event. Post event there were decreases in loan originations, larger in percentage terms among non-specialist than specialist lenders. The increases in interest rates, both initial and stress test, were larger among the former than the latter, but smaller for loans granted to portfolio landlords by specialist lenders. In addition, the decreases in average LTV and fixation term are smaller among specialist than non-specialist lenders, and among portfolio than the other landlord types. On the other hand, the increases

in loan fees are highest among specialist lenders and portfolio landlords. These characteristics play a role in the underwriting process, in facilitating credit access.

4.3   Facilitating access to credit

The averages shown in Table 5 show that specialist lenders charge higher interest rates than non-specialist lenders, and that within each lender type portfolio landlords pay on average higher interest rates than intentional who in turn pay higher interest rates than accidental.

To investigate whether these differences across landlord type within lender type are significant, in Table 7 we divide the sample into loans originated by each of these two types of lenders, and estimate the regressions separately for each. Comparing columns (1) and (3), we find that portfolio landlords pay higher interest rate on loans compared to accidental and professional landlords, within both types of lenders.

[Insert Table 7 here]

In columns (2) and (4), we interact the post and the landlord type dummies. The negative estimates on these interaction terms show that post event the interest rates increased less for portfolio and intentional landlords than accidental ones. This happens both within specialist and non-specialist lenders. Lastly, in columns (3) and (5), we account for time-varying unobserved lender characteristics by interacting lender fixed effects with origination quarter fixed effects. The estimated coefficients become smaller (in absolute value), but the conclusions are similar.

Figure 1 showed that there was decline in the number of loan originations after the event. This, of course, is the result of supply and demand and does not by itself mean that landlords found it more difficult to access credit. In order to investigate this further, Figure 6 plots the number of loans granted by each of the lender types in each month, focusing on the year before and after the event. The number of originations is fairly stable in the year preceding the event, but we observe significant drops starting in December 2022. This is two months after the event and it may in part due to some borrowers having had pre-approved loan offers before the mini-budget announcement, with the corresponding loan originations occurring later.[23] Although the

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[23]The process is such that borrowers approach lenders for an offer. The loan offer is typically valid for a period of 3 months before it expires. This means that those borrowers who requested offers prior to the mini-budget announcement may have decided to go ahead after the announcement, in which case they were borrowing at the lower pre-event interest rate.

number of originations decreases for both lender types, the decline is much more pronounced for non-specialist than specialist lenders.

[Insert Figure 6 here]

4.3.1 Stress test interest rate and initial interest rate fixation period

The differential decline in loan originations for the two lender types suggests that specialist lenders likely facilitated access to credit after the event. In order to investigate this, we estimate regressions similar to those for the loan interest rate in which we divide the sample between non-specialist and specialist lenders, but with the stress test interest rate as dependent variable. Columns (1) and (4) of the top panel of Table 8 show that both lender types use relatively lower stress test rates for portfolio and intentional landlords than accidental ones.

[Insert Table 8 here]

Interestingly, we also find that they react differently post event. Non-specialist lenders increase relatively more the stress test rate that they use for portfolio and intentional landlords (column (2)), while the estimated coefficients for specialist lenders are negative (column (5)). In columns (3) and (6) we control for lender times quarter fixed effects, which effectively controls for time-varying lender characteristics, such as demand, that might drive the interest rate choices. Both lender types use lower stress test rate for portfolio landlords post event, but the difference is larger post event for specialist lenders.

In the bottom part of Table 8 we show results for similar regressions with the initial period of interest rate fixation (years) as dependent variable. Column (2) shows that while post-event there is a decline in the average period of interest rate fixation for loans granted to portfolio landlords by non-specialist lenders, the reverse is true for loans originated by specialist lenders to the same landlord types. The fixation term matters since the stress testing regulatory requirements are less stringent for loans with an interest rate fixation period of 5 years or more.

4.3.2 Loan fees

Table 9 shows the estimates for loan fees, computed as a fraction of the loan amount, consistent with industry practice. Compared to the base case of accidental landlords, both lender types receive relatively more fees from portfolio and intentional landlords (columns (1) and (4)), with

relative differences economically larger in the sample of specialist lenders. Furthermore, post-event, specialist lenders increased the fees that they charge these landlord types significantly more.

[Insert Table 9 here]

For instance, post increases for portfolio landlords are 0.314 among specialist and 0.088 among non-specialist lenders (columns (5) and (2)). The fees increase is in contrast with the previously identified relative decrease in loan interest rate for these landlords.

Lenders are compensated through the loan interest rate and loan fees. Substituting a higher loan interest by higher fees facilitates access to credit since it improves ICRs. As a simple example, consider a property that generates 1 of rental income and that the maximum ICR is 1.25. Assume also that the LTV constraint is not binding. We compare two interest-only loans of maturity 5 years. The first has interest rate of 5% and zero upfront fees. The maximum loan amount determined by the ICR constraint is 16.

The second loan has initial fees of 2% which are added to the loan balance, and the annual loan interest rate is reduced by 40 basis points (2% divided by the 5 years of the loan). In this case, the maximum loan amount is 17.05, a 6.6% increase over the first loan. In this way, substituting loan interest rate by fees improves ICRs.[24] This simple example shows how loan fees can be used by lenders, and in particular specialist lenders, as a substitute to a higher loan interest rate and in this way increase maximum loan amounts or improve ICRs for a given loan size.

The results in this section suggest that specialist lenders facilitate access to credit by landlords, with lenders structuring loans in a way that reduces the impact of regulations in their activities. They also indicate a different approach between specialist and non-specialist lenders in the treatment of large landlords in response to the event. But ultimately, loan originations are equilibrium outcomes that result from the supply and demand of funds by different lenders and landlord types, respectively. In the next section, we study the loans on offer in the market, and how they changed after the event, allowing us to shed more light on supply side reaction.

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[24]For this to work, the LTV constraint cannot be binding. In the BTL market, loan fees can be added to the outstanding loan balance, even if that brings the loan over the maximum LTV.

5 Loans on offer

The first part of this section studies the loans available in the market and how they changed after the event. For this purpose, we rely on Moneyfacts data that includes loan-level daily information on all loans *on offer* in the market. Our focus is on comparing loans offered by specialist and non-specialist lenders, with particular emphasis on 5-year fixed rate ones. As discussed in section 2.3, the regulatory framework is less stringent for loans with interest rate fixed for 5-years or more, so that the comparison of such loans for the two lender types may be more informative.

A shortcoming of the Moneyfacts data is that it does not allow us to clearly distinguish among loans on offer to the different landlord types (accidental, intentional and portfolio). There are "let-to-buy" and "let-to-buy only" variables that allow us to identify loans to accidental landlords. Let-to-buy refers to a situation when households rent out their existing home and buy a new one to live in. Roughly 34% of the 2.05 million loan observations in the data are available for let-to-buy. But the vast majority of these same loans are also available to non-accidental landlords: only a very small fraction (1.2%) of the total are let-to-buy only. The remaining 66% are not available for let-to-buy. For parts of the analysis we focus on the latter, available to intentional and portfolio landlords.

In the second part of this section, we study some of the loan restrictions that shed light on how lenders manage the risks of lending to large landlords.

5.1 Characteristics

5.1.1 Number

On each day, there are many different loans on offer, by different lenders, of different type (e.g. fixed or variable interest rate), with a given maximum LTV, among other differences. Panel (a) of Figure 7 plots the daily number of 5-year fixed interest rate loan products, by lender type. For comparison, the same figure plots the 2-year fixed rate products, which together with the 5-year fixed are the largest categories.

A larger number of products are offered by non-specialist lenders, reflecting their larger size. Before the event both lender types offered more 5-year than 2-year loans. The number of products on offer declined prior to the event, as interest rates increased. The event triggered a large abrupt decline in the number of loans on offer.

After the event, as uncertainty reduced and lenders repriced the loans, the number of product

offerings increased. However, interestingly, among non-specialist lenders the relative importance of 5-year and 2-year loans remained similar to that of pre-event, with a larger number of the former. On the other hand. among non-specialist lenders we see a reversal, with a larger increase in the number of 2-year products, whose count becomes larger than that of 5-year ones. This shows how specialist lenders favor relatively more 5-year products for which the regulatory ICR stress testing requirements are less stringent.

Panel (b) of Figure 7 shows the number of products on offer, distinguishing among those that are also available to let-to-buy landlords and those which are not. Both lender types offer significantly more loans to intentional/portfolio landlords.

5.1.2 Minimum ICRs

The variable rental income in Moneyfacts data contains a textual description of the minimum product ICR and the interest rate at which that minimum ICR restriction must be satisfied. The minimum ICRs are typically 125 (145) for standard (high) rate tax payers. However, there is some variation across products in these values and those that apply to different borrower types (e.g. second time buyer, remortgagor). For each product, we extract all the minimum ICRs reported and calculate their average.

With respect to the interest rate at which the minimum ICR restriction must be satisfied, there is variation across products in both the reporting and the interest rate values.

Recall that, as discussed in section 2.3 the PRA regulations specify that, when assessing affordability, lenders should take into account likely future increases in interest rates over a minimum period of five years (unless the interest rate is fixed for 5 years or more). They should do so using a stress test interest rate that takes into account market expectations of future interest rates and a minimum 200 basis points increase in mortgages rates. Furthermore, they specify that a minimum stress test interest rate of 5.5% should be used, unless the interest rate is fixed or capped for a period of 5 years or more. Therefore, the regulatory framework treats loans with interest rates that are fixed for 5 years or more more favorably, giving lenders considerable discretion on the interest rate used for the ICR calculation.

The data includes a textual description of the interest rate that is used in the minimum ICR calculation. For some entries, lenders report the interest rate value directly (e.g. "Calc at managed rate of 5.5%," the most frequent managed rate is 5.5%). For others, lenders report it as a premium over the loan interest rate (E.g. "Calc at Product Pay Rate +2%," the most frequent premium is 2%). There is a much smaller number of products for which lenders

report it as a premium over the reversion rate (E.g. "Calc at Revert Rate"). We extract this information from the text, and for all the alternatives we calculate the interest rate premium over the loan interest rate.[25]

Figure 8, Panel (a), plots the daily evolution of the minimum ICRs, distinguishing between lender types and loans that are also available (or not) for the let-to-buy segment of the market. Prior to the event, minimum ICRs were on average higher for specialist lenders, but the differences are relatively small, on average around 2 percentage points for the loans for the intentional/portfolio landlords only. These differences disappeared after the event, due to the decline in ICR for specialist lenders.

Figure 9 plots the time series evolution of the average premia over the loan interest rate used in the minimum ICR calculation. Panel (a) shows the results for 2-year products. In the early part of the sample, they were equal to between 2% and 3%, a result of loan interest rates of around 3%, and the regulations specifying a minimum stress test interest rate of 5.5% for 2-year fixed rate loans. As interest rates increase, there is a steady decline in the premia, both for specialist and non-specialist lenders. The event triggered premia increases for both lender types, with significant volatility.

Panel (b) shows the results for 5-year fixed rate products. The premia are significantly lower than those for 2-year products, as the regulatory framework does not prescribe a minimum stress test interest rate 5-year fixed rate products. Pre-event, as interest rates increase, non-specialist lenders decrease the premium that they use the not buy-to-let segment from an average value of 2% to roughly 0.5% just before the event. On the other hand, specialist lenders used a fairly stable low premium of between 0.1 - 0.3% throughout.

Interestingly, upon the event, non-specialist lenders double the premium that they use to 1%, while specialist lenders keep at their pre-event level. This is further evidence of specialist lenders facilitating credit access. For a loan interest rate of 5% and a minimum ICR of 1.27, a 50 basis points difference the premium, making the stress test interest rates of 5.5% and 6%, imply a different in maximum loan amount of 9.09%.

In the weeks after the event, non-specialist lenders decreased the premium that they use for the not let-to-buy sector, but it remained higher than that of specialist lenders for the remainder of the sample.

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[25] As for the ICR, when there there is more than one interest rate reported we extract all and calculate their average.

5.1.3 Fees

The origination data showed significant differences in fees across lender types, calculated as total origination fees divided by loan amount. We now study fees for the products on offer. This information is included in the data in textual form, which distinguishes between different types of fees (arrangement, booking, etc). A further difficulty is that for some entries fees are a fixed £ s amount whereas for others they are a % amount. Furthermore, some products have both fixed and percentage fees (for different types of fees).

We extract the fees information from the textual data by searching for the amounts after the £ and before the % signs. For those entries with more than one value for each of the fee types, we extract all the values and add them to create a total value for the flat fees and another for the percent fees. In the origination data the two are combined into a total percentage of loan amount. But here we analyze them separately, rather than assuming a given loan amount.

Panel (a) of Figure 10 shows the average flat fees, distinguishing between lender and landlord type. Average fees are relatively stable over time. They are on average higher for those in the let-to-buy segment borrowing from both specialist and non-specialist lenders. Panel (b) focuses on the percentage fees, for which the differences are more significant. Prior to the event, when interest rates were already increasing, specialist lenders increased the fees on intentional/portfolio landlords from 1.0% to around 1.2% where non-specialist lenders kept them relatively stable at around 0.6%. After the event, specialist lenders increased them further to around 1.4%. It was only later that non-specialist lenders increased their percentage fees to bring them closer to those of specialists.

5.2 Risk management

The analysis shows how specialist lenders facilitate access to credit to landlords and in particular large landlords by originating loans with a longer period of interest rate fixation, by using less stringent stress testing and by substituting a higher interest rate for loan fees. This may lead to an increased risk exposure of specialist lenders to the buy-to-let sector. In this section, we use the Moneyfacts data to study how lenders manage this risk.

The variable property portfolio contains information on whether lenders impose restrictions on the the maximum number of landlord properties that they are willing to finance (E.g. "Max 10 Props With Lender", "max props: any number of properties", "Max 20 props"). Some lenders impose restrictions both on the maximum number of properties with the lender and the

overall number, while others impose restrictions only on the former or the latter. We create a dummy variable that takes the value of one if there is restriction on the maximum number of properties and zero otherwise. In addition, we create a variable with the value of the maximum number of properties (with the lender, or overall if there is no maximum number with lender is included).

The same property portfolio variable includes information on whether the lender imposes a restriction on the maximum amount that it is willing to lend to each landlord (across all loans that the lender provides to the landlord), and what that amount is. We construct a dummy variable that takes the value of one if there is such a restriction and zero otherwise. And another variable with the maximum amount.

Panel (a) of Figure 11 plots the daily average value of the dummy for restrictions on the maximum number of properties, by lender type. A smaller proportion of the loans offered by specialist lenders have a restriction on the maximum number of properties. In terms of the time series evolution, in the immediate period before the event, as interest rates started rising, there is an increase in the proportion of loans on offer with restrictions. However, when the mini-budget is announced, the proportion of loans with restrictions decreases significantly, particularly among specialist lenders. This decrease is due a disproportionate number of loans which imposed restrictions being withdrawn from the market.

Panel (b) of Figure 11 shows the results for the average maximum number fo properties (for the loans on offer with a restriction). The average values is similar for both lender types, albeit more volatile for specialist lenders.

The bottom two panels of Figure 11 show the results for the no restriction on maximum advance dummy (Panel (c)) and the maximum advance amount (Panel (d)). Most lenders and in particular specialist lenders impose restrictions on the maximum total amount that they are willing to lend to each landlord. The proportion of specialist lenders that impose any restrictions is less than 95% early in the sample, and even though it slightly decreases in the period before and after the event. As far as the average values are concerned, conditional on a restriction being imposed, for specialist lenders they are roughly equal to an average of £4 million throughout the sample period, with no significant increase post mini-budget announcement.

These results show how specialist lenders use the maximum amount that they lend to each landlord so as to limit their exposure to each individual borrower. This allows them to mitigate idiosyncratic borrower risk but not necessarily aggregate sector risk.

6 Conclusion

We have used an administrative dataset on the universe of mortgage loans granted to UK individual landlords to study the links between property and credit markets. Our analysis took advantage of an event that led to an unexpected and sudden credit tightening, including a large increase in financing costs. We study both changes to individual landlords' property investments and financing outcomes in the mortgage market.

On the asset side, after the credit tightening, there was an increase in rental yields driven by a decline in property values in spite of rents continuing to increase. The co-movement that characterized changes in rents and property values prior to the event broke down temporarily, as the higher discount rates offset the positive cash-flow effects of higher rents. With respect to landlord size, we find that larger landlords are able to achieve higher rental yields on their assets, as a result of property investments in lower-priced local housing markets.

In spite of the increase in rental yields, the much larger increase in mortgage interest rates led to a steep decline in interest coverage ratios. Together with loan to values, interest coverage ratios are then main criteria for loan underwriting. On the lender side, we compare the loans originated by those lenders which prior to the event had high exposure to the buy-to-let segment of the mortgage mortgage (which we call specialist lenders) and those with low exposure (non-specialist). The former include small banks and shadow banks and the latter the main banks. Specialist lenders charge on average higher interest rates.

After the credit tightening, both lender types increase their loan interest rates, but less so for larger landlords. There are however differential responses in other loan features that show how specialist lenders facilitate access to credit to larger landlords. They increase the interest rate that they use in the calculation of stress tested interest coverage ratios relatively less than the one they use for other landlord types. Moreover, specialist lenders increase upfront loan fees relatively more for large landlords, substituting away from charging higher mortgage rates to fees. These changes allow these lenders to better meet the underwriting standards and facilitate credit access to larger landlords.

Overall, these results inform policymakers concerned about financial stability risks emanating from the high interest rate and with a focus on individual investors in the mortgage markets.

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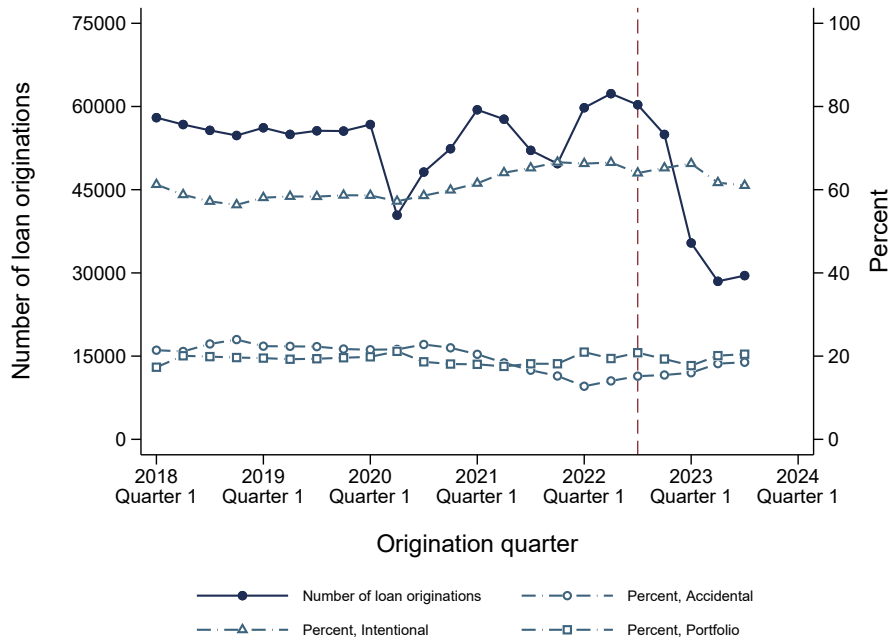Zemaityte, G., H. Elle, and B. Katherine (2023). The buy-to-let sector and financial stability. *Working Paper*.

Figure 1: Number of quarterly loan originations and proportions by landlord type

The solid line (black) plots the total number of loans originated in each quarter over the sample period (left axis). The dashed lines (blue) plot the proportions of loans granted to each landlord type (right axis). The dashed vertical line (maroon) marks 2022/Q3, wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant unfunded reduction in taxation sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a few days.
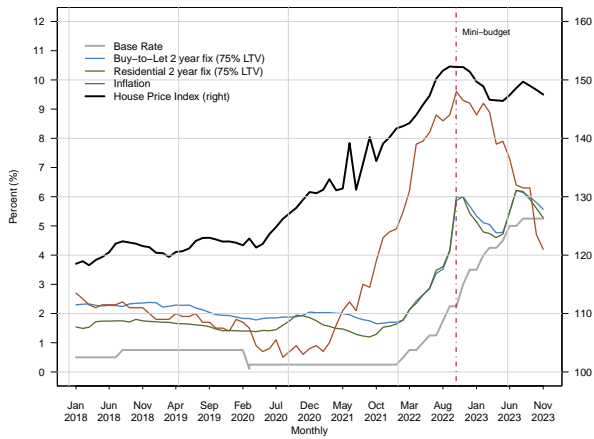
(a) Macroeconomic conditions
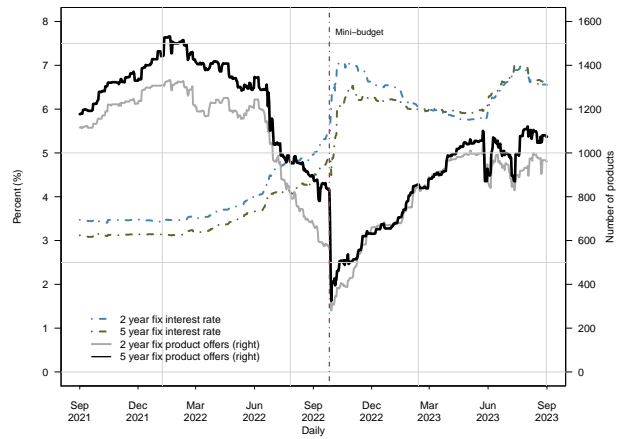
(b) Buy-to-let products on offer
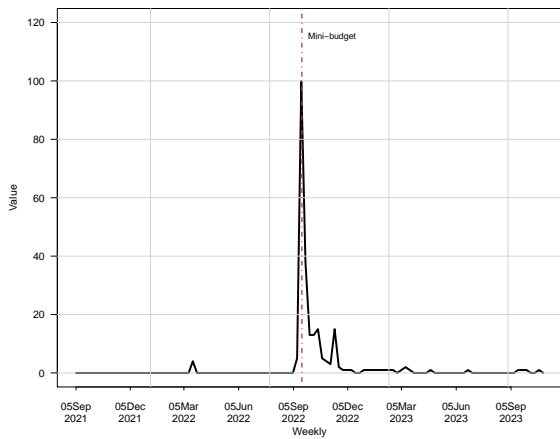
(c) Google Trends
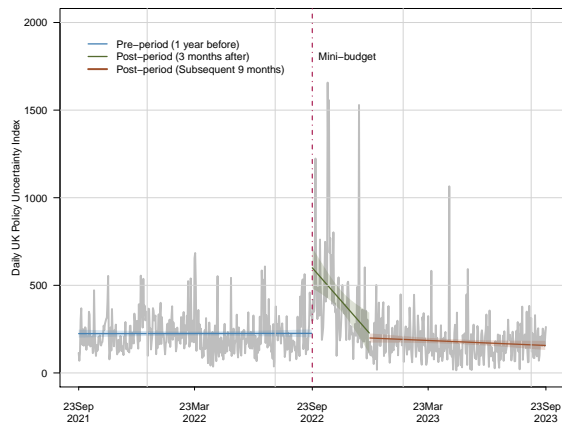
(d) UK Daily Policy Uncertainty Index

Figure 2: UK Macroeconomic context around the mini-budget

Panel (a) plots the monthly time series for several macroeconomic variables from January 2018 to September 2023: the Bank of England base rate (dark gray), the year-on-year consumer price inflation (CPI) change (brown), the 2-year fixed rate for 75% LTV buy-to-let (blue) and residential (green) mortgages, and the England and Wales National House Price Index (black) plotted on the right vertical axis. Panel (b) plots the daily average interest rate for 2 and 5-year mortgage products *on offer*, and their count. The data are from Moneyfacts for the ±12 months around the mini-budget. Panel (c) plots the Google trend weekly query for the term "Mini budget," where the numbers represent search interest relative to the highest point on the chart (re-scaled to 100) for the given region and time (±12 months around the mini-budget). Panel (d) plots the daily UK policy uncertainty index from https://www.policyuncertainty.com/uk_daily.html. A linear fit and the corresponding 95% confidence interval is generated separately for 1 year before the mini-budget event, the first 3 months, and the following 9 months thereafter. In all panels the dashed vertical line (maroon) marks the event date, when the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant unfunded reduction in taxation sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a few days.
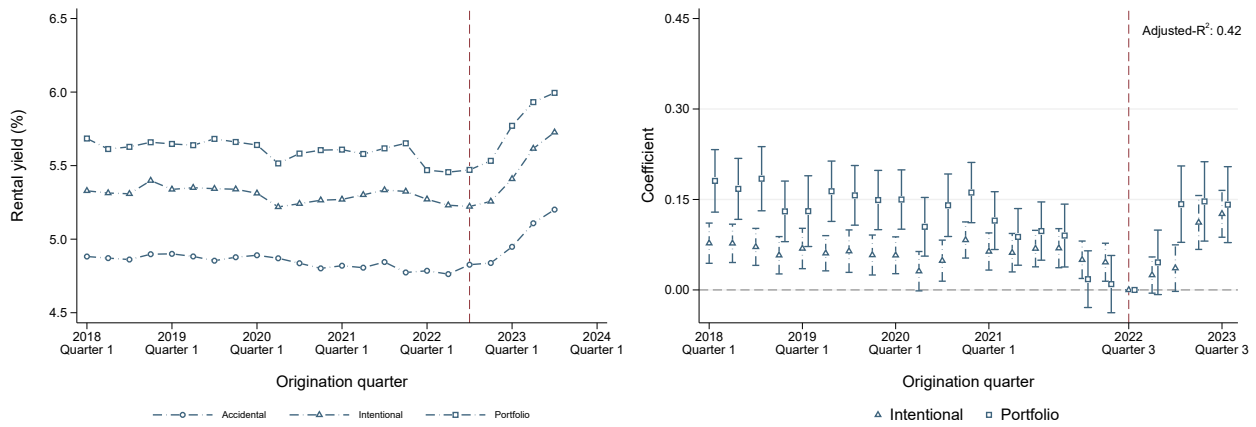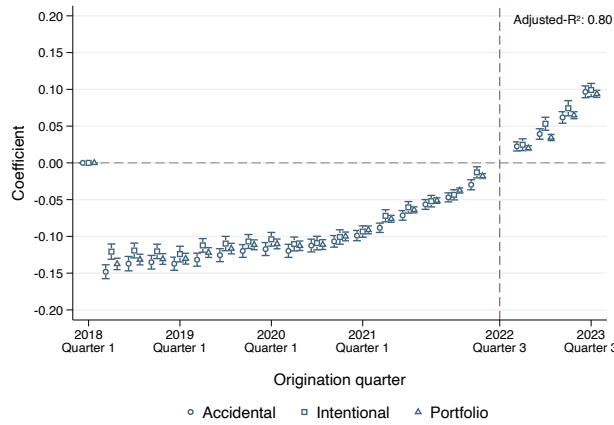
(a) Rental yields by landlord type

(b) Estimated regression coefficients

(c) Rental income (monthly)
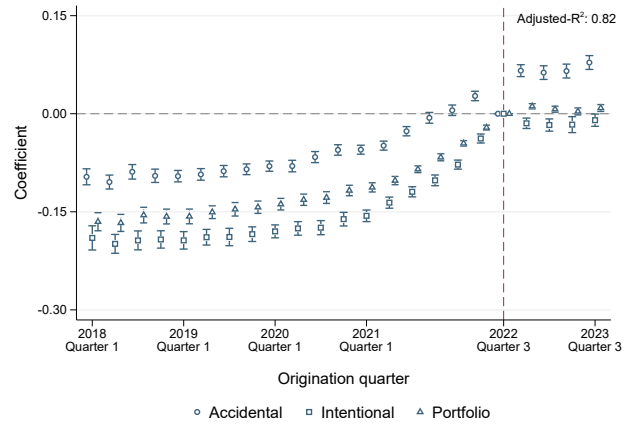
(d) Property value

Figure 3: Rental yields, rents and property values over time and in cross-section of landlord types

Panel (a) plots the time-series evolution of average rental yields in percent, split by landlord type. Panel (b) plots the estimated coefficients and their 95% confidence intervals from an event-study difference-in-differences specification outlined in Equation (5). The specification controls for property characteristics and local-area-by-origination quarter fixed effects. Squares (triangles) represent Portfolio (Intentional) landlords. The estimated coefficients are relative to Accidental landlords and normalized to zero in 2022/Q3. Panel (c) (Panel (d)) plots the time-series evolution of monthly rental income (property values). The coefficients are estimated from the same event-study difference-in-differences specification with log monthly rental income (Panel c) and log property value (Panel d) as dependent variables. The estimated coefficients are normalized to zero in 2018/Q1. In all panels the dashed vertical line (maroon) marks 2022/Q3, the "mini-budget" announcement (event) date.
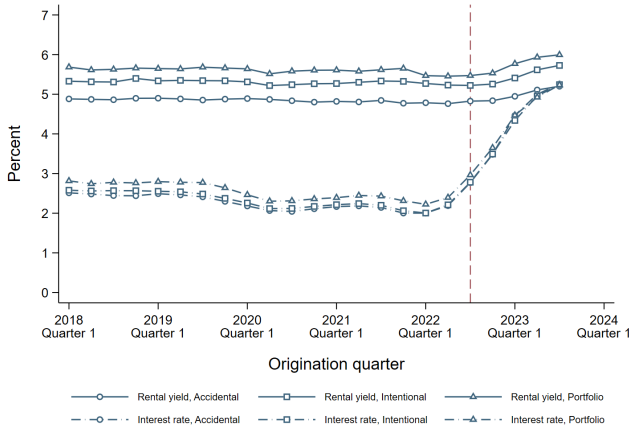
(a) Rental yields and interest rate
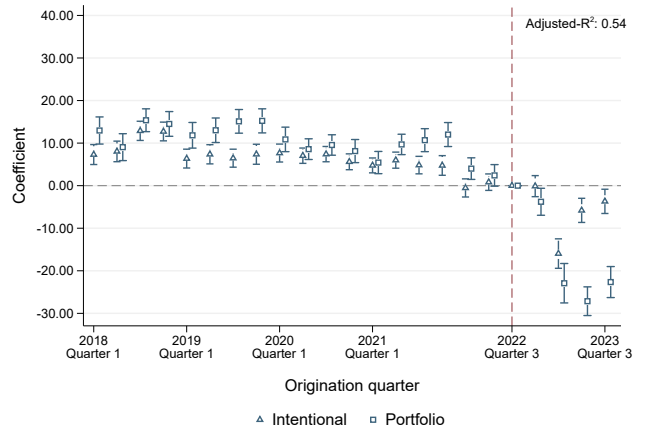
(b) Interest rate, regression coefficients
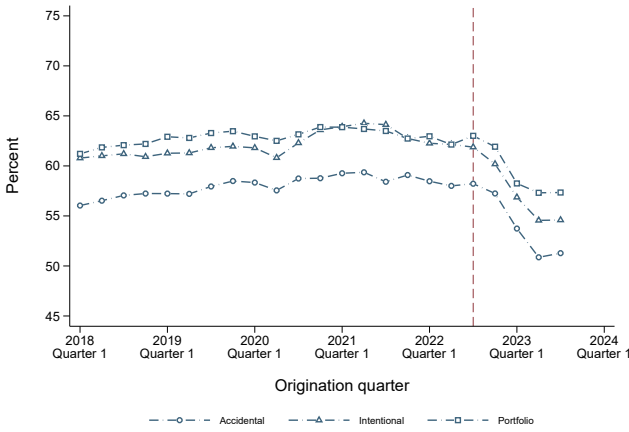
(c) Loan-to-value
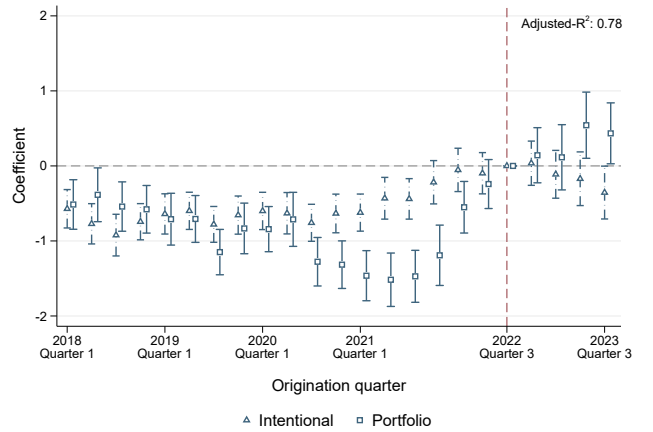
(d) Loan-to-value, regression coefficients

Figure 4: Loan interest rate and loan-to-value over time and in cross-section of landlords

Panel (a) (Panel (c)) plots the time-series evolution of the average initial loan interest rate (loan-to-value) (in percent) by landlord type. Panel (b) (Panel (d)) plots the estimated coefficients and their 95% confidence intervals from an event-study difference-in-differences specification with the initial loan interest rate (loan-to-value) as dependent variable. Squares (triangles) represent Portfolio (Intentional) landlords. The estimated coefficients are relative to Accidental landlords and normalized to zero in 2022/Q3, the "mini-budget" announcement (event) date, marked by the dashed vertical line (maroon).
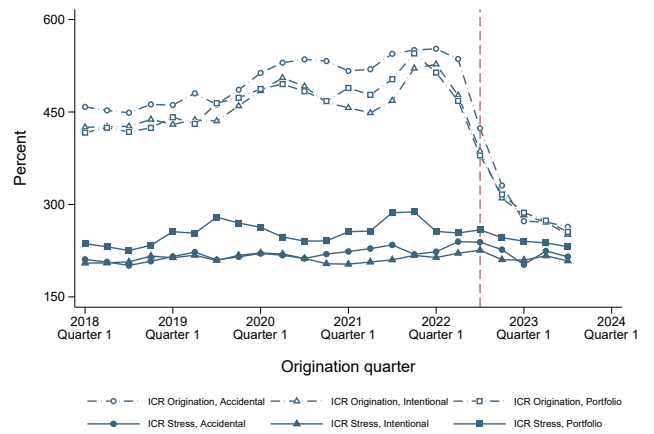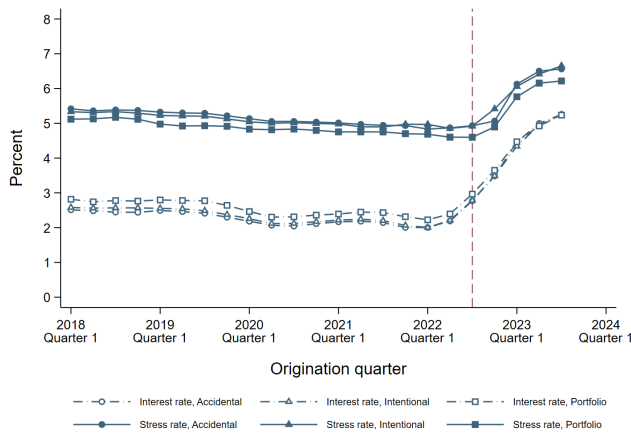
(a) Initial and stress test interest rate

(b) Interest Coverage Ratio

Figure 5: Interest coverage ratios by landlord type

The figure plots the time-series evolution of interest rates (Panel (a)) and interest coverage ratios (Panel b), by landlord type. The interest coverage ratios are reported for both the initial loan interest rate and the stress test interest rate. The dashed vertical line (maroon) marks Quarter 3 of the fiscal year 2022, wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant reduction in taxation and included other looser set of policies that were largely unfunded, sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a matter a few days.
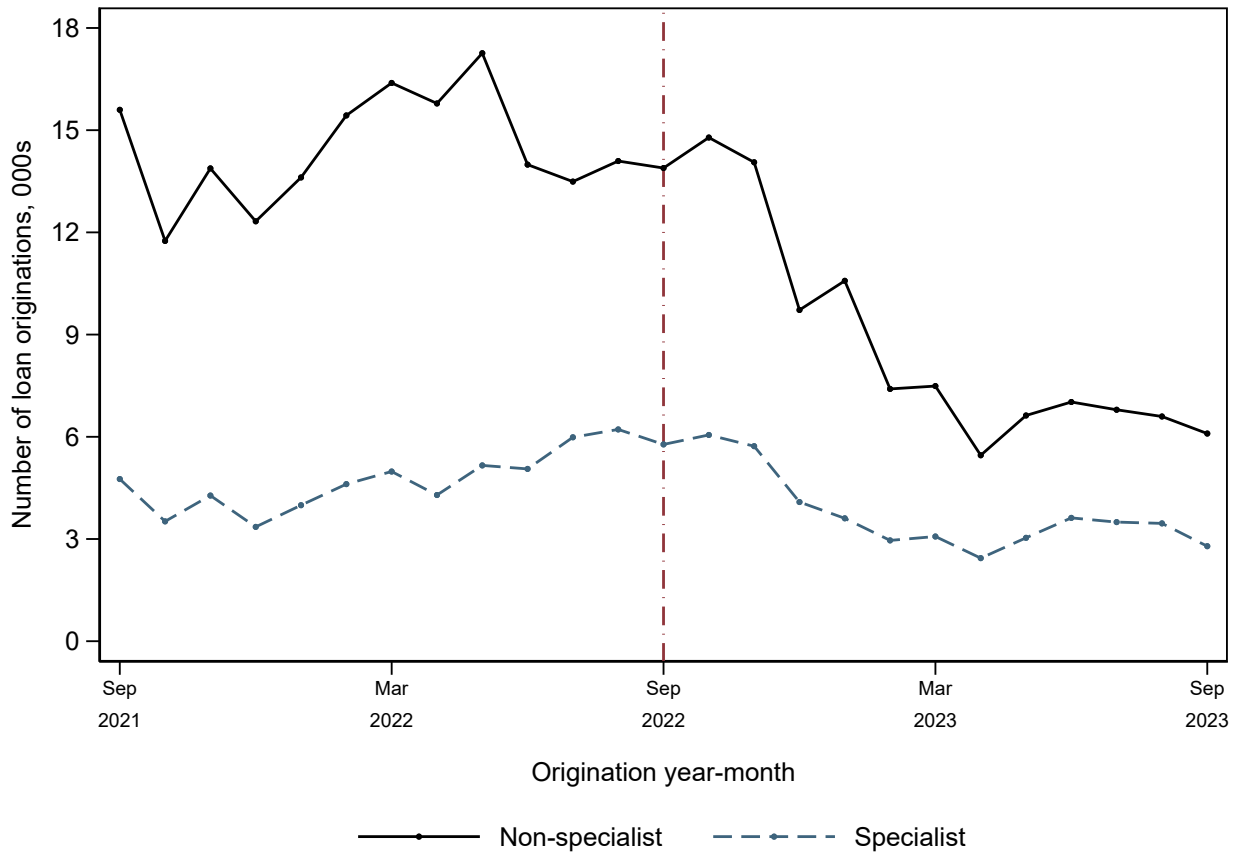
Figure 6: Loan originations by lender type

The solid (dashed) line plots the number of loans originated in each year-month by Non-specialist (Specialist) lenders. The dashed vertical line (maroon) marks September 2022, wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant unfunded reduction in taxation sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a few days.
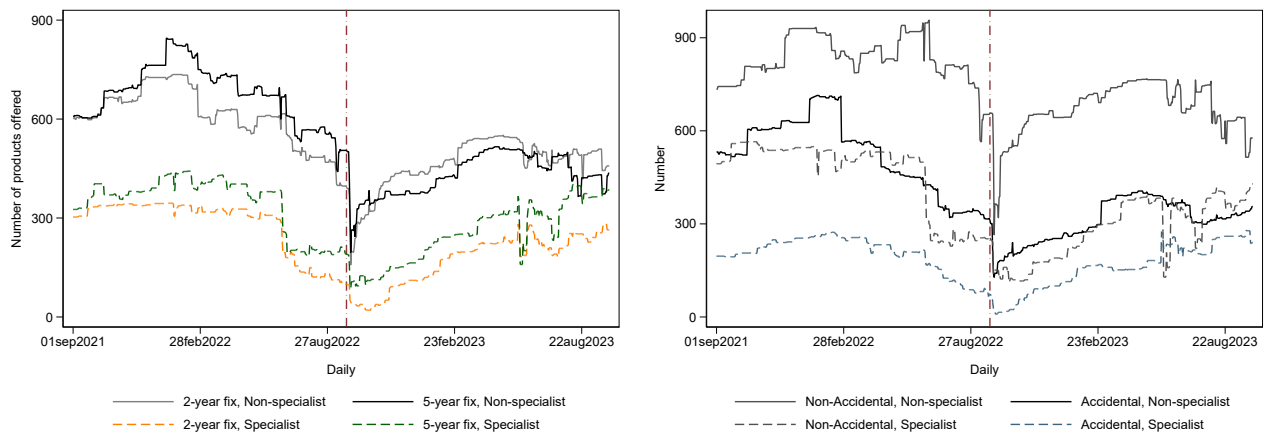
(a) Lender type and fixation period (b) Landlord and lender type

Figure 7: Number on loans on offer

Panel (a) plots the number of products offered each day by lender type and fixation period. Panel (b) plots the number of products offered each day by lender type and landlord type. The dashed vertical line (maroon) marks 23 September 2022, wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant unfunded reduction in taxation sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a few days.
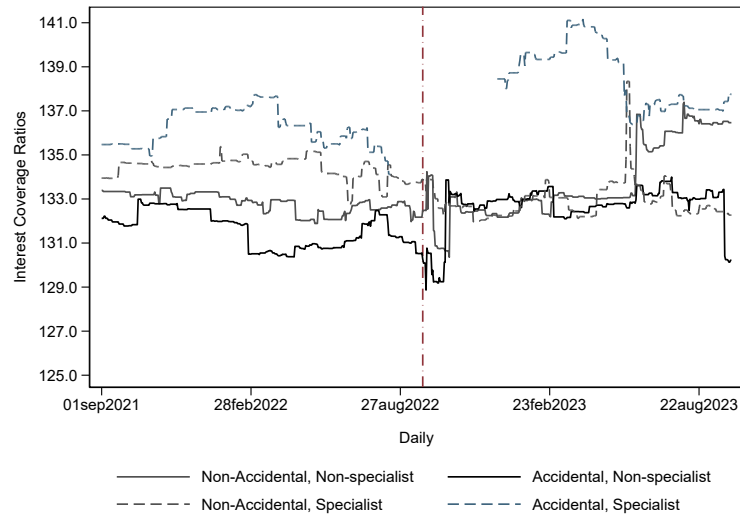
Figure 8: Minimum Interest Coverage Ratios

The figure plots the minimum interest coverage ratios each day by lender type and landlord type. We require that each day there at least 100 products on offer in each category. The dashed vertical line (maroon) marks 23 September 2022, wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant unfunded reduction in taxation sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a few days.
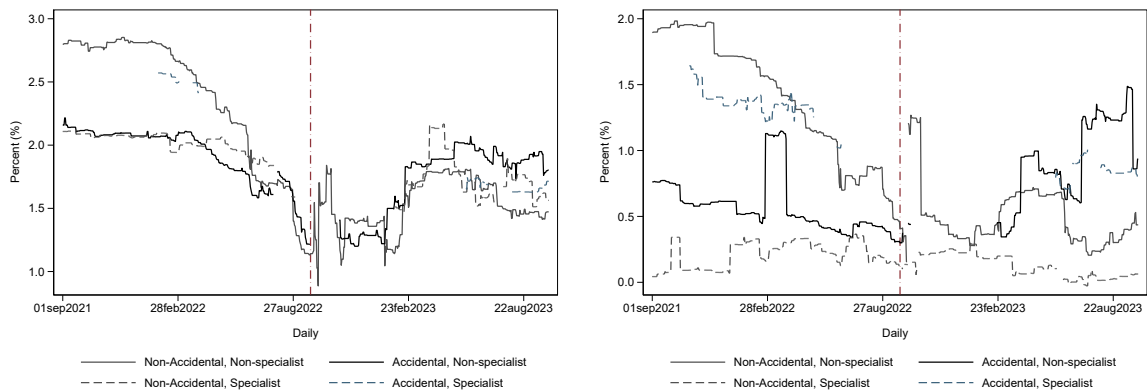
(a) 2-year fixed interest rate   **(b)** 5-year fixed interest rate

Figure 9: Interest rate premium used for the ICR calculations by lender and landlord type

Panel (a) plots the interest rate premium used for ICR calculations for each day split by lender type for 2-year fix products. Panel (b) plots the interest rate premium used for ICR calculations for each day split by lender type for 5-year fix products. We require that each day there at least 100 products on offer in each category. The dashed vertical line (maroon) marks 23 September 2022, wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant unfunded reduction in taxation sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a few days.
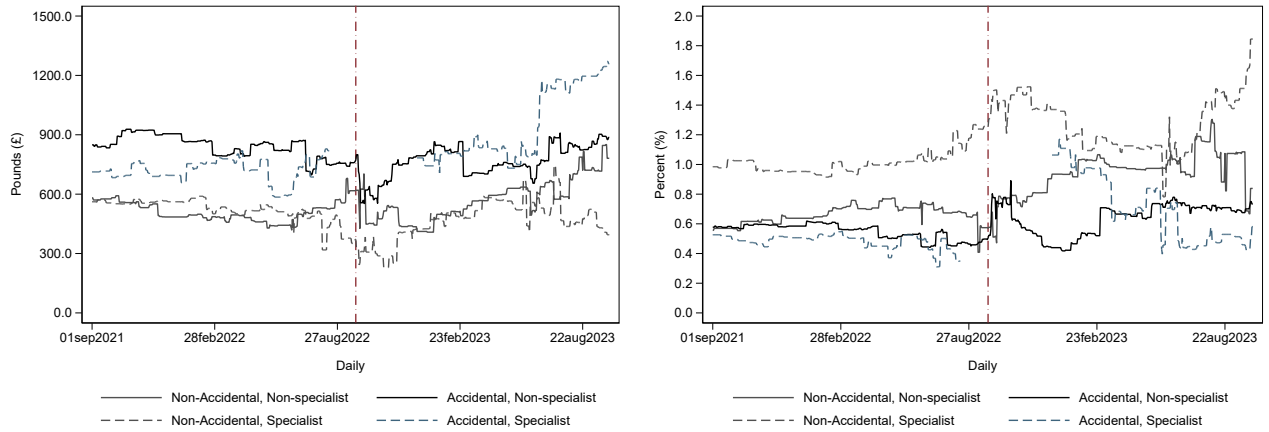
(a) Product fees (£s) (b) Product fees (%)

Figure 10: Product fees by lender type

Panel (a) (Panel (b)) plots the daily evolution of the average loan flat (percent) fees by lender and landlord type. We require that each day there at least 100 products on offer in each category. The dashed vertical line (maroon) marks 23 September 2022, wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant unfunded reduction in taxation sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a few days.
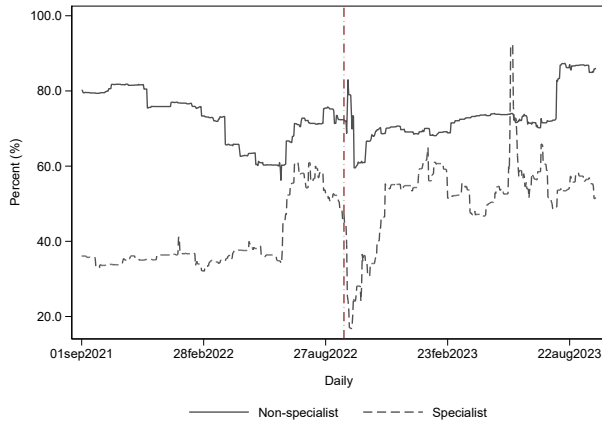
(a) Restriction on maximum number of properties (% of products)
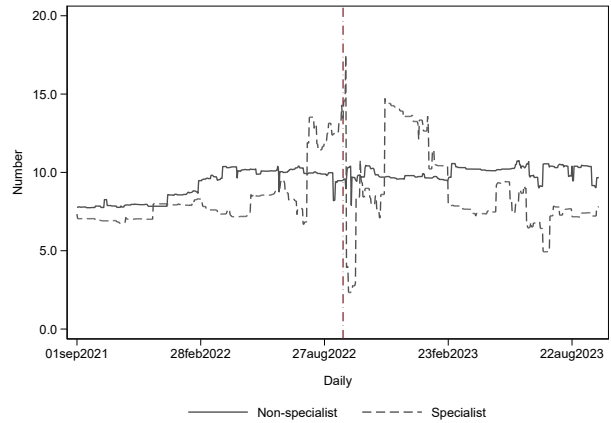
(b) Maximum number of properties, conditional on restriction
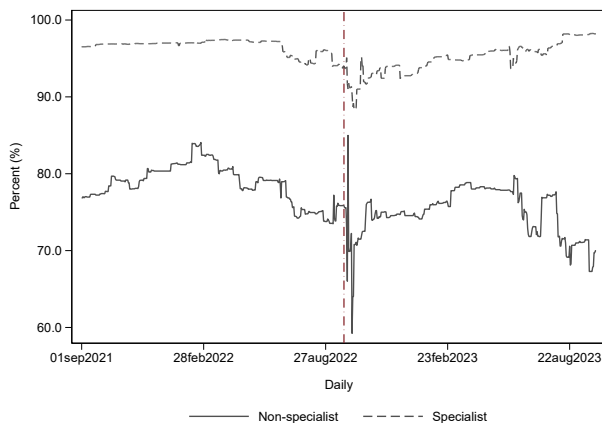
(c) Restriction on maximum advance (% of products)
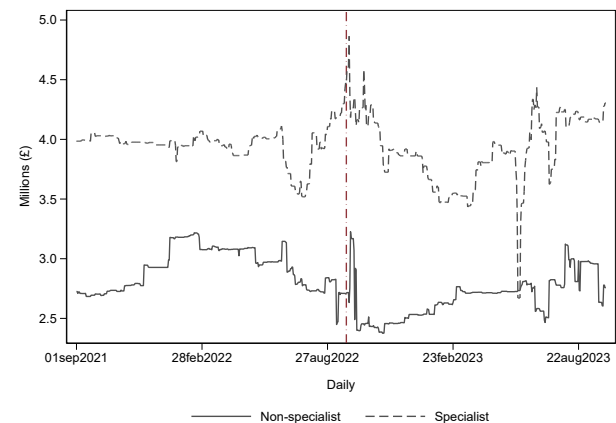
(d) Maximum advance (million £), conditional on restriction

Figure 11: Risk management: maximum number of properties and advance restrictions

Panel (a) reports the fraction of products each day by lender type that impose restriction on maximum number of properties. Panel (b) reports the maximum number of properties, conditional on restriction. Panel (c) reports the fraction of products each day by lender type that impose restriction on maximum advance. Panel (d) reports the maximum advance in million £, conditional on restriction. We require that each day there at least 100 products on offer in each category. The dashed vertical line (maroon) marks 23 September 2022, wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant unfunded reduction in taxation sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a few days.

Table 1: Summary Statistics

This table presents descriptive statistics for the universe of mortgages granted to individual landlords in the United Kingdom from 2018/Q1 to 2023/Q3. The number of originated loans included in the sample is 1,172,223. Annual rental yield is calculated by multiplying monthly rental income by 12 and dividing by property value. Loan-to-value is loan amount divided by property value. Interest rate is the initial interest rate. Fixation term is the initial period during the which the loan interest rate is fixed. Income is other borrower income (other than the rental income). Distance to the rental property is measured from the borrower's home. The number of buy-to-let properties refers to the total number of mortgaged properties that the borrower owns (not only the one for which the loan is originated).

Variable	Mean	Sd	P10	P25	Median	P75	P90
				Panel A: Property			
Rental income (monthly, £)	1054	771	525	650	850	1300	1750
Property value (£)	269,874	243,193	95000	135,000	210,000	335,596	500,000
Rental yield (annual, percent)	5.30	1.51	3.80	4.33	5.00	6.00	7.20
				Panel B: Loan			
Loan amount (£)	154,848	121,732	53313	80565	124,000	198,006	288,000
Loan-to-value (percent)	60.89	16.90	36.74	52.80	65.76	75.00	75.70
Interest rate (basis points)	262.82	102.29	173.00	199.00	234.00	294.00	389.00
Initial loan fee (% of loan amount)	0.88	1.20	0.00	0.04	0.68	1.21	1.96
Fixation term (years)	4.09	2.43	1.95	2.08	4.90	5.06	5.18
Mortgage term (months)	255.58	80.15	144.00	192.00	264.00	300.00	360.00
				Panel C: Borrower			
Age (years)	47.1	11.3	33	38	46	55	63
Annual income (£)	65503	231,633	15000	27005	42561	70145	120,000
Marginal tax rate (percent)	28.1	11.8	20	20	20	40	40
Distance (kilometers)	35.50	80.27	0.29	1.5	5.44	21.10	113.72
Number of buy-to-let properties	3.09	6.13	1.00	1.00	2.00	3.00	6.00

Table 2: Summary statistics by landlord type

This table presents descriptive statistics for the universe of mortgages granted to individual landlords in the United Kingdom from 2018/Q1 to 2023/Q3, by landlord type. Accidental landlords are those who initially bought the rental property to live in or who inherited it (228,127 loans). Intentional landlords acquired the property with the intention of renting it (715,566 loans). Portfolio landlords are intentional landlords who own four or more mortgaged properties (228,530 loans). Interest coverage ratio (ICR) is equal to the ratio of annual rental income to interest payments. The origination (stress) ICR is calculated with the initial (stress tested) loan interest rate.

Variable	Landlord type	Mean	Sd.	P10	P25	Median	P75	P90
				Panel A: Property				
Rental yield	Accidental	4.87	1.14	3.65	4.13	4.71	5.40	6.25
(percent)	Intentional	5.33	1.52	3.82	4.36	5.05	6.00	7.20
	Portfolio	5.62	1.68	3.96	4.52	5.28	6.36	7.76
				Panel B: Loan				
Loan to value	Accidental	57.53	17.99	30.45	48.17	61.23	73.00	75.40
(percent)	Intentional	61.48	16.59	37.82	53.50	66.67	75.00	75.69
	Portfolio	62.38	16.30	40.76	55.80	67.00	75.00	76.12
Interest rate	Accidental	253.26	99.93	169.00	194.00	224.00	274.00	377.00
(basis points)	Intentional	260.22	103.15	172.00	199.00	229.00	285.00	385.00
	Portfolio	280.53	99.81	179.00	209.00	255.00	329.00	404.00
Origination ICR	Accidental	470.68	651.56	204.85	278.06	354.67	470.18	684.19
(basis points)	Intentional	436.55	674.98	207.66	276.35	351.85	455.47	612.24
	Portfolio	439.82	993.21	190.09	256.29	335.29	437.43	593.67
Stressed ICR	Accidental	218.12	344.18	123.90	134.07	152.00	191.41	290.55
(basis points)	Intentional	213.78	458.12	125.00	138.94	157.23	194.38	263.32
	Portfolio	252.65	814.14	138.60	145.08	165.50	206.13	279.37
				Panel C: Borrower				
Age	Accidental	44	10	31	36	42	50	59
(years)	Intentional	47	11	32	38	46	55	62
	Portfolio	51	11	37	44	52	59	65
Income	Accidental	55,836	122,681	12,900	25,030	40,000	64,000	105,117
(£)	Intentional	56,699	216,493	14,016	25,310	39,000	60,309	100,548
	Portfolio	98,428	322,270	22,602	37,690	61,340	104,563	180,453
Distance	Accidental	36.98	84.01	0	0.97	5.20	23.97	118.75
(kilometers)	Intentional	35.30	79.93	0.33	1.45	5.26	20.68	114.25
	Portfolio	34.67	77.66	0.69	2.06	6.16	20.00	107.21
Buy-to-let properties	Accidental	1.42	1.19	1	1	1	2	2
(number)	Intentional	1.73	0.77	1	1	2	2	3
	Portfolio	8.50	11.81	4	4	6	8	13

Table 3: Rental yields over time and in the cross-section

The dependent variable is the annual rental yield calculated by multiplying monthly rent by 12 and dividing by property value. In column 1, we include indicator variables for landlord types, *Portfolio* and *Intentional*. The base case is *Accidental*. In column 2 we control for property characteristics (number of bedrooms and property type). In column 3, we also include local-area (local administrative unit, level 1) fixed effects while in column 4, we add origination quarter fixed effects. In column 5, the empirical specification includes the interactive fixed effects between local area and origination quarter. Lastly, in column 6, we include lender fixed effects The standard errors are clustered at the local administrative unit (level 1) and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent variable:	Rental yield (p.p)					
	(1)	(2)	(3)	(4)	(5)	(6)
Portfolio	0.760***	0.714***	0.402***	0.715***	0.408***	0.381***
	(0.034)	(0.031)	(0.017)	(0.031)	(0.018)	(0.018)
Intentional	0.464***	0.444***	0.261***	0.448***	0.269***	0.260***
	(0.021)	(0.019)	(0.013)	(0.020)	(0.014)	(0.014)
Constant	4.868***	5.002***				
	(0.043)	(0.081)				
Property characteristics		Yes	Yes	Yes	Yes	Yes
Fixed effects:						
Local-area			Yes			
Origination quarter				Yes		
Local-area × quarter					Yes	Yes
Lender						Yes
Adjusted-R^2	0.03	0.06	0.40	0.06	0.41	0.43
Observations	1,176,967	1,154,844	1,154,844	1,154,844	1,154,799	1,154,799

Table 4: Initial loan interest rate

This table examines the relationship between the initial loan interest rate and landlord type. The dependent variable is the initial loan interest rate. In column 1, we include indicator variables for landlord types, *Portfolio* and *Intentional* while in column 2, the empirical specification includes the following property characteristics: number of bedrooms and property type, as controls. Additionally, in column 3, we include local-area (local administrative unit, level 1) fixed effects while in column 4, we add origination quarter fixed effects. In column 5, the empirical specification includes the interactive fixed effects between local area and origination quarter. Lastly, in column 6, we include lender fixed effects All specifications control for leverage by including dummies for loan-to-value ratios. Specifically, we include 3 dummies for (55,65], (65,75], and >75 (omitted category being $\leq$ 55). The standard errors are clustered at the local administrative unit (level 1) and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent variable:	Interest rate (basis points)					
	(1)	(2)	(3)	(4)	(5)	(6)
Portfolio	28.552***	26.919***	22.861***	21.530***	18.779***	2.861***
	(0.787)	(0.679)	(0.581)	(0.440)	(0.394)	(0.250)
Intentional	7.236***	7.802***	5.663***	4.031***	2.532***	0.064
	(0.511)	(0.469)	(0.396)	(0.324)	(0.290)	(0.185)
Constant	252.226***	246.408***				
	(0.578)	(1.039)				
Property characteristics		Yes	Yes	Yes	Yes	Yes
LTV dummies	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects:						
Local-area			Yes			
Origination quarter				Yes		
Local-area × quarter					Yes	Yes
Lender						Yes
Adjusted-R^2	0.01	0.02	0.04	0.55	0.56	0.80
Observations	1,176,967	1,154,844	1,154,844	1,154,844	1,154,799	1,154,799

Table 5: Summary statistics pre- and post-event, by landlord and lender type

Panel A (Panel B) presents summary statistics for loans originated in the 12 months before (12 months after) the event. In each table, we distinguish between loans originated by specialist and non-specialist lenders. The first column reports the number of originated loans to each landlord type. The remaining columns show the averages of several variables. *Interest rate* is the initial loan interest rate; *Stress rate* is the interest rate used in the stress-test done as part of the underwriting; *Loan-to-value* is calculated by dividing loan amount by the property value; *Fixation term* is the initial period of fixed interest rate; *Lender fees* are calculated as a proportion of loan amount; *Interest coverage ratio, origination* is the ratio of rental income to loan interest payments; *Interest coverage ratio, stress* is the ratio of rental income to interest payments calculated using the stress test rate. Panel C shows the differences between pre- and post-event (post- minus pre-).

Landlord type	Number loans	Interest rate (%)	Stress rate (%)	LTV (%)	Fix. term (yrs)	Loan fees (%)	ICR (%)	ICR stress (%)
Panel A.1: Specialist lenders, pre-period								
Accidental	7,398	2.60	4.82	57.4	4.5	1.25	466.0	232.2
Intentional	29,979	2.83	4.81	60.0	5.1	1.35	458.5	248.5
Portfolio	19,845	2.80	4.63	63.8	4.7	1.46	412.7	240.1
Panel A.2: Non-specialist lenders, pre-period								
Accidental	25,582	2.16	4.91	58.7	4.1	0.69	526.6	230.7
Intentional	120,605	2.11	4.97	62.7	4.2	0.74	485.1	212.3
Portfolio	25,707	2.23	4.67	61.7	4.4	0.89	519.7	280.4
Panel B.1: Specialist lenders, post-period								
Accidental	6,749	4.68	5.85	53.6	4.2	1.50	255.3	201.1
Intentional	23,545	4.78	5.74	57.1	5.0	1.67	271.0	218.4
Portfolio	14,053	4.55	5.51	60.8	4.7	1.95	284.8	227.6
Panel B.2: Non-specialist lenders, post-period								
Accidental	17,932	4.30	5.99	53.9	3.8	0.86	302.7	222.4
Intentional	70,488	4.14	6.11	57.3	4.0	0.84	290.3	207.5
Portfolio	14,212	4.28	5.75	57.6	4.1	1.14	293.7	252.3
Panel C.1: Specialist lenders, Δ post-period								
Accidental	-0.09%	2.08	1.03	-3.8	-0.3	0.25	-210.7	-31.1
Intentional	-0.21%	1.94	0.94	-2.9	-0.1	0.31	-187.5	-30.1
Portfolio	-0.29%	1.75	0.89	-3.0	0.0	0.49	-127.8	-12.5
Panel C.2: Non-specialist lenders, Δ post-period								
Accidental	-0.30%	2.14	1.08	-4.7	-0.3	0.17	-223.9	-8.3
Intentional	-0.42%	2.02	1.13	-5.4	-0.2	0.10	-194.7	-4.7
Portfolio	-0.45%	2.04	1.08	-4.2	-0.3	0.25	-226.0	-28.2

Table 6: Changes in loan characteristics by landlord and lender type

This table presents changes in loan characteristics by lender and landlord type around the event. *Specialist* lenders, defined as lenders with above-median share of BTL mortgage origination between January 2018 and December 2019. The columns reports the following characteristics: column 1 reports *Interest rate* defined as the initial loan interest rate; column 2 reports *Stress rate* defined as the interest rate used in the stress-test done as part of the underwriting; column 3 reports *Fixation term* defined as the initial period of fixed interest rate; and column 4 reports *Lender fees* defined as a proportion of loan amount; *Portfolio* and *Intentional* are dummies for the landlord type (*Accidental* is the omitted category). *Post* is an indicator taking the value of one for all mortgages originating after 2022/Q3 wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." The loan-to-value dummies are (55,65], (65,75], and >75 (omitted category being ≤ 55). The property characteristics are property type and number of bedrooms. Local-area dummies are for local administrative unit, level 1. The standard errors are clustered at the local administrative unit (level 1) and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent variable:	Interest rate	Stress Rate	Fix Term	Fee Loan Amt
	(1)	(2)	(3)	(4)
Portfolio × Specialist × Post	-9.384***	-4.243	0.397***	0.305***
	(1.885)	(2.644)	(0.044)	(0.039)
Intentional × Specialist × Post	13.904***	-17.356***	0.445***	0.118***
	(1.590)	(2.275)	(0.039)	(0.034)
Portfolio × Specialist	16.579***	12.050***	-0.311***	-0.093***
	(0.963)	(1.333)	(0.024)	(0.010)
Intentional × Specialist	14.657***	-3.035***	-0.025	0.042***
	(0.833)	(0.602)	(0.028)	(0.009)
Post × Specialist	-12.243***	-22.894***	-0.516***	0.310***
	(1.509)	(1.781)	(0.032)	(0.028)
Post × Portfolio	-21.960***	1.539	-0.162***	0.060***
	(1.127)	(1.552)	(0.025)	(0.018)
Post × Intentional	-14.011***	20.358***	-0.071***	-0.114***
	(0.742)	(1.163)	(0.016)	(0.011)
Portfolio	9.566***	-33.073***	0.484***	0.206***
	(0.332)	(0.528)	(0.012)	(0.005)
Intentional	-0.455**	-4.919***	0.269***	0.114***
	(0.195)	(0.580)	(0.007)	(0.003)
Specialist	37.115***	-4.254***	1.027***	0.321***
	(1.274)	(0.653)	(0.022)	(0.010)
Property characteristics	Yes	Yes	Yes	Yes
LTV dummies	Yes	Yes	Yes	Yes
Fixed effects:				
Local-area	Yes	Yes	Yes	Yes
Origination quarter	Yes	Yes	Yes	Yes
Observations	1,141,654	1,141,654	1,141,654	1,141,654

Table 7: Initial loan interest rate, by lender type

The dependent variable is the initial loan interest rate in basis points. Columns (1) through (3) present estimates for non-specialist lenders, defined as lenders with below-median share of BTL mortgage origination between January 2018 and December 2019 while Columns (4) through (6) present estimates for specialist lenders, defined as lenders with an above-median share of BTL mortgage origination between January 2018 and December 2019. For each lender type, the columns differ in the explanatory variables and set of controls included. *Portfolio* and *Intentional* are dummies for the landlord type (*Accidental* is the omitted category). *Post* is an indicator taking the value of one for all mortgages originating after 2022/Q3 wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." The loan-to-value dummies are (55,65], (65,75], and >75 (omitted category being $\leq$ 55). The property characteristics are property type and number of bedrooms. Local-area dummies are for local administrative unit, level 1. The standard errors are clustered at the local administrative unit (level 1) and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent variable:	Interest rate (basis points)					
Lender type:	Non-specialist			Specialist		
	(1)	(2)	(3)	(4)	(5)	(6)
Portfolio	3.117***	5.292***	4.776***	3.464***	8.001***	5.468***
	(0.333)	(0.360)	(0.328)	(0.317)	(0.317)	(0.291)
Intentional	-0.276	1.057***	0.857***	1.083***	2.758***	2.123***
	(0.207)	(0.193)	(0.177)	(0.294)	(0.308)	(0.282)
Post × Portfolio		-20.913***	-13.059***		-32.869***	-11.678***
		(1.103)	(1.113)		(1.425)	(1.216)
Post × Intentional		-12.750***	-10.547***		-13.494***	-6.681***
		(0.736)	(0.781)		(1.096)	(1.022)
Property characteristics	Yes	Yes	Yes	Yes	Yes	Yes
LTV dummies	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects:						
Local-area × quarter	Yes	Yes	Yes	Yes	Yes	Yes
Lender	Yes	Yes		Yes	Yes	
Lender × quarter			Yes			Yes
Adjusted-R^2	0.74	0.74	0.75	0.83	0.83	0.86
Observations	825,870	825,870	825,869	315,650	315,650	315,642

Table 8: Stress test interest rate and initial fixation period, by lender type

The dependent variables are the stress test loan interest rate (top panel) and initial period of interest rate fixation in years (bottom panel). Columns (1) through (3) ((4) through (6)) are estimated on the sample of non-specialist (specialist) lenders. *Portfolio* and *Intentional* are dummies for the landlord type. *Post* is an indicator taking the value of one for all mortgages originating after 2022/Q3, the event date. The loan-to-value dummies are (55,65], (65,75], and >75 (omitted category being ≤ 55). The property characteristics are property type and number of bedrooms. Local-area dummies are for local administrative unit, level 1. The standard errors are clustered at the local administrative unit (level 1) and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Lender type:	Non-specialist			Specialist		
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Stress test interest rate (basis points)					
Portfolio	-11.090***	-11.106***	-8.927***	-11.935***	-11.505***	-12.346***
	(0.324)	(0.300)	(0.310)	(0.681)	(0.728)	(0.732)
Intentional	-4.647***	-5.455***	-2.299***	-5.856***	-5.682***	-6.125***
	(0.195)	(0.173)	(0.140)	(0.734)	(0.784)	(0.746)
Post × Portfolio		0.183	-3.786***		-3.133*	-7.583***
		(1.402)	(1.355)		(1.785)	(1.614)
Post × Intentional		7.343***	-5.258***		-1.398	-2.460*
		(1.046)	(0.889)		(1.447)	(1.318)
Adjusted-R^2	0.50	0.50	0.60	0.48	0.48	0.53
Dependent variable:	Fixation term (years)					
Portfolio	0.244***	0.262***	0.230***	0.286***	0.250***	0.249***
	(0.009)	(0.009)	(0.009)	(0.017)	(0.019)	(0.019)
Intentional	0.154***	0.164***	0.146***	0.114***	0.117***	0.136***
	(0.006)	(0.006)	(0.006)	(0.014)	(0.015)	(0.014)
Post × Portfolio		-0.173***	0.036		0.249***	0.063*
		(0.024)	(0.027)		(0.037)	(0.033)
Post × Intentional		-0.098***	-0.069***		-0.018	0.070**
		(0.016)	(0.016)		(0.035)	(0.030)
Adjusted-R^2	0.07	0.07	0.17	0.30	0.30	0.33
Property characteristics	Yes	Yes	Yes	Yes	Yes	Yes
LTV dummies	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects:						
Local-area × quarter	Yes	Yes	Yes	Yes	Yes	Yes
Lender	Yes	Yes		Yes	Yes	
Lender × quarter			Yes			Yes
Observations	825,870	825,870	825,869	315,650	315,650	315,642

Table 9: Loan fees, by lender type

The dependent variable is the initial loan fees. Columns (1) through (3) ((4) through (6)) are estimated on the sample of non-specialist (specialist) lenders. *Portfolio* and *Intentional* are dummies for the landlord type. *Post* is an indicator taking the value of one for all mortgages originating after 2022/Q3, the event date. The loan-to-value dummies are (55,65], (65,75], and >75 (omitted category being $\leq$ 55). The property characteristics are property type and number of bedrooms. Local-area dummies are for local administrative unit, level 1. The standard errors are clustered at the local administrative unit (level 1) and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Lender type:	Non-specialist			Specialist		
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Loan fees as a fraction of loan amount					
Portfolio	0.084***	0.075***	0.088***	0.259***	0.213***	0.077***
	(0.005)	(0.005)	(0.005)	(0.009)	(0.008)	(0.008)
Intentional	0.074***	0.076***	0.073***	0.074***	0.073***	0.074***
	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)
Post × Portfolio		0.088***	-0.016		0.314***	0.257***
		(0.017)	(0.016)		(0.034)	(0.035)
Post × Intentional		-0.014	-0.010		0.009	0.122***
		(0.011)	(0.011)		(0.029)	(0.028)
Adjusted-R^2	0.16	0.16	0.18	0.35	0.35	0.43
Property characteristics	Yes	Yes	Yes	Yes	Yes	Yes
LTV dummies	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects:						
Local-area × quarter	Yes	Yes	Yes	Yes	Yes	Yes
Lender	Yes	Yes		Yes	Yes	
Lender × quarter			Yes			Yes
Observations	825,870	825,870	825,869	315,650	315,650	315,642

Internet Appendix For
"Individual Landlords in the Mortgage Market"

A Data description

In this section we report additional details on the data and summary statistics.

Figure IA.A1 plots the time-series evolution of the average loan amount, by landlord type. Loan amounts are on average larger for accidental landlords who also own more expensive properties. This explains why their average LTVs are lower, in spite of the larger loan amounts. Post event there is a decrease in the average loan amount, more significant for accidental than the other landlord types.

Table IA.A1 reports additional summary statistics of borrowers, by landlord type. Portfolio landlords have on average and at the median higher marginal tax rates than the remaining landlord types. They are more likely to make use of interest only loans (9 out of 10), but their fraction is still high among the other landlord types (0.74 for accidental and 0.79 for intentional). As expected, the fraction of loans for house purchase granted to accidental landlords is negligible. Accidental landlords receive on average higher monthly rental income on their properties (£1,145), followed by intentional landlords (£1,035) and portfolio landlords (£1,023). Properties owned by portfolio landlords have on average more bedrooms, but the differences relative to those owned by the other landlord types are small.

Table IA.A2 focuses on a 12 month window around the credit tightening event. Similar to Table 5 It shows that specialist lenders charge higher interest rates than non-specialist lenders, and that within each lender type portfolio landlords pay on average higher interest rates than intentional who in turn pay higher interest rates than accidental. To investigate whether these differences across landlord type within lender type significant, in Table 7 we divide the sample into loans originated by each of these two types of lenders, and estimate the regressions separately for each. Comparing columns (1) and (3), we find that portfolio landlords pay higher interest rate on loans compared to accidental and professional landlords, within both types of lenders.
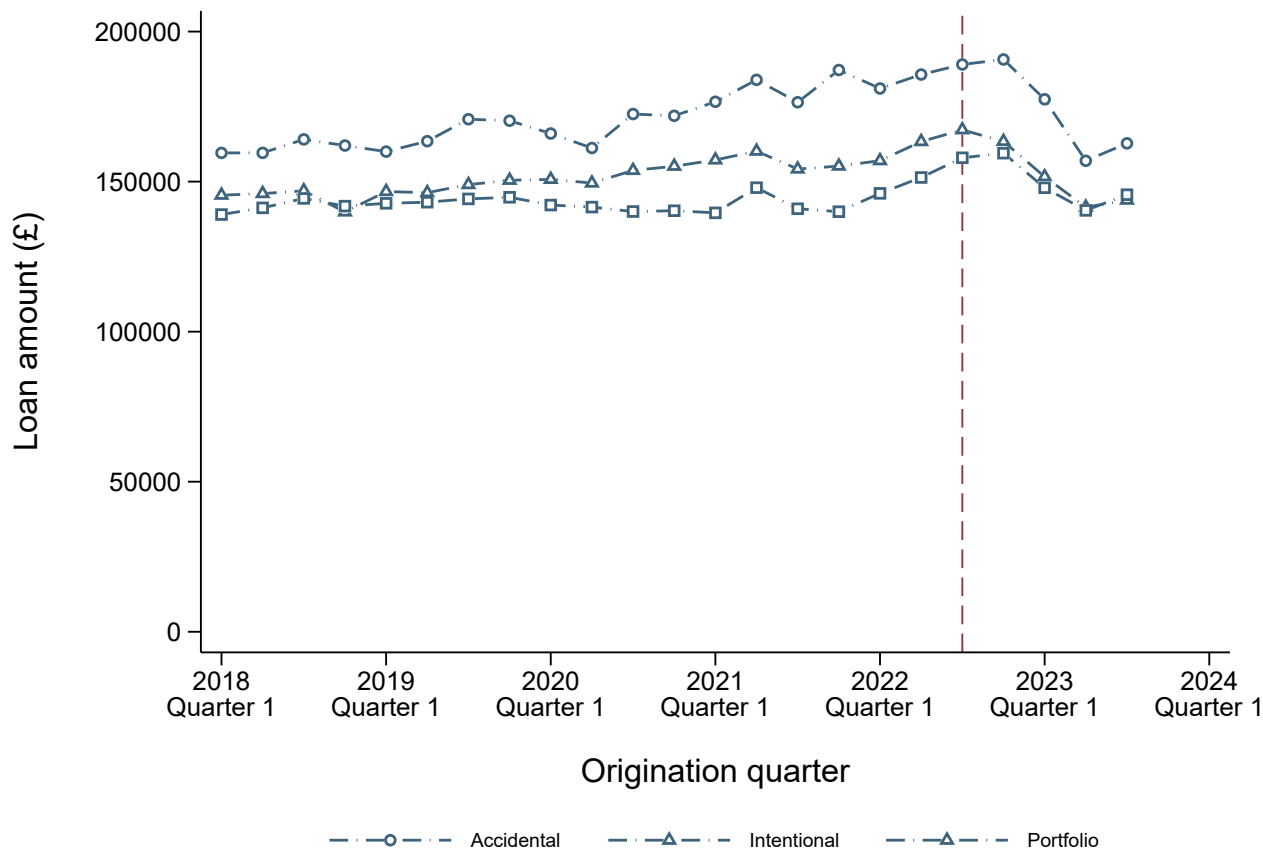
Figure IA.A1: Loan amount by landlord type

The figure shows the time-series evolution of average loan amounts, split by landlord type. Circles represent Accidental landlords, squares represent Portfolio landlords, and triangles represent Professional landlords. The dashed vertical line (maroon) marks Quarter 3 of the fiscal year 2022, wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant reduction in taxation and included other looser set of policies that were largely unfunded, sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a matter a few days.
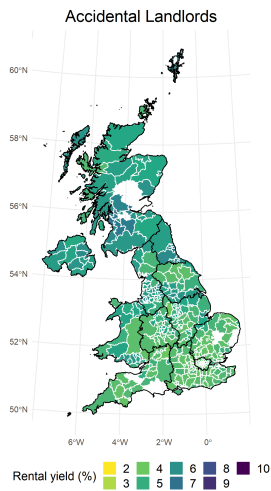
(a) Accidental Landlords
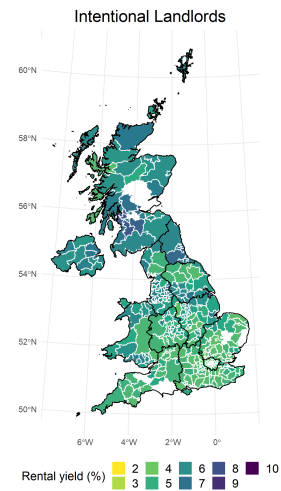
(b) Intentional Landlords
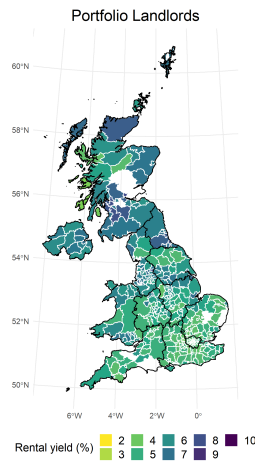
(c) Portfolio Landlords

Figure IA.A2: Average rental yields by location and landlord type

The figure plots the average rental yield of rental properties located within each Local Administrative Unit (LAU, Level 1) and owned by each landlord type. The solid (black) boundaries highlight the NUTS 1 level regions. The regions marked in white indicate no transactions. The sample covers 392 out of a possible 400 LAUs.

Table IA.A1: Summary statistics of borrowers, by landlord type

This table presents descriptive statistics for the universe of mortgages granted to individual landlords in the United Kingdom from 2018/Q1 to 2023/Q3, by landlord type. Accidental landlords are those who initially bought the rental property to live in or who inherited it (228,127 loans). Intentional landlords acquired the property with the intention of renting it (715,566 loans). Portfolio landlords are intentional landlords who own four or more mortgaged properties (228,530 loans). Tax rate is the marginal tax rate at origination. IO loans is the fraction of interest-only loans. Proportion of house purchases is the fraction of buy-to-let mortgages for house purchases. Monthly rental income is the value of expected gross rental income. Number of bedrooms is the number of property bedrooms.

Variable	Landlord type	Mean	Std. dev	P10	P25	Median	P75	P90
Tax rate	Accidental	27.4	11.6	20.0	20.0	20.0	40.0	40.0
(percent)	Intentional	27.6	11.8	20.0	20.0	20.0	40.0	40.0
	Portfolio	31.9	11.7	20.0	20.0	40.0	40.0	45.0
IO loans	Accidental	0.74	0.44	0	0	1	1	1
(fraction)	Intentional	0.79	0.41	0	1	1	1	1
	Portfolio	0.89	0.31	0	1	1	1	1
House purchases	Accidental	0.01	0.09	0	0	0	0	0
(fraction)	Intentional	0.33	0.47	0	0	0	1	1
	Portfolio	0.24	0.43	0	0	0	0	1
Rental income	Accidental	1,145	694	550	700	975	1400	1842
(monthly, £)	Intentional	1,035	758	525	625	850	1250	1700
	Portfolio	1,023	815	500	600	795	1200	1750
Number of	Accidental	2.47	1.02	1	2	2	3	4
bedrooms	Intentional	2.44	1.03	1	2	2	3	3
	Portfolio	2.59	1.44	1	2	2	3	4

Table IA.A2: Summary statistics, by landlord and lender type (±12 months around the event)

Panel A (Panel B) presents summary statistics for Specialist lenders (Non-specialist lenders) in a 12 month around the credit tightening event. The statistics are calculated over the whole sample period. The first column reports the number of originated loans to each landlord type. The remaining columns show the averages of several variables. *Interest rate* is the initial loan interest rate; *Stress rate* is the interest rate used in the stress-test done as part of the underwriting; *Loan-to-value* is calculated by dividing loan amount by the property value; *Fixation term* is the initial period of fixed interest rate; *Lender fees* are calculated as a proportion of loan amount; *Interest coverage ratio, origination* is the ratio of rental income to loan interest payments; *Interest coverage ratio, stress* is the ratio of rental income to interest payments calculated using the stress test rate.

Landlord type	Number loans	Interest rate (%)	Stress rate (%)	LTV (%)	Fix. term (yrs)	Loan fees (%)	ICR (%)	ICR stress (%)
			Panel A: Specialist lenders					
Accidental	14,147	3.59	5.32	55.59	4.38	0.0137	365.5	217.3
Intentional	53,524	3.69	5.22	58.74	5.07	0.0149	376.0	235.3
Portfolio	33,898	3.53	4.99	62.57	4.71	0.0166	359.7	234.9
			Panel B: Non-specialist lenders					
Accidental	43,514	3.04	5.36	56.73	3.95	0.0076	434.3	227.3
Intentional	191,093	2.86	5.39	60.68	4.13	0.0078	413.2	210.5
Portfolio	39,919	2.96	5.05	60.26	4.26	0.0098	439.3	270.4

Table IA.A3: Loan characteristics by lender and landlord type

This table presents loan characteristics by lender and landlord type. *Specialist* lenders, defined as lenders with above-median share of BTL mortgage origination between January 2018 and December 2019. The columns reports the following characteristics: column 1 reports *Interest rate* defined as the initial loan interest rate; column 2 reports *Stress rate* defined as the interest rate used in the stress-test done as part of the underwriting; column 3 reports *Fixation term* defined as the initial period of fixed interest rate; and column 4 reports *Lender fees* defined as a proportion of loan amount; *Portfolio* and *Intentional* are dummies for the landlord type (*Accidental* is the omitted category). The loan-to-value dummies are (55,65], (65,75], and >75 (omitted category being ≤ 55). The property characteristics are property type and number of bedrooms. Local-area dummies are for local administrative unit, level 1. The standard errors are clustered at the local administrative unit (level 1) and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent variable:	Interest rate	Stress Rate	Fix Term	Fee Loan Amt
	(1)	(2)	(3)	(4)
Intentional	-1.903***	-2.343***	0.263***	0.097***
	(0.198)	(0.607)	(0.007)	(0.003)
Portfolio	7.254***	-32.860***	0.468***	0.211***
	(0.325)	(0.557)	(0.012)	(0.005)
Specialist	35.880***	-7.180***	0.965***	0.358***
	(1.195)	(0.629)	(0.021)	(0.009)
Intentional × Specialist	16.131***	-5.426***	0.028	0.062***
	(0.827)	(0.594)	(0.027)	(0.009)
Portfolio × Specialist	14.285***	10.827***	-0.269***	-0.039***
	(0.896)	(1.317)	(0.023)	(0.011)
Property characteristics	Yes	Yes	Yes	Yes
LTV dummies	Yes	Yes	Yes	Yes
Fixed effects:				
Local-area	Yes	Yes	Yes	Yes
Origination quarter	Yes	Yes	Yes	Yes
Observations	1,141,654	1,141,654	1,141,654	1,141,654

B High-street and non-high-street lenders

In the main body of the paper we distinguished between lenders which have high exposure to the buy-to-let mortgage market and those which do not, that we called specialist and non-specialist lenders, respectively. In this section, we show that our results are robust to an alternative classification of lenders between high-street and non-high-street lenders. High-street lender is a term used to designate a mainstream bank that has a high-street branch presence. Of the 57 unique lenders in the BTL origination data, we classify 7 of them into high-street and the remainder into non-high-street. This means that out of the 1.21 million loans originated over the whole sample period, roughly 720 (490) thousand were granted by high-street (non-high-street) lenders.

Table IA.B1 shows summary statistics for the loans granted by each of these two groups of lenders to the different landlord types. A larger fraction of the loans granted by non-high street lenders are to portfolio landlords. The remaining patterns in the table are similar to those emphasized in the main body of the paper when comparing specialist and non-specialist lenders.

Table IA.B2 reports the results for the initial loan interest rate charged by the two groups of lenders to the different landlord types and how it changed post event. Both high-street and non-high-street lenders charge on average higher interest rates to portfolio landlords. However, post event they increased relatively less than those on loans to intentional and to accidental landlords.

Table IA.B3 shows the results for the stress test interest rate and the initial loan fees. Both high-street and non-high-street lenders use on average a lower stress test interest rate for portfolio landlords than other landlord types. However, post event and relative to accidental landlords, high-street lenders increased the stress test interest rate that they use for portfolio landlords whereas non-high-lenders decreased it. Furthermore, non-high-street lenders increased relatively more the initial loan fees that they charge the largest landlords. These patterns are similar to those emphasized in the main body of the paper when comparing specialist and non-specialist lenders.

Finally, Figure IA.B1 plots the number of loan originations by lender type focusing on the year before and the year after the event.
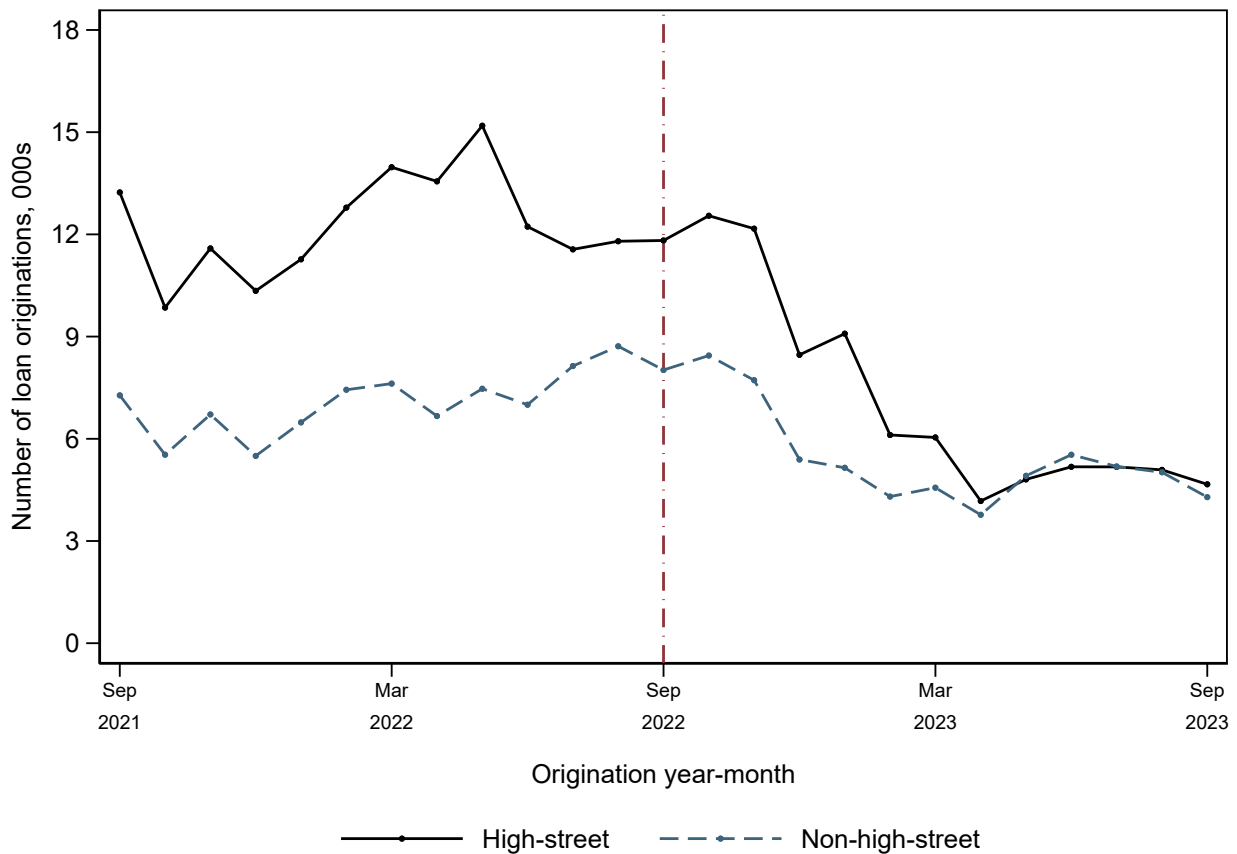
Figure IA.B1: Loan originations by lender type

The solid (dashed) line plots the number of loans originated in each year-month by High-street (Non-high-street) lenders. The dashed vertical line (maroon) marks September 2022, wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." It advocated for a significant unfunded reduction in taxation sparking a strong bond market reaction and dramatically increasing mortgage borrowing costs within a few days.

Table IA.B1: Summary statistics, by landlord and lender type

Panel A (Panel B) presents summary statistics for High-street lenders (Non-high-street lenders). The statistics are calculated over the whole sample period. The first column reports the number of originated loans to each landlord type. The remaining columns show the averages of several variables. *Interest rate* is the initial loan interest rate; *Stress rate* is the interest rate used in the stress-test done as part of the underwriting; *Loan-to-value* is calculated by dividing loan amount by the property value; *Fixation term* is the initial period of fixed interest rate; *Lender fees* are calculated as a proportion of loan amount; *Interest coverage ratio, origination* is the ratio of rental income to loan interest payments; *Interest coverage ratio, stress* is the ratio of rental income to interest payments calculated using the stress test rate.

Landlord type	Number loans	Interest rate (%)	Stress rate (%)	LTV (%)	Fix. term (yrs)	Loan fees (%)	ICR (%)	ICR stress (%)
			Panel A: High-street lenders					
Accidental	139,186	2.37	5.20	57.48	3.51	0.006	502.81	228.91
Intentional	466,840	2.43	5.18	62.17	3.87	0.008	433.70	206.01
Portfolio	112,582	2.51	4.88	62.31	4.01	0.009	454.53	257.00
			Panel B: Non-high-street lenders					
Accidental	95,104	2.75	5.28	57.51	4.23	0.009	425.81	202.40
Intentional	273,077	2.90	5.20	60.37	4.67	0.011	438.49	225.25
Portfolio	121,271	3.07	5.02	62.36	4.71	0.012	427.19	247.69

Table IA.B2: Initial loan interest rate, by lender type

The dependent variable is the initial loan interest rate. Columns (1) through (3) present estimates for High-street lenders while columns (4) through (6) present estimates for Non-high-street lenders. For each lender type, the columns differ in the explanatory variables and set of controls included. *Portfolio* and *Intentional* are dummies for the landlord type (*Accidental* is the omitted category). *Post* is an indicator taking the value of one for all mortgages originating after 2022/Q3 wherein the U.K government under Prime Minister Liz Truss unexpectedly announced a "mini-budget." The loan-to-value dummies are (55,65], (65,75], and >75 (omitted category being ≤ 55). The property characteristics are property type and number of bedrooms. Local-area dummies are for local administrative unit, level 1. The standard errors are clustered at the local administrative unit (level 1) and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent variable:	Interest rate (basis points)					
Lender type:	High-street			Non-high-street		
	(1)	(2)	(3)	(4)	(5)	(6)
Portfolio	4.321***	6.960***	5.907***	1.569***	5.465***	3.939***
	(0.372)	(0.394)	(0.369)	(0.261)	(0.259)	(0.239)
Intentional	-0.245	1.311***	0.823***	0.602***	2.040***	1.880***
	(0.228)	(0.207)	(0.191)	(0.226)	(0.230)	(0.213)
Post × Portfolio		-26.480***	-16.372***		-27.415***	-9.430***
		(1.243)	(1.287)		(1.137)	(1.066)
Post × Intentional		-15.761***	-12.793***		-10.928***	-5.943***
		(0.819)	(0.842)		(0.832)	(0.827)
Property characteristics	Yes	Yes	Yes	Yes	Yes	Yes
LTV dummies	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects:						
Local-area × quarter	Yes	Yes	Yes	Yes	Yes	Yes
Lender	Yes	Yes		Yes	Yes	
Lender × quarter			Yes			Yes
Adjusted-R^2	0.75	0.75	0.76	0.82	0.82	0.85
Observations	689,188	689,188	689,188	465,433	465,433	465,421

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Table IA.B3: Stress tested interest rate and loan fees, by lender type

The dependent variables are the stress tested loan interest rate (top panel) and initial loan fees (bottom panel). Columns (1) through (3) ((4) through (6)) are estimated on the sample of High-street (Non-high-street) lenders. *Portfolio* and *Intentional* are dummies for the landlord type. *Post* is an indicator taking the value of one for all mortgages originating after 2022/Q3, the event date. The loan-to-value dummies are (55,65], (65,75], and >75 (omitted category being ≤ 55). The property characteristics are property type and number of bedrooms. Local-area dummies are for local administrative unit, level 1. The standard errors are clustered at the local administrative unit (level 1) and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Lender type:	High-street			Non-high-street		
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Stress tested interest rate (basis points)					
Portfolio	-9.515***	-10.374***	-8.774***	-14.537***	-13.340***	-11.703***
	(0.428)	(0.423)	(0.400)	(0.591)	(0.634)	(0.580)
Intentional	-4.788***	-5.847***	-2.187***	-6.060***	-5.745***	-5.104***
	(0.188)	(0.178)	(0.167)	(0.558)	(0.618)	(0.539)
Post × Portfolio		8.719***	3.650**		-8.322***	-13.282***
		(1.614)	(1.546)		(1.497)	(1.352)
Post × Intentional		10.245***	-3.006***		-2.393*	-4.814***
		(1.279)	(0.886)		(1.225)	(1.049)
Adjusted-R^2	0.50	0.50	0.61	0.47	0.47	0.55
Dependent variable:	Loan fees as a fraction of loan amount					
Portfolio	0.057***	0.049***	0.065***	0.246***	0.203***	0.111***
	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.006)
Intentional	0.053***	0.057***	0.051***	0.096***	0.095***	0.103***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)
Post × Portfolio		0.088***	-0.039**		0.292***	0.159***
		(0.018)	(0.017)		(0.025)	(0.026)
Post × Intentional		-0.032**	-0.003		0.012	0.047**
		(0.013)	(0.013)		(0.018)	(0.018)
Adjusted-R^2	0.18	0.18	0.20	0.32	0.32	0.39
Property characteristics	Yes	Yes	Yes	Yes	Yes	Yes
LTV dummies	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects:						
Local-area × quarter	Yes	Yes	Yes	Yes	Yes	Yes
Lender	Yes	Yes		Yes	Yes	
Lender × quarter			Yes			Yes
Observations	689,188	689,188	689,188	465,433	465,433	465,421