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***Project Title: Effects of interest rate volatility on mortgage lending
and housing affordability in the UK.***

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Executive Summary

This research paper will look at the effect of Bank of England (BoE) interest rate changes and rate volatility on mortgage lending and housing affordability in the United Kingdom over the period of 2016-2025. The study employs secondary data available in the official channels. This can be found on the BoE, FCA/MLAR, UK Finance, the Office for National Statistics (ONS), HM Land Registry, and the Department for Levelling Up, Housing and Communities (DLUHC). It will be analysed using R. It will use error-correction and ARDL models of pass-through, fixed-effects panel regressions of lending outcomes and affordability, and Interrupted Time Series or Difference-in-Differences of major policy events. The study will generate policy-inducible evidence on the policy rate to the mortgage pricing, regional affordability, and arrears that will ensue. It will enlighten communication by the central bank, risk management by lenders and safeguarding consumers.

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Introduction

The UK interest rates have been in a long-run low-rate regime context since the end of 2021 and shifted to a high rate of tightening. This change has increased the cost of borrowing among households and altered risk and return trade-offs between lenders (Carlin and Soskice, 2015). The uncertainty has been enhanced by volatility in the policy rate. It may influence the speed with which lenders change prices, the kind of products they provide and the timing of new borrowing or refinancing by the borrowers. Meanwhile, families have a cost-of-living squeezer. Affordability of housing has emerged as a major issue of concern to both the policy makers and the ordinary people (Baqutayan, 2016).

These circumstances provide significant practical interests. First, mortgage prices react to both the policy rate level and uncertainty at future levels. Second, there can be distracting changes in lending approvals and product mix in which the lenders balance pipeline risk and funding cost. Third, the metrics of affordability have movement according to monthly repayments, growth in income, and prices of houses. Fourth, arrears and possessions are a risk when there is an increase in payment rates and growth ceases. Regional disparities could increase as there is a variation in income levels, prices, and the availability of goods across the UK (Šedivý and Janský, 2025).

Pass-through of policy rate to lending rate has been heavily covered in both the academic literature and the policy literature. But most of the studies focus not on volatility but on rate levels. On approvals, product choice, and the regional profile of affordability, there is less systematic evidence on the actual effect of volatility alone on the activity. Recent and more current (2021 and beyond) evidence, which incorporates the recent policy and market events, and the 2023 Mortgage Charter, is needed, too.

That gap is addressed in the dissertation. It is centred on volatility and levels. It defines affordability on a regional level. It analyses arrears and refinancing behaviour, taking into account the recent responses of the policy. The approved ethics form is entirely consistent with the project. It is a computer-based research utilising aggregate, publicly available information. The personal information is not gathered. All analyses will be done in R using transparent and reproducible analysis.

Aim, Objectives & Research Questions

Aim

To investigate the impacts of the changes and fluctuations in the interest rates set by the Bank of England on the lending patterns of mortgages, the cost of repayments, and the overall affordability of housing across various UK regions. This will be done by collecting and analysing secondary data sources within the period from 2016 to 2025.

Objectives

- i. To understand the historical trends of the Bank of England interest rate movement and its transmission to mortgage pricing.
- ii. To measure the impacts of the volatility of interest rates on the approval of mortgages, the product mix of mortgages, and the affordability of borrowers.
- iii. To investigate regional differences in housing affordability due to changes in interest rates.
- iv. To evaluate how the rate changes have affected the level of arrears and refinancing of mortgage lending from secondary data.
- v. To investigate policies, measures, and regulatory interventions put in place to mitigate or amplify the impact of interest rate swings on borrowers.

Research Questions

- What is the speed and completeness with which changes in policy-rate filter down to new mortgage rates and reversion rates?
- Is volatile rate volatility less approvals or lower product mix?
- What are the most worsening areas of affordability, and why?
- What are the responses of arrears and remortgaging to the level and volatility of rates?
- Did the Mortgage Charter 2023 have any significant impact on these relationships?

Indicative Hypotheses

H1: Pass-through is not symmetric, and it is higher in increasing rates.

H2: Fluctuations discourage approvals and push the demand towards longer fixes.

H3: Reducing payment-to-income is greater in lower-income regions.

H4: Mortgage Charter decelerates the growth of arrears.

Literature Review

Mortgage markets and monetary transmission

The policy rate transmission to household borrowing is achieved in terms of bank funding costs, swap curve and competition. The mortgage markets of the UK have a high proportion of fixed-rate products with standard maturity of two and five years, and revert to Standard Variable Rates (SVR) (Lustig, 2016). Pass-through to new-business rates may take place quickly when there is a change in wholesale benchmarks. The slower adjustments of the institutions can be incorporated in the form of reversion rates (Gibbard, Grubb and Wesselbaum, 2025). Spreads to government bond yields reflect risk premia and correlations in the liquidity effects. The literature reveals that the level and slope of the yield curve are important with regard to pricing incentives and refinancing incentives.

Volatility channels and uncertainty

Volatility poses the risk of planning to borrowers and risks of pipeline to lenders. When the future rates are uncertain, households can postpone refinancing or increase the length of fixation (Ndou, Gumata and Ncube, 2018). Spreads can be widened or product menus changed by lenders to hedge the margins. Greater volatility may decrease the risk-taking propensity and reduce the availability of credit, at the same level of rates. The value of waiting, which influences how and when to use applications and product decisions, can also be changed by volatility (Stanhouse and Stock, 2004).

Measures of affordability and distributional impacts

Affordability has a number of dimensions. Payment-to-income (PTI) is the ratio of monthly payments on a mortgage against income. Price-to-income measures the cost of houses to annual income. The deposit-to-income indicator represents down-payment requirements. These indicators are reactive to rates, earnings, and prices of houses. Distributional effects are due to variations in consumption of income and price levels across regions (Šedivý and Janský, 2025b). There are two possible results from lower house prices: low-income areas can experience greater growth in PTI as the rates increase, due to weak income growth, despite the low house prices.

Arrears and forbearance

The dynamics of the arrears are based on the payment burdens, the employment, and the lender policies. The tools of forbearance and sector-wide agreements can delay the increase in arrears at the time of stress. The Mortgage Charter of 2023 was meant to help borrowers who were experiencing refix shocks. Its effectiveness is yet to be developed and needs the help of empirical tests.

UK policy context

Mortgage Market Review (MMR) put in place stress testing and affordability checks. Stressed interest rates are used by the lenders when evaluating the resilience. Market practices and guidance have been changed (Nield, 2015). The most recent combined action is the Mortgage Charter. This policy situation determines supply and demand.

Synthesis

The theoretical model interconnects the rate level, volatility, and mortgage pricing. Approvals and product mix take their origin in pricing. The latter, in turn, impacts the affordability. Both payment burdens and policy support lead to arrears and refinancing. These relationships are smoothed by income, inflation and conditions of supply. This chain encourages the model decisions in the methodology.

Data & Variables

Design

The research employs the secondary data on monthly and quarterly data from 2016 to 2025. It covers the UK overall and NUTS1 regions, where possible.

Core sources

Bank of England (Bank Rate: Quoted mortgage rates: Money and Credit approvals) FCA/MLAR (mix and arrears of product). UK Finance (arras and possessions). HM Land Registry and ONS (UK House Price Index). ONS (CPIH and ASHE earnings). DLUHC (completions and supply of housing).

Key constructs

- Policy rate level (r_t). The monthly policy rate is the Bank Rate.
- Rate volatility. Calculation of rolling 3-month and 6-month standard deviation of monthly rate changes (σ). The GARCH(1,1) model of σ^2_t that gives us another measure of volatility.
- Mortgage pricing. Two and five-year LTV-band and SVR fixed rates for new business. Isolate risk premia by using spreads versus two and five-year gilt yields.
- Lending outcomes. Approvals for mortgages to buy and remortgage houses. Product shares by fixation length and LTV. Remortgage share in proxy of refinancing.

- Affordability metrics. PTI is the annual payment of the annuities of the members based on the rate and the price of the region, expressed in median monthly payment. Price to income and deposit to income are complements to PTI.
- Arrears. Arrears rate or counts, and also, possession data.
- Controls. CPIH, wage growth, unemployment and housing completions.

Data management

It will be organised into a straightforward folder structure where there will be data_raw, data_clean, code, and outputs. Checksums, source URLs and the retrieval date will be logged using R scripts. Changes will be tracked by the version control. Sources, units and transformations are going to be documented in a data dictionary (Weidmann, 2023).

Methodology

Approach

The research is ex-post and quantitative. All analyses will be in R. The process of work will be repeatable and reported. The sequence is based on the description, the identification, the estimation and the validation (Inchausti, 2023).

Pass-through to pricing (Objective 1)

In order to gauge the short and long-run pass-through of policy rate to mortgage price, I will incorporate an Error-Correction Model (ECM) or the ARDL framework (Beenstock and Felsenstein, 2019). The ECM form is:

$$\Delta mt = \alpha + \sum \phi_i \Delta rt - i + \lambda (mt - 1 - \beta_0 - \beta_1 rt - 1) + \varepsilon_t$$

In this case, m is the mortgage rate or spread, and r is the policy rate. The differenced terms are short-run effects. The error-correction term is the measure of the rapidity of adjusting to the long-run relationship. I will also estimate an asymmetric ECM to determine whether pass-through is different on rate rises and cuts.

Outcomes of volatility and lending (Objective 2)

I will employ two-way fixed-effects panel models at the level of the region-month to conduct a study of approvals and product mix. The volatility measure, the policy rate and controls are all explanatory variables. I will control the cross-sectional dependence and serial correlation

through Driscoll-Kraay standard errors. This will determine the relationship between volatility and lending behaviour, controlling for region and month fixed effects.

Regional affordability (Objective 3)

I will build PTI, price-to-income and deposit-to-income by region. I will approximate panel fixed-effects estimates, which associate such measures with rate level, volatility, and controls. I shall incorporate the interactions using volatility and income quartiles to test the effects on distributions.

Refinancing and arrears (Objective 4)

In time-series settings, Arrears counts or rates with ARDL in count outcomes with GLM/Negative Binomial. I shall also employ local projections to follow the dynamic response of rate shocks or volatility shocks identified. An analysis of remortgage volumes will be a measure of refinancing behaviour.

Evaluation of the policy (Objective 5)

Interrupted Time Series models will be used to test structural changes by Mortgage Charter (August 2023) with the help of Interrupted Time Series. I will use Difference-in-Differences where an appropriate comparison can be made. It is aimed at identifying the change in the level or slope in arrears, approvals, or refinancing associated with the policy.

Diagnostics and robustness

The tests that I will employ will be stationarity (ADF/KPSS), cointegration (Johansen, where applicable), and classical problems such as heteroskedasticity, serial correlation, and multicollinearity. His/her sub-sample analysis will exclude pandemic spikes. I will use different volatility windows and alternate the HPI source to test the sensitivity. The outcomes will contain effect sizes and confidence intervals.

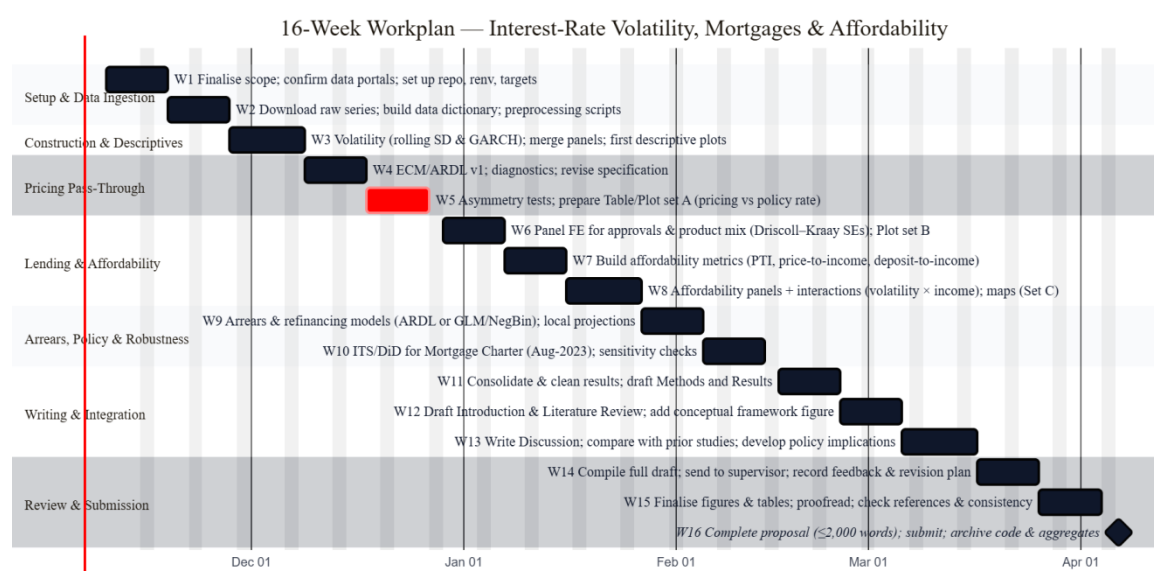
Software

The R packages will consist of tidyverse to handle data, fixest and plm to handle panel models, dynlm to handle ECM/ARDL, rugarch to handle volatility, timeseries helpful tidyverse packages (tsibble and feasts), and validate packages (sandwich and lmtest). Reproducibility will be aided with the help of the targets and renv packages.

Expected Outputs

The project will deliver empirical tables and figures that will be usable by policy teams and practitioners. Table formats will entail long- and short-run pass-through estimates, panel fixed-effects estimates on Mortgage Charter approvals and affordability, as well as ITS or DiD results on Mortgage Charter. It will consist of a timeline of rates of policies and important events, price of mortgage with the policy rate and volatility index, PTI in regions, trends in approvals and product mix and trend in arrears. I will also draft a brief policy note (two to three pages) that encapsulates major results, their analysis and recommendations to the BoE, the FCA, lenders and housing stakeholders. The end product will consist of processed and summarised data and a complete R code base.

Workplan & Timeline



Conclusion

The proposal is a focused and workable study and employs the high quality UK data and conventional econometric tests to address a policy question in time. As it breaks down into both rate levels and volatility, it closes another evidence gap and enables optimal decision-making by NKs, regulators, and lenders. The design is scientific, replicable, and consistent to the university standards. The intended deliverables are efficient and feasible. The quality assurance and on-time delivery is facilitated by the help of the week-by-week plan.

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