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Title Dissertation:

Bricks, Mortar, and Macroeconomics: Dissecting the Drivers of UK Housing Affordability

by

Mohammed Omar

Student ID: P2436151

Supervisor: Babar Syed

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**Declaration**

I, Mohammed Omar, declare that this dissertation is my own work, conducted under the supervision of Babar Syed. All sources used or referred to in this dissertation have been properly acknowledged and cited. Any assistance received in preparing this dissertation has been acknowledged in the acknowledgments section.

I understand that any form of plagiarism, including the unacknowledged use of another author’s work, is a serious academic offense and may result in disciplinary action by the university.

Signature: Mohammed Omar

Date: 10/06/2025

**Acknowledgements**

First and foremost, all praise and thanks belong to **Allah (God)** for granting me the strength, patience, and resilience to complete this dissertation. This dissertation is not just a piece of academic work; it is a product of deep personal struggle, perseverance, and constant reliance on His mercy. Without His guidance, none of this would have been possible. He placed moments of clarity amidst the chaos, and ease after hardship, exactly when I needed it most. Every word written, every barrier overcome, every bit of resilience I showed, it was by His will. And I pray that this work, however imperfect, is accepted as a small act done sincerely for His sake.

I would like to sincerely thank my supervisor, **Dr. Babar Syed**, for his consistent support, constructive feedback, and invaluable insights throughout the research process. His expertise helped shape the direction and depth of this study.

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Last, but not least, to **Myeda**, thank you for being a constant source of inspiration, calm, and belief. I could not have done this dissertation without your ongoing support. Your encouragement meant more than you know, and I will be forever in your debt.

Bricks, Mortar, and Macroeconomics: Dissecting the Drivers of UK Housing Affordability

**1.1 Background and Context**

The housing market plays a key part in forming a country’s economic and social structure. Recently, homeownership has become an investment, rather than a necessity. The UK’s house prices have risen drastically over the last two decades, ahead of wage growth and inflation. According to *North, A. (2023),* the average house price increased by roughly 93% over 18 years. As such, concerns about affordability and sustainability become urgent, requiring policy attention.

According to *Lewis, R. and Christiansen, K. (2019),* between 2007 and 2017, households buying with a mortgage declined from 37% to 28%, a 9% decrease over 10 years. Simultaneously, households renting privately increased from 13% to 20%, a 7% rise. This highlights a growing affordability gap, and households resort to renting instead. Policymakers must understand why this has happened and should make informed decisions for the future.

Policymakers focus on demand-side pressure, such as income and interest rates. However, these factors do not fully explain the issues in homeownership and unaffordability. Therefore, supply-side variables such as construction costs must be taken into consideration. The affordability crisis is driven by supply and demand-side constraints, making it a complex problem. This raises the question of why countries like Germany, Italy, and Sweden, which share similar macroeconomic trends to the UK, do not experience the same degree of housing inflation.

**1.2 Research Problem**

With house prices rising and affordability decreasing, homeownership in the UK has become increasingly difficult. While existing studies support the claims of this dissertation, they often overlook supply-side determinants in their analysis. Instead, they focus on macroeconomic indicators which risks oversimplifying a deeply rooted systemic issue.

Studies like *Whitehead, C. (2022)* investigate housing affordability focusing on economic factors but do not analyse supply-side factors in depth*. Hilber, C.A.L. & Vermeulen, W. (2016)* who emphasise supply-side constraints but do not delve into demand-side factors*. Barker, K. (2004)* who includes supply-side factors and policy implications, but lacks econometric analysis*,* and *Cheshire, P., Hilber, C.A.L. & Koster, H.R.A. (2018)* who do not include a cross-country analysis,have incorporated similar ideas to this dissertation, but includes them in isolation.

This dissertation bridges these gaps by integrating both supply and demand-side variables, examining short and long-run drivers, and incorporating a cross-country comparison through data-driven analysis. By doing this, practical policy recommendations can be suggested based on empirical evidence found.

**1.3 Objectives of the Study**

This dissertation explores which macroeconomic and supply-side variables impact UK house prices the most. It examines short-run fluctuations and long-run trends that contribute to issues within the housing market using econometric analyses such as time-series techniques, VAR analysis, regression models, and elasticity estimation using data gathered from various reputable sources.

Additionally, this study will include cross-country comparisons to find whether the UK’s housing affordability crisis is primarily domestic or part of an international trend. To support the analyses and comparisons, academic literature and statistical data will be used. These research objectives aim to contribute to academic literature and practical housing policy by identifying causes of long-term unaffordability.

**1.4 Research Questions**

This study is guided by four main research questions:

1. What are the main economic and supply-side determinants of house prices in the UK?
2. How do economic and supply-side drivers behave in the short-run and in the long-run?
3. Do supply-side variables influence affordability in the UK?
4. How does the UK housing affordability compare with other developed countries including Germany, Sweden, Italy, USA, Canada, and Australia?

Through these research questions, the study can define what the affordability crisis is, which variables affect house prices the most, how these drivers behave at different lags, if supply-side variables influence affordability trends, and how the UK housing market compares with other countries. Furthermore, by incorporating supply-side variables and a cross-country analysis, this study bridges gaps found in existing literature.

Upon answering these questions, suitable recommendations can be made to ease the housing affordability crisis. These questions will be answered through econometric analyses using data gathered from official national/international agencies, visualisations, existing literature, and international policy. Including economic theory like elasticity to show responsiveness of housing supply to rising demand, human capital theory to understand if the affordability issue reflects deeper structural barriers like upskilling and access to high-paying sectors, and market failure to advise policymakers accordingly based on past precedents of market failure and how best to avoid it.

**1.5 Structure of the Dissertation**

This dissertation is structured into five main chapters:

1. Chapter 1 – Introduction: Outlines the context, research problem, research objectives, and research questions.
2. Chapter 2 – Methodology: Explains the research design, data collection and analysis techniques, and ethical considerations.
3. Chapter 3 – Data Analysis and Findings: Presents econometric results, interprets trends, and compares cross-country data.
4. Chapter 4 – Conclusion and Policy Recommendations: Summarises findings, discusses policy implications, and suggests areas for further research.

**2.0 Research Methodology**

**2.1 Research Design**

This chapter entails the research design based on the “research onion” framework proposed by *Saunders, M.N., Lewis, P. and Thornhill, A. (2023)*. This model helps to explain the rationale behind methodological decisions, including the research philosophy, approach, strategy, and time horizon.

**2.1.1 Research Philosophy**

This study adopts a pragmatic research philosophy. This means real-world application is prioritised over other philosophies like positivism which tests research hypotheses through observed and measurable data, and interpretivism which using qualitative insights focuses on understanding subjective meanings and social constructs.

This pragmatic philosophy supports a blend of data-driven insights and policy relevance, making it suitable for the aims of this research. As *Creswell, J. and Creswell, D. (2018)* explains, positivism was not chosen due to its rigidity for policy driven research, and interpretivism was not chosen as it lacks the quantitative depth needed for the chosen analysis.

This decision aligns with *Bramley, G. (2013)* who applied quantitative modelling of housing affordability using econometric methods similar to this dissertation.

**2.1.2 Research Approach**

A deductive approach was applied, where hypotheses are derived from existing economic theories, and then tested against empirical data. For example, supply and demand suggests that increasing housing supply while demand remains stable, house prices should decrease, thus improving affordability. This is supported by *Glaeser, E. and Gyourko, J. (2008)* and can be tested using a deductive approach. This approach is commonly used in housing market analyses, such as *Hilber, C.A.L. & Vermeulen, W. (2016),* where the relationship between planning constraints and house price growth is tested using measurable economic indicators.

An inductive approach was rejected as the objective is to test existing theories, rather than building a new theory. Due to involving data-driven methodologies, an abductive approach was also rejected as it often used in qualitative exploratory research. This aligns with *Saunders, M.N., Lewis, P. and Thornhill, A. (2023),* who explains a deductive approach is recommended for studies that test hypotheses through quantitative analysis, like the structure of this dissertation.

**2.1.3 Research Strategy**

A quantitative strategy is employed, using econometric models to test relationships between house prices and various macroeconomic and supply-side indicators. This strategy is effective when working with secondary datasets such as time-series and has been used in related housing affordability research such as *Glaeser, E. and Gyourko, J. (2008).* The chosen strategy allows for objective comparisons, finding statistically significant variables, and making data-driven conclusions, these are directly pertinent to this dissertation. Due to the nature of the research questions, which rely on measurable variables rather than interpretive or experimental data, qualitative or mixed-method strategies were rejected.

However, a limitation of a purely quantitative strategy is that it may overlook social or behavioural factors that influence the housing market. For example, cultural views towards homeownership. While the quantitative data tells a detailed story, the qualitative aspect, if included, may have been able to tell the entire story.

**2.1.4 Time Horizon**

A longitudinal time horizon was selected due to the data covering a period of 22 years. This was done to identify both short-run and long-run trends while taking economic cycles, housing policy, and shifts in affordability into account. Housing markets evolve over time, thus making a longitudinal time horizon most appropriate.

A cross-sectional time horizon would not have been applicable due to its limitation in studying change over time as its purpose is to study a phenomenon at a particular moment.

**2.1.5 Methodological Justification**

The chosen methodology is as follows:

* Pragmatic
* Deductive
* Quantitative
* Longitudinal

This methodology is best suited to this dissertation due to the research questions in section 1 relying on econometric testing on various variables over a 22-year time frame. It allows for an investigation into the drivers of affordability, while enabling a cross-country comparison to conclude if affordability is a domestic issue, or part of an international trend. Ultimately, this methodology encourages data-driven empirical conclusions, which can be used to guide policymakers.

However, a drawback of this methodology is that it does not encourage qualitative data such as stakeholder perspectives and housing narratives, which may provide valuable context for affordability dynamics that quantitative data may not capture.

**2.2 Data Collection**

**2.2.1 Data Type and Source Selection**

This study uses secondary, quantitative data gathered from official national and international sources to ensure reliability and consistency. UK data from 2000-2022 is sourced from the Office of National Statistics (ONS), Bank of England, FRED, and UK government housing databases. The variables gathered can be found in figure 1A in the appendices. It includes every variable used, if the data was interpolated, and an additional note. A total of 92 data points per variable, across 9 variables for the UK, and 6 for other countries were gathered. The econometric analysis was conducted using this data, where some variables such as bank rate and GDP per capita needed interpolation to meet the format of the other variables.

**2.2.2 Cross-Country Data**

Comparative data was gathered from OECD, FRED, Eurostat, and World Bank for the following countries: Germany, Italy, Sweden, USA, Canada, and Australia. These sources offered consistent data in the correct format for each indicator across all 6 nations. To keep some analyses consistent with the UK and other countries, only demand-side data was gathered. They included: house price index (HPI), bank rate, unemployment rate, income, GDP per capita, and household debt.

**2.2.3 Justification for Secondary Data & Ethical Considerations**

Using secondary data is time-efficient and cost-effective while maintaining ethical integrity. It allows for longitudinal analysis and large-scale cross-country comparisons, both integral to this dissertation. All data used was sourced from publicly available and reputable databases. No personal or sensitive information was accessed, and all data usage followed academic integrity guidelines including citations. Most of the cross-country data was handled, cleaned, and tested on Microsoft Excel. Meanwhile, most of the UK data was tested on RStudio for more robust methodologies and results.

**2.2.4 Analytical Techniques**

This study uses various econometric techniques to assess the relationship between macroeconomic indicators and house prices (represented as HPI). Time-series methods such as linear regression, and vector autoregression (VAR), were used to explore both short-run and long-run trends. Figure 2A is a table highlighting each technique, the type of analysis it was, where it was conducted, and why it was conducted.

RStudio was used for the UK analysis to allow for lag analysis and dynamic interactions between variables. For cross-country analysis, simpler techniques like descriptive statistics and linear regression were used to identify shared trends and outliers.

**2.2.5 Justification for Analytical Techniques**

The selected methods were used due to their wide application in housing market research (e.g., *Hilber, C.A.L. & Vermeulen, W. 2016 and Bramley, G. 2013)* and their ability to produce policy relevant results. They allow hypothesis testing and forecasting, making them suitable for a data-driven study.

Each technique served its own purpose as they were carefully thought out beforehand, the purposes are as follows:

* Descriptive statistics – provide a foundational understanding of the data and help summarise trends across countries.
* Linear regression – quantify the effect of independent variables such as income and bank rates on house prices (HPI).
* Elasticity calculations – show how responsive house prices were to changes in key variables like supply, demand, and interest rate. Essential to understand short-run vs long-run impacts.
* Vector autoregression (VAR) – assesses whether changes in one variable causes delayed effects in another using lag effects.

**3.0 Findings and Discussion**

**3.1 Introduction**

Using national and international data from 2000-2022, through the lenses of theory, descriptive insights, and econometric modelling, this section aims to evaluate UK housing market dynamics.

The first stage of this data analysis begins with descriptive statistics and time-series trends to establish patterns across macroeconomic variables such as income, bank rate, GDP, and housing supply. This is supported through statistical validity tests such as ADF and KPSS to confirm stationarity for further modelling.

Inferential analysis then applies multiple econometric technique. Beginning with Ordinary Least Squares (OLS) regression to identify statistically significant relationships between variables and house prices. Followed by elasticity estimation to quantify housing affordability responsiveness. Then Vector Autoregression (VAR) and Forecast Error Variance Decomposition (FEVD) to explore dynamic interactions among variables. Finally, Granger Causality tests to clarify which indicators act as leading predictors of house price changes.

Literature, theory, and visuals are used to support findings. Where appropriate, limitations of methods are acknowledged, and cross-country comparisons are made to place the UK’s housing affordability challenge in a global context.

The analysis proceeds in three sections:

1. **3.2** details descriptive statistics, validity tests, and initial observations.
2. **3.3** presents econometric modelling results and their theoretical implications.
3. Finally, the discussion concludes by tying key insights back to the central research questions.

**3.2 Preliminary Analysis and Descriptive Statistics**

To conduct inferential modelling correctly, a series of descriptive and diagnostic tests were conducted to assess data quality, establish underlying patterns, collinearity, and justify the econometric strategy. This section presents initial insights, highlight macroeconomic trends across counties, and set foundations of statistical validity.

**3.2.1 Stationarity and Validity Testing**

Both Augmented Dickey-Fuller (ADF) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests were used to identify each variables statistical properties. The ADF test checks for unit root (stationarity), while the KPSS tests the null hypothesis of stationarity. Together, they provide complementary assessments.

Most indicators were non-stationary in levels but became stationary after first differencing which was done on RStudio to all variables that failed the ADF of KPSS test at 5% significance level. The transformation is as follows:

This removes trends and stabilises the mean across time which is essential for time-series models as using non-stationary data risks producing spurious regression results, where apparent relationships are driven by shared trends, not true causality. Failing to address non-stationarity would violate Gauss-Markov assumptions and risk invalid regression coefficients. This was the case from preliminary regression analysis conducted on Microsoft excel where variables were not differenced first.

All non-stationary variables were differenced before used in VAR and final regression models to ensure unbiased estimators. These transformations align with the practices of *Hilber, C.A.L. & Vermeulen, W. (2016)* and *Gyourko, J. and Molloy, R. (2015)*, who argue that housing data often show long-run data drift, and differencing helps mitigate this.

These results were confirmed through ADF and KPSS tests which can be found below. Overall, stationarity testing confirms that most housing market variables in this study show non-stationary behaviour in levels but are suitable for regression modelling once transformed.

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**3.2.2 Descriptive Statistics**

Descriptive statistics discover trends across nations, for example:

* Canada had the highest House Price Index (HPI) and household debt ratio, while Italy had the lowest. This reinforces that high-price markets often coincide with high leverage.
* The UK’s average HPI (indexed to 100 in 2010) was 128.6, with a standard deviation (SD) of 19.2. this indicates moderate price volatility compared to countries like Sweden where SD was 25.7, and Canada where SD was 30.1.
* Household income in the UK averaged 32,100 (SD = 4,920) lagging behind the USA (41,100).
* Unemployment in the UK significantly fell after 2011, reflecting macroeconomic stability. However, this did not proportionately translate into housing affordability.

These results support RQ4: UK affordability worsened due to income, credit, and supply constraints, not exclusive to high prices. The results can be found below:

A screenshot of a computer screen

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**3.2.3 Visual Trends Across Countries (2000–2022)**

**House Prices Over Time**

The graph below shows *HPI Over Time,* showing house prices rose sharply in Canada and Sweden, while Italy’s HPI remained stable. The UK followed an upward trend, with more upward pressure post-2012 and 2020. This supports existing literature arguing that post-crisis quantitative easing inflates UK house prices (*Whitehead, C. 2020).*

A graph of different colored lines

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**Unemployment and Income**

The graphs below show that the UK’s unemployment rate decreased consistently after the 2008 financial crisis, while income grew steadily. However, income growth did not match HPI growth, supported by *Glaeser, E. and Gyourko, J. (2008)* finding that income-HPI growth mismatch is a symptom of constrained supply or financial distortion.

A graph of different colored lines

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A graph of the number of countries/regions

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**Bank Rate, Household Debt, and GDP per capita**

The graphs below show prolonged periods of low interest rates across countries post-2008. The UK remained below 1% for over a decade, contributing to cheap credit conditions and demand-side pressures. This aligns with theories of financialisaton, where low rates boost borrowing and inflate asset prices. Meanwhile, figure 3H shows household debt where the UK remains moderate between other countries like Canada and Australia, and Figure 3I shows GDP per capita where the UK also remains moderate.

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**3.2.4 Affordability Index Comparison**

An affordability index (and visualised) was created to quantify the relationship between house prices and income. Using standardised income-to-HPI ratios, affordability in the UK declined post 2012, mirroring Canada and Sweden. In contrast, Italy maintained relatively stable affordability due to stagnant house prices despite weak income growth.

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*Meen, G. (2018)* explains that the UK housing affordability reflects a mix of constrained supply, credit accessibility, and a generational income divide *(International Monetary Fund (IMF) 2022)*. This affordability index shows that the affordability crisis is a global one.

**3.3 Inferential Analysis and Econometric Modelling**

This section presents the econometric results used to explore casual and statistical significance of macroeconomic and supply-side variables that affect UK house prices. Each model answers specific research questions using methods found in economic theory and literature.

**3.3.1 OLS Regression: Short-Run vs Long-Run Predictors**

The adjusted R² in the short-run quarterly model was weak (0.33), confirming that house prices react sluggishly to short-term shocks. Significant predictors at the 5% level included GDP (P = 0.0488), Bank Rate (P = 0.0023), and Tender Price Index (P = 0.004). these results are consistent with *Whitehead, C. (2020),* who notes construction costs get passed onto buyers and interest rate fluctuations can temporarily distort housing demand, both of which act as short-run drivers of house prices. Quarterly regression and model fit results can be found below:

A screenshot of a spreadsheet

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However, the annual model revealed stronger long-run drivers. The adjusted R² was 0.993 with no heteroskedasticity (BP P = 0.362) meaning regression residuals had constant variance which passes key OLS assumptions, and normally distributed residuals (Shapiro-Wilk P = 0.938). significant predictors included Income, GDP, Unemployment, Bank Rate, Permits, and Tender Price Index. This aligns with *Gyourko, J. and Molloy, R. (2015),* who identify both demand and supply frictions in explaining housing inflation. These results support RQ1 and RQ2, confirming house prices are shaped by both macroeconomic and supply-side factors. Annual regression and model fit results can be found below:

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A screenshot of a data table

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**3.3.2 Elasticity Estimation: Measuring Responsiveness**

Household debt had an elasticity of 1.0017 (P = 0.000), showing near-proportional sensitivity which reinforces financialisation theory *(Aalbers, M.B. 2016).* GDP (0.6289), income (0.498), and tender prices (0.3602) were all significant. However, supply-side responsiveness was weaker with permits (0.2562), reinforcing *Hilber, C.A.L. and Vermeulen, W. (2016)* findings that UK supply is inelastic. These results confirm that affordability is elastic to credit and income, but supply-side responsiveness is weak. A key bottleneck in long-run affordability.

The results of the elasticity model are below:

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**3.3.3 VAR and FEVD**

A VAR model was applied to understand long-run dynamics using differenced variables, results can be found below:

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The Durbin-Watson (2.51), Shapiro-Wilk (P = 0.9281), and BP (P = 0.362) tests confirm the model’s residuals were well behaved.

The FEVD revealed that over a 10-year period, GDP (~17%) and debt (~16%) explained the largest share of house price variance. Followed by income (~15%) and permits (~13%). Bank rate accounted for ~11%, showing that monetary policy is not the sole driver of affordability. These results, alongside other lags, can be seen in figure 3P.

These findings offer support for RQ2 and RQ3. They show that short-run responses exist but are often lagged and limited, and supply-side constraints restrict the ability for markets to adapt quickly to economic shocks.

**3.3.4 Granger Causality: Leading Indicators**

To address causality, Granger tests were performed. Permits (F = 14.533, P = 0.0002), bank rate (F = 7.906, P = 0.0087), and GDP (F = 5.065, P = 0.0282) were statistically significant, meaning they Granger-cause house price changes. This means these indicators statistically “lead” price movements and act as early signals of affordability shifts.

These findings support RQ1, reinforcing that certain supply and demand variables are not just correlated, but predictive of housing inflation. The Granger Causality results can be found below:

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**3.3.5 Critical Reflection on Methodology and Limitations**

Despite strong results, some limitations must be acknowledged. Firstly, quarterly models had low explanatory power due to market stickiness and delayed reactions. Secondly, log-log models assume constant elasticates which oversimplify real housing behaviour. Thirdly, Granger causality implies temporal precedence, not structural cause and cannot fully isolate external shocks.

Cross-country comparisons lacked supply-side data due to inconsistent availability, limiting scope. Furthermore, factors like planning systems and tax regimes which influence affordability, were not modelled directly. Future studies could incorporate qualitative variables, similar to *Bramley, G. (2013)*. This also highlights a limitation of the research methodology applied in this dissertation.

Collectively, these methods provided strong empirical support for the idea that affordability in the UK is a layered issue shaped by both constrained supply and macroeconomic conditions.

**4. Conclusion and Policy Recommendations**

**4.1 Conclusion**

Using various econometric techniques, this study set out to explore supply and demand-side determinants of housing affordability in the UK and assess short and long-run dynamics. This was done by answering established research questions. Several key insights were found:

**RQ1 and RQ2:**

Findings from regression analysis confirm that both demand and supply-side variables influence house prices particularly in the long run. In specific, key drivers include GDP, income, household debt, planning permissions, and building costs. However, demand-side indicators showed stronger power, especially in the UK.

**RQ3:**

Elasticity analysis revealed strong responsiveness to household debt and GDP growth, while supply-side responsiveness was weaker. This supports the view that affordability in the UK is inelastic to supply-side shifts, consistent with *Glaeser, E.L. and Gyourko, J. (2008)* and *Hilber, C.A.L. and Vermeulen, W. (2016),* who highlight regulatory frictions as key constraints on house price responsiveness.

**RQ4:**

Cross-country VAR comparisons indicate that the UK’s affordability crisis mirrors global patterns but is worsened by local constraints in housing supply and planning policy reinforcing *Hilber, C.A.L. (2011)*. In contrast, countries like Germany and Canada show more moderate price responses, underling the influence of national-level supply responsiveness.

Collectively, these findings confirm that the UK’s affordability crisis is structurally driven, and not easily corrected by market forces alone. Policy interventions that focus primarily on boosting supply without addressing credit expansion will likely fall short. A long-term solution requires integrated reforms across planning, credit markets, and affordability policy. Simply building more houses will not suffice.

**4.2 Policy Recommendations**

From econometric lenses, the following recommendations are proposed:

**Expland Housing Supply Through Planning Reform**

The Granger causality tests, and elasticity coefficients confirm that planning permit approvals have a predictive and statistically significant effect on house prices. Streamlining this process for high-density or affordable units could help ease long-run price pressure.

However, planning reform faces political and local resistance, particularly from existing homeowners with worries of densification (*Breach, A. 2025).* Even with approval, logistical limitations still apply such as construction delays and infrastructure constraints.

**Target Credit Regulation to Reduce Excess Demand**

Strong elasticity of house prices to household debt (1.0017) shows the need for better regulation as more household debt equates to higher availability to credit, thus demand for housing increases and price follows. Tighter credit conditions, including stricter loan-to-value ratios, could prevent demand from outpacing supply especially in low-interest periods.

However, tightening credit could disproportionately affect first time buyers and lower-income households, further causing inequality and predatory behaviour from landlords.

**Incentivise Affordable Housing Supply via Taxation**

Fiscal incentives such as land value taxes for affordable housing could encourage developers to build more accessible housing stock, directly addressing the elasticity gap between income and prices.

However, this reform requires accurate land valuation and strong enforcement. Developers may also shift costs onto buyers or reduce overall housing output if incentives are not well targeted.

**4.3 Limitations and Areas for Further Research**

While findings are robust in this study, several limitations remain. First, the analysis relied on quarterly data and annual data over a 22-year period. This limits the sample size and increases sensitivity to structural breaks. Second, the cross-country analysis focused on demand-side factors due to the limited availability of consistent supply-side data internationally.

Granger causality implies temporal precedence, not structural causation. This means deeper mechanisms behind price formations are not captured. Finally, the assumption of log-linear relationships oversimplifies non-linear dynamics in the housing market.

Future research could integrate spatial modelling to examine regional affordability or incorporate behaviour insights to capture demand. Expanding the cross-country analysis to include policy and institutional differences would offer a broader comparative base that the UK could integrate.

While the affordability debate is dominated by macroeconomic indicators and planning policy, future research must integrate behavioural economics and deeper societal functions like generational wealth and poverty. The issue of housing affordability does not pertain to just supply and demand, rather it is broad, including risk tolerance, and market sentiment.

These reflections do not undermine the validity of the results, rather they suggest avenues of refinement and areas of future research in housing economics.

Appendices   
  
Figure 1A – table to show which variables were used, their measure, the unit, if it was interpolated, and some notes:

A screen shot of a computer

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Figure 2A – Summary of each econometric model applied, its function, and rationale:A screenshot of a computer

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RStudio Code:

# Load Required Libraries

library(readxl)

library(dplyr)

library(tidyr)

library(ggplot2)

library(tseries)

library(urca)

library(lmtest)

library(vars)

library(forecast)

library(broom)

library(corrplot)

library(car)

# Step 1: Import UK Data

uk <- read\_excel("~/Downloads/RStudio Disso Data.xlsx", sheet = "UK",

col\_types = c("date", rep("numeric", 9)))

colnames(uk) <- c("Date", "HPI", "Unemp", "GDP", "Income", "Bank\_Rate",

"Debt", "Permits", "Tender", "Build\_Costs")

# Step 2: First Differences

uk\_diff <- data.frame(

HPI = diff(uk$HPI),

Unemp = diff(uk$Unemp),

GDP = diff(uk$GDP),

Income = diff(uk$Income),

Bank\_Rate = diff(uk$Bank\_Rate),

Debt = diff(uk$Debt),

Permits = diff(uk$Permits),

Tender = diff(uk$Tender),

Build\_Costs = diff(uk$Build\_Costs)

) %>% na.omit()

# Step 3: ADF Test Output

cat("ADF Test Results:\n")

for (var in colnames(uk\_diff)) {

test <- adf.test(uk\_diff[[var]])

cat(var, "- p-value:", round(test$p.value, 4), "\n")

}

# Step 4: KPSS Test Output

cat("\nKPSS Test Results:\n")

for (var in colnames(uk\_diff)) {

test <- ur.kpss(uk\_diff[[var]], type = "mu")

stat <- test@teststat

crit <- test@cval["5pct"]

decision <- ifelse(stat < crit, "Yes", "No")

cat(var, "- KPSS stat:", round(stat, 4), ", 5% critical:", crit, ", Stationary:", decision, "\n")

}

# Step 5: Second Differences

uk\_diff$Income\_2diff <- c(NA, diff(uk\_diff$Income))

uk\_diff$Debt\_2diff <- c(NA, diff(uk\_diff$Debt))

uk\_diff <- na.omit(uk\_diff)

# Step 6: Quarterly Regression

regression\_data\_q <- data.frame(

HPI = uk\_diff$HPI,

Income = uk\_diff$Income\_2diff,

Unemp = uk\_diff$Unemp,

GDP = uk\_diff$GDP,

Debt = uk\_diff$Debt\_2diff,

Rate = uk\_diff$Bank\_Rate,

Permits = uk\_diff$Permits,

Tender = uk\_diff$Tender,

Costs = uk\_diff$Build\_Costs

)

model\_q <- lm(HPI ~ ., data = regression\_data\_q)

print(summary(model\_q))

print(AIC(model\_q))

print(BIC(model\_q))

print(durbinWatsonTest(model\_q))

print(bptest(model\_q))

print(shapiro.test(residuals(model\_q)))

# Step 7: Annual Regression

uk$Year <- format(uk$Date, "%Y")

uk\_annual <- uk %>%

group\_by(Year) %>%

summarise(across(where(is.numeric), mean, na.rm = TRUE))

model\_a <- lm(HPI ~ Income + Unemp + GDP + Debt + Bank\_Rate + Permits + Tender + Build\_Costs, data = uk\_annual)

print(summary(model\_a))

print(AIC(model\_a))

print(BIC(model\_a))

print(durbinWatsonTest(model\_a))

print(bptest(model\_a))

print(shapiro.test(residuals(model\_a)))

# Step 8: Granger Causality

cat("\nGranger Causality Results:\n")

quarterly\_vars <- list(

Income\_2diff = "Income",

Unemp = "Unemployment",

GDP = "GDP",

Debt\_2diff = "Debt",

Bank\_Rate = "Bank Rate",

Permits = "Planning Approvals",

Tender = "Tender Price Index",

Build\_Costs = "Building Costs"

)

for (var in names(quarterly\_vars)) {

formula <- as.formula(paste("HPI ~", var))

test <- grangertest(formula, order = 1, data = uk\_diff)

cat(quarterly\_vars[[var]], "- F:", round(test$F[2], 3), ", p-value:", round(test$`Pr(>F)`[2], 5), "\n")

}

# Step 9: VAR Model

var\_data <- data.frame(

HPI = uk\_diff$HPI,

Debt = uk\_diff$Debt\_2diff,

Permits = uk\_diff$Permits,

Unemp = uk\_diff$Unemp,

Income = uk\_diff$Income\_2diff,

Bank\_Rate = uk\_diff$Bank\_Rate

) %>% na.omit()

var\_model <- VAR(var\_data, p = 2, type = "const")

# Step 10: FEVD

fevd\_result <- fevd(var\_model, n.ahead = 10)

fevd\_HPI <- fevd\_result$HPI

fevd\_df <- as.data.frame(fevd\_HPI)

fevd\_df$Step <- 1:nrow(fevd\_df)

fevd\_long <- pivot\_longer(fevd\_df, -Step, names\_to = "Variable", values\_to = "Share")

ggplot(fevd\_long, aes(x = Step, y = Share, color = Variable)) +

geom\_line(size = 1.1) +

geom\_point(size = 2) +

labs(title = "FEVD – Contribution to HPI Forecast Error Over Time",

x = "Forecast Step (Quarter)",

y = "Variance Explained",

color = "Variable") +

theme\_minimal()

# Step 11: Elasticity (Log-Log Annual)

uk\_annual\_log <- uk\_annual %>%

mutate(

log\_HPI = log(HPI),

log\_Income = log(Income),

log\_GDP = log(GDP),

log\_Unemp = log(Unemp),

log\_Debt = log(Debt),

log\_Bank\_Rate = log(Bank\_Rate),

log\_Permits = log(Permits),

log\_Tender = log(Tender),

log\_Costs = log(Build\_Costs)

)

elasticity\_model <- lm(log\_HPI ~ log\_Income + log\_Unemp + log\_GDP +

log\_Debt + log\_Bank\_Rate + log\_Permits +

log\_Tender + log\_Costs,

data = uk\_annual\_log)

print(summary(elasticity\_model))

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