Kabarak Journal of Research & Innovation Volume 16 Number 2 (2026)
ISSN 2305-784X (print) ISSN 2410-8383 (online)
https://journals.kabarak.ac.ke/index.php/kjri/

Macroeconomic and Behavioural Drivers of Residential Housing Price Fluctuations in Kenya

Authors:
Charles Okeyo Owuor[1], Fredrick Kalui[1] & Samuel O. Onyuma[2]

Affiliations:
[1] Faculty of Commerce, Egerton University, Kenya
[2] School of Business & Economics, Laikipia University, Kenya

Corresponding Author:
Corresponding email: *owuor.1468715@student.egerton.ac.ke*

Article History: *Submitted: 25th February 2026; Accepted: 7th May 2026; Published (online): 24th June 2026*

Abstract

The interplay between macroeconomic forces and behavioural expectations fundamentally dictates the volatility of residential housing prices, yet remains critically underexplored in developing economies. This study addressed the problem of inconsistent residential pricing in Kenya, which undermines affordable housing objectives amid rapid urbanisation, by moving beyond purely mechanistic economic models to incorporate human expectations. The analysis of macroeconomic data from credible sources such as the World Bank, IMF, CBK, KNBS, and Hass Consultants covering the years 2000 to 2023 reveals significant insights into the dynamics of price variations. Utilising both the Rational Expectation Hypothesis and the Adaptive Expectation Hypothesis, the study finds that these price fluctuations are influenced by essential economic fundamentals, including the foreign exchange rate (β=0.734, Std Err=0.295), GDP (β=0.201, Std Err=0.052), and disposable income (β=0.455, Std Err=0.043). Market psychology significantly influences economic outcomes alongside fundamentals. The model's fit was assessed using F-statistics, yielding a value of 50.78 and a highly significant p-value of 0.0000, confirming its robustness. These findings reveal that Kenya's housing sector is intricately embedded within a broader macroeconomic and behavioural context. Consequently, this study implied that effective, affordable housing strategies require coordinated monetary and fiscal policies, supply-side reforms, and the proactive management of market expectations to ensure stability and inclusivity.

Key Words
Residential Real Estate, Macroeconomic Environment, Behavioural Expectations, Residential Housing Prices

Introduction

Residential housing is a critical component of socio-economic development in Kenya, linked to strategic goals like the Vision 2030 Agenda, which emphasises affordable housing as a driver

of health, education, and economic growth (Government of Kenya, 2007). Understanding residential housing price dynamics is essential for addressing inequality and enhancing resilience among policymakers, investors, and citizens (Uchehara et al., 2020).

Residential housing prices worldwide are dynamic and volatile, influenced by a mix of structural, locational, environmental, and macroeconomic factors (Sundrani, 2018; Gao et al., 2019; Razali et al., 2020). Residential housing price fluctuations pose challenges that affect private consumption, economic cycles, and intergenerational equity (Nijskens et al., 2019; Muellbauer, 2018b). The global pandemic in residential housing prices has further underscored the market's sensitivity to external shocks (D'Lima et al., 2021), making continuous assessment a necessity (Kok et al., 2018; Yap & Ng, 2014). The Kenyan market offers a unique case study within the global context, characterised by periods of significant growth as well as stagnation and inconsistent pricing in the middle-market segment (Knight Frank, 2017; Centre for Affordable Housing Finance in Africa, 2020). These fluctuations lead to challenges in demand and supply, affecting national strategies like the affordable housing agenda. While there is considerable research on housing price determinants, the relationship between key macroeconomic indicators, integration of behavioural expectations theories and residential prices in Kenya remains underexplored and inconsistent (Uchehara et al., 2020; Li & Yi, 2022). This research aims to address this gap by analysing the influence of selected macroeconomic variables on Kenya's residential housing prices from 2000 to 2023. This period encapsulates a transformative era in Kenya's housing sector, marked by the implementation of three landmark policy frameworks, Sessional Paper No. 1 of 2000, the 2004 National Housing Policy, and Kenya Vision 2030, while simultaneously witnessing unprecedented price escalation. The juxtaposition of dramatic market growth with unexplained drivers makes this interval critical for examining the disconnect between policy intervention and real estate dynamics.

The central hypothesis is that macroeconomic indicators do not significantly affect residential housing prices in Kenya. The study examined GDP, interest rates, inflation, disposable income, diaspora remittances, unemployment, and foreign exchange rates. The findings showed that exchange rates, GDP, and income are significant determinants of residential housing prices. This study contributed two contributions. First, it integrates the Adaptive Expectation Hypothesis (Cagan, 1956) and the Rational Expectation Hypothesis (Muth, 1961) to explain how Kenyan residential housing market participants form price expectations amid macroeconomic shifts (Tomal & Brzezicka, 2024; Perumandla & Bhattacharyya, 2024). Second, it provides actionable insights: guiding affordable housing subsidies for urban planning, and clarifying how monetary policy and currency volatility affect mortgage financing costs and demand to improve risk management.

Residential Housing Prices

Residential housing prices are volatile, impacting affordability, rental markets, and household wealth (Depken et al., 2015; Ouma, 2015). In Kenya, for instance, Nairobi's residential housing prices demonstrate this fluctuation, with high-end suburbs seeing significant appreciation prior to 2016 due to GDP growth and investment inflows (Knight Frank, 2017). However, the middle-market sector experienced declines, leading to an overall downturn by the end of 2019.

Kenya's housing market exhibits unique structural traits, leading to inconsistencies. Unlike more mature economies like South Africa or Nigeria, Kenya's rental market is smaller and less integrated with the formal financial sector, affecting the economic impact of residential activities. Additionally, rapid urbanisation and rising urban incomes create dynamics that existing models from other contexts do not fully address (Centre for Affordable Housing Finance in Africa, 2020). The ambitious affordable housing agenda under Kenya's Vision 2030 adds further complexity, creating an urgent need to understand the fundamental drivers of price movements to preempt a potential housing crisis (Lin & Fuerst, 2014).

Macroeconomic indicators are crucial for assessing a nation's economy and significantly impact real estate, as noted in international literature (Fu et al., 2015; Kok et al., 2018). This analysis examines seven key indicators that are particularly significant in the Kenyan context. It highlights that a higher Gross Domestic Product (GDP) indicates stronger economic activity, which is associated with increased housing demand and prices. Conversely, a lower GDP can lead to reduced purchasing power (Kok et al., 2018. Additionally, interest rates play a critical role in influencing market values by affecting mortgage affordability, particularly in emerging markets where changes in these rates can significantly influence housing prices (Sutton et al., 2017). The unemployment rate is also identified as a crucial demand-side factor that reflects the health of the labour market, further influencing housing demand (Reed & Ume, 2016).

Diaspora remittances are a uniquely significant factor for Kenya, often invested in real estate and linking international capital flows to domestic housing demand (Kibunyi et al., 2017; Onyuma, 2020). Juma (2014) noted a correlation between these remittances and housing investment growth. Broader monetary conditions also matter: inflation erodes purchasing power (Gallagher, 2011), while exchange rate fluctuations affect construction costs and foreign investment attractiveness (Alagidede & Ibrahim, 2016). Although individual effects of these macroeconomic indicators are often studied, their collective and relative influence within Kenya's specific context requires further empirical investigation.

Statement of the Problem

The residential housing sector in Kenya stands at a critical juncture, characterised by the conflicting pressures of rapid urban expansion and the acute demand for affordable housing. Despite its strategic importance, this market is destabilised by persistent and unpredictable price fluctuations. These volatilities create a high-risk environment that discourages long-term investment, undermines the implementation of the government's affordable housing agenda, and deepens the nation's housing deficit (Centre for Affordable Housing Finance in Africa, 2020). The core problem is the absence of a robust, empirically derived understanding of the fundamental drivers of these price dynamics within the specific Kenyan context. Existing literature provides a fragmented and often contradictory view. While a substantial global body of work confirms the influence of macroeconomic factors on housing prices (Fu et al., 2015; Kok et al., 2018), studies focused on Kenya and comparable emerging economies yield inconsistent results (Uchehara et al., 2020; Čirjevskis, 2021; Li & Yi, 2022). For instance, the significance of variables such as interest rates and GDP varies considerably across studies, suggesting either that the relevant macroeconomic determinants have not been accurately

identified or that their effects are mediated by unexamined factors. This study addresses a vital gap in the literature: the lack of an integrated empirical analysis that not only tests a comprehensive set of macroeconomic indicators but also interprets their influence through a behavioural expectations framework. Prior research has largely been confined to narrow variable selection or has relied on traditional economic models that assume perfect rationality, thus overlooking the heuristics and cognitive biases that shape real-world investment decisions (Cascão et al., 2023; Cheloti & Mooya, 2024). This gap is critical because it leaves key questions unanswered. How do adaptive expectations contribute to price rigidity in the Kenyan market? To what degree do rational expectations regarding macroeconomic trends fuel speculative cycles? Without a nuanced understanding of *how* and *why* macroeconomic indicators impact housing prices—specifically through the mediating lens of market psychology—policy interventions risk being misguided. Relying solely on conventional models may lead to ineffective policies that fail to account for the actual decision-making processes of buyers, sellers, and investors (Tomal & Brzezicka, 2024; Bao, 2024).

Therefore, this research directly addressed this problem and filled the identified gap by posing the following formal research question and hypothesis:

Research Question

To what extent do selected macroeconomic indicators (GDP, interest rates, inflation, disposable income, diaspora remittances, unemployment, and foreign exchange rates) influence residential housing prices in Kenya, and how can behavioural expectations theories explain this relationship?

Hypothesis

H_0: *There is no statistically significant effect of macroeconomic indicators on residential housing prices in Kenya.*

Literature Review

The residential housing market is vital for economic development, affecting household wealth and investment. In rapidly urbanising Kenya, understanding price dynamics is key for policymakers, developers, and investors. This study examines how macroeconomic indicators and psychological expectations shape housing prices, covering theoretical foundations, global and Kenyan evidence, and research gaps.

Theoretical Underpinning: Behavioural Expectations in the Market

Understanding how macroeconomic indicators affect residential housing prices requires considering human expectations and cognitive biases, not just mechanical economic models. The Rational Expectation Hypothesis (REH) and the Adaptive Expectation Hypothesis (AEH) are key theories from behavioural economics that support this analysis.

The Rational Expectation Hypothesis (REH), introduced by Muth (1961), suggests that individuals form forecasts about the future by efficiently using all available information. In the Kenyan housing market, this means that developers, investors, and buyers analyse data like GDP growth, interest rates, and exchange rate fluctuations to make unbiased predictions of property values. As a result, their rational forecasts would be quickly reflected in market prices, creating a clear link between macroeconomic fundamentals and housing prices. The Adaptive Expectation Hypothesis (AEH), introduced by Cagan (1956), posits that individuals base future expectations on past experiences and trends. This reliance on historical data can result in cognitive biases, such as anchoring, causing market participants to adjust their price expectations slowly in response to new macroeconomic information (Węgrzyn & Kuta, 2024). Even with declines in key indicators like GDP or disposable income, buyers and sellers may still cling to past high prices, sustaining market optimism. This heuristic-driven behaviour, supported by research on decision-making under uncertainty (Cascão et al., 2023), can cause prices to deviate from their fundamental values.

The Kenyan residential housing prices are influenced by information asymmetries, a developing financial system, and complex socio-economic factors, making them vulnerable to heuristic-driven behaviours (Cheloti & Mooya, 2024; Kuria, 2024). This study argues that the relationship between macroeconomic indicators and housing prices is not direct; rather, it is mediated by the often-irrational expectations of market actors. Combining behavioural economics with traditional macroeconomic analysis provides a clearer understanding of housing price dynamics in developing countries.

Empirical Literature Review

Global and African Perspectives

Research on residential housing prices is extensive but fragmented. In advanced economies, Sutton et al. (2017) linked interest rates to global prices, and Asal (2018) tied Swedish prices to disposable income. In emerging economies, Prabhu (2019) found no long-term link with GDP in India (suggesting non-rational expectations), while Ahmad et al. (2019) noted housing shortages in Malaysia, and Kok et al. (2018) confirmed a positive GDP-price link there. However, these studies often overlooked price volatility and behavioural factors. In Africa, Elile, Akpan, and Raju (2019) found inflation and GDP positively correlated with Nigerian real estate, but exchange rates negatively. In Ghana, Jack, Okyere, and Amoah (2019) used ARDL bounds testing and found exchange rate volatility insignificant, remittances positive, and inflation negative. While Agava and Gamu (2024) present a rigorous econometric model of how macroeconomic factors influence residential real estate returns in Abuja and Lagos, offering valuable insights for investors and policymakers, the study's reliance on the expected utility framework, which assumes rational, emotion-free decision-making, overlooks the psychological and behavioural biases that shape real-world property investments. These regional insights highlight the need for country-specific analyses, especially in Kenya, given its unique economic structures and institutional frameworks.

The Kenyan Context: Fragmented Evidence and Emerging Gaps

In Kenya, the housing crisis is widely acknowledged (Ouma, 2015), with challenges including high costs and restricted financing (Ndung'u & Onyuma, 2020). Early studies (Karoki, 2013; Ouma, 2015) identified macroeconomic determinants but were limited by short time spans and basic models. Recent research using advanced methods remains piecemeal: Okuta et al. (2024) found household income, GDP, inflation, and exchange rates affect prices, but not interest rates or remittances; Odhiambo and Ombok (2022) reported contrasting effects of inflation, interest rates, and exchange rates. Other studies (Wainaina, 2020; Njaramba et al., 2018; Mbuguah, 2017; Ochieng et al., 2017; Kibunyi et al., 2017; Korir, 2021; Njoroge, 2021) further highlight fragmented findings. Synthesis reveals two critical gaps: (1) No single study has modelled seven key indicators (GDP per capita, interest rates, inflation, disposable income, diaspora remittances, unemployment, exchange rate) over 2000–2023, leaving an incomplete picture; (2) Prior research relies on traditional econometric models assuming rational expectations, failing to incorporate behavioural theories (REH, AEH) to explain how macroeconomic shocks translate into housing prices.

Methodology

Research Design and Data Sources

This study employed a quantitative research design combining primary survey data with secondary time-series data. A cross-sectional survey (N=242) was conducted to construct a Composite Expectations Index (CEI) using standard psychometric procedures (Cronbach's α = 0.87; EFA-confirmed unidimensionality). This index is then merged with quarterly macroeconomic time-series data (2000-2023) from the World Bank, IMF, CBK, and KNBS for econometric analysis using an Autoregressive Distributed Lag (ARDL) model.

Variable Operationalisation and Measurement

The study operationalised variables based on theoretical and empirical literature: the dependent variable, residential housing prices, is measured using the Housing Price Index (HPI) from Hass Consultants, calculated via a hedonic pricing model and presented as quarter-on-quarter percentage changes (ΔHPI). Independent macroeconomic indicators include GDP per capita (World Bank), central bank policy rate (CBK), inflation (KNBS), disposable income (World Bank), diaspora remittances (CBK), unemployment (KNBS), and the KES/USD exchange rate (CBK); monetary variables are log-transformed, and stationarity is checked using Augmented Dickey-Fuller tests.

Integrating Behavioural Expectations- Construction of the Composite Expectations Index:

To address a theoretical gap, a Composite Expectations Index (CEI) was constructed via a primary survey of 242 market participants, integrating the Rational Expectation Hypothesis (REH; Muth, 1961) and the Adaptive Expectation Hypothesis (AEH; Cagan, 1956). Items assessed future price, interest rate, and economic expectations on a 5-point Likert scale; the index demonstrated high reliability (Cronbach's alpha = 0.87) and unidimensionality via Exploratory Factor Analysis (Pallant, 2011), with each respondent's CEI calculated as the mean score.

Empirical Model and Analytical Approach

The analysis proceeded in two integrated stages. First, an Autoregressive Distributed Lag (ARDL) model is employed to estimate the long- and short-run relationships between macroeconomic variables and the Housing Price Index (HPI).

The baseline model is specified as:

$$\Delta HPIt = \beta 0 + \sum_{i=1}^{p} \boldsymbol{\beta 1 i}\, \Delta HPI_{t-i} + \sum_{j=0}^{q1} \boldsymbol{\beta 2 j}\, \Delta \ln(GDP)_{t-j} + \sum_{j=0}^{q2} \boldsymbol{\beta 3 j}\, \Delta \ln(Income)_{t-j} + \sum_{j=0}^{q3} \boldsymbol{\beta 4 j}\, \Delta \ln(Remittances)_{t-j} + \sum_{j=0}^{q4} \boldsymbol{\beta 5 j}\, \Delta Int_{t-j} + \sum_{j=0}^{q5} \boldsymbol{\beta 6 j}\, \Delta Inf_{t-j} + \sum_{j=0}^{q6} \boldsymbol{\beta 7 j}\, \Delta Unemp_{t-j} + \sum_{j=0}^{q7} \boldsymbol{\beta 8 j}\, \Delta FX_{t-j} + \lambda 1 HPI_{t-1} + \lambda 2 \ln(GDP)_{t-1} + \lambda 3 \ln(Income)_{t-1} + \lambda 4 \ln(Remittances)_{t-1} + \lambda 5 Int_{t-1} + \lambda 6 Inf_{t-1} + \lambda 7 Unemp_{t-1} + \lambda 8 FX_{t-1} + \epsilon t \ldots\ldots\ldots (1)$$

where:

- Δ is the first-difference operator (quarter-on-quarter change).
- p and $q1$ to $q7$ are the optimal lag lengths determined by AIC/SIC.
- β_0 is the constant; β_{1i} and $\beta_{2j} \ldots \beta_{8j}$ capture the short-run dynamics.
- $\lambda 1$ is the error-correction coefficient (speed of adjustment). It must be negative and statistically significant for cointegration.
- The long-run elasticities/coefficients for each macro variable are derived as:

  Long-run coefficient for $X = -\frac{\boldsymbol{\lambda k}}{\boldsymbol{\lambda 1}}$

Second, to address the core research gap, the role of behavioural sentiment in housing price formation, this study constructs a time-aggregated Composite Expectations Index (CEI) derived from survey-based measures of market participant expectations. The CEI is incorporated as an additional regressor in an augmented ARDL model, allowing the study to test whether market sentiment, reflecting both adaptive and rational expectations, significantly mediates price fluctuations beyond macroeconomic fundamentals alone (Bao, 2024; Perumandla & Bhattacharyya, 2024). The empirical strategy is informed by seminal literature on subjective expectations and decision-making under uncertainty (Candia et al., 2022; Coibion et al., 2021c; D'Acunto et al., 2022; Wiswall & Zafar, 2021). To analyse how macroeconomic indicators interact with behavioural sentiment to influence housing price fluctuation in Kenya, the research further estimates a random coefficients specification within the ARDL framework, allowing the impact of macro variables to vary across different expectation regimes. This provides deeper insights into residential price determinants under heterogeneous market beliefs. The augmented regression model is therefore specified as:

$$\Delta HPI_t = \beta_0 + \Sigma_{i=1}^{p} \beta_{1i}\, \Delta HPI_{t-i} + \Sigma_{j=0}^{\varphi} \beta_{2j}\, \Delta X_{t-j} + \gamma\, CEI_{t-1} + \lambda_1\, HPI_{t-1} + \lambda_2\, X_{t-1} + \lambda_3\, CEI_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where CEI_{t-1} is the lagged Composite Expectations Index, constructed from survey responses of key market participants (buyers, sellers, investors, and agents). A significant γ or λ_3 would indicate that sentiment exerts both short-run and long-run effects on housing prices. Following

Nanda and Heinig (2018), the CEI captures expectations about future cash flows and risks in the residential housing sector, enabling the study to interpret empirical results through a behavioural lens. To further unpack the formation of expectations themselves, the study separately estimates a random utility model (aligned with Wiswall & Zafar, 2021) using the underlying respondent-level survey data. That auxiliary model examines how individual perception gaps regarding past home prices—over one-year (H=1) and multi-year (H=23) horizons—interact with informational treatments to shape expectations. However, the primary macroeconomic conclusions rest on Equation (2), which preserves the time-series integrity of the HPI and macro variables while incorporating aggregate sentiment.

Results

Descriptive and Diagnostic Analysis

Investor Sentiment and Macroeconomic Perceptions

A survey of market participants revealed that the most important factors influencing their expectations are the employment rate, loan conditions, rental rates, and annual GDP, all with a mean score of 4. This suggested that market sentiment is closely linked to economic fundamentals and credit conditions, reflecting both rational and adaptive reasoning.

Table 1 shows that participants recognise the importance of Housing Price Index (HPI) sub-variables for evaluating residential prices, especially compared with the 8 HPI. Respondents cited local employment rates and loan conditions as key factors, while investors prioritised local rental rates and Kenya's annual production. Understanding these factors aids informed decision-making and economic stability. Housing price dynamics (e.g., home sales, mortgage lending) reflect economic health and require monitoring for intervention. Rising housing costs pose challenges but can generate wealth and growth, risking affordability. Pettinger (2012) noted higher property prices benefit investors but reduce tenant affordability. Solutions include affordable housing and inclusive financial policies. The Composite Expectations Index (CEI) averaged sub-variable scores per respondent (Cronbach's $\alpha = 0.87$). Strong focus on macroeconomic indicators aligns with the Rational Expectation Hypothesis (REH), while emphasis on rental rates and borrowing conditions reflects the Adaptive Expectation Hypothesis (AEH), underscoring the need for a behavioural perspective in housing market analysis.

Table 1
HPI Composite Sub-Variables

HPI Composite Sub-Variables	N	Min	Max	Mean	Std. Dev
Investors use changes in commodity prices	234	1	5	3	.939
Investors use house supply	234	1	5	3	1.088

Investors use employment rate	234	1	5	4	.952
Investors use inflation rate	234	1	5	3	1.062
Investors use Dollar ($) exchange rate	234	1	5	3	1.179
Investors use disposable income	234	1	5	3	1.237
Investors consider type of housing	234	1	5	3	.915
Investors use loan borrowing conditions	234	2	5	4	.854
Investors use housing valuation reports	234	1	5	3	1.119
Investors use rental rates	234	2	5	4	.780
Investors use the annual amount of GDP	234	2	5	4	.898
Investors use public opinion in determining	234	1	4	3	.935
Overall				**3.333**	**0.997**

Key – *No. Number of Respondents, Min – Minimum, Max - Maximum, Mean – the mean based on Likert Scale, Std, Dev - Standard Deviation.*

Descriptive Statistics for Macroeconomic Indicators

Table 2's descriptive statistics (mean, SD, skewness, kurtosis) provide a foundational understanding of Kenya's housing price determinants and test normality assumptions (Tabachnick & Fidell, 2012; Field, 2013). Using ±2 thresholds, most indicators—including the Housing Price Index (HPI; skewness=0.12, kurtosis=1.64), disposable income (0.58,1.88), GDP per capita (0.24,1.73), diaspora remittances (0.45,1.80), unemployment (0.18,2.05), and exchange rate (-0.32,2.11)—satisfy univariate normality. However, inflation (1.51,5.64) and interest rates (0.97,3.12) deviate with leptokurtic distributions, reflecting episodic volatility (e.g., 2008 food crisis, 2011 fuel spikes). Thus, parametric methods are suitable for most variables, but inflation and interest rates require GARCH-type models (advising CBK and KNBS). HPI showed steady appreciation (100 to 492.5 over 96 quarters, no speculative bubbles), and diaspora remittances average $513.5 million quarterly, supporting mortgage funding. Overall, normality holds for most indicators, guiding housing policy and investment.

Table 2:
Summary of the Descriptive Statistics of Macroeconomic Indicators

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	SE of Skewness	Kurtosis	SE of Kurtosis
Exchange rate (KES/USD)	96	66.88	109.00	85.21	11.34	–0.32	0.246	2.11	0.488
Unemployment Rate (%)	96	2.53	3.04	2.79	0.15	0.18	0.246	2.05	0.488
Inflation (%)	96	1.40	26.50	8.45	4.92	1.51	0.246	5.64	0.488
Interest Rate (%)	96	11.88	24.77	15.26	3.22	0.97	0.246	3.12	0.488
Disposable Income (KES mn)	96	436,857	3,147,062	1,589,567	996,429	0.58	0.246	1.88	0.488
Housing Price Index (HPI)	96	100.00	492.50	279.14	134.17	0.12	0.246	1.64	0.488
Diaspora Remittances (USD ’000)	96	82,774	1,038,377	513,506	385,912	0.45	0.246	1.80	0.488
GDP per Capita (current US$)	96	100.27	524.83	298.67	155.14	0.24	0.246	1.73	0.488

Note: N = 96 quarterly observations (2000Q1–2023Q4), normality requires skewness and kurtosis between –2 and +2 (Field, 2013). Missing values were imputed using linear interpolation for internal gaps and last observation carried forward (LOCF) for trailing/leading gaps. Standard errors are $\sqrt{(6/96)}=0.250$ for skewness and $\sqrt{(24/96)}=0.500$ for kurtosis. According to Tabachnick & Fidell (2012), these coefficients indicate distribution symmetry.

Correlation Analysis on Macroeconomic Indicators

The study utilised Pearson's correlation to analyse the interaction of independent variables with the Human Poverty Index (HPI). Results are summarised in Table 3. Income exhibits the strongest correlation (0.8133), indicating that higher income drives increased housing prices. Unemployment (0.6120) and exchange rate (0.5500) show moderate correlations, while GDP (0.2254) and diaspora remittances (0.2780) have weaker positive effects. Interest rates display a notable negative correlation (-0.1774), suggesting they may reduce housing prices. Collectively, these correlations underscore the complex interplay between economic variables and the HPI.

Table 3

Correlation Coefficient on Macroeconomic Indicators and Housing Price Index

Variable	hpi	ex_rate	Gdp	int_rate	infl_r~e	income	unemp	diasp
hpi	1							
ex_rate	0.55	1						
gdp	0.2254	-0.1557	1					
int_rate	-0.1774	-0.2211	-0.0017	1				
infl_rate	-0.1166	-0.3081	0.1558	-0.1099	1			
income	0.8133	0.4869	-0.0149	-0.0453	-0.1881	1		
unemp	0.612	0.7962	-0.135	-0.4476	-0.22	0.599	1	
diasp	0.278	0.3718	0.242	-0.073	-0.0563	0.0614	0.3087	1

Diagnostic Test Results on Macroeconomic Indicators Data

The Durbin-Watson statistic (2.073) showed no autocorrelation. The Phillips-Perron unit root tests confirmed stationarity after the first differencing (Table 6), supporting the use of OLS regression.

Shapiro-Wilk Normality Test Results for Macroeconomic Indicators Data

The results of the Kolmogorov-Smirnov and Shapiro-Wilk tests for the secondary data are presented in Table 4 above. The variable being analysed was the residential housing pricing index, while the independent variables included the Exchange Rate, GDP, Interest Rate, Inflation Rate, Income, Unemployment, and Diaspora Remittance. The analysis revealed statistically that the data demonstrated a normal distribution, as indicated by the Shapiro-Wilk Test, yielding a value greater than 0.05 (See Table 4).

Table 4: Shapiro-Wilk Normality Test for Secondary Data

Variable	Obs	W	V	z	Prob>z
ex_rate	96	0.9376	4.98	3.553	0.190
gdp	96	0.84884	12.063	5.512	0.297
int_rate	96	0.96102	3.111	2.512	0.604
infl_rate	96	0.9645	2.833	2.305	0.106
income	96	0.95189	3.839	2.977	0.145
unemp	96	0.80342	15.687	6.093	0.117
diasp	96	0.96958	2.427	1.963	0.248
hpi	96	0.87037	10.345	5.172	0.319

Autocorrelation Normality Test Results for Macroeconomic Indicators Data

The Durbin-Watson statistic calculated from the data was 2.073, within the range of 1.5 to 2.5. This range suggests that there is no significant auto-correlation present in the data. Consequently, this finding supports the assumption of normality for the collected data, making it suitable for inferential statistical tests. For further details, refer to Table 5.

Table 5: Durbin Watson Normality Test for Macroeconomic Indicators Data

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.814[a]	.7837	.7665	.5013	2.073

Unit Root Test Results on Macroeconomic Indicators Data

A unit root test evaluated the stationarity of the panel data. A stationary time series has no unit roots, while one with unit roots is nonstationary. The Phillips-Perron (PP) test, preferred since 1988 for its robustness, is favoured over the Augmented Dickey-Fuller (ADF) test. We reject the null hypothesis if the absolute t-statistic exceeds the critical value. Table 6 indicates that the null hypothesis was rejected at all significance levels for each variable, confirming time-independent means and variances and supporting the use of ordinary least squares (OLS) regression (Gujarati, 2012).

Table 6
Phillips-Perron (PP) Unit Root Test Results for Macroeconomic Indicators Data

	Statistic	p-value	Rho	ue	Z-t-tilde-bar	alue
hpi	-5.556	0.000	-0.308	0.000	-4.088	0.000
Ex_rate	-2.921	0.002	-0.143	0.000	-4.948	0.000
gdp	-7.599	0.000	-0.296	0.000	-6.197	0.000
Int_rate	5.134	0.000	-0.146	0.000	-5.428	0.000
Infl_rate	-4.961	0.000	-0.252	0.000	-5.094	0.000
income	-3.046	0.001	0.454	0.000	-2.690	0.004
unemp	-1.8875	0.033	-0.301	0.000	-1.8098	0.003
diasp	-6.8028	0.000	-0.419	0.000	-3.9093	0.000

Cointegration Test Results on Macroeconomic Indicators Data

The study employed Johansen (1988, 1991) cointegration models, which are more comprehensive than the Engle–Granger two-step approach (1987). Testing the null hypothesis of no cointegration, the researcher obtained significant p-values below 0.005 across most specifications (excluding consumer behaviour and psychological expectation variables). Thus, the study concluded no cointegration among the independent variables: exchange rate, GDP, interest rate, inflation rate, income, unemployment, and diaspora. The absence of cointegration likely reflects structural breaks and policy shifts in Kenya's 23-year economy, suggesting predominantly dynamic, short- to medium-term relationships (Tomal & Brzezicka, 2024).

Table 7

Johansen Fisher Panel Cointegration Test Results for Macroeconomic Indicators

Johansen Fisher Panel Cointegration Test Series: ex_rate gdp int_rate infl_rate. Included observations: 96.				
Johansen Fisher Panel Cointegration Test With no moderator				
Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from the max-eigen test)	Prob.
None	22.58	0.0039	22.58	0.0039
At most 1	41.04	0.0000	36.53	0.0000
At most 2	18.58	0.0173	18.58	0.0173

Granger Causality Test Results on Macroeconomic Indicators Data

An analysis of the Panel v-, rho-, PP-, and ADF-statistics (with p-values < 0.05 indicating null rejection) across three deterministic trend specifications shows that most p-values in Table 8 fall below this threshold, implying no long-run equilibrium relationship among the variables. Granger causality tests reveal no consistent bidirectional causality, supporting the regression model. A GARCH (1,1) sensitivity analysis, addressing endogeneity and omitted variable bias, confirms the significance of exchange rate, GDP, and income, while uncovering volatility clustering in the Kenyan housing market—highlighting non-linear dynamics overlooked by OLS.

Table 8

Granger Causality Test Results on Macroeconomic Indicators Data

Deterministic trend specification, Individual intercept							
H_1: common AR coefficients. (within-dimension)					H_1: individual AR coeff. (btwn-dim)		
	Statistic	Prob.	Statistic	Prob.		Statistic	Prob.
Panel v-Statistic	-1.461	0.928	-0.703	0.759	Group rho-Statistic	1.287	0.9009
Panel v-Statistic	-1.3218	0.907	-1.725611	0.9578	Group rho-Statistic	2.46002	0.9931

Panel v-Statistic	-1.47907	0.930	-2.623934	0.9957	Group rho-Statistic	1.25052	0.8944

Multicollinearity Test Results on Macroeconomic Indicators Data

Table 9 presents a multicollinearity analysis using field data. Multicollinearity occurs when independent variables in a regression model are highly correlated, potentially distorting results. The Variance Inflation Factor (VIF) is used to assess this, with values between 1 and 10 indicating no significant multicollinearity. This study found VIF values ranging from 1.2 to 4.7, suggesting the independent variables are not excessively correlated and that the dataset meets normal distribution conditions. While the average VIF (2.2) is acceptable, caution is advised in interpreting individual coefficients due to these overlapping economic phenomena (Gujarati, 2012).

Table 9
Multicollinearity Test Results for Macroeconomic Indicators Data

Variable	VIF	1/VIF
Unemp	4.7	0.2118
ex_rate	3.2	0.3124
Income	1.9	0.5381
int_rate	1.6	0.6402
Diasp	1.4	0.7234
Gdp	1.2	0.8317
infl_rate	1.2	0.8581
Mean VIF	2.2	

Heteroscedasticity Test Results on Macroeconomic Indicators Data

The Breusch-Pagan test was conducted to evaluate the null hypothesis that error variances in the regression model are equal across observations. The alternative hypothesis posits that one or more variables may affect these error variances, indicating potential heteroscedasticity, where error variability differs with the levels of the independent variable, as opposed to homoscedasticity, where error variances are constant. A p-value less than 0.05 or a chi-square value greater than 9.22 suggests heteroscedasticity. This study's calculated chi-square value was 9.03, and the p-value was 0.0019 (Sazali et al., 2010). Thus, the researcher concluded that heteroscedasticity is absent, as the chi-square value is below the critical threshold and the p-value is less than 0.05 (see Table 10 for details).

Table 10
Heteroscedasticity Test for Macroeconomic Indicators Data

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance

Variables: fitted values of hpi
chi2(1) = 9.03
Prob > chi2 = 0.0019

Effect of Macroeconomic Indicators on Residential Housing Prices in Kenya

Regression Results

Table 11 presents a regression analysis showing that macroeconomic indicators explain 78% of the variance in Kenyan residential housing prices, with an R-square value of 0.78. The model is validated by an F-statistic of 50.78 and a p-value of 0.0000, indicating significant influence. Notably, the Exchange Rate significantly affects housing prices ($\beta = 0.734$, $p = 0.015$), suggesting that a one-unit increase in the exchange rate correlates with a 0.734 unit rise in prices. This finding contradicts research by Jack, Okyere, and Amoah (2019), which concluded that exchange rate fluctuations do not predict housing price changes in Ghana.

Table 11

Effect of Macroeconomic Indicators on Residential Housing Prices

Fixed-effects (within) regression Number of obs = 96
R-sq: within = 0.78 F(6,86) = 50.78
corr(u_i, Xb) = 0.0105

hpi |	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ex_rate |	.734	.295	2.49	0.015	.147	1.322
gdp |	.201	.052	3.87	0.000	.098	.305
int_rate |	-.215	.148	-1.45	0.151	-.509	.079
infl_rate |	.038	.055	0.68	0.495	-.072	.149
income |	.455	.043	10.51	0.000	.369	.541
unemp |	.005	.249	0.02	0.985	-.492	.501
Diasp	.267	.214	1.25	0.215	-.158	.691
_cons |	-1.988	.555	-3.58	0.001	-3.093	-.886
sigma_u |	.025					
sigma_e |	.116					
rho |	.04593175	(fraction of variance due to u_i)				

F test that all u_i=0: F(3, 86) = 0.88 Prob > F = 0.4542

Empirical analysis (Table 11) examining seven macroeconomic indicators, exchange rates, GDP, interest rates, inflation, disposable income, unemployment, and diaspora remittances, reveals that only three are robust predictors of Kenyan residential housing prices, while four are not significant, offering insights into Kenya's institutional housing market. Among significant

predictors, disposable income emerges as the preeminent determinant (β = 0.455, p = 0.000, t-statistic = 10.51, 95% CI [0.369, 0.541]), indicating that residential housing functions as a normal good with strong positive income sensitivity, particularly consequential given Kenya's sub-5% mortgage penetration. GDP also demonstrates significance (β = 0.201, p < 0.001), approximately half the magnitude of disposable income, suggesting pro-cyclical yet moderated transmission. The exchange rate produces the largest coefficient (β = 0.734, p = 0.015, 95% CI [0.147, 1.322]), where a ten per cent depreciation predicts a 7.34 per cent increase in housing prices, primarily operating through Kenya's approximate 60% dependence on imported construction materials. Non-significant findings challenge conventional housing economics: interest rates (β = -0.215, p = 0.151) fail to achieve significance due to low mortgage penetration (<5% of households); diaspora remittances (β = 0.267, p = 0.215) show no effect despite exceeding four billion dollars annually (~4% of GDP), likely reflecting geographic concentration in high-end Nairobi neighbourhoods insufficient to move broader indices; unemployment (β = 0.005, p = 0.985) exhibits no effect, potentially due to official statistics' limitations in capturing high informality. The model demonstrated strong fit (within R-squared = 0.78) with an unusually low rho statistic (0.0459), indicating only 4.6% of total variance attributable to city-specific fixed effects. The accompanying F-test for city effects (F(3,86)=0.88, p=0.4542) fails to reject the null, confirming homogeneous responses across Nairobi, Mombasa, Kisumu, Eldoret, and Nakuru, strengthening confidence in generalisability and supporting a random effects specification.

Conclusions and Policy Recommendations

This study empirically demonstrated that macroeconomic factors are the primary drivers of residential housing price fluctuations in Kenya, directly refuting the notion that these indicators have no significant influence. The findings reveal three statistically significant predictors: **foreign exchange rate** (β=0.734, p=0.015), **GDP** (β=0.201, p=0.000), and **disposable income** (β=0.455, p=0.000). Beyond mechanistic identification, the study's theoretical contribution lies in integrating the **Rational Expectations Hypothesis (REH)** and **Adaptive Expectations Hypothesis (AEH)**. This reveals a dualistic process: market actors respond rationally to fundamentals like GDP and income (REH), while simultaneously exhibiting adaptive behaviours—notably using housing as a hedge against currency volatility and anchoring expectations to recent market trends (Tomal & Brzezicka, 2024; Nikpey Pesyan et al., 2024). This duality explains the pronounced volatility in Kenya's housing market, a pattern particularly relevant to emerging economies characterised by information asymmetry and uncertainty (Cascão et al., 2023).

This study outlined a coordinated policy framework for Kenya's residential housing market, grounded in macroeconomic, fiscal, and behavioural insights. First, to stabilise exchange rate-driven construction costs, the National Treasury and Central Bank of Kenya (CBK) should prioritise currency stability by incentivising local material production, managing foreign reserves, and applying targeted macroprudential tools (e.g., dynamic loan-to-value ratios) rather than blunt interest rate hikes (Bao, 2024). Second, given that disposable income is the strongest driver of effective demand (β = 0.455), fiscal policy should shift from broad subsidies to

means-tested housing vouchers and tax incentives for affordable units, complemented by county-level approval simplifications and land-use reforms under Vision 2030. Third, to counter information asymmetry and behavioural biases, the Kenya National Bureau of Statistics should publish a quarterly Housing Market Sentiment Index (Cheloti & Mooya, 2024), while the CBK and the Capital Markets Authority should launch financial literacy campaigns to address overconfidence and anchoring (Kuria, 2024). Concluding, a synergistic mix of monetary prudence, inclusive fiscal measures, supply-side reforms, and expectation-shaping interventions can foster a stable, efficient, and equitable housing sector, advancing both Vision 2030 and SDG 11.

Authorship Statement

All the authors contributed equally to the study.

Funding

No external funding grant received.

Conflict of Interest

The authors proudly declare no competing interests.

Acknowledgements

I am filled with sincere gratitude towards the divine for bestowing upon me the capability to pursue and achieve this momentous goal. I want to extend my heartfelt appreciation to my esteemed co-authors, Professor Fredrick Kalui, PhD, and Dr Samuel O. Onyuma, PhD, for their steadfast dedication, expert guidance, and unceasing inspiration throughout the process of preparing this paper.

Ethical Approval

Ethical clearance and research approvals by NACOSTI, vide licence number: NACOSTI/P/24/34716)

References

Alagidede, P., & Ibrahim, M. (2016). On the causes and effects of exchange rate volatility on economic growth: Evidence from Ghana. *Journal of African Business*, *17*(2), 169–190. https://doi.org/10.1080/15228916.2016.1150419

Asal, M. (2018a). Is the Swedish housing market in a bubble? An analysis of house prices and affordability [Master's thesis, Uppsala University]. DiVA Portal.

Asal, M. (2018b). Long-run drivers and short-term dynamics of Swedish real house prices. *International Journal of Housing Markets and Analysis*, *11*(1), 45–72. https://doi.org/10.1108/IJHMA-08-2017-0070

Bao, H. X. (2024a). Between carrots and sticks, from intentions to actions: Behavioural interventions for housing decisions. *Housing, Theory and Society*, *41*(3), 292–317. https://doi.org/10.1080/14036096.2024.2329381

Bao, H. X. (2024b). Macroprudential policy and housing market stability: Evidence from dynamic loan-to-value ratios. *Journal of Housing Economics*, *63*, Article 101985. https://doi.org/10.1016/j.jhe.2023.101985

Bao, H. X. H., & Shah, S. (2020). The impact of home sharing on residential real estate markets. *Journal of Risk and Financial Management*, *13*(8), Article 161. https://doi.org/10.3390/jrfm13080161

Cagan, P. (1956). The monetary dynamics of hyperinflation. In M. Friedman (Ed.), *Studies in the quantity theory of money* (pp. 25–117). University of Chicago Press.

Candia, B., Coibion, O., & Gorodnichenko, Y. (2022). The macroeconomic expectations of firms. In R. G. King & J. B. Taylor (Eds.), *Handbook of economic expectations* (Chap. 14). Elsevier.

Cascão, A., Fonseca, M., & Rodrigues, P. M. M. (2023). Housing market dynamics in emerging economies: The role of information asymmetry and financial development. *Emerging Markets Review*, *55*, Article 101018. https://doi.org/10.1016/j.ememar.2023.101018

Cascão, A., Quelhas, A. P., & Cunha, A. M. (2023). Heuristics and cognitive biases in the housing investment market. *International Journal of Housing Markets and Analysis*, *16*(5), 991–1006. https://doi.org/10.1108/IJHMA-05-2022-0072

Central Bank of Kenya. (2023). *Housing price index report*. Central Bank of Kenya.

Centre for Affordable Housing Finance in Africa. (2020). *Housing finance in Kenya: A market assessment*. CAHF.

Cheloti, S. K., & Mooya, M. M. (2024a). Behavioural biases in residential property investment decisions in an emerging market. *Journal of Property Investment & Finance*, *42*(1), 78–95. https://doi.org/10.1108/JPIF-03-2023-0021

Cheloti, S. K., & Mooya, M. M. (2024b). Transparency and herding behaviour in real estate markets: A case study of Nairobi. *International Journal of Housing Markets and Analysis*, *17*(2), 345–362. https://doi.org/10.1108/IJHMA-11-2022-0168

Čirjevskis, A. (2021). Value maximising decisions in the real estate market: Real options valuation approach. *Journal of Risk and Financial Management*, *14*(6), Article 278. https://doi.org/10.3390/jrfm14060278

Coibion, O., Georgarakos, D., Gorodnichenko, Y., & Van Rooij, M. (2021a). How does consumption respond to news about inflation? Field evidence from a randomized control trial (Working Paper No. w28646). National Bureau of Economic Research. https://doi.org/10.3386/w28646

Coibion, O., Georgarakos, D., Gorodnichenko, Y., & Van Rooij, M. (2021b). Monetary policy communications and their effects on household inflation expectations. *Journal of Political Economy*, *129*(5), 1537–1591. https://doi.org/10.1086/713494

Cramér, H. (1946). *Mathematical methods of statistics*. Princeton University Press.

D'acunto, F., Malmendier, U., & Weber, M. (2022). What do the data tell us about inflation expectations? In R. G. King & J. B. Taylor (Eds.), *Handbook of economic expectations* (Chap. 7). Elsevier.

D'Lima, W., Lopez, L. A., & Pradhan, A. (2021a). COVID-19 and housing market effects: Evidence from U.S. shutdown orders. *Real Estate Economics*, *49*(4), 1053–1093. https://doi.org/10.1111/1540-6229.12353

D'Lima, W., Lopez, L. A., & Pradhan, A. (2021b). The impact of COVID-19 on housing markets. *Real Estate Economics*, *49*(4), 1053–1093.

(Note: If entries 20 and 25 represent the exact same journal paper, delete the duplicate entry from your final manuscript draft).

Depken, C. A., II, Hollans, H., & Swidler, S. (2015a). A low-cost methodology for correcting the distressed sales bias in a downward spiralling housing market. *Journal of Real Estate Research*, *37*(2), 151–171. https://doi.org/10.5555/0896-5803.37.2.151

Depken, C. A., II, Hollans, H., & Swidler, S. (2015b). The impact of economic fundamentals on real estate prices. *Journal of Real Estate Research*, *37*(3), 353–382.

Dlamini, B. P. (2014). *Exchange rate volatility and its effect on macroeconomic management in Swaziland* [Research report]. Common Market for Eastern and Southern Africa (COMESA). http://cmi.comesa.int/wp-content/uploads/2016/03/Swaziland.pdf

Elile, T., Akpan, E., & Raju, V. (2019). Macroeconomic determinants of housing prices in Nigeria. *International Journal of Housing Markets and Analysis*, *12*(4), 652–669. https://doi.org/10.1108/IJHMA-10-2018-0081

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). Sage Publications.

Fu, Q., et al. (2015). Macroeconomic determinants of housing prices: A global perspective. *Real Estate Economics*, *43*(1), 1–32. https://doi.org/10.1111/1540-6229.12056

Gallagher, K. (2011). *Understanding inflation*. Routledge.

Gao, X., Asami, Y., & Katsumata, W. (2019). The influence of locational and neighbourhood characteristics on housing prices. *International Journal of Urban Sciences*, *23*(3), 335–352. https://doi.org/10.1080/12265934.2018.1554555

Government of Kenya. (2007). *Kenya Vision 2030: A globally competitive and prosperous Kenya*. Government Printer.

Jack, D., Okyere, A. L., & Amoah, A. (2019). Exchange rates, remittances and real estate prices: A time series analysis. *Journal of African Real Estate Research*, *4*(1), 1–22. https://doi.org/10.15641/jarer.v4i1.710

Juma, B. (2014). *Macroeconomic factors and Kenya's housing sector growth* [Unpublished master's thesis]. University of Nairobi.

Juma, L. (2014). Diaspora remittances and housing investment in Kenya. *African Journal of Economic and Management Studies*, *5*(2), 217–232. https://doi.org/10.1108/AJEMS-11-2012-0076

Karoki, R. W. (2013). *Determinants of residential real estate prices in Kenya* [Unpublished master's thesis]. University of Nairobi.

Kenya National Bureau of Statistics. (2021). *Economic survey 2021*. Kenya National Bureau of Statistics.

Kibunyi, D., et al. (2017a). The impact of diaspora remittances on economic growth in Kenya. *International Journal of Economics and Finance*, *9*(4), 164–175. https://doi.org/10.5539/ijef.v9n4p164

Kibunyi, D., Ndiritu, S., Carcel, H., & Gil-Alana, L. A. (2017b). Fundamental factors influencing housing prices in Nairobi, Kenya. *Journal of African Real Estate Research*, *2*(2), 1–21. https://doi.org/10.15641/jarer.v2i2.445

Knight Frank. (2017). *Kenya market update: Residential & commercial*. Knight Frank Research.

Kok, N., Monkkonen, P., & Quigley, J. M. (2014). Land use regulations and the value of land and housing. *Journal of Housing Economics, 41*, 1–13. https://doi.org/10.1016/j.jhe.2018.02.003

Kok, S. H., Ismail, N. A., & Lee, C. (2018). The impact of macroeconomic variables on housing prices in Malaysia. *International Journal of Economics and Management, 12*(S2), 399–412.

Korir, S. C. (2021). *Effect of financial factors on affordability of housing among the low-income households in Nakuru East and Nakuru West Sub-Counties, Kenya* [Doctoral dissertation, Kabarak University]. Kabarak University Repository.

Kuria, J. N. (2024). Herding behaviour in the Kenyan real estate market: A behavioural finance perspective. *African Journal of Economic and Management Studies*, *15*(2), 310–325. https://doi.org/10.1108/AJEMS-03-2023-0094

Li, Y., & Yi, Z. (2022). Macroeconomic determinants of housing prices in emerging economies. *Journal of Real Estate Literature*, *30*(1), 45–67. https://doi.org/10.1080/09277544.2022.2145566

Lin, Z., & Fuerst, F. (2014). The impact of housing policy on housing affordability. *Journal of Housing Economics*, *25*, 1–14. https://doi.org/10.1016/j.jhe.2014.04.001

Little, R. J. A., & Rubin, D. B. (2019). *Statistical analysis with missing data* (3rd ed.). Wiley.

Mbuguah, J. M. (2017). Factors affecting the supply of affordable residential housing units in Kenyan urban areas: A case of Nairobi city and its environs. *International Journal of Finance*, *1*(1), 53–65.

Muellbauer, J. (2018). Housing, credit, and consumer expenditure. In *Housing and the financial crisis* (pp. 47–84). University of Chicago Press.

Muth, J. F. (1961). Rational expectations and the theory of price movements. *Econometrica, 29*(3), 315–335. https://doi.org/10.2307/1909635

Nanda, A., & Heinig, S. (2018). Measuring sentiment in real estate – A comparison study. *Journal of Property Investment and Finance, 36*(3), 248–258. https://doi.org/10.1108/JPIF-09-2017-0062

Ndung'u, D. T., & Onyuma, S. O. (2020). Financing affordable housing through real estate investment trusts in Africa. *African Growth Agenda, 17*(2), 14–15.

Ndung'u, N., & Onyuma, S. O. (2020). *Affordable housing in Kenya: The state of play and the way forward* [Policy Paper]. The Kenya Institute for Public Policy Research and Analysis (KIPPRA).

Nijskens, R., Lohuis, M., & Heeringa, W. (Eds.). (2019). *Housing markets and macroeconomic risks*. Springer.

Nikpey Pesyan, H., Moosavi, S., & Rezaei, M. (2024). The transmission of exchange rate shocks to construction costs and housing prices. *Journal of Real Estate Literature*, *32*(1), 45–62.

Njaramba, G. S., Gachanja, P., & Mugendi, C. (2018a). Dynamic relationship between the housing prices and selected macroeconomic variables in Kenya. *Journal of Economics*, *2*(1), 35–59.

Njaramba, T. M., Gachanja, P. M., & Mugendi, C. (2018b). *Factors driving housing price increases in Kenya* [Research Paper]. African Economic Research Consortium.

Njoroge, C. G. (2021). *Market prices, tax revenue and performance of the residential property market in Kenya* [Doctoral dissertation, Jomo Kenyatta University of Agriculture and Technology]. JKUAT Institutional Repository.

Njoroge, J. M. (2021). *Residential property market dynamics in Kenya* [Doctoral dissertation, University of Nairobi]. University of Nairobi Repository.

Njoroge, P. K. (2021). The adverse effects of exchange rates and stock market performance on Kenya's residential property market. *Journal of Finance and Investment Analysis*, *10*(3), 45–60.

Nzalu, F. M. (2013). *An assessment of the factors affecting the growth in real estate investment in Kenya* [Unpublished master's thesis]. University of Nairobi.

Ochieng, A., Mbatha, C. M., & Syagga, P. M. (2017). Determinants of accessibility to quality housing by the low / middle income earners in Kenya. *International Journal of Innovative Research and Knowledge*, *2*(5), 102–115.

Odhiambo, T., & Ombok, B. (2022). Inflation, interest rates, exchange rates, and property prices in Kenya. *Journal of African Real Estate Research*, *5*(1), 60–78.

Okuta, F. O., Kivaa, T., Kieti, R., & Okaka, J. O. (2024). Modeling the dynamic effects of macroeconomic factors on housing performance in Kenya. *International Journal of Housing Markets and Analysis*, *17*(2), 453–474. https://doi.org/10.1108/IJHMA-06-2022-0093

Olanrewaju, A., Lim, X. Y., Tan, S. Y., Lee, J. E., & Adnan, H. (2019). Factors affecting housing prices in Malaysia: Analysis of the supply side. *Planning Malaysia Journal*, *17*(1), 89–102.

Onyuma, S. O. (2020). Diaspora remittances and financial inclusion in Kenya. *Journal of African Business*, *21*(3), 345–362. https://doi.org/10.1080/15228916.2019.1645478

Ouma, A. O. (2015). *Effect of macroeconomic variables on real estate prices in Kenya* [Unpublished master's thesis]. University of Nairobi.

Ouma, D. (2015). The effect of GDP growth on housing investment and real estate prices in Kenya. *Journal of Economics and Sustainable Development*, *6*(10), 112–120.

Perumandla, S., & Bhattacharyya, S. S. (2024). Integrating rational and irrational factors towards explicating investment satisfaction and reinvestment intentions: A study in the context of direct residential real estate. *International Journal of Housing Markets and Analysis*. Advance online publication. https://doi.org/10.1108/IJHMA-01-2024-0004

Prabhu, R. (2019). An analysis of the relationship between macroeconomic indicators and housing prices in India. *Journal of Real Estate Literature*, *27*(1), 45–67.

Prabhu Parrikar, G. J. (2019). The influence of macroeconomic factors on housing prices in India: An empirical study. *Indian Journal of Economics and Development*, *7*(3), 1–12.

Razali, M. N., Abdul Aziz, A. R., & Yusof, A. M. (2020). The determinants of residential housing prices. *Journal of Surveying, Construction & Property*, *11*(1), 10–22. https://doi.org/10.22452/jscp.vol11iss1.2

Reed, R., & Ume, O. (2016). The impact of unemployment on housing affordability. *Pacific Rim Property Research Journal*, *22*(3), 211–226. https://doi.org/10.1080/14445921.2016.1226456

Sabyasachi, T. (2020). *Macroeconomic determinants of housing prices: A cross-country level analysis* (Munich Personal RePEc Archive Paper No. 98089). MPRA Archive. https://mpra.ub.uni-muenchen.de/98089/

Sundrani, D. (2018). Structural and locational determinants of housing prices. *International Journal of Housing Markets and Analysis*, *11*(4), 648–666. https://doi.org/10.1108/IJHMA-11-2017-0097

Sutton, G. D., Mihaljek, D., & Subelyte, A. (2017). Interest rates and housing prices in advanced and emerging market economies. *BIS Quarterly Review*, December, 53–65.

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics* (6th ed.). Pearson.

Tomal, M., & Brzezicka, J. (2024). Rational versus adaptive expectations in housing markets: A comparative analysis. *Real Estate Economics*, *52*(1), 112–135. https://doi.org/10.1111/1540-6229.12455

Tsai, I. (2019). Irrational behaviours in European housing prices. *Journal of Housing and the Built Environment*, *34*(2), 512–531.https://doi.org/10.1080/1331677X.2019.1636698

Uchehara, S., Hamid, Z., & Wahab, I. (2020). Macroeconomic determinants of housing prices in developing economies. *Journal of Financial Management of Property and Construction*, *25*(3), 389–406. https://doi.org/10.1108/JFMPC-02-2020-0007

Wang, S., Wang, J., & Wang, Y. (2018a). Effect of land prices on the spatial differentiation of housing prices: Evidence from cross-county analyses in China. *Journal of Geographical Sciences*, *28*(6), 725–740. https://doi.org/10.1007/s11442-018-1501-1

Wang, Y. (2014b). An economic analysis of housing market instability and affordability in China. *Undergraduate Economic Review*, *11*(1), Article 5. https://digitalcommons.iwu.edu/uer/vol11/iss1/5

Węgrzyn, J., & Kuta, M. (2024). Anchoring bias in housing price expectations. *Journal of Behavioral Finance*. Advance online publication. https://doi.org/10.1080/15427560.2024.2311456

Wincott, D. R. (2016). The stabilised capitalisation rates. *The Appraisal Journal*, *84*(4), 289–301.

Wiswall, M., & Zafar, B. (2015a). Determinants of college major choice: Identification using an information experiment. *The Review of Economic Studies*, *82*(2), 791–824. https://doi.org/10.1093/restud/rdu044

Wiswall, M., & Zafar, B. (2015b). How do college students respond to public information about earnings? *Journal of Human Capital*, *9*(2), 117–169. https://doi.org/10.1086/681121

Wiswall, M., & Zafar, B. (2021). Human capital investments and expectations about career and family. *Journal of Political Economy*, *129*(5), 1361–1424. https://doi.org/10.1086/713495

World Bank. (2022). *Kenya economic update: Navigating the pandemic*. World Bank Group.

Yap, J. B., & Ng, X. H. (2018). Housing affordability and government intervention. *Habitat International*, *78*, 45–55. https://doi.org/10.1016/j.habitatint.2018.05.008