THE EFFECT OF GEOPOLITICAL ZONES AND BUILDING STRUCTURES ON HOUSE PRICING IN NIGERIA

BY;

DUROSARO AFEEZ ADEOLA

HND/23/STA/FT/0019

PRESENTED TO

DEPARTMENT OF STATISTICS,

INSTITUTE OF APPLIED SCIENCES,

KWARA STATE POLYTECHNIC, ILORIN.

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF HIGHER NATIONAL DIPLOMA (HND) IN STATISTICS.

JUNE, 2025

CERTIFICATION

This is to certify you that this project was carried out by DUROSARO AFEEZ ADEOLA (HND/23/STA/FT/0019), has been read and approved as meeting the requirements in partial fulfilment of the award of Higher National Diploma (HND) in statistics, Institute of Applied Sciences, Kwara State Polytechnic, Ilorin.

…… …….

MISS AJIBOYE, R. A DATE

(PROJECT SUPERVISOR)

…….. …….

MISS AJIBOYE, R. A DATE

(PROJECT CORDINATOR)

…….. ……..

MRS. ELEPO, T. A DATE

(HEAD OF DEPARTMENT)

…… ……...

EXTERNAL EXAMINER DATE

DEDICATION

This project is dedicated to Almighty Allah for his merciful supervision over me throughout my stay on campus, granting me wisdom, knowledge and understanding towards the successful completion of my HIGHER NATIONAL DIPLOMA (HND). I also dedicate this milestone to my parents MR. and MRS. DUROSARO, my siblings RILWAN and ABDULRASAK for their guidance and support during this academic program.

AKNOWLEDGEMENT

I would love to express my sincere gratitude to my project supervisor, MISS AJIBOYE, R. A., for her motherly guidance and support throughout this project and my entirely 5years in this citadel of learning.

I also appreciate the HOD of my department MRS ELEPO, and also to every lecturer in the Department of Statistics who has impacted knowledge in me and cubed me to be a statistician that I have become. To the friends I made during my stay on campus, from my closest friend on campus and brother IDOWU MALIK OLAYINKA, my statistician gurus ABDULLAHI KAOSARAH AJOKE and ISHOLA AJARAT, who has significantly impacted in me through tutorials and lessons.

Lastly to my brother from another mother OLASUPO MALIK ABAYOMI who has been with me throughout this journey. I pray Allah rewards each and every one of them abundantly.

ABSTRACT

This study analyzes the key determinants of house prices using a Generalized Linear Model (GLM) with a Gamma distribution and log link function. The model focuses on structural property attributes (number of bedrooms, bathrooms, toilets, and parking spaces) and geopolitical zones to understand their impact on pricing variations. The results identify significant structural factors influencing house prices and examine the effect of geopolitical zones on house price variations. The study also assesses the suitability of the Gamma distribution with a log link function in modeling house prices, providing insights for policymakers, investors, and homeowners. The findings contribute to a better understanding of the housing market and inform decision-making processes.

Keywords: House prices, Generalized Linear Model (GLM), Gamma distribution, Log link function, Structural property attributes, Geopolitical zones.

TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

The real estate market plays a vital role in the Nigeria economy, and understanding the factors influencing house prices are crucial for stakeholders. One significant factor that can impact house prices is the geopolitical zone in which a property is located. House prices are influenced by a complex array of factors, including structural property attributes such as the number of bedrooms and bathrooms, and geographical location, which can impact desirability, accessibility, services, opportunities and amenities making some area sore desirable than others.

The relationship between geopolitical zones and housing properties is influenced by various factors, including zoning regulations, economic conditions, and demographic trends. Zoning regulations, in particular, play a crucial role in determining housing prices and property values. Research has shown that zoning regulations can have a price-increasing effect on housing if the government uses supply-side regulations, while regulations that focus on characteristics can have a price-decreasing effect.

Studies have also shown that geopolitical zones can impact housing prices through their effect on local amenities and services. For example, areas with good schools, transportation links, and access to healthcare and other amenities tend to have higher housing prices. Conversely, areas with limited access to these amenities may have lower housing prices.

1.2 STATEMENT OF PROBLEMS

The effects of geopolitical zones on house pricing pose several challenges, including:

1. **Inconsistent pricing patterns:** House prices vary significantly across different geopolitical zones, making it challenging to identify the underlying factors driving these differences.

2. **Limited understanding of zone-specific factors:** There is a lack of comprehensive understanding of the specific factors that influence house prices in different geopolitical zones.

3. **Difficulty in predicting price trends:** Predicting house price trends in different geopolitical zones is challenging due to the complex interplay of various factors, including economic conditions, government policies, and demographic trends.

4. **Inequitable access to housing:** The impact of geopolitical zones on house prices can lead to inequitable access to housing, with some zones being more desirable and affordable than others.

5. **Informing policy decisions:** Policymakers face challenges in developing effective policies to address the unique housing needs of different geopolitical zones.

1.3 AIMS AND OBJECTIVES

AIMS

The aim of this study is to analyze the key determinants of house prices using a Generalized Linear Model (GLM) with a Gamma distribution and log link function, focusing on structural property attributes and geopolitical zones to understand their impact on pricing variations.

OBJECTIVES

1. To identify the significant structural factors (toilet, bedrooms, bathrooms, parking spaces) influencing house prices.
2. To examine the effect of geopolitical zones on house price variations across different regions.
3. To assess the suitability of the Gamma distribution with a log link function in modelling house prices.

1.4 RESEARCH QUESTIONS

1. Does the price of housing differ across geopolitical zones in Nigeria?

2. How does the structure of building i.e number of bedrooms, bathrooms, toilets and parking space influence house prices variations across different geopolitical zones?

3. Can a Generalized Linear Model (GLM) WITH Gamma distribution and Log link function accurately model house prices in different geopolitical zones?

4. What is the relationship between geopolitical zones and the structural factors that affects the house pricing in Nigeria.

1.5 HYPOTHESIS OF THE STUDY

The hypothesis would be tested using Generalized Linear Modelling to determine the effect of geopolitical zones in the pricing of houses.

$\boldsymbol{H_0}$**:** There is no significant difference in house prices across different geopolitical zones in Nigeria.

$\boldsymbol{H_1}$**:** There is significant difference in house prices across different geopolitical zones in Nigeria.

1.6 SIGNIFICANCE OF STUDY

Understanding the effect of geopolitical zones on housing properties is essential for policymakers, investors, and homeowners. By analyzing the relationship between geopolitical zones and housing prices, stakeholders can make informed decisions about investments, policy interventions, and housing development strategies.

The findings of this study can have significant implications for:

- **Policymaking**: By understanding the impact of geopolitical zones on housing prices, policymakers can develop more effective policies to promote affordable housing, reduce inequality, and stimulate economic growth.

- **Investment**: Investors can use the findings of this study to make informed decisions about investments in the housing market, taking into account the potential impact of geopolitical zones on property values.

- **Housing Development:** Housing developers can use the findings of this study to identify areas with high demand for housing and to develop strategies to meet the needs of different demographic groups.

1.7.1 SCOPE AND LIMITATIONS OF STUDY

The scope of this study includes:

1. **Geopolitical zones in Nigeria:** The study focuses on the effects of geopolitical zones on housing properties in Nigeria.

2. **Housing prices and property structure:** The study examines the relationship between geopolitical zones and housing prices, as well as property structure such as bedrooms, bathrooms, toilets and parking spaces.

3. **Determinants of house prices:** The study investigates the key factors that determine house prices in different geopolitical zones.

1.7.2 LIMITATIONS

The limitations of this study include:

1. **Data availability and quality:** The study may be limited by the availability and quality of data on housing prices and property values in Nigeria.

2. **Generalizability:** The findings of the study may not be generalizable to other countries or regions with different geopolitical zone characteristics.

3. **Methodological limitations**: The study may be limited by the choice of methodology, including the use of a Generalized Linear Model (GLM) with a Gamma distribution and log link function.

4. **Zone-specific factors:** The study may not capture all the zone-specific factors that influence housing prices and property values.

5. **Temporal scope:** The study may be limited to a specific time period, which may not capture long-term trends or changes in the housing market.

1.8 DEFINATION OF TERMS

1. **Geopolitical Zones**: Regions or areas defined by geographical, economic, or political boundaries that can impact housing prices and property values.

2. **Housing Properties:** Residential properties, including single-family homes, apartments, and other types of dwellings.

3. **Hedonic Pricing Model:** A theoretical framework that posits that housing prices are influenced by various factors, including structural characteristics, locational attributes, and neighborhood characteristics.

4. **Locational Attributes:** Characteristics of a location that can impact housing prices, such as proximity to amenities and services.

5. **Neighborhood Characteristics:** Features of a neighborhood that can influence housing prices, such as safety, schools, and community amenities.

6. **Housing Prices:** The monetary value of residential properties.

7. **Property Values:** The economic value of residential properties, including land and improvements.

CHAPTER TWO

2.0 LITERATURE REVIEW

The relationship between geopolitical zones and housing properties has been extensively studied in various contexts. This literature review aims to provide a comprehensive overview of the existing research on this topic.

2.1 THEORETICAL FRAMEWORKS

The hedonic pricing model is a widely used theoretical framework for understanding the relationship between housing prices and various factors, including structural characteristics, locational attributes, and neighborhood characteristics (Rosen, 1974). This model posits that housing prices are influenced by a bundle of attributes, including the physical characteristics of the property, the location, and the neighborhood.

2.2 EMPIRICAL EVIDENCE

Numerous studies have examined the impact of geopolitical zones on housing prices. For example, a study on the effect of school zones on housing prices in New Zealand found that the school zones' first downsizing had a negative effect on housing prices, decreasing prices between 2.1% and 7.2% (Ferguson et al., 2018). Another study on the relationship between residential property prices and its determinants in Malaysia found a strong relationship between residential property prices and its determinants, with geographically varying relationships between property prices and locational attributes (Salleh et al., 2017).

2.3 GEOPOLITICAL ZONE EFFECTS

Research has shown that geopolitical zones can impact housing prices due to regional differences in economic development, infrastructure, and policy. For example, a study on the impact of geopolitical zones on housing prices in Nigeria found that the zones had a significant impact on housing prices, with areas with good infrastructure and amenities commanding higher prices (Adebayo, 2018).

2.4 ZONING REGULATIONS

Zoning regulations are a key factor that can influence housing prices. Research has shown that zoning regulations can have a price-increasing effect on housing if the government uses supply-side regulations, while regulations that focus on characteristics can have a price-decreasing effect (Quigley & Rosenthal, 2005).

2.5 SUMMARY OF REVIEW

The literature review highlights the complex relationship between geopolitical zones and housing properties. Further research is needed to explore the impact of geopolitical zones on property values and to inform policymaking, investment, and housing development strategies.

CHAPTER THREE

3.1 METHODOLOGY

This chapter will employ a quantitative research approach to analyze the key determinants of house prices using a Generalized Linear Model (GLM) with a Gamma distribution and log link function and shows the relationship between geopolitical zones and house structures i.e number of bedrooms, bathrooms, toilets and parking spaces

3.2 DATA COLLECTION

The study will utilize secondary data on house prices and property attributes from a reliable source, such as a real estate database or government records. The data will include:

1. **House prices:** The dependent variable, representing the price of each house.
2. **Structural property attributes:** Independent variables, including:
   - Number of bedrooms
   - Number of bathrooms
   - Number of parking spaces
   - Other relevant attributes
3. **Geopolitical zones:** Independent variable, representing the region or zone where each house is located.

3.3. DATA ANALYSIS

The study will employ the following statistical techniques:

1. **Descriptive statistics:** To summarize and describe the characteristics of the data.

2. **Generalized Linear Model (GLM):** With a Gamma distribution and log link function, to model the relationship between house prices and the independent variables.

3. **Model diagnostics:** To assess the suitability of the Gamma distribution with a log link function in modeling house prices.

3.2. MODEL SPECIFICATION

The GLM model will be specified as follows:

House Price = $\beta 0 + \beta 1$ (Bedrooms) + $\beta 2$ (Bathrooms) + $\beta 3$ (Parking Spaces) + $\beta 4$ (Geopolitical Zone) + ε

Where:

- $\beta 0$ is the intercept
- $\beta 1$, $\beta 2$, $\beta 3$, and $\beta 4$ are the coefficients for each independent variable
- ε is the error term

3.3. MODEL ESTIMATION

The model will be estimate and evaluate the performance using various metrics, including:

-**Scaled Deviance**: To assess the fit of the model

-**Pearson Chi-Square:** To assess the test for independence between variables

-**Scaled Pearson Chi-Square:** To assess goodness-of-fit of the model as a modification of Pearson Chi-Square

-**Log Likelihood**: Used to derive the maximum likelihood estimator (MLE) of the parameters

-**Akaike's Information Criterion (AIC):** To assess the relative quality of the model

-**Finite Sample Corrected AIC (AICC):** To assess the comparison of the quality of the model

-**Bayesian Information Criterion (BIC):** To assess the relative quality of the model.

-**Consistent AIC (CAIC):** To assess the evaluation of the model

-**Residual analysis**: To check for any deviations from the assumptions of the GLM.

3.4 EXPECTED OUTCOMES

The methodology aims to:

1. Identify the significant structural factors influencing house prices.
2. Examine the effect of geopolitical zones on house price variation.
3. Assess the suitability of the Gamma distribution with a log link function in modeling house prices.

By employing a GLM with a Gamma distribution and log link function, this study aims to provide a comprehensive understanding of the key determinants of house prices and the impact of geopolitical zones on pricing variations.

CHAPTER FOUR

4.0 DATA ANALYSIS

House prices are influenced by a variety of factors, including structural attributes, location, and regional economic conditions. Understanding these determinants is crucial for real estate investors, policymakers, and property developers to make informed decisions. Traditional linear regression models often struggle with the skewed nature of house price distributions, making alternative modelling techniques more suitable. This study employs a Generalized Linear Model (GLM) with a Gamma distribution and log link function to better capture the relationship between house prices and their key predictors. By incorporating structural variables such as the number of bedrooms, bathrooms, parking spaces, and regional variations across Nigeria's geopolitical zones

Model Information

Dependent Variable	Price
Probability Distribution	Gamma
Link Function	Log

Categorical Variable Information

			N	Percent
Factor	Geopolitical Zone	North Central	3553	14.6%

	North East	2	0.01%
	North West	27	0.1%
	South East	528	2.2%
	South South	636	2.6%
	South West	19580	80.5%
	Total	24326	100.0%

The **Geopolitical Zone** variable in the **Gamma GLM (log link)** model represents regional differences in the dataset, with a total of **24,326 observations**. The data is highly skewed, with the **South West (80.5%)** being the most dominant group, while the **North East (0.01%)** and **North West (0.1%)** have extremely low representation. The **North Central (14.6%)**, **South East (2.2%)**, and **South South (2.6%)** have moderate representation, allowing for more stable estimates. Since the **Gamma GLM with a log link** models a **positive, right-skewed dependent variable**, the estimated coefficients for each region reflect their multiplicative effect on the outcome variable relative to the reference category. Given the severe class imbalance, model estimates will be primarily driven by the **South West.**

Continuous Variable Information

		N	Minimum	Maximum	Mean	Std. Deviation
Dependent Variable	price	24326	90000.0	1800000000000.0	301380208.472	12204027269.3809
Covariate	bedrooms	24326	1.0	9.0	4.339	1.1385
	bathrooms	24326	1.0	9.0	4.601	1.1632
	toilets	24326	1.0	9.0	5.176	1.2263
	parking_space	24326	1.0	9.0	4.042	1.3999

The Continuous Variable Information provides insights into the distribution of house prices and key structural property attributes. The dependent variable (price) exhibits extreme variation, ranging from ₦90,000 to ₦1.8 trillion, with a mean price of ₦301,380,208.47 and a very high standard deviation of ₦12,204,027,269.38, indicating significant price dispersion and a highly skewed distribution. Among the covariates, the number of bedrooms, bathrooms, toilets, and parking spaces ranges from 1 to 9, with mean values of 4.34, 4.60, 5.18, and 4.04, respectively. The relatively small standard deviations suggest that most properties have similar structural characteristics, though variations exist. These findings support the use of the Gamma distribution, which is suitable for modelling positively skewed data like house prices.

Model Estimation

MODEL 1

Goodness of Fit[a]

	Value	df	Value/df
Deviance	41013.108	24316	1.687
Scaled Deviance	29317.057	24316	
Pearson Chi-Square	8985751.192	24316	369.541
Scaled Pearson Chi-Square	6423209.315	24316	
Log Likelihood[b]	-490201.365		
Akaike's Information Criterion (AIC)	980424.730		
Finite Sample Corrected AIC (AICC)	980424.741		
Bayesian Information Criterion (BIC)	980513.823		
Consistent AIC (CAIC)	980524.823		

Tests of Model Effects

Source	Type III Wald Chi-Square	df	Sig.
(Intercept)	12105.508	1	.000
Geopolitical Zone	520.514	5	.000
bedrooms	1820.547	1	.000
bathrooms	7.211	1	.007
toilets	.028	1	.868
parking space	692.243	1	.000

MODEL 2

Goodness of Fit[a]

	Value	df	Value/df
Deviance	66051.419	24303	2.718
Scaled Deviance	86682.228	24303	

Pearson Chi-Square	50933832.611	24303	2095.784
Scaled Pearson Chi-Square	66842743.673	24303	
Log Likelihood[b]	-510310.407		
Akaike's Information Criterion (AIC)	1020668.813		
Finite Sample Corrected AIC (AICC)	1020668.863		
Bayesian Information Criterion (BIC)	1020863.197		
Consistent AIC (CAIC)	1020887.197		

Tests of Model Effects

	Type III		
Source	Wald Chi-Square	df	Sig.
(Intercept)	.[a]	.	.
Geopolitical Zone	189.170	4	.000
bedrooms	65.510	1	.000
bathrooms	7.512	1	.006
toilets	759.869	1	.000
parking space	.955	1	.329

Geopolitical Zone * bedrooms	93.454	4	.000
Geopolitical Zone * bathrooms	15.950	4	.003
Geopolitical Zone * parking space	88.401	4	.000

Model 3

Goodness of Fit[a]

	Value	df	Value/df
Deviance	64741.817	24295	2.665
Scaled Deviance	85191.404	24295	
Pearson Chi-Square	47966304.43	24295	1974.328
Scaled Pearson Chi-Square	63117116.42	24295	
Log Likelihood[b]	-509528.488		
Akaike's Information Criterion (AIC)	1019120.976		
Finite Sample Corrected AIC (AICC)	1019121.063		
Bayesian Information Criterion (BIC)	1019380.153		
Consistent AIC (CAIC)	1019412.153		

Dependent Variable: price
Model: (Intercept), Geopolitical_Zone, bedrooms, bathrooms, toilets, parking_space, Geopolitical_Zone * bedrooms, Geopolitical_Zone * bathrooms, Geopolitical_Zone * parking_space, bedrooms * bathrooms, Geopolitical_Zone * bedrooms * bathrooms * parking_space, bedrooms * parking_space, bathrooms * parking_space

a. Information criteria are in smaller-is-better form.

b. The full log likelihood function is displayed and used in computing information criteria.

Tests of Model Effects

Source	Type III Wald Chi-Square	df	Sig.
(Intercept)			
Geopolitical Zone	52.293	4	.000
bedrooms	10.645	1	.001
bathrooms	6.928	1	.008
toilets	534.463	1	.000
parking space	13.031	1	.000
Geopolitical Zone * bedrooms	53.438	4	.000
Geopolitical Zone * bathrooms	9.758	4	.045
Geopolitical Zone * parking space	25.358	4	.000
bedrooms * bathrooms	2.032	1	.154
Geopolitical Zone * bedrooms * bathrooms * parking space	6.732	5	.241
bedrooms * parking space	9.872	1	.002

bathrooms * parking space	10.868	1	.001

MODEL SELECTION

Model	AIC	AICc	BIC
Model 1	980424.730	980424.741	980513.823
Model 2	1020668.813	1020668.863	1020863.197
Model 3	**1019120.976**	**1019121.063**	**1019380.153**

The **model s table** compares three models using **AIC, AICc, and BIC**, where lower values indicate a better balance between model fit and complexity. **Model 1 has the lowest AIC (980,424.730), AICc (980,424.741), and BIC (980,513.823), making it the most optimal model** compared to Model 2 and Model 3, which have significantly higher values. Since both **AIC and BIC are low Model 1**, it suggests that this model provides the best trade-off between explanatory power and simplicity. Therefore, **Model 1 is the best model**

Omnibus Test

Omnibus Test[a]

Likelihood Ratio Chi-Square	df	Sig.
9889.735	9	<0.0001

The **Omnibus Test** evaluates the overall significance of the model by comparing it to a null model (a model with no predictors). The **Likelihood Ratio Chi-Square value of 9889.735** with **9 degrees of freedom (df)** and a **p-value (Sig.) of <0.001** indicates that the model is **highly significant**. This means that at least one of the predictor variables in the model contributes significantly to explaining variations in the dependent variable. Therefore, the model provides a significantly better fit to the data.

Model Effect Test

Tests of Model Effects

Source	Type III Wald Chi-Square	df	Sig.
(Intercept)	12105.508	1	.000
bedrooms	1820.547	1	.000
bathrooms	7.211	1	.007
toilets	.028	1	.868
parking_space	692.243	1	.000
Geopolitical_Zone	520.514	5	.000

The Tests of Model Effects table shows that the intercept (χ^2 = 12,105.508, p = 0.000) is highly significant, confirming a meaningful baseline prediction. Among the predictors, bedrooms (χ^2 = 1,820.547, p = 0.000), bathrooms (χ^2 = 7.211, p = 0.007), parking space (χ^2

= 692.243, p = 0.000), and geopolitical zone (χ^2 = 520.514, p = 0.000) significantly influence the house price. However, toilets (χ^2 = 0.028, p = 0.868) is not significant, indicating it does not meaningfully impact the outcome. This suggests that bedrooms, bathrooms, parking space, and location are key determinants, while the number of toilets does not contribute significantly to the model.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	16.760	.0297	16.702	16.818	317817.640	1	<0.0001
Bedrooms	.406	.0095	.387	.425	1820.547	1	<0.0001
Bathrooms	.028	.0105	.008	.049	7.211	1	0.007
Toilets	.001	.0074	-.013	.016	.028	1	0.868
Parking space	.138	.0052	.128	.148	692.243	1	<0.0001
North Central	.112	.0224	.068	.156	24.941	1	<0.0001
North East	-.585	.8364	-2.224	1.055	.489	1	0.485
North West	-1.524	.2279	-1.971	-1.077	44.697	1	<0.0001
South East	-.773	.0527	-.877	-.670	215.484	1	<0.0001
South South	-.707	.0478	-.801	-.614	218.928	1	<0.0001
South West	0[a]	.	.	.	.	.	.
(Scale)	1.399[b]	.0108	1.378	1.420			

The **GLM (Gamma with Log Link) model equation** based on the parameter estimates is:

log(Price)=16.760 + 0.406*Bedrooms + 0.028*Bathrooms + 0.138*Parking Space + 0.112*North Central −1.524 *North West −0.773*South East −0.707* South South.

Since the **South West** region serves as the reference category, its coefficient is **0** and is excluded from the equation.

- The negative coefficients (**North East, North West, South East, South South**) indicate that **houses in these regions are generally cheaper** than in the South West.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. SUMMARY OF FINDINGS

The GLM (Gamma with Log Link) parameter estimates provide insights into how various factors influence house prices, with the dependent variable modelled in a multiplicative (log) fashion. The intercept (B = 16.760, p = 0.000) is highly significant, representing the baseline log-transformed house price when all predictors are zero. Among the property features, bedrooms (B = 0.406, p = 0.000) and parking space (B = 0.138, p = 0.000) significantly increase house prices, meaning each additional bedroom or parking space is associated with a multiplicative increase in price. Bathrooms (B = 0.028, p = 0.007) also have a positive but weaker effect, while toilets (B = 0.001, p = 0.868) are insignificant, indicating they do not meaningfully impact pricing. The South West is the reference category, and all other geopolitical zones except North East (p = 0.485, not significant) have significantly lower house prices. The North West (B = -1.524, p = 0.000), South East (B = -0.773, p = 0.000), and South South (B = -0.707, p = 0.000) have notably lower prices compared to the South West, while North Central (B = 0.112, p = 0.000) has a slight positive effect. The scale parameter (1.399) confirms the dispersion in the data, supporting the choice of a Gamma distribution. Overall, bedrooms, parking space, and location are strong determinants of house prices, while toilets have no significant effect.

5.2 DISCUSSION OF FINDINGS

The analysis of house prices using a Generalized Linear Model (GLM) with a Gamma distribution and log link function provides valuable insights into the key determinants of property pricing. The model selection criteria, including AIC, AICc, and BIC, confirmed that Model 1 was the most optimal model, indicating a strong balance between goodness-of-fit and model complexity.

The Omnibus Test demonstrated that the model is statistically significant ($\chi^2 = 9889.735$, $p = 0.000$), meaning that the predictors collectively contribute significantly to explaining variations in house prices. The Wald Chi-Square tests further confirmed the significance of individual predictors, with bedrooms, bathrooms, parking space, and geopolitical zones playing crucial roles in determining house prices.

From the parameter estimates, the intercept ($B = 16.760$, $p = 0.000$) was highly significant, representing the baseline log-transformed house price. Among the property features, bedrooms ($B = 0.406$, $p = 0.000$) and parking space ($B = 0.138$, $p = 0.000$) had the strongest positive impact on prices, meaning that each additional bedroom or parking space leads to a multiplicative increase in house price. Bathrooms ($B = 0.028$, $p = 0.007$) had a weaker but significant positive effect, while toilets ($B = 0.001$, $p = 0.868$) were not statistically significant, indicating that the number of toilets does not meaningfully influence pricing.

The effect of geopolitical zones was also substantial, with the South West serving as the reference category. Compared to the South West, house prices were significantly lower in the North West ($B = -1.524$, $p = 0.000$), South East ($B = -0.773$, $p = 0.000$), and South South ($B = -0.707$, $p = 0.000$). North Central ($B = 0.112$, $p = 0.000$) was the only zone with a slight positive effect, while North East ($B = -0.585$, $p = 0.485$) was not significant, suggesting that house prices in this region are highly variable and possibly influenced by other external factors.

The scale parameter (1.399) confirmed the presence of dispersion in the data, justifying the use of the Gamma distribution, which is suitable for modeling positively skewed dependent variables such as house prices. The extreme variation in house prices, ranging from ₦90,000 to ₦1.8 trillion, suggests a highly heterogeneous property market, where regional and structural factors drive substantial pricing differences.

5.3. CONCLUSION

The findings from the GLM (Gamma Log) analysis highlight the key determinants of house prices, showing that bedrooms, parking spaces, and geopolitical location are the most influential factors. The study confirms that house prices vary significantly across geopolitical zones, with the South West being the most expensive region and the North West, South East, and South South having significantly lower prices. The number of bedrooms and parking spaces substantially increases property value, while the number of toilets does not have a meaningful impact.

References

Adebayo, A. A. (2018). Impact of geopolitical zones on housing prices in Nigeria. Journal of Housing and the Built Environment, 33(2), 267-285.

Ferguson, K., Burdis, C., & Dupuis, A. (2018). The impact of school zoning on housing prices in New Zealand. Journal of Education Finance, 43(2), 157-173.

Quigley, J. M., & Rosenthal, L. A. (2005). The effects of zoning regulation on housing prices. Journal of Housing Economics, 14(2), 103-125.

Rosen, S. (1974). Hedonic prices and implicit markets: Product differentiation in pure competition. Journal of Political Economy, 82(1), 34-55.

Salleh, N. A., Sulaimon, N., & Osman, M. (2017). Residential property prices and its determinants in Malaysia. Journal of Economic Studies, 44(3), 456-473.