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Graded Land-Improvement Rating a Tool For Controlling Urban Sprawl and Land Speculation in Bauchi, Nigeria

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Abstract: *Graded Land-Improvement Rating (GLIR) placed higher tax rate on land, and at the same time lower rate on the improvement thereon in order to curb land speculation, this study investigated whether GLIR can control the urban sprawl alongside land speculation that has been rampant in Bauchi metropolis of Nigeria. Multiple Regression and Structural Equation Modelling with AMOS were used to analyse the relationship. Both analyses reported that GLIR in Bauchi metropolis if harnessed could significantly curb or reduce the urban sprawl and land speculation. Furthermore, the estimates from the results of the analysis indicated a strong link between US and LS, and it implied that the urban sprawl increased with the land speculation and vice versa.*

Keywords: *Graded Land-Improvement Rating, Urban Sprawl, Land Speculation, Bauchi*

INTRODUCTION

Graded Land-Improvement Rating (GLIR) is a two-rate property tax, where the higher tax rate is levied on the land, and the lower tax rate on the improvements (buildings) thereon (Anderson, 1999), GLIR is emanated from the property rating due to the belief by the economists that the property rate tends to reduce the housing stock and envisage an improved scenario, if the tax is graded into two viz including: land tax and improvement tax where much tax rate is applied on land than improvements (Anderson, 1999). Though, Baba *et al.*, 2016 have established that the property rating has a backing of a legal instrument but has not been implemented yet. Also in (Baba *et al.,* 2017), it was posited that services financed by the property rating can curb the occurrence of the diseases like cholera and malaria fever in the study area.

Two-rate property tax has had the effect of influencing the speed of the property development as well as the intensity of the development (Anderson, 1999); in the contemporary land administration, a shift from the conventional property rating to GLIR (two-rate tax) had in its aim to halt the speculative land holding, inspire the speedy property development, and increase the housing stock. Banzhaf and Lavery (2010) posited that the land tax has the potent to curb the urban sprawl, increase the housing units and results in a dense property development. Urban sprawl can have both negative and positive effects, the negative effects include transportation problems (in terms of distance and cost), congestion, lack of necessary infrastructure which are the major area of concern hence the need for control (Habibi & Asadi, 2011).

The UN-Habitat (2011) envisaged that the land tax can inspire the good and intensive land use, reduce the unnecessary urban sprawl, thus, curb the land speculation and make the land affordable. Taiwan in1985 once applied higher tax on vacant land, though repealed due to the poor real estate market; Latvia also levied higher tax rate on land to curb the speculation (UN-Habitat, 2011), and in Brueckner (2001) reported by England (2004) that two-rate tax can reduce the urban sprawl and encourage the dense property development. This study has investigated whether GLIR (also called split-rate property taxation) can control the urban sprawl alongside the land speculation that has been rampant in Bauchi metropolis of Nigeria.

Literature Review

Earlier in the introduction, it was mentioned that the lower tax rate on the improvement can increase the density of the property development and the speed of the development, while the higher tax rate on land has no known effects on the density of the development but seemed to have effects on the land speculation and also tends to speed up the timing of the development (Anderson, 1999), already it was established in Reeb (1998) that land tax tended to inspire the utilization, the property development and avoid the redundant land, while tax on the improvement had the tendency to reduce the property development; to mitigate the negative impact of the improvement tax, and GLIR advocated for the lower tax rate on any improvement but the higher tax rate on land. In studies by Oates and Schwab in Pittsburgh and by Alanna hartzok and Steve Cord in 15 communities of Pennsylvania as reported by (Reeb, 1998), a remarkable increase was indicated in the property development due to GLIR.

Song and Zenou (2006) confirmed that the higher property tax as a whole had the effect of making smaller cities, and further explained that the urban sprawl results to sparsely-locate the unplanned developments of the low density across the vast area of the urban periphery. A specific instance was the case of the cities in the United States that have been physically expanded but the density per capita has been very low; as examples, the population of Los Angeles increased by 45%, but the developed land expanded to about 300%; New York's population increased by 2.6% and experienced 30% urban sprawl (Song & Zenou, 2006). Urban sprawl became a phenomenon associated with the socio-economic and environmental problems like increase in the walking distance and time, the loss of farmlands and so on. A shift from the traditional property tax to a GLIR resulted in an increases in general land use and urban development, and reduced the unnecessary urban expansion (Kwak & Mak, 2009). By virtually increasing the land use, the speculative land hoarding tended to reduce to a great extent.

Materials and Method

The notion of this study was emanated from the reviewed related articles, and the data were collected from the field using the questionnaire designed according to three main variables viz: graded land-improvement rating as the exogenous (predictor) variable, urban sprawl as the (dependent) variable, as well as the land speculation as the (dependent) variable also. Multiple Regression and Structural Equation Modelling with AMOS was employed to analyse the relationship.

Hypothesis

H_1 Graded land-improvement rating can significantly curb the urban sprawl in Bauchi metropolis.

H_2 Graded land-improvement rating can significantly curb the land speculation in Bauchi metropolis.

H_3 Significant correlation exists between the urban sprawl and the land speculation in the study area.

Reliability Analysis

The internal consistency of the measurement items were tested using Cronbach's Alpha (Table 1); a range of 0.7 to 0.95 was reported as acceptable (Gliem & Gliem, 2003; Gencturk *et al.* 2010; Tavakol & Dennick, 2011). Morgan, Leech, Gloeckner & Barrett (2004) indicated that an alpha value of .69 can be accepted in research with at least four items of measurement. Gliem &Gliem (2003) reported that there has been no specific range, but the closer the value to 1.0, the higher the internal consistency of the measurement items; thus, an alpha coefficient of 0.628 has been accepted in this study.

Table 1: Reliability Table

S/N	Factors (Main Constructs)	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items of Measurement
1.	GLIR (Exogenous Variable)	0.750	0.756	8
2.	US (Endogenous Variable)	0.707	0.707	7
3.	LS (Endogenous Variable)	0.628	0.631	6
Total Items				**20**

Multiple Regression Analysis

The Model Summary on Table 2 shows that R with a value of 0.684 indicated a good correlation between the predictor variable and the dependent variable; the R^2 0.468 meant that the predictor variable explained or predicted about 47% of the variance in the dependent variable (US). In other words, the graded land-improvement rating could predict 47% of the variance in the urban sprawl, and 53% might be predicted by other things.

Table 2: Model Summary of the exogenous variable (GLIR) predicting the endogenous variable (US).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.684[a]	.468	.462	.47780	.468	80.999	1	92	.000
a. Predictors: (Constant), GLIRplus									

The ANOVA on Table 3 shows the cumulative effects of the predictors on the endogenous variable, though on this model, there was only one predictor (GLIR); the effect was significant at 0.001 (Table 2 and 3).

Table 3: ANOVA (GLIR and US)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.492	1	18.492	80.999	.000[b]
	Residual	21.003	92	.228		
	Total	39.495	93			
a. Dependent Variable: USplus						
b. Predictors: (Constant), GLIRplus						

The coefficient table (Table 4) usually shows the individual effect. The effect was significant at P value less than 0.001. The Graded Land-Improvement Rating with Beta value of 0.684 was significant at P value < 0.05; as seen on (Table 2), and that 47% of the variation in US might be accounted or predicted by GLIR. The collinearity statistics reported no collinearity problem, as the Variance Inflation Factor (VIF) was detected to be less than 3.0, and the Tolerance was above 0.1.

Table 4: Coefficient Table (GLIR and US)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.368	.288		4.752	.000					

	GLIRplus	.662	.074	.684	9.000	.000	.684	.684	.684	1.000	1.000
a. Dependent Variable: USplus											

Similar analysis was carried out to examine the effect of Graded Land-Improvement rating (GLIR) on Land Speculation (LS) in Bauchi metropolis of Nigeria. The Model Summary on Table 5 showed R with a value of 0.575, also depicted a good correlation between the predictor variable and the dependent variable; while the R^2 at 0.330 implied that the predictor variable explained or predicted only 33% of the variance in the dependent variable (LS). In other words, the graded land-improvement rating could predict 33% of the variance in the land speculation, and 67% might be predicted by the other factors.

Table 5: Model Summary of the exogenous variable (GLIR) predicting the endogenous variable (LS).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.575[a]	.330	.323	.48818	.330	45.414	1	92	.000
a. Predictors: (Constant), GLIRplus									

The ANOVA on Table 6 showed the cumulative effects of the predictors on the endogenous variable, though on this model, there was only one predictor (GLIR); the effect was significant at 0.001 (Table 5 and 6).

Table 6: ANOVA (GLIR and LS)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.823	1	10.823	45.414	.000[b]
	Residual	21.925	92	.238		
	Total	32.748	93			
a. Dependent Variable: LSplus						
b. Predictors: (Constant), GLIRplus						

The coefficient table (Table 7) on the other hand showed the individual effect. The effect was significant at P value less than 0.001. The Graded Land-Improvement Rating with Beta value of 0.575 was significant at P value < 0.05; as seen on (Table 5); and that 33% of the variation in LS might be predicted by GLIR. The collinearity statistics reported no problem as the Variance Inflation Factor (VIF) was less than 3.0 and the Tolerance was above 0.1.

Table 7: Coefficient Table (GLIR and LS).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-8order	Partial	Part	Tolerance	VIF
1	(Constant)	2.029	.294		6.898	.000					
	GLIRplus	.507	.075	.575	6.739	.000	.575	.575	.575	1.000	1.000
a. Dependent Variable: LSplus											

Structural Equation Modelling Analysis with AMOS Graphics.

The fitness indexes on the measurement model (Figure 1) have achieved the required level fitness of ≥ 0.90, except for AGFI and NFI whose values were 0.846 and 0.839; respectively; and the ChiSq/df was required at <5.0, while RMSEA at 0.063 <0.080 was accepted (Wan Afthanorhan, 2014; Awang, 2014); however, AGFI and NFI > 0.80 could be accepted as a recommended value for the good fit, as in (Chau & Hu, 2001 & Hair *et al.*, 2010 cited in Akinyode, 2016). Though, some factor loadings were lower than the values expected, but the significant and convincing result was obtained and reported.

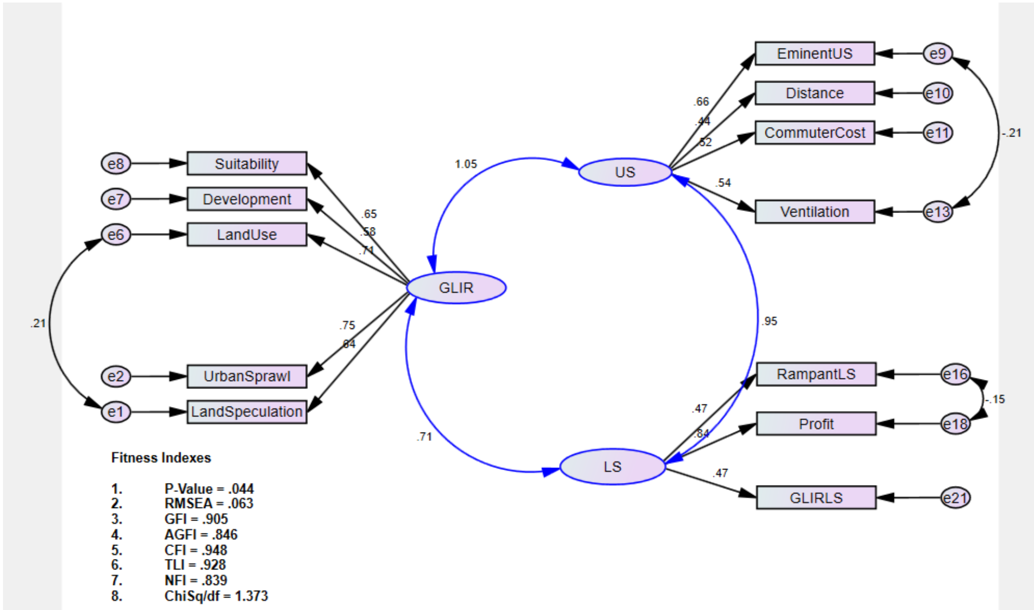

Figure 1: Measurement model

The structural model on Figure 2 below indicated the causal effect of the predictor on the endogenous variables, the model has indicated the effects of GLIR with a single head arrow pointing towards both the dependent variables (US & LS) (Byrne, 2010, Awang, 2014); and has provided a means to reject or fail to reject the hypotheses formulated in line with the latent unobserved construct. Loadings in some factors were less than the values expected, but the significant and convincing result was obtained and reported.

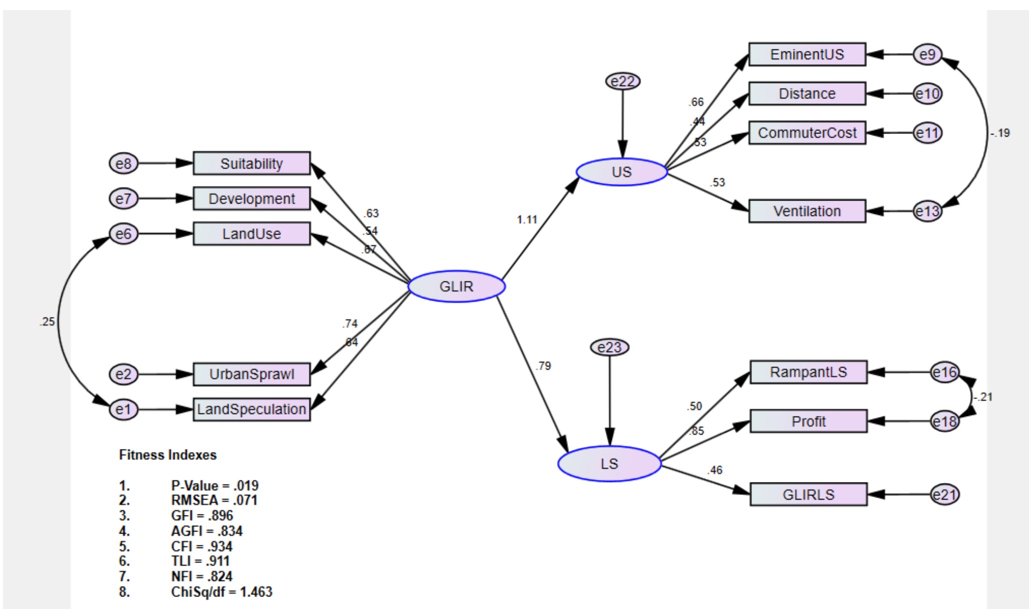

Figure 2: Structural Model

Results and Discussion

There was a positive and strong relationship between the predictor (GLIR) and the endogenous variable (US) with the correlation value of 0.684; and the predictor could explain 47% of the variance in the urban sprawl; the effects were significant at P-value <0.001; on the other hand, the correlation between GLIR and LS at

0.575 was strong, but the predictor explained only 33% of the variance in the land speculation which meant more than half of the variances were explained by other factors, however the effects were significant at P-value <0.001. The analysis of the structural equation modelling indicated that Graded Land-Improvement Rating (GLIR) had a significant influence on both the Urban Sprawl (US) and Land Speculation (LS) in the study area; and that the dependent variables were strongly related to one another, in that, US could determine LS and vice versa (Table 8).The hypothesis whose P-value was reported with three asterisks meant that the hypothesis was accepted as the value was less than 0.001; and the hypotheses were accepted at P-value < 0.05. The correlation between US-LS was 0.947 which was approximately 0.95, as could be seen on the measurement model (Figure 1), and was significant on Table 8.

Table 8: Estimates

Path	Estimates	S. E.	C. R.	P-Value	Remark
H_1: GLIR ➡ US	1.211	0.209	5.794	***	Accepted
H_2: GLIR ➡ LS	0.618	0.173	3.565	***	Accepted
H_3: US ⟷ LS	0.328	0.101	3.250	0.001	Accepted

The results of the hypothesis test (Table 9 below) revealed that GLIR could significantly influence both US and LS in Bauchi metropolis, all the three proposition of the hypotheses were supported based on the collected and analysed empirical data.

Table 9: Hypothesis Results

Path		Remark
H_1: GLIR ➡ US	Graded land-improvement rating can significantly curb urban sprawl in Bauchi metropolis.	Supported
H_2: GLIR ➡ LS	Graded land-improvement rating can significantly curb land speculation in Bauchi metropolis.	Supported
H_3: US ⟷ LS	Significant correlation exists between urban sprawl and land speculation in the study area.	Supported

Conclusion

The Graded Land-improvement rating in Bauchi metropolis was a potential factor that could significantly curb or reduce the urban sprawl and the land speculation rampant in the study area. The estimates from the results of the analysis showed a strong link between US and LS, and it implied that when the urban sprawl increased, the land speculation also increased, and vice versa.

Limitation of the Study

This study based its analysis and findings on the empirical data collected in the study area between July to September in 2018, and it did not consider other factors that might result in volatility in the land price and general market situations. Thus, the urban sprawl has not been considered to examine how the land price could be influenced.

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