DETERMINANTS OF INTERNALLY GENERATED REVENUE IN NASARAWA STATE, NIGERIA (1997 – 2016)

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Abstract

The study examines the determinants of Internally Generated Revenue (IGR) in Nasarawa State from 1997 – 2016. The study used secondary data and was obtained from the State Board of Internal Revenue Service and the State Ministry of Finance and Economic Development. A longitudinal research design was used in structuring the study. The data collected were subjected to Unit Root test to ascertain their stationarity. Regression model was employed to establish the relationship between the predictor and the explanatory variables, and correlation analysis was adopted to determine the direction and magnitude of the relationship. The results indicate that personal income tax, fines and fees, and licenses are the main determinants of IGR in state. The overall effect of the explanatory variables on the dependent variable is 98% as depicted the value of the r^2. Hence, it was recommended that Nasarawa State Government should review their commitments to revenue generation through exploiting the sources of revenue in the state, Embark on sensitization and awareness campaigns to promote willingness of people to payment of statutory taxes and levies, government in their revenue thrive should also adopt and implement commercialization policy on abandoned government factories, and finally, government should computerize the entire assessment and collection to ensure efficiency and also ensure complete autonomy of the Board of Internal Revenue Services of the state.

Keywords: Internally Generated Revenue (IGR), Personal Income Tax, Revenue, Fines and Fees, Licenses, Rent, Interest

1. Introduction

In recent time, task of governance has become so challenging with the dwindling finances and enormous expansion or increase in the activities of government. It is necessary owing the fact government has a statutory responsibility to provide both economic and social infrastructure services to the people. This is in agreement with the Adoph Wagner's 'Law of Increasing State Activity' and Peacock and Wiseman Hypothesis, Wagner (1883) and Peacock and Wiseman (1961) respectively. Governments are required to generate revenue

that will be adequate to finance its obligations to the citizenry. The sources of these revenues differ with base and location. Some revenue sources fall under the exclusive list of the federal government in respective of where they are located and cannot be captured as revenue base at the state level. Although, the revenue rebate is collected as part of the proceeds from monthly sharing of the federation account to states, they are not adequate to meet the expenditure provisions of the state government. Therefore, Nasarawa State Government is encouraged to expand it internally generated revenue (IGR) base in order to support planning and execution of social infrastructure. This is possible only when the components of internally generated revenue in the state are assessed accurately to determine the effects and exploit their potentials to the revenue generation in the state. The study therefore set to examine determinants of the internally generated revenue and with specific targets assessing their individual contributions to the revenue growth of the state.

In Nasarawa State, different ministries, Boards and parastatals are saddled with the responsibilities of collecting different types of revenues based on its jurisdiction. Ministry for Lands, Survey and Town Planning is responsible of collecting land rents and fees for title documents, inspections, etc. Ministry of Education for fees, Judiciary fines etc, Hospitals and Health Centres bills, Water Board bills and Board of Internal Revenue is responsible for the collection of other types such as income taxes and levies, licenses and fees etc.

Governments at all levels need to raise revenue from a variety of sources to finance government expenditures. That is why Adam Smith in book, The Wealth of Nations wrote “Such things as defending the country and maintaining the institutions of good

government are of general benefit to the public, hence, it is reasonable that the population as a whole should contribute to the tax costs. It is also reasonable to demand certain other things of a tax system. For example, that the amounts of tax individuals pay should bear some relationship to their abilities to pay and that good taxes meet four major criteria, namely be proportionate to incomes or abilities to pay by individual, amount be certain rather than arbitrary, payable at times and in ways convenient to the taxpayers, and it should be cheap to administer and collect."

Fiscal operations in Nigeria has been a problem because of its over dependence on oil money and states tend to neglect other sources of revenues that are more sustainable and independent from external shocks. As a result of down turn in the international oil markets and other contending factors in the oil industry, the expected revenue targets of states to implement their planned expenditures have pushed every state to exploit alternatives to finance their obligations. That was why Alade (2015), posited that due to increasing cost of running government business, coupled with the dwindling revenue, has compelled all levels of government in Nigeria to formulate strategies to improve their respective revenue base. Also, Onyekwelu and Ugwuanyi (2014) opined that, the problem of public finance in Nigeria was their inability to generate sufficient revenue from the tax and non-tax sources in recent years to meet her financial obligations, particularly, States and Local Government as a result of increased recurrent and overhead costs on wages bills and other auxiliary services, neglecting the provision of basic social infrastructure services. The implication is further deterioration in the revenue base of the state, since without good social infrastructure in place; attraction for investors into the state is compromised, etc.

The weakening financial position of states in Nigeria in recent time is as a result of how the issue of tax assignment has been handled. According to Bird (2008), posited that:

> "many countries have not implemented tax assignment as was propounded by Musgrave's theory of Tax Assignment of 1959, and tried to raise a question, 'What did Musgrave say?'. In addressing the issue he said "Musgrave approached the issue of what he called 'multilevel finance' within his standard three branch budgetary model. He argued that stabilization was essentially a central government issue as on the whole was distribution, so the principal function of sub-national governments was essentially confined to the allocation branch. However, always well aware of the diversity of intergovernmental arrangements in the real world, even in his earliest discussion of this subject, Musgrave noted that the solution depends on what view of federalism we wish to take".

To further reiterate the position of Musgrave, the system of federalism operated in Nigerian give rise to the situation of overdependence on the central government for allocations to other federating units without necessarily contributing adequately to revenue generation efforts. Other federating units like states and local government have undermine efforts to generate revenue for self-sustaining rather to depend on monthly federation allocations revenue rebate as their principal revenue source.

However, the question is how long should the states in Nigeria continue to depend on the federal allocations to meet their government obligations to the citizenry and without the federal allocation will the states cease to exist? The answer will be how well every state is prepared to be self-sustaining through its internally generated revenue. Thus, the components of the IGR in the state must also be considered and reviewed where necessary in order to ensure adequate IGR. This research sets out to examine the determinants of IGR in Nasarawa State from 1997 to 2016.

2 Literature Review

The most sustainable source of revenue to government globally is the revenue tax source which directly from the people that the tax proceeds will be utilized. Government uses the revenue to provide all the necessary facilities to the citizenry where the market mechanism has failed or cannot be efficient. Like in the words of Alade (2015), opined that government uses tax revenue to meet its statutory obligations to the citizenry, such as the provision of public goods, maintenance of law and order, defense against external aggression, regulation of trade and commerce to ensure economic and social efficiency.

However, to discuss on revenue in a federal system of government, the issue of tax assignment is critical and attention must be given to the pioneer work of Richard Musgrave in 1959.

Bahl and Cyan observed that the multi-level budget framework that assigned the stabilization and distribution functions to the central government and allocation responsibility to the local governments has created divisions of responsibilities to lead the general guidance about the placement of various instruments of taxation at the central, state and local levels of government. Also, that progressive taxes with a distributional goal and taxes containing automatic stabilizers would be left with the central government. He further stated that Sub-national governments should rely mostly on those taxes levied against relatively immobile bases. In their review of the theory, they opined that the theory and its practice have moved on, and competing hypotheses have been offered about the motives that drive governments to make the tax decisions that they do. Thus, they focused on the importance of competition among sub-national governments as a way of controlling the size of governments on taxing non-residents for benefits received. (Bahl and Cyan, 2010).

The need to meet government obligations, Nigerian government embarked on various tax reforms to expand tax base, improve tax administration and to increase tax yield. The Value Added Tax (Amendment) Act, 2007 was for instance intended to widen the value added tax base and improve the machinery for its collection and further reduces the discrepancies arising from tax administration. Other reforms were applicable to the Company`s Income Tax (Amendment) Act. 2007, the Federal Inland Revenue Services (Establishment) Act, 2007 and The Personal Income tax (Amendment) Act, 2011, wereall aimed at expanding the base, encouraging tax compliance and increasing tax yield. (Aguolu, 2001).

Similarly, looking at the guide on personal income tax computation based on personal income tax (Ameendment)) Act, 2011, demands that with the consolidated salary, the taxable income should be the gross minus the relief. However, in the provision tax exemption include only contribution to the National Housing Fund, National Health Insurance Scheme, Life Insurance Premium, National Pension Scheme and Gratuities.By implication, tax yield is a function of the gross emoluments and taxable income of the people. That is, tax levied on employment income and any other income received by individuals. Individuals here include people in paid employment and those in self-employment, i.e. thosein a trade and other businesses, Artisans, professionals such aslawyers, accountants, doctors.

Onyekwelu and Ugwuanyi (2014) Assessed Personal Income Tax Amendment Act 2011and the Effects on Revenue Generation in Nigeria. Their study exposed the possible challenges and prospects it poses to the Nigerian tax payers. Primary data was used for the study, and study reveals among other things that the increase in the tax rate affected

the tax payers revenue generation, and the retro-active nature of our tax laws constitutes a major problem thus resulting in double taxation during the assessment and collection of taxes. Based on this finding, they recommended for a review of the laws by the government on personal Income tax collection and generation, stiff penalties be imposed on the tax avoiders and evaders. Also, tax laws should be complex and recruitment of qualified personnel should be encouraged to enable them cover fully the scope of work and finally the tax payers should be educated sufficiently on the importance of tax. Similarly, Oti, Effiong, Dickson, Rabson and Chris (2016) did a study on the evaluation of the effect Personal Income Tax on State Governments internally generated revenue and used secondary data sources. The study established a significant difference between the amount generated as internally generated revenue and the inadequacies of the internally generated revenue to cater for the states' total expenditure profiles. It also revealed that there is higher reliance on the federation account for the states revenue profile, thus recommended that the state must look inwards and develop new strategies to enhance their internally generated revenue.

Theoretical Literature Review

The Concentration Theory was advocated by the Physiocrates school of thought in France during the middle of the 18th century. They believed there is an inherent tendency for all taxes to be concentrated on individuals which enjoy a surplus and also believed that agriculture is the only productive sector. Although there are other sectors but were considered as sterile. Their reason was that those who could bear the taxes were those which are appropriating from surplus, else would be shifted and re-shifted. Instead, if imposed on the Landlord will not be shifted because tax fall upon the surplus. By

implication the theory supports progressive tax as a measure to boost government revenue.

The **Laffer Curve** is a theory developed by supply-side economist, Arthur Laffer to show the relationship between tax rates and the amount of tax revenue collected by governments. The curve is used to illustrate Laffer's main premise that the more an activity such as production is taxed, the less of it is generated. However, the important aspect of the theory is the effect of tax rates on government revenue which he termed as "Arithmetic" effect. It states that for every amount of money cut in the tax rates translates directly to one less amount of money to be generated by government as revenue. Although economist Arthur Laffer does not claim to have invented the Laffer curve concept, it was popularized in the United States with policymakers following an afternoon meeting with Ford Administration officials Dick Cheney and Donald Rumsfeld in 1974 in which he reportedly sketched the curve and further developed it to what has been known and applied as the Laffer Curve.

Empirical Literature Review

Nassar and Taiwo (2006) assessed the impact of Personal Income Tax on Internally Generated Revenue Performance in Oyo State Nigeria. The study examined the income profiles of Oyo State Government in respect to the impact of personal income tax income accruable to the state under the constitution of the Federal Republic of Nigeria. Secondary data was used for the analysis which was sourced from the approved budgets of Oyo State from year 2000-2006 for the study. The research used stepwise regression technique to select the revenue source that has the greatest impact on Internally Generated Revenue (IGR) in the state. From their findings, it indicates that personal

income taxes have systematic variation of 68.4% effect on IGR in Oyo State. Both taxes and licenses jointly accounted for 68.8% systematic variation in IGR in the state. Therefore recommends that a strategy of the use of electronic revenue assessment, collection and monitoring technique together with the development of unique taxpayer personal identification number (UTPIN) database be improved to attract both the self employed and salary earners into the Personal Income Tax Net.

Igyo, Simon and Iorlumun (2016) examined the contribution of Personal Income Tax on Internally Generated Revenue in Benue State. Their study specifically examined the impact of PIT sources on IGR of Benue state government. The research utilized secondary sources of data from the budget office of ministry of finance from 1999 to 2014. The data were analyzed using multiple regression The Augmented Dicky-fuller test ADF and diagnostic test were carried out to test for data stationarity, multicollinearity and serial correlation. Their findings show that PIT contributes significantly to IGR in Benue State and it is genuine sources through which the government deficits finances can be solved hence recommend that the state should improve on these sources of revenue.

Jibrin M. S., Blessing A. and Ejura S. B **(**2016**)** analyzed the effect of personal income tax on internally generated revenue in Kogi State. The specific objectives are to examine the individual contributions of the components of personal income tax, on internally generated revenue in Kogi State. This study used secondary data from eight years record from Kogi State Board of Internal Revenue. Ordinary least squares regression method of analysis, was adopted to test the hypotheses and unit root test of all the selected variables for the model were carried out using Augmented Dickey-Fuller (ADF) methodology and all the variables in the models were stationary at first level with the order of integration of

I (1). The most important variables that can drive internally generated revenue in Kogi State were correctly signed based on a priori expectation and were statistically significant at 5% confidence level. The result of this research was free of auto-correlation in both models. It was concluded that PAYE and other taxes beside road tax and direct assessment can be used to measure the effect of personal income tax on internally generated revenue of Kogi State. Therefore, it recommend that adequate care and due diligence should be maintained to sustain the collection of PAYE and other taxes and that the existing law provision on direct assessment and road taxes in the state need review to improve the collection to impact on IGR.

4. The Methodology

The longitudinal researchdesign that corroborates the trend design was used in structuring the study, given that time is a critical element. For the purpose of this study, secondary data sources were considered. Therefore, data on personal income tax, fines and fees, licenses, earnings, rents and interest/dividends as they relate to the total internally generated revenue (IGR) in Nasarawa State, between 1997 and 2016 werecollected for analysis.

3.1 Model Specification

The revenue functionparameters are central to the decomposition IGR into contribution from Personal Income Tax, Licenses, Fines and Fees, Earnings and Sales, Rent, Interest and Dividends. The classical Ordinary Least Squares Method of regression function:

IGR= f(PIT, F&F, LIC, ES,RENT,DIV)

Functional Relation for Model 2
IGR = Internally Generated Revenue
PIT = Personal Income Tax
RENT = Rents on Land and Properties

F&F= Fine and Fees
ES= Earning and Sales
DIV= Dividends from investments

EQUATION/ FITTED LINE

Estimation Command:
==========
IGR PIT LIC FF ES INT RENT

Estimation Equation:
==========
$IGR = b_0 + b_1*PIT + b_2*FF + b_3*LIC + b_4ES + b_5* + b_6INT$

3.1**Justification of the Models**

The estimation technique that was adopted for this research was Ordinary Least Square (OLS) Method. Software E-view 9 version is use to estimate the model.Considering the fact that the research has to do with time series data and to obtain meaningful results, and avoid spurious regression outcome; it was necessary that the data analysis had to be carried out in the following order: Unit root test, Cointegration test, OLS estimation and Correlation coefficient.

4. Data Analysis and Results

Unit Root Test

The study uses economic time-series data and it is expected that the data be tested to ascertain their stationarity in order to ensure that the outcome of the research will not be spurious. The unit root test was conducted on the variables on the model one after the other to verify the data for further analysis.The stationarity test were carried out using Augmented Dickey-Fuller (ADF) Unit Root test on the IGR data, PIT data, FF data, Lic data, ES data, Div. and Rent data. The tests were on stages as stated above. For every

variable to become stationary it involves various stages and it therefore depends on which stage a particular variable becomes stationary. As mentioned earlier, the test was carried out using the E-view 9 econometric software. The following results were obtained as shown in the table below.

Table 4.1. Summary of Unit root tests using the ADF Criterion

Variable	Coefficient	Standard. Error	t-Statistic	Prob.
IGR I(1)	-1.2242	0.24992	-4.89774	0.0001
PIT I(1)	-0.756817	0.246954	-1.113943	0.0001
FF I(1)	-0.950542	0.242262	-3.923614	0.0011
LIC I(1)	-1.407444	0.256975	-5.476974	0.0004
INT I(1)	-0.891533	0.233675	-3,765,728	0.0014
RENT I(1)	-2.000044	0.684045	-2.923848	0.0095

Source: Author's Computation

Multicollinearity Test

The decomposition of IGR in the state has brought out varied attributes and the tendency that the variables can exhibit multicollinearity and will lead to unreliable outcome which cannot be dependable for any policy decision. Therefore a correlation test was conducted and the results as indicated on Appendix II

The data of all variables considered for this study were stationary at fist difference and at all test critical values of 1%, 5% and 10% respectively were consistently higher than the tau statistics values of all the variables. See Appendix I. With the outcome of the Unit Root test, a further step was taken to estimate the model using ordinary least square method.

Estimation Equation:

$IGR = b_0 + b_1*PIT + b_2*FF + b_3*LIC + b_4ES + b_5* + b_6INT$

Substituted Coefficients:
IGR = 2.246973 + 0.9815PIT + 1.5434LIC + 1.1019FF + 0.6857ES + 2.6487INT

4. Discussion

The results revealed that the multicollinearity test has proved the tendency of interactions of exogenous variables. For example, PIT and FF were shown to influence each other positively since the values exhibit correlation tendency. We employed by isolating one of the two variables and introduce one after the other alongside other variable into the model for the regression. The regression results indicated that PIT, FF, LIC, ES, INT and RENT determine the IGR by 98%. By implication, the entire IGR of Nasarawa State within the period under review are determined by what happened to PIT, FF, LIC, ES, INT and RENT. See Appendix III. However, on the strength of individual variable contribution to IGR in Nasarawa State, PT(Personal Income Tax), FF(Fines and Fees) and Licenses were the highest determinants of IGR, the next determinant were ES (Earnings and sales) and Rent. The INT was the least determinant of IGR in the state.

The result of the coefficient of determination (R^2) at 98 % indicated that the variables identified for the study were the critical determinants of IGR in the state given that only 2% of other factors that determine IGR were not explained by the variables. Based on these outcomes, it signified that these strategies must be given adequate attention by the state government to ensure that nothing should be neglected to ensure that internal revenue generation should be maximized

5 Conclusion

The broad objective of this study is to examine the determinants of internallygenerated revenue in Nasarawa State from 1997 and 2016.The evidence of the influence of the personal income tax, Fine and Fees, Earning & Sales, Rent on government Property,

Interests/ Repayment andDividends on government investments have been the determinant of internally generated revenue (IGR) in the state since 1997. The R^2further reiterate this position by the magnitude of the strength of effect these variables have on the IGR. From all indications, if government must carry out its functions adequately and deliver on her mandates to the citizenry will depend largely on the amount of revenue generated internally and not continued dependence on the federal allocations. The reason is this, internally generated revenue proved to be more sustainable source of revenue.

5.1 Recommendations

Based on the findings arising from the study, the following were recommended:

i. Nasarawa State Government should review its commitments to the revenue generation in the state, especially, developing the revenue base of the state by adopting innovating approach such as commercialization of some of its abandoned factories in the state. Partnering in terms of venture capital to develop some viable revenue generating venture.

ii. Government should embark of sensitization and awareness campaign to build the confidence of her citizenry in government so that there will be that willingness to pay their taxes and levies faithfully. Also, revenue generation in the state is a function of productivity in the state, thus, government must ensure that there is stability in the state devoid of crisis that will impede on the revenue thrive of government.

iii. The internal revenue service department must be fully computerized in their operations toenhance the compilation of a comprehensive database for the taxpayers for easyidentification and personal identification number must be

issued to eligible taxpayerswhich must be unique to pay taxes to serve as a machinery to bureaucratic pettycorruption within the board. This will provide a track record for actual state revenuecollected for a period.

iv. Finally, operational and administrative autonomy of the Board of internal revenue of thestate must be granted according to Law. While adequate monitoring, check and balances must be in place to ensure transparency and accountability in all their conduct.

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APPENDICES

Appendix I a

Null Hypothesis: D(IGR) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.897740	0.0001
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IGR,2)
Method: Least Squares
Date: 06/15/17 Time: 16:03
Sample (adjusted): 1999 2016
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IGR(-1))	-1.224200	0.249952	-4.897740	0.0001

			-
R-squared	0.584392	Mean dependent var	1.02E+08
Adjusted R-squared	0.584392	S.D. dependent var	2.32E+09
S.E. of regression	1.49E+09	Akaike info criterion	45.14116
Sum squared resid	3.79E+19	Schwarz criterion	45.19063
Log likelihood	-405.2705	Hannan-Quinn criter.	45.14799
Durbin-Watson stat	1.809745		

Appendix I b

Null Hypothesis: D(PIT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.113943	0.0001
Test critical values:	1% level	-4.571559	

	5% level	-3.690814
	10% level	-3.286909

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PIT,2)
Method: Least Squares
Date: 06/15/17 Time: 18:33
Sample (adjusted): 1999 2016
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PIT(-1))	-1.756817	0.246954	-7.113943	0.0000
C	-2.75E+08	6.22E+08	-0.441769	0.6650
@TREND("1997")	64734010	55215797	1.172382	0.2593

			-
R-squared	0.776026	Mean dependent var	1.38E+08
Adjusted R-squared	0.746163	S.D. dependent var	2.29E+09
S.E. of regression	1.15E+09	Akaike info criterion	44.71727
Sum squared resid	1.99E+19	Schwarz criterion	44.86566
Log likelihood	-399.4554	Hannan-Quinn criter.	44.73773
F-statistic	25.98607	Durbin-Watson stat	1.617335
Prob(F-statistic)	0.000013		

Appendix I c
Null Hypothesis: D(F_F) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.923614	0.0006
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(F_F,2)
Method: Least Squares
Date: 06/15/17 Time: 16:10
Sample (adjusted): 1999 2016
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(F_F(-1))	-0.950542	0.242262	-3.923614	0.0011

R-squared	0.475217	Mean dependent var	1912651.
Adjusted R-squared	0.475217	S.D. dependent var	5.79E+08
S.E. of regression	4.19E+08	Akaike info criterion	42.59990
Sum squared resid	2.99E+18	Schwarz criterion	42.64937
Log likelihood	-382.3991	Hannan-Quinn criter.	42.60672
Durbin-Watson stat	1.981166		

Appendix I d
Null Hypothesis: D(LIC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.476974	0.0004
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LIC,2)
Method: Least Squares
Date: 06/15/17 Time: 16:15

Sample (adjusted): 1999 2016
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LIC(-1))	-1.407444	0.256975	-5.476974	0.0001
C	7694442.	18057338	0.426112	0.6757

R-squared	0.652153	Mean dependent var	8046649.
Adjusted R-squared	0.630413	S.D. dependent var	1.26E+08
S.E. of regression	76610312	Akaike info criterion	39.25080
Sum squared resid	9.39E+16	Schwarz criterion	39.34973
Log likelihood	-351.2572	Hannan-Quinn criter.	39.26444
F-statistic	29.99725	Durbin-Watson stat	2.419477
Prob(F-statistic)	0.000051		

Appendix I e

Null Hypothesis: D(ES) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.512631	0.0004
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ES,2)
Method: Least Squares
Date: 06/15/17 Time: 16:18
Sample (adjusted): 1999 2016
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ES(-1))	-1.310130	0.237660	-5.512631	0.0000
C	15029737	38579792	0.389575	0.7020

R-squared	0.655091	Mean dependent var	75471.20

Adjusted R-squared	0.633535	S.D. dependent var	2.70E+08
S.E. of regression	1.63E+08	Akaike info criterion	40.76421
Sum squared resid	4.27E+17	Schwarz criterion	40.86314
Log likelihood	-364.8779	Hannan-Quinn criter.	40.77785
F-statistic	30.38910	Durbin-Watson stat	2.114172
Prob(F-statistic)	0.000047		

Null Hypothesis: D(F_F) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.923614	0.0006
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(F_F,2)
Method: Least Squares
Date: 06/15/17 Time: 16:21
Sample (adjusted): 1999 2016
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FF(-1))	-0.950542	0.242262	-3.923614	0.0011

R-squared	0.475217	Mean dependent var	1912651.
Adjusted R-squared	0.475217	S.D. dependent var	5.79E+08
S.E. of regression	4.19E+08	Akaike info criterion	42.59990
Sum squared resid	2.99E+18	Schwarz criterion	42.64937
Log likelihood	-382.3991	Hannan-Quinn criter.	42.60672
Durbin-Watson stat	1.981166		

Appendix I f
Null Hypothesis: INT has a unit root
Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.765728	0.0008
Test critical values:	1% level	-2.692358	
	5% level	-1.960171	
	10% level	-1.607051	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INT)
Method: Least Squares
Date: 06/15/17 Time: 16:26
Sample (adjusted): 1998 2016
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT(-1)	-0.891533	0.236749	-3.765728	0.0014

R-squared	0.440321	Mean dependent var	858846.5
Adjusted R-squared	0.440321	S.D. dependent var	35919369
S.E. of regression	26871888	Akaike info criterion	37.10226
Sum squared resid	1.30E+16	Schwarz criterion	37.15196
Log likelihood	-351.4714	Hannan-Quinn criter.	37.11067
Durbin-Watson stat	2.023172		

Appendix I g
Null Hypothesis: D(RENT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.923848	0.0060
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RENT,2)
Method: Least Squares
Date: 06/15/17 Time: 16:27
Sample (adjusted): 1999 2016
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RENT(-1))	-2.000044	0.684045	-2.923848	0.0095

R-squared	0.308843	Mean dependent var	25379174
Adjusted R-squared	0.308843	S.D. dependent var	1.33E+08
S.E. of regression	1.10E+08	Akaike info criterion	39.92980
Sum squared resid	2.07E+17	Schwarz criterion	39.97926
Log likelihood	-358.3682	Hannan-Quinn criter.	39.93662
Durbin-Watson stat	1.208842		

Appendix II Correlation of the model

	IGR	PIT	LIC	FF	ES	INT
IGR	1.000000	0.983663	0.726634	0.931282	0.533417	0.145751
PIT	0.983663	1.000000	0.673768	0.861186	0.470366	0.106630
LIC	0.726634	0.673768	1.000000	0.679171	0.580838	0.272571
FF	0.931282	0.861186	0.679171	1.000000	0.468988	0.056022
ES	0.533417	0.470366	0.580838	0.468988	1.000000	0.683308
INT	0.145751	0.106630	0.272571	0.056022	0.683308	1.000000
RENT	0.419251	0.334566	0.426625	0.471661	0.158121	0.143635

Source: Author's Computation

Appendix III

Dependent Variable: IGR
Method: Least Squares
Date: 06/15/17 Time: 22:50
Sample: 1997 2016
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	2.246973	1.18E+08	-0.189772	0.8522
PIT	1.262479	0.066646	18.94317	0.0000
LIC	1.754005	2.089422	0.839469	0.4153
ES	2.311426	1.074950	2.150265	0.0495
INT	6.564115	5.547740	-1.183205	0.2564
RENT	2.630443	0.975162	2.697443	0.0173

R-squared	0.985529	Mean dependent var	1.96E+09
Adjusted R-squared	0.980361	S.D. dependent var	2.77E+09
S.E. of regression	3.88E+08	Akaike info criterion	42.63178
Sum squared resid	2.10E+18	Schwarz criterion	42.93050
Log likelihood	-420.3178	Hannan-Quinn criter.	42.69010
F-statistic	190.6877	Durbin-Watson stat	2.477181
Prob(F-statistic)	0.000000		

Dependent Variable: IGR
Method: Least Squares
Date: 06/15/17 Time: 22:53
Sample: 1997 2016
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.09E+08	3.26E+08	0.334152	0.7432
FF	3.002463	0.508442	5.905220	0.0000
LIC	6.210097	5.628221	1.103386	0.2885
ES	0.648049	3.121512	0.207607	0.8385
INT	4.895297	16.27566	0.300774	0.7680
RENT	1.325311	2.883950	-0.459547	0.6529

R-squared	0.889599	Mean dependent var	1.96E+09
Adjusted R-squared	0.850169	S.D. dependent var	2.77E+09
S.E. of regression	1.07E+09	Akaike info criterion	44.66375
Sum squared resid	1.60E+19	Schwarz criterion	44.96247
Log likelihood	-440.6375	Hannan-Quinn criter.	44.72206
F-statistic	22.56199	Durbin-Watson stat	2.826987
Prob(F-statistic)	0.000003		