

Office Rental Determinants in WUSE Commercial District of Abuja, Nigeria

N B Udoekanem*

*Department of Estate Management and Valuation,
Federal University of Technology,
Minna, Niger State, Nigeria
E-mail: namnsoudoekanem@futminna.edu.ng*

J I Ighalo

*Department of Estate Management,
Bells University of Technology,
Ota, Nigeria
E-mail: jiighalo@yahoo.com*

Y A Sanusi

*Department of Urban and Regional Planning,
Federal University of Technology,
Minna, Niger State, Nigeria
E-mail: yasanusi2@futminna.edu.ng*

M B Nuhu

*Department of Estate Management and Valuation,
Federal University of Technology,
Minna, Niger State, Nigeria
E-mail: mbnuhu@futminna.edu.ng*

Paper accepted on 07 May 2015

Abstract

This paper examines the determinants of office rents in Wuse commercial district of Abuja, Nigeria. Primary and secondary data were utilized for the study. Primary data obtained for the study include office rental levels and office space data in the study area for the period between 2001 and 2012. Secondary data obtained for the study are mainly macroeconomic variables in Nigeria for the period, 2001-2012. Appropriate statistical techniques including regression analysis were used for data analysis. The study revealed that real GDP growth and vacancy rate are the major determinants of office rents in the commercial property market in the study area as they account for between 74% and 83% of

the variation in office property rents in the commercial property market in the area. It concludes that Real GDP growth and vacancy rates are the significant drivers of office rental change in the commercial property market in Wuse Commercial District of Abuja, Nigeria.

Keywords: *Office Property Market; Office Rental Determinants; Rental Growth; Wuse Commercial District; Abuja, Nigeria*

**For correspondences and reprints*

1. INTRODUCTION

Rent is the economic return to land resources. It is also the value of land on annual basis (Ifediora, 2005). As a factor of production, classical economists over the years have attempted to analyse the economic concept of land, the role of land in the production process and the nature of rent. This analysis was initially based on agricultural production (Von Thunen, 1826 as cited in Hall, 1966) and was gradually extended to other land uses (Ricardo Land Rent Model). Studies on real property rents were commenced by the early classical economists in the fifteenth century. Arguments and debates at that time were centred on the theory, origin, nature and composition of real property rents. Contributors to the early conceptualization of rent theory believed that rent is a differential caused mainly by distance and cost of transportation and attributed differences in rent-earning capacity of land to differences in location and transport cost.

Findings from contemporary empirical studies also reveal that rental growth factors vary from locality to locality (Gardiner & Henneberry, 1989; Giussani; Hsia & Tsolacos, 1993; Yusof, 2001; Tonelli, Cowley & Boyd, 2004; Hui & Yu 2006; Boon & Higgins, 2007). Furthermore, a good number of academics and real estate practitioners have recognised that the cyclical behaviour of real estate markets are significantly influenced by volatile macro, regional and local economic factors (Dokko; Edelstein; Lacayo & Lee, 1999). Also, academics, practitioners, researchers and decision makers have developed strong interest in the subject of property market and related issues in recent times. This is evidenced by the increased expansion of the frontiers of knowledge on the subject by academics and practitioners (Pyhrr; Roulac & Born, 1999). The real estate market is a subset of the global investment market and as such is influenced by macroeconomic factors.

As argued by Boon and Higgins (2007), rental value is a key parameter for measuring real property market performance. It is also a major cost for tenants and an important source of income for the landlord. Key property market participants such as investors and developers often use rental value as an indicator to appraise the viability of their real estate development and investment

schemes. On this basis, understanding the nature and basic features of rental movements provides a better comprehension of the dynamics of the commercial property market. Also, rental growth indices are often incorporated into discounted cash flow analysis for the appraisal of real property investments (Boon & Higgins, 2007).

Thus, professionals in the real estate industry in Nigeria in particular require better knowledge of commercial property rental movements as well as the key determinants that influence office property rents in the country. This paper seeks to empirically assess the determinants of office property rents in Wuse commercial district of Abuja, the Federal Capital Territory of Nigeria with a view to explaining the real property market performance in the study area.

2. LITERATURE REVIEW

As an economic return to real property, *rent* varies in concept and form. Rent which is determined by the interaction of demand and supply in the property market in the absence of any government interference is known as commercial rent (Harvey & Jowsey, 2003) or market rent (Ifediora, 1993; Mackmin, 1995 & Investment Property Forum, 2007). Thus, the notion of rent which is implied in this study and also, which is the focus of this study is market rent. Existing literature reviewed for this study is on commercial property rents in urban areas, observed drivers of office property rents, commercial property markets and patterns of office rental movements.

Commercial Property Rents in Urban Areas

The basis for the existence and growth of urban areas is found in the gregarious nature of mankind and also in the cultural, economic and political advantages that stem from the agglomeration or clustering together of people (Barlowe, 1986). From the standpoint of intensity of use, rent-paying capacity and land values, the areas occupied by central business districts in urban areas represent some of the most valuable lands (Lean & Goodall, 1966; Barlowe, 1986; Harvey & Jowsey, 2003).

In urban areas where the central business district has retained its attractiveness, economic strength and viability, the central business district is almost always found near the hub of the city's traffic and transportation system and at sites both accessible and convenient to large numbers of people. This creates a potential for high volumes of retail and other commercial activities, which in turn justifies intensive land use practices, high rents and high land values (Lean & Goodall, 1966; Barlowe, 1986; Ighalo, 2002; Harvey & Jowsey, 2003). In other words, sites closer to the central business district often offer greatest opportunities for profitable use and these sites have the highest site values and command the highest rents. Thus, due to the business opportunities available to firms at the central business district, there is considerable bidding and counter-bidding between firms and operators for the choice of locations. This process often results in commercial land use patterns in which office and retail spaces are allocated in accordance with the rent-paying capacities of the various operators. This pattern is seldom stable as new adjustments are always taking place, including rental adjustments or rental growth. The determinants of this rental growth in the office property market in Wuse Commercial District of Abuja, Nigeria's capital territory constitute the principal focus of this study.

Observed Drivers of Office Property Rents

Measuring commercial property rental patterns is important as it provides information to make a decision about investing and developing and can be used to predict the cyclical behaviour of commercial property development (Born & Phyr, 1994). Rental growth forecast parameters are often incorporated into discounted cash flow models for property appraisals (Boon & Higgins, 2007). Most literature on commercial property rental determinants are based on studies conducted in four geographical regions of the world. These include America, Europe, Asia and Australia (Yusof, 2001; Chin, 2003; Boon & Higgins, 2007). In searching through previous literature on the determinants of commercial property rental growth, studies in African cities and particularly Nigerian cities are not too common. Thus, the literature review on commercial property rental determinants is focused on the relevant studies conducted in America, Europe, Asia and Australia. These studies are based on two major classes of commercial properties, namely offices and shops. While majority of the studies are focused

on office rental determinants, few are focused on shop or retail property rental determinants. A study conducted by Gardiner and Henneberry(1989) on the determinants of office rents in eight standard planning regions in the United Kingdom using spatially disaggregated annual data for the period,1977-1984 found that regional Gross Domestic Product(GDP) and the regional stock of office floor space were the main factors affecting office rents in those regions. The study evaluated the determinants of office rent and described the initial stages in the development of a regional office rent prediction model which uses readily available data to aid the investment decision-making process. They rejected cross-sectional analysis and preferred time series approaches. They formulated a spatially disaggregated model which allows for delays between changes in user output and changes in user demand, and which reflects the variable adjustment rate between these two factors. They concluded that the combined influence of the independent variables in the derived equation can explain up to 97 per cent of the variation in rent over the period examined.

Gardiner and Henneberry (1991) developed a habit-persistence model which is based on the assumption that experience conditions present behaviour and expectations. The model combines the adaptive expectations hypothesis with the partial adjustment process. They concluded that accurate forecasts for declining regions were produced but the results for growing regions were not significant.

Dobson and Goddard (1992) provided an insight into the determinants of office rents in certain regions across the United Kingdom. Only demand-side variables were used in their study to test the determination of rental levels and they found that office employment, house price index and interest rates were the major office rental determinants in the areas under study.

Giussani, Hsia and Tsolacos (1993) examined office rent determinants across European cities and the relationship between office rental value and economic activity using cross section and time-series analysis, based on a demand and supply framework. The study empirically investigated office rental trends for some of the largest cities in Europe and used annual data for the period 1983-91 to test the changes in rental values and fluctuations in economic activity. They

included a review of previous office market studies and an assessment of the research direction and information requirements of current European property research. Their findings suggest that European rental values are determined by similar demand-side variables and, in particular, real gross domestic product (GDP). Although the study ignored supply-side variables due to insufficient data at that time, they found that Gross Domestic Product (GDP) and unemployment rates played an important part in determining office rents.

D'Arcy, McGough and Tsolacos (1994) also examined the determinants of office rents in twelve European cities over the period, 1982-1993 and their result is consistent with the result obtained by Giussani *et al* (1993). Similarly, they concluded that Gross Domestic Product (GDP) and unemployment rates are the most important determinants of office rents across those twelve European cities. Jones (1995) asserted that property markets are urban, or a series of linked urban markets, rather than regional and that the office market itself is determined by local flows, partly influenced in turn by urban form and differential planning policies. He concluded that the analysis of office property markets is most appropriately undertaken at the urban level and given the relationship between property market dynamics, demand and supply elasticities and rental change, rental growth for office properties is linked to the profitability of businesses and inflation and therefore subject to national economic influences.

McGough, Olkkonen and Tsolacos (1998) and D'Arcy, McGough, and Tsolacos (1998) examined individual property markets in Europe and offered additional insights into the determinants of office property rents. They also found that Gross Domestic Product (GDP) and unemployment rates were the important office rental determinants. Mueller (1999) determined rental growth rates to be statistically different at six different points in the property market cycle in the United States.

Commercial Property Markets and Patterns of Office Rental Movements

McFarlane and Moon (1999) analysed demand, supply and rent in the office markets of Sydney and Melbourne central business districts in Australia using time-series data from 1970-1997 and were able to provide some insights into how

net absorption, new office completion and rent relate with such independent variables as vacancy rate, occupied space, stock of office space and office employment. Yusof (2001) examined the determinants of office property rents in Malaysia with particular focus on the office market in the city of Kuala Lumpur. The study found that office rent in the city of Kuala Lumpur is significantly influenced by changes in unemployment level and average occupancy rate.

Chin (2003) analysed the relationship between macroeconomic factors and office rental movements in five South-East Asian cities of Singapore, Hong Kong, Taipei, Kuala Lumpur, and Bangkok over the period 1988-2001. The study tested office rental value against some indicators of economic activity which have been used in previous empirical studies. The study also assessed the influence of six-demand-side variables (Real Gross Domestic Product (GDP), interest rates, prime lending rates, consumer price index, service sector output and unemployment rates) and one supply-side variable (changes in office floor space). The study revealed that changes in floor space and prime lending rates were the key determinants of office property rental values in the selected cities apart from Bangkok.

Orr and Jones (2003) focused their study on the analysis and prediction of local office rents and in particular the development of econometric models for two UK cities, Edinburgh and Glasgow. Their study reviewed the current state of modelling and forecasting for office markets and noted the sparsity of urban office rent models. They contended that urban models that exist suffer from data problems and such models either make the fatal flaw of ignoring supply constraints or consider supply in terms of net change in floor space. The objective of their study was to address some of the deficiencies identified in existing empirical works on office market dynamics by using local take-up as a variable to model urban rents. Their study adopted two approaches to modelling urban office rents. The first model adopted a single reduced-form price equation using direct demand and supply measures and suggested that variation in market dynamics exists between the two centres. They asserted that these equations for the two cities have statistical weaknesses. The second model is a three-equation 'structural' model. The results of their analysis also suggest that Edinburgh

responds more quickly to fundamental changes in supply-demand imbalances than Glasgow in the determination of office rents. The variation between Edinburgh and Glasgow, two cities within one administrative region of the UK, exemplifies the arguments in favour of urban analysis and the deficiencies in the regional approach to forecasting. The results of their empirical analysis also emphasize the importance of including local supply variables in office rental modelling. They concluded that the use of a demand flow variable encompasses local economic drivers, and thereby negates to some extent the need for local economic indicators.

A comparative analysis of commercial property rents in nine cities in Finland by Karakozova (2005) revealed that in all the nine cities, demand-side variables, namely Gross Domestic Product (GDP), employment measures, consumer expenditure and disposable income exerted more influence on changes in commercial property rents than a proxy for changes in supply namely, new commercial property completion. The study also found that both national and local factors were important in explaining rental changes in Finnish cities, with national Gross Domestic Product (GDP) growth having the most significant impact. It is important to note that this result is consistent with the findings of previous studies in other parts of Europe (Giussani *et al*, 1993; D’Arcy *et al*, 1997a; 1997b). The results of the study indicate that there are some differences in the timing and magnitude of rents’ responses to changes in demand and supply across the cities. The study concluded that commercial property rents in all the nine cities behave broadly in the same way as they are driven by fluctuations in demand and supply and can be explained to some extent solely by national macroeconomic factors (Karakozova, 2005).

Hui and Yu (2006) analysed the Hong Kong’s office rental market for the period 1990-2004, using single-equation multiple regression analysis incorporating systems dynamics. They found that vacancy rate, Finance, Insurance and Real Estate (FIRE) unemployment rate, Gross Domestic Product (GDP), change in Consumer Price Index (CPI), and FIRE Real Wage Index exerted significant influence on office property rental movement in the Central District of Hong Kong within the study period.

In the same vein, Boon and Higgins (2007) examined the determinants of office rents in the Singapore office market for the period, June 1992-December, 2005, using a single equation regression analysis. Their office rent equation was able to account for 72 per cent of variation in gross office rents for the study period. Changes in previous year vacancy rates, construction costs, prime lending rates and office sector employment rates were identified by the study as the key determinants of variation in gross office rents in the Central Region of Singapore (Boon and Higgins, 2007).

Ozus (2009) investigated the factors which affect office rents in Istanbul, using hedonic price analysis. According to the results of the analysis, the number of floors of the buildings is the most important factor which affects office rents in the study area. Other factors according to their importance were identified to include vacancy rate in the vicinity, social facilities in the buildings, aesthetics of the buildings, rental office floor, banks in the vicinity, and accessibility. On the other hand, management cost, age, view and distances to the old CBD and the major highways were not found significant since these sub-centers were already located on major highways. The results of the study could be useful for property investors, real estate agents, urban planners, architects and policy makers.

McCartney (2012) examined the short and long-run rent adjustment in the Dublin office property market in Ireland. The study estimated a rent determination model for the office market in Dublin based on a two-stage error correction mechanism which involved estimation of a long-run equilibrium rent equation and a short-run rent adjustment process. The result of the long-run analysis indicated that office demand is relatively inelastic in Dublin while the short-run model indicated a relatively slow rate of rent adjustment in the Dublin office market. Evidence from all previous empirical studies which have been reviewed suggests that office rental determinants vary from location to location in the context of national, regional and local commercial property markets. Thus, there is need to identify leading office rental indicators which are representative of the Nigerian economy and the commercial property markets in the country. This is the basis of this paper.

3. METHODOLOGY AND DATA

This study utilised primary and secondary data. The primary data basically comprise rental data of office properties in Wuse commercial district of Abuja, Nigeria and were collected using structured questionnaires administered to estate surveying and valuation firms in the city. These include annual data on rental levels for office properties under study for the period 2001 – 2012 and their specific characteristics, occupancy levels and property floor stock. Secondary data for the study are mainly data on macro-economic indices in Nigeria for the period 2001 – 2012. These macro-economic indices are inflation rate, interest rate on real estate loans, interest rate on commerce, Monetary Policy Rate (MPR), Gross Development Product (GDP), Unemployment rate, and Employment Rate. They were identified from existing literature reviewed for the study. Based on the aim of the study, only commercial investment properties were selected for data collection for the study as they constitute the only class of commercial properties which rents are paid to occupy them and such rents undergo changes in form of rental adjustment or rental growth. These properties are mainly office properties in Wuse commercial district of Abuja, Nigeria. The rental data were obtained from estate surveying and valuation firms which are active in the commercial property market in the area. The sample size for each of the commercial zones under study was determined quantitatively using the Frankfort-Nachmias (1996) model for sample size determination as follows:-

$$n = \frac{z^2 pqN}{e^2 (N - 1) + Z^2 pq}$$

Where N = population size

n = sample size

p = sample population estimated to have characteristics being measured

(In this study, 95% confidence level of the target population)

q = 1 – p

e = Acceptable error

Z = 1.96(The standard normal deviation at 95% confidence level)

The various commercial zones, number of office properties with required data and number of office properties sampled are presented in Table 1.

Table 1: Commercial Zones, Number of Office Properties with Required Data and Number of Office Properties sampled in the study area

<i>Commercial Zone</i>	<i>Number of Office Properties with Required Data</i>	<i>Number of Office Properties sampled</i>
<i>Wuse Zone 1</i>	<i>87</i>	<i>40</i>
<i>Wuse Zone 2</i>	<i>92</i>	<i>41</i>
<i>Wuse Zone 3</i>	<i>104</i>	<i>43</i>
<i>Wuse Zone 4</i>	<i>133</i>	<i>47</i>
<i>Wuse Zone 5</i>	<i>126</i>	<i>46</i>
<i>Wuse Zone 6</i>	<i>110</i>	<i>44</i>
<i>Wuse Zone 7</i>	<i>81</i>	<i>39</i>
<i>Total</i>	<i>733</i>	<i>300</i>

Source: Author's Fieldwork Analysis, 2013

4. RESULTS AND DISCUSSION

In order to establish the rental trend for the office properties under study, rental index was constructed based on the weighted rent/m² of office properties in the commercial property markets selected for the study. The rental index was constructed using 2001 as the base year as presented in Table 3. The result of rental index analysis for office properties in the various commercial property sub-markets in the study area indicates upward trend in rental values of office properties in the city within the study period. Annual rental growth rates were determined for the properties under study for the period, 2001 – 2012. The annual rental growth rates were determined based on the rental growth factor for office properties for each year under study. Similarly, the rental growth factor for office properties in all commercial property sub-markets in Wuse for the period, 2001-2012 is 1.083 – 1.1197. This represents an average rental growth rate of 8.3% - 11.97% for the study period as presented in Table 2. Plates 1 and 2 show the images of typical office properties in the study area.



Plate 1: A typical multi-storey office property in Wuse, Abuja



Plate 2: A typical multi-storey office property in Wuse, Abuja

Thus, although office properties in all the commercial zones experienced upward rental changes during the study period, the size of the rental change was higher in Wuse Zone 2 (11.97%) than in any other commercial zone within the study area.

Table 2: Office Rental Change, Rental Growth Factor and Average Rental Growth Rate for Office Properties in the Study Area, 2001 - 2012

Commercial Property Market	Rental Change	Slope	Rental Growth Factor	Average Rental Growth Rate (%) (2001-2012)
Wuse Zone 1	1.2087	0.10988	1.1161	11.61
Wuse Zone 2	1.2432	0.1130	1.1197	11.97
Wuse Zone 3	1.144767	0.1040697	1.10968	10.97
Wuse Zone 4	1.2001	0.109097	1.11527	11.53
Wuse Zone 5	0.8783	0.0798	1.083	8.3
Wuse Zone 6	1.14016	0.10365	1.1092	10.92
Wuse Zone 7	1.137199	0.10338	1.1089	10.89

Source: *Author's Fieldwork Analysis, 2013*

Vacancy rates for office properties in the study area for the period, 2001-2012 were determined as presented in Table 4. This was based on the office space data for the study areas. Based on the stock of office space and office vacancy rate for a particular commercial property market, the occupied office space is expressed as:

$$\text{Occupied space} = \text{Stock of office space} \times [1 - \text{Vacancy Rate}]$$

$$\text{Thus, Vacancy Rate} = 1 - \frac{\text{Occupied Space}}{\text{Stock of Office Space}}$$

Table 3: Rental Index for Office Properties in the Study Area, 2001 - 2012

Commercial Property Market	Office Rental Index											
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Wuse Zone 1	100	112.08	124.21	133.34	170.96	183.44	207.76	232.04	265.58	280.22	301.04	334.92
Wuse Zone 2	100	125.90	161.74	185.60	234.04	245.97	264.90	290.00	303.73	307.31	316.04	346.67
Wuse Zone 3	100	135.85	156.45	169.64	206.60	219.34	239.08	259.32	273.97	278.40	283.29	314.17
Wuse Zone 4	100	108.63	127.88	143.74	158.14	190.89	205.66	218.95	241.57	264.98	292.40	332.03
Wuse Zone 5	100	106.3	120.63	130.53	158.67	168.76	182.50	199.00	210.95	214.22	219.93	240.68
Wuse Zone 6	100	105.51	126.31	133.57	149.85	175.81	189.58	201.66	221.47	227.44	242.70	312.73
Wuse Zone 7	100	130.90	153.13	170.56	203.35	216.36	232.34	255.65	269.07	273.31	277.65	311.80

Source: Author's Fieldwork Analysis, 2013

Table 4: Vacancy Rates for Office Properties in the Study Area, 2001-2012

Commercial Property Market	Office Vacancy Rates											
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Wuse Zone 1	41.89	34.77	32.00	25.43	19.84	16.88	12.98	9.57	12.23	10.45	7.51	4.49
Wuse Zone 2	35.5	29.69	24.98	18.96	17.07	17.73	13.48	11.27	13.00	8.78	10.18	6.77
Wuse Zone 3	35.46	32.42	28.85	26.31	23.84	25.30	21.00	16.44	15.47	10.91	8.43	6.49
Wuse Zone 4	42.47	34.57	29.70	24.53	20.33	16.33	13.72	13.52	12.07	9.26	7.89	6.26
Wuse Zone 5	9.95	5.84	4.85	6.29	5.21	6.36	3.87	2.84	2.30	3.48	3.02	2.10
Wuse Zone 6	34.05	32.98	34.03	28.33	30.56	24.64	23.21	19.41	16.15	15.17	11.24	5.7
Wuse Zone 7	31.24	29.52	20.51	15.89	15.06	14.38	10.42	7.81	6.7	6.35	6.07	6.76

Source: Author's Fieldwork Analysis, 2013

Macroeconomic data collected for the study were based on the macroeconomic variables identified from the existing literature reviewed for the study. These variables include interest rate on general commerce, interest rate on real estate loans, inflation rate, monetary policy rate, unemployment rate, exchange rate, real GDP growth rate and change in employment level. The Augmented Dicker Fuller (ADF) unit root test was carried out on all the data series to examine the extent of their stationarity. The ADF result is presented in Table 5.

Table 5: Result of Stationarity Test for Data Series utilised for the study

Variable	Computed ADF Statistic	Critical ADF Statistic at $\alpha = 0.05$
Δ Interest Rate on General Commerce	-6.000	-1.9791
Δ Interest Rate on Real Estate Loans	-5.8631	-1.9791
Δ Inflation Rate	-5.4785	-1.9791
Δ Monetary Policy Rate	-2.8953	-1.9791
Δ Unemployment Rate	-4.9116	-1.9791
Δ Exchange Rate	-3.1905	-1.9791
Δ Real GDP Growth Rate	-4.4665	-1.9791
Δ Employment Level	-6.4692	-1.9791
Δ Office Vacancy Rate(Wuse Zone 1)	-3.2951	-1.9755
Δ Δ Office Rent(Wuse Zone 1)	-6.3083	-1.9835
Δ Office Vacancy Rate(Wuse Zone 2)	-2.7303	-1.9755
Δ Δ Office Rent(Wuse Zone 2)	-5.0443	-1.9835
Δ Office Vacancy Rate(Wuse Zone 3)	-3.6388	-1.9755
Δ Office Rent(Wuse Zone 3)	-2.7851	-1.9791
Δ Office Vacancy Rate(Wuse Zone 4)	-7.8066	-1.9755
Δ Δ Office Rent(Wuse Zone 4)	-5.1956	-1.9835
Δ Office Vacancy Rate(Wuse Zone 5)	-3.2793	-1.9791
Δ Δ Office Rent(Wuse Zone 5)	-5.7751	-1.9835
Δ Office Vacancy Rate(Wuse Zone 6)	-2.2078	-1.9755
Δ Δ Office Rent(Wuse Zone 6)	-3.6123	-1.9835
Δ Office Vacancy Rate(Wuse Zone 7)	-3.6899	-1.9755
Δ Office Rent(Wuse Zone 7)	-3.3099	-1.9791

Source: *Author's Fieldwork Analysis, 2013*

The computed ADF statistics are less than the critical value at 0.05 level as presented in Table 5. The implication of this is that, the time series data on the variables utilised for the study are suitable for regression analysis. Also, based on the stationary nature of the time series data utilised for the study, Granger causality test was applied to the data to assess the causal linkage between the explanatory variables explored for the study and office rental movements in the commercial property market under study. The result of the Granger causality test revealed that among all the explanatory variables explored for the study, only real GDP growth, vacancy rate and inflation rate were found to have statistically significant causal linkage to office rental movements in the various commercial zones in the study area and as such Granger causes office rental movements in the commercial property market in the area. Consequently, explanatory variables with no statistically significant causal linkage were dropped while those with statistically significant causal linkage were utilised to develop regression model for office property rents in the commercial property markets under study. The regression analysis was based on the theoretical framework of the commercial property rent equation in which commercial property rent is assumed to be a linear function of demand and supply factors in the commercial property market. The results of the regression analysis are presented in Table 6.

Table 6: Results of the Regression Analysis

Commercial Property Market	Term	Coefficient	t - Statistics	p - Value	Tolerance	VIF	R ²	SE	DW- Statistic
Wuse Zone 1	Intercept	4.759	22.58	<0.0001			0.79	0.21835	1.03
	ΔINR_{t-2}	0.04979	0.54	0.6011	0.4899	2.0412			
	ΔRGDP_{t-1}	0.6846	3.88	0.0047	0.4105	2.4361			
	ΔVACR_{t-1}	-0.2703	-3.40	0.0093	0.6970	1.4347			
Wuse Zone 2	Intercept	4.702	24.77	<0.0001			0.83	0.19349	0.659
	ΔINR_{t-2}	0.09771	1.21	0.2624	0.4902	2.0400			
	ΔRGDP_{t-1}	0.6059	3.77	0.0054	0.3894	2.5681			
	ΔVACR_{t-1}	-0.1755	-2.22	0.0570	0.6498	1.5389			
Wuse Zone 3	Intercept	4.694	24.85	<0.0001			0.78	0.19357	0.769
	ΔINR_{t-2}	0.06321	0.78	0.4585	0.4893	2.0437			
	ΔRGDP_{t-1}	0.5522	3.40	0.0093	0.3811	2.6240			
	ΔVACR_{t-1}	-0.131	-1.70	0.1280	0.6038	1.6562			
Wuse Zone 4	Intercept	4.736	23.75	<0.0001			0.80	0.20489	1.02
	ΔINR_{t-2}	0.04771	0.56	0.5934	0.4903	2.0396			
	ΔRGDP_{t-1}	0.6545	3.92	0.0044	0.4043	2.4734			
	ΔVACR_{t-1}	-0.2469	-3.27	0.0113	0.6972	1.4343			

Source: Author's Fieldwork Analysis, 2013

Table 6 Continued: Results of the Regression Analysis

Commercial Property Market	Term	Coefficient	t - Statistics	p - Value	Tolerance	VIF	R²	SE	DW- Statistic
Wuse Zone 5	Intercept	4.671	30.24	<0.0001			0.79	0.16273	0.898
	ΔINR_{t-2}	0.02056	0.30	0.7727	0.4812	2.0781			
	ΔRGDP_{t-1}	0.4815	3.64	0.0066	0.4067	2.4588			
	ΔVACR_{t-1}	-0.2734	-2.95	0.0183	0.7834	1.2765			
Wuse Zone 6	Intercept	4.72	23.04	<0.0001			0.74	0.21000	0.895
	ΔINR_{t-2}	0.05683	0.65	0.5366	0.4896	2.0425			
	ΔRGDP_{t-1}	0.6494	3.47	0.0085	0.3371	2.9665			
	ΔVACR_{t-1}	-0.2507	-2.73	0.0260	0.4987	2.0052			
Wuse Zone 7	Intercept	4.713	28.99	<0.0001			0.83	0.16789	0.896
	ΔINR_{t-2}	0.06255	0.89	0.3997	0.4902	2.0400			
	ΔRGDP_{t-1}	0.5292	4.00	0.0039	0.4326	2.3116			
	ΔVACR_{t-1}	-0.1546	-2.50	0.0368	0.7796	1.2827			

Source: *Author's Fieldwork Analysis, 2013*

For Wuse Zone 1, the Durbin-Watson Statistic for the model is 1.03. This is greater than its critical value at 0.05 level (0.658) and indicates that residual serial correlation was not statistically significant in the model. Again, the collinearity statistics, that is, tolerance and Variance Inflation Factor (VIF) are within acceptable statistical limits. This implies that the predictor variables for the model have no problem of multicollinearity. Also, 79% variation in office property rents in the commercial property market in Wuse Zone 1 is explained by the model. Furthermore, real GDP growth and vacancy rate are the significant drivers of rental change in the commercial property market in Wuse Zone 1. Although inflation rate Granger causes office rental movements in the area within the period under study, again its influence in predicting office property rents in the area is insignificant. Thus, a unit increase in real GDP growth will produce 0.6846 increase in office rents in Wuse Zone 1 while a unit increase in vacancy rate will produce 0.2703 decrease in office rents in the area. Also, a unit increase in inflation will produce 0.04979 increase in office rents in the commercial property market in Wuse Zone 1, *ceteris paribus*. This scenario is applicable to other commercial zones (Zones 2- 7) in the study area as depicted by the results in Table 6. The significance of the regression models was tested using F-test. The computed F-statistic for the office rent model for office property rents in all the commercial property sub-markets in (Wuse) Abuja is significant at p-value less than 0.05 as presented in Table 7. This indicates that the office rent model for the various commercial zones under study fits the data utilised and as such can be used as a basis for prediction of office property rents in the commercial property market in the study area.

Table 7: Results of the Test for the Statistical Significance of the Regression Models

Commercial Property Market	Source of Variation	Sum of Squares	DF	Mean Square	F-Statistic	p - Value
Wuse Zone 1	Model	1.47154	3	0.49051	10.29	0.0040
	Residual	0.38141	8	0.04768		
	Total	1.85295	11			
Wuse Zone 2	Model	1.43128	3	0.47709	12.74	0.0020
	Residual	0.29952	8	0.03744		
	Total	1.73080	11			
Wuse Zone 3	Model	1.03777	3	0.34592	9.23	0.0056
	Residual	0.29976	8	0.03747		
	Total	1.33753	11			
Wuse Zone 4	Model	1.34301	3	0.44767	10.66	0.0036
	Residual	0.33583	8	0.04198		
	Total	1.67883	11			
Wuse Zone 5	Model	0.78599	3	0.26200	9.89	0.0046
	Residual	0.21185	8	0.02648		
	Total	0.99784	11			
Wuse Zone 6	Model	1.01156	3	0.33719	7.65	0.0098
	Residual	0.35279	8	0.04410		
	Total	1.36435	11			
Wuse Zone 7	Model	1.10185	3	0.36728	13.03	0.0019
	Residual	0.22550	8	0.02819		
	Total	1.32734	11			

Source: *Author's Fieldwork Analysis, 2013*

5. CONCLUSION

The conclusion of this study is that the dynamics of office property rents in the commercial property market in Wuse commercial district of Abuja are significantly influenced by real GDP growth and vacancy rate. While real GDP growth influences office rental movements in the commercial property markets positively, vacancy rate influences office rental movements in the commercial property markets negatively. This has serious implications on commercial property investments in the area. First, a unit increase in real GDP will lead to significant positive change in office property rents in the commercial property market in the area. Second, commercial property investors are likely to benefit from the overall economic boom associated with increased economic activity resulting from general economic growth as evidenced by increase in real GDP. The policy implication of this is that greater attention should be focused on those sectors of the economy that can engender and sustain economic growth in the country as increased economic activity resulting from general economic growth will create significant positive influence on rental income flows from commercial property investments in the area.

6. REFERENCES

- BOON, F.N. & HIGGINS, D. (2007). Modelling the Commercial Property Market: An Empirical Study of the Singapore Office Market. *Pacific Rim Property Research Journal*. 13(2), 176 – 193.
- BORN, W. L. & PYHRR, S. A. (1994). Real Estate Valuation: The Effect of Market and Property Cycles. *Journal of Real Estate Research*. 9(4), 455-486.
- CHIN, H. W. (2003). *Macro-Economic Factors Affecting Office Rental Values in Southeast Asian Cities: The Case of Singapore, Hong Kong, Taipei, Kuala Lumpur and Bangkok*. Paper presented at the 9th Pacific Rim Real Estate Society Conference held at Brisbane, Australia.

D'ARCY, E., MCGOUGH, T. & TSOLACOS, S. (1994). Modelling the Determinants of Office Rental Values in Major European Cities. *Discussion Papers in Urban and Regional Economics*. Series C, Vol.VII, No. 99. Department of Economics, University of Reading, Reading, England.

D'ARCY, E., MCGOUGH, T. & TSOLACOS, S. (1997a). An Empirical Investigation of Retail Rents in Five European Cities. *Journal of Property Valuation and Investment*. 15 (4), 308 – 322.

D'ARCY, E., MCGOUGH, T. & TSOLACOS, S. (1997b). National Economic Trends, Market Size and City Growth Effects on European Office Rents. *Journal of Property Research*. 14(4), 297-308.

D'ARCY, E., MCGOUGH, T. & TSOLACOS, S. (1998). An Econometric Analysis and Forecasts of the Office Rental Cycle in the Dublin Area. *Discussion Papers in Urban and Regional Economics*. Series C, Vol. XI, No. 33. Department of Economics, University of Reading, Reading, England.

DOBSON, S. M. & GODDARD, J.A. (1992). The Determinants of Commercial Property Prices and Rents. *Bulletin of Economic Research*. 44(4), 301-321.

DOKKO, Y.; EDELSTEIN, R. H.; LACAYO, A. J. & LEE, D. C. (1999). Real Estate Income and Value Cycles: A Model of Market Dynamics. *Journal of Real Estate Research*. 18(1), 69-95.

FRANKFORT-NACHMIAS, C. (1996). *Research Methods in the Social Sciences*. Auckland, Hodder Arnold Ltd

GARDINER, C. & HENNEBERRY, J. (1989). The Development of a Simple Office Rent Prediction Model. *Journal of Property Valuation and Investment*. 7 (1), 36-52.

- GARDINER, C. & HENNEBERRY, J. (1991). Predicting Regional Office Rents using Habit- Persistence Theories. *Journal of Property Valuation and Investment*. 9(3), 215-226.
- GIUSSANI, B., HSIA, M. & TSOLACOS, S. (1993). A Comparative Analysis of the Major Determinants of Office Rental Values in Europe. *Journal of Property Valuation and Investment*. 11 (2), 157 – 173.
- HALL, P. (1966). *Von Thunen's Isolated State*. London, Pergamon Press
- HARVEY, J. & JOWSEY, E. (2003). *Urban Land Economics (6e)*. London, Palgrave Macmillan
- HUI, E.C.M. & YU, K. H. (2006). The Dynamics of Hong Kong's Office Rental Market. *International Journal of Strategic Property Management*.10, 145-168.
- IFEDIORA, G.S.A. (1993). *Appraisal Framework*. Enugu, Iwuba Ifediora and Associates.
- IFEDIORA, B.U. (2005). *Valuation Mathematics for Valuers and Other Financial and Investment Analysts*. Enugu, Immaculate Publications Ltd.
- IGHALO, J.I. (2002). *The Urban Economy, Urban Growth and Change*. Lead Paper Presented at the Conference on the City in Nigeria, organized by the Faculty of Environmental Design and Management, Obafemi Awolowo University, Ile-Ife, Nigeria, 9th – 10th October.
- INVESTMENT PROPERTY FORUM (2007). *Understanding Commercial Property Investment*. Retrieved from [www. Ipf.org.uk](http://www.Ipf.org.uk) on 3rd December, 2007
- JONES, C. (1995). An Economic Basis for the Analysis and Prediction of Local Office Property Markets. *Journal of Property Valuation and Investment*. 13 (2), 16-30.

- KARAKOZOVA, O. (2005). *Modelling and Forecasting Property Rents and Returns*. Helsinki: Swedish School of Economics and Business Administration.
- LEAN, W. and GOODALL, B. (1966). *Aspects of Land Economics*. London, Estates Gazette
- MACFARLANE, J. & MOON. S. (1999). *Modelling of Office Markets in Australia*. Paper presented at the International Real Estate Society Conference held at Kuala Lumpur, Malaysia, 26th – 30th January.
- MACKMIN, D. (1995). DCF Discounted: Further Implications for the Surveyor arising from the over-rented property debate. *Journal of Property Valuation and Investment*. 13(2), 5-15.
- MCCARTNEY, J. (2012). Short and Long-Run Rent Adjustment in the Dublin Office Market. *Journal of Property Research*. 29(3), 201- 226.
- MCGOUGH, T.; OLKKONEN, O. & TSOLACOS, S. (1998). *The Cyclical Behaviour of Office Rents in Helsinki*. Paper presented at the Annual Conference of the European Real Estate Society held at Maastricht, The Netherlands.
- MUELLER, G. R. (1999). Real Estate Rental Growth Rates at Different Points in the Physical Market Cycle. *Journal of Real Estate Research*. 18 (1), 131-150.
- ORR, A. M. & JONES, C. (2003). The Analysis and Prediction of Urban Office Rents. *Urban Studies*. 40(11), 2255 – 2284.
- OZUS, E. (2009). Determinants of Office Rents in the Istanbul Metropolitan Area. *European Planning Studies*. 17(4), 621 – 633.

PYHRR, S. A.; ROULAC, S. E. & BORN, W.L. (1999). Real Estate Cycles and their Strategic Implications for Investors and Portfolio Managers in the Global Economy. *Journal of Real Estate Research*.18 (1), 7- 68.

TONELLI, M., COWLEY, M. & BOYD, T. (2004). Forecasting Office Building Rental Growth Using a Dynamic Approach. *Pacific Rim Property Research Journal*. 10(3), 283 – 304.

YUSOF, A. M. (2001). *Modelling Office Market in Malaysia*. Paper presented at the Pacific Rim Real Estate Society Conference held at Adelaide, January 21st – 24th.