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Employment Generation and Earnings in the Informal Transport Sector in Nigeria

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Abstract: Unemployment and poverty are two of the challenges facing the Nigerian economy. Most urban semi and unskilled labour have found solace in the informal sector particularly informal transport. This paper examines employment generation and determinants of earnings in the informal transport sector in Nigeria using a case study. An adapted Mincerian equation and logistic models were used as tools of analysis.

It was found that the informal sector is a source of employment for 21.7 per cent of jobless people; and 72.3 per cent of those who switched jobs from an informal activity to transport business. Household size, experience and operating hours were found to be significant determinants of earnings. The probability that a motorcyclist would earn at least the informal average in the Okada business when the operator has a driver license, owns the motorcycle, works on full time basis and also a member of the okada union is 0.8018, which is higher than that of an operator with the reverse attributes at 0.2849. The probability of earning at least the industry average by an educated operator was found to be higher than less educated operators. Employment and earnings can be improved upon in this sector if the government regulates its operations and segregate traffic.
Key words: Transport; Informal; Employment; Earnings; Education

1. INTRODUCTION

Nigeria is one of the oil exporting countries earning millions of naira yearly from oil exports. Nigeria earned N59 trillion from oil exports between 1960 and 2009 (Arosanyin, 2011). In spite of the oil wealth, poverty and unemployment have been on the increase. The poverty rate rose from 27.2 percent in 1980 to 46.3 and 54.4 percent in 1985 and 2004 respectively (FRN, 2008). Unemployment rate has been on the increase in Nigeria over the years. It was 13.1 per cent in 2000; rose to 14.8 percent in 2003 and 19.7 percent in 2009 (NBS, 2009). The reduction in the poverty rate in Nigeria is highly dependent on sustainable sources of livelihood and enabling environment for such livelihood activities.

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The sources of livelihood for most Nigerian in the formal sector are threatened due to power crises, recession, poor policy guidelines, low capacity utilization in the manufacturing sector, etc. The informal sector in Nigeria has assumed the role of employer of the 'last resort'. The informal sector in Nigeria contributes about 58 per cent of the Gross National Income (GNI) (Schneider, 2002). One of the informal sector activities that is thriving in Nigeria's urban sector is the informal transport system, which has developed over the years as a result of land use and transport planning failure in Nigeria urban centres. The urban informal transport system in Nigeria ranges from the unorganised bus transit system, taxis tricycle called *Keke NAPEP* to motorcycles popularly called *okada, going, express, achaba,* etc. Nigeria has witnessed unprecedented growth in motorcycles especially those used for passenger transportation. Newly registered motorcycles stood at 19,589 in 1995; it rose to 35,788 in 1997 and 344,215 in 2000. It was 617,739, 501,809 and 439,536 in 2001, 2003 and 2005 respectively (FRN, 1999; FRN, 2007). The activity of commercial motorcyclists as providers of urban passenger transport is a source of livelihood for thousands of Nigerians either as new job or for job switching particularly among artisans, in spite of the public outcry on its suitability for passenger transport in terms of safety and security.

Various studies in Nigeria such as Ogunsanya and Galtima, 1993; Ojekunle, 1988; Adesanya, 1998 etc have examined the employment and earnings capacity of motorcycle passenger transportation. These studies however did not examine the core determinants of earnings in this informal transport mode. Secondly, the studies did not examine the probability that a commercial motorcyclist will earn above the informal sector daily average in his domain, given that most of them abandoned an informal job for the motorcycle transport business with the aim of earning more.

The basic objectives of this paper therefore are to: evaluate the employment dimension of the informal transport mode; evaluate the determinants of earnings from this mode of transport and; determine the probabilities of motorcyclists' earning above the industry daily average.

The rest of this paper is structured into theoretical framework; models and data; empirical results; implications and conclusion.

2. THEORETICAL FRAMEWORK

The human capital theory (HCT) provides the theoretical foundation for earnings. It posits that productivity is determined by the stock of human capital embodied in a person. This includes the total stock of one's knowledge, skills, competence and other attributes that are crucial to economic activity (OECD, 1998). Ricaute (2007) conceived human capital as any stock of innate or acquired knowledge or features an individual possesses that contribute to his/her productivity. The attributes may include talent, level of schooling, quality of education, etc. The classical human theory therefore suggests that earnings respond to general human capital in full and specific human capital partially (Steven, 2000:3).

The starting point of HCT is that education is an investment good; more education yields more human capital and hence higher income or earnings, *ceteris paribus*. The standard Mincerian equation, where earnings are seen as a function of schooling and experience, provides the empirical link between human capital and earnings (Mincer, 1958, 1974; Schultz, 1961). The Mincerian equation has been expanded and used in various fields to estimate earnings, earning differentials, rate of return to schooling, litigation involving earnings, etc. due to its flexibility advantage as it allows for the incorporation of variables of interest that are peculiar to the issue at stake (Chiswick, 1997; Rodgers, 1999; Rama, 2002; Becker, 1964; Ram, 1996; Suleiman and Jean-Jacques, 2004). In the informal sector, the Mincerian equation has been used through adaptation of the peculiarities of the informal sector into the model (see Cervero, 2000; Arosanyin and Ipingbemi, 2007). One significant element in the use of the Mincerian equation in the evaluation of earnings in informal transport is the introduction of the safety vector into the analysis.

Ogunsanya and Galtima (1993) found in their study of okada in Yola, Nigeria that the operators earned an average of N50.00 per day after deducting the cost of fuel. In a study conducted in Port Harcourt, Adeyemo (1998) shows that motorcycles as commercial passenger transport provided employment and income to the operators. He compared the average income of the operators before and after entering the business and found that the average income increased by 710.6 per cent. Ojekunle (1988) on the other hand studied Okada in

Agege Local Government Area of Lagos and found that 73 per cent of the operators earn an annual income between ₦10,001 and ₦20,000 while 15 per cent earn between ₦ 20,001 and ₦ 30,000 per annum. Only 4 per cent earn less than ₦10, 000 per annum while only 3 per cent of the operators earn between ₦30, 001 and ₦ 40,000 per annum. In a survey of Okada in Ibadan, Adesanya (1998) found that 20.5 per cent of the operators earn less than ₦ 200 per day. Those who earn between ₦ 201 and ₦300;₦ 301 and ₦400; ₦ 401 and ₦ 500; ₦ 501 and₦ 600 and above ₦ 600 per day constitute 13.1, 23.8, 30.3, 10.7 and 1.6 per cent respectively.

One major limitation of the above studies is that they did not examine the core determinants of earnings in commercial motorcycle operation beyond the estimation of their average earnings either daily or monthly or annually. Arosanyin (2010) bridged the research gap by examining the determinants of commercial motorcyclists' earnings using an adapted Mincerian model which incorporated safety factors and operational features into the traditional Mincerian factors. The study found that patronage index, experience, mode of work, ownership status and number plates were significant determinants of earnings in this informal transport mode. One important feature of this informal transport mode is the fact that most of the operators used it as a source of 'last resort employment'. Most of them left their previous employments especially in the informal sector due to poor or low earnings for the motorcycle business. This therefore creates another research gap on whether on the daily average they now earn higher in motorcycle operation than in their former informal jobs. The resolution of this research gap is one of the rationales for this paper.

3. MODELS AND DATA

3.1 Models

Two types of models were estimated in this work. The first being the earnings models for commercial motorcyclists, based on modified Mincerian equation. The stepwise version was adopted to determine the significant factors, given the fact that there are many possible determinants. The objective therefore is to select the most significant of these possible determinants, which affect their earning capacity and not to estimate the rate of returns on education in the sector as customary with earning functions. The informal sector is characterised by lowly educated operators. The earnings model is expressed as;

$$\text{Log } Y_i = f(X_i, P_i, Z_i, u) \quad \text{.....(1)}$$

Where log Y is the logarithm of gross daily earnings in Naira. The use of gross instead of net earnings became necessary due to *information hoarding syndrome (IHS)* when a research involved questions on operating cost and tax in the informal sector. X is a vector of operator's characteristics. The ideal response variable from the view of transport is earnings per kilometre day or hour. The absence of data on this variable made the use of proxies such as earnings per day or hour inevitable. In fact, the speedometers of most of the motorcycles were not functional and those with functional speedometer do not keep any record. P is a vector of motorcycle operational factors and; Z is a vector of safety features. u is the error term. The vector of X is made up of age (AG); highest educational attainment (EDU); household size (HH); ownership type (OT). The vector of P is made up of daily operation hours (OH); passenger carried per day (PC); mode of operation (MO); membership of union (MU); types of motorcycle purchased (TM) and; experience (EX). The safety vector has Highway Code awareness (HC); license holding (LH) and helmet usage (HU). Equation (1) can be expressed as;

$$\text{Log } Y = f(\text{AG; EDU; HH; OT; OH; PC; MO; MU; TM; EX; HC; LH; HU; u}) \quad \text{.....(2)}$$

The a priori expectations with respect to equation (2) are stated below;

$f'_{AG}>0$; $f'_{EDU}>0$; $f'_{LH}>0$; $f'_{HU}>0$; $f'_{PC}>0$; $f'_{HH}>0$; $f'_{TM}>0$; $f'_{OH}>0$; $f'_{HC}>0$; $f'_{MU}>0$; $f'_{MO}>0$; $f'_{OT}>0$; $f'_{EX}>0$.

The second earnings model derives from the first with a modification of the response variable. The response variable i.e. earnings is modified to reflect earnings per hour. This takes care of the need to address the fact that there are those who operate short hours that is on part-time basis. Since the response variable is now earnings per hour (Yp_i), the patronage index which is passengers carried per day therefore becomes passenger per hour (PPH).

Log Y_P=f(AG; EDU; HH; OT; PPH; MU; TM; EX; HC; LH; HU; u).....(3)

All a priori expectations in the first model are retained, except the addition of PPH, which is:

$f'_{PPH} > 0$

The second sets of models are the qualitative response models. The first set of models was modified to estimate the probability that a commercial motorcyclist will earn above the informal sector daily average in Samaru area. The average daily earnings of the informal sector activities in Samaru was estimated at N1, 000. Y takes the value 1, if daily earnings is N1, 000 and above; 0 if otherwise. The reason for this estimation is that most of the operators left their informal job for motorcycle passenger business due to economic downturn and to take advantage of improved earnings. Also the probability that an operator will earn above informal transport industry average was also estimated. In this case Y takes the value 1, if earnings per hour is N99.21k and above; 0 if otherwise.

These models therefore have binary responses. It therefore necessitates the use of qualitative response models (See Maddala, 1983). The response is binary or dichotomous. This makes the use of probability models appropriate. Linear regression model (LRP) cannot be used because the estimated values could be negative and also in excess of one; also the problem associated with heteroscedasticity and its treatment makes its application to the study at hand not appropriate (see Gujarati, 2005).

If π is the probability that Y, the dependent variable assumes 1 (π = P(Y=1)), and $1-\pi$ is the probability that Y assumed value zero, in the absence of other information, we would estimate π by the simple proportion of cases for which Y=1. However, in the regression context, it is assumed that there is a set of predictor variables, x_1, x_2,-, -,-x_p, that are related to Y and therefore, provide additional information for predicting Y.

The generic binary model is given as;

$$Log\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta_1 x_1 + \beta_2 x_2 + -,-,-\beta_p x_p \quad \text{..... (4)}$$

Equation (4) could be written as follows;

$$\pi = \frac{e^{\alpha+\beta_1 x_1+\beta_2 x_2+-,-,-+\beta_p x_p}}{1+e^{\alpha+\beta_1 x_1+\beta_2 x_2+-,-,-+\beta_p x_p}} \quad \text{..... ..... (5)}$$

Equation (5) implies;

$$P(Y=1|x_1, x_2, -,-,-x_p) = \frac{e^{\alpha+\beta_1 x_1+\beta_2 x_2+-,-,-+\beta_p x_p}}{1+e^{\alpha+\beta_1 x_1+\beta_2 x_2+-,-,-+\beta_p x_p}} \quad \text{.....(6)}$$

Two versions of Equation (6) were estimated; where Y takes the value 1, if daily earnings is N1, 000 and above; 0 if otherwise; and where Y takes the value 1, if earnings per hour is N99.21k and above; 0 if otherwise. X_{1-p} is a vector of regressors as used in Equations (2) and (3); e is the natural logarithm.

The estimation of the two versions of equation (6) is based on the maximum likelihood principle. The stepwise regression method was adopted. The variables were screened for significance at 5 per cent.

3.2 Source of Data

The data for this paper was sourced randomly from 334 commercial motorcyclists in Samaru, Zaria, where the main campus of Ahmadu Bello University, Zaria is located.

The main campus, 13km Northwest of Zaria City, is bounded on the north by the Kubani River. It covers a land area of over 21km^2 (2133 hectares).

The campus has a population of about 34 thousand students and staff, excluding economic and social service providers. The population moves to various destinations on campus and to Samaru the host community in Zaria using private transport and commercial motorcycles. Motorcycle transport belongs to Class IV of the Classes of informal transport mode (Cervero, 2000:24). The information required for this

study was obtained from primary data sourced through administration of carefully designed questionnaire.

The Ahmadu Bello University Security Unit is responsible for regulating commercial motorcycle operation on campus. It gave the total population of registered motorcycle operators on the campus as 716 at the time of the survey. The study chose the sample using simple random sampling technique. The procedure adopted was the use of odd-even number relying on their registered number. Fifty percent of the operators were sampled based on this procedure. The expected questionnaire was therefore 358. However only 334 were returned, which is about 47 per cent of the operators. The questionnaires were mostly administered personally to the operators, except few who collected and filled themselves. The difference in the expected and actual was as a result of those who collected but failed to return. They were however not replaced, since over 93 per cent of the expected questionnaires were returned.

3.3 Data Measurement

The data were measured both nominally and categorically. The categorically data are ownership (owner-operator = 1; otherwise = 0); type of purchase (new = 1; otherwise = 0); mode of operation (full-time = 1; otherwise = 0); licence holding(licensed=1; otherwise=0);highway code awareness (aware = 1; otherwise = 0); membership of union (member = 1; otherwise = 0); educational attainment (No formal schooling = 0; Quranic education = 1; Primary school = 2; junior secondary = 3; senior secondary = 4; post secondary school = 5). The other variables measured nominally are age (in completed year); household size; daily operation hours; experience (in months); and passenger carried per hour.

4. EMPIRICAL RESULTS

4.1 Descriptive Statistics

The survey shows that all commercial motorcyclists were male with average age of 31 years. The minimum age was 18 years, which conforms to the legal age required to ride a motorcycle (FRN, 2004:B199). About 91.8 percent of the operators were between the ages of 18 and 40 years. About 70 percent are married with mean household size of 6.53. The mean experience on the job was computed at 52.8 months. The mean passenger per day and earnings per day were estimated at 43 and N1, 265 respectively. The mean passenger-hour and earnings per hour were estimated at 3.4 and N99.21kobo respectively. The operators work on the average of 13 hours a day.

The marginal percentages for the variables that were measured categorically are shown in Table 1.

Table 1: Marginal Percentages of Categorical Variables

Variable	Marginal percentage	
License holding	No license=27.6	Licensed=72.4
Helmet usage	Not used=84.2	Used=15.8
Earnings (mean=N1000)	Less than the mean=26	Mean and above=74
Earnings per hour (mean =N99.21kobo)	Below the mean=58.4	Mean and above=41.6
Highway Code awareness	Not aware=41.8	Aware=58.2
Type of purchase	New motorcycle=58.0	Fairly used=42.0
Highest education attained	No schooling=9.9	Quranic =16.5
	Primary education=32.9	Junior education=20.7
	Senior secondary =15.0	Above senior secondary=5.1
Membership of Union	Member=83.3	Non member=16.7
Mode of operation	Part time=17.9	Full time=82.1
Ownership of motorcycle	Rented=55.6	Owner-operator=44.4

4.2 Employment Generation

Commercial motorcycle operation provides employment and earnings to two categories of people. The first are those who are involved in the direct operation of the motorcycles. The second are those who have fleet of motorcycles which they rent out for a fee of N400.00 daily per motorcycle. The more motorcycles rented out, the higher their earnings.

The first category of people is the main focus of this paper. There are two types of operators; those who work as fulltime commercial motorcyclists and those who work as part-time operators. Those who work on fulltime basis accounted for 82.1 percent while those who work as part-time operators accounted for 17.9 percent. One striking feature of employment in this informal transport mode is the fact that only 21.7 per cent took to it as their new job while the rest switched job to informal transport operation. The distribution of previous occupation engaged in shows that 26 per cent were into farming; 18.7 per cent were informal sector artisans; 29.3 per cent were into trading (buying and selling); 21.7 per cent had no job at all while 4.3 per cent were in jobs outside those mentioned above.

Due to poverty and inability to acquire motorcycle on their own, about 63.6 percent of the operators use rented motorcycles. Only 44.4 percent have motorcycles on their own, which are used as owner-operator. The distribution of the sources of rented motorcycles shows that commercial rental accounted for 67.2 percent while the combination of family and relations accounted for 32.8per cent. The rent paid provides income to the owners on daily basis. For rented motorcycles, the operator after paying the rent is responsible for fuelling it for operation. Whatever he earns belongs to him. Major repairs are borne by the owner and not the user.

4.3 Earnings among Operators

The result of the stepwise regression of determinants of earnings among commercial motorcycle operators is shown in Table 2. The use of log earnings per day yielded three significant factors namely: household size, operation hours and experience, which are all positive. The signs conformed to a priori expectations. It has an R-Square of 0.23, implying that about 23 per cent of the variation in earnings is explained by the model. This low R-square is expected since it is a cross sectional data. The F-statistic also shows the global fitness of the model. The use of log earnings per hour however, yielded only two significant variables which are household size and experience. The F-statistic shows that the model has a global fit while the R-square, though low and expected, stood at 0.13. The above results show that earnings are positively related to experience. This is due to the fact that the number of trips is a function of knowledge of commuters; and established customer base which develop over time. Also operators with long experience seem to enjoy more patronage for security reason. In the case of household size, it depicts responsibility factor. Giving that commercial motorcycle operation is done on full time basis, operators with larger households tend to be safety conscious and maintain their motorcycles to avoid loss in their earnings stream. The above results further show that education is not really a factor in determining earnings in the informal sector, when modelled along the traditional Mincerian equation. Added to this is the fact that no serious education is required to operate in the informal sector.

Table 2: Stepwise Regression Results for Log Earnings

Regressors	Earnings per day	Earnings per hour
Household size	0.069	0.070
	(3.606)	(3.706)
Operation hour	0.064	
	(3.159)	
Experience	0.003	0.003
	(2.316)	(2.021)
Constant	5.532	3.846
R^2	0.226	0.140
R^2 Adjusted	0.206	0.126
F statistic	11.474	9.889
N	258	258

Note: t values are in parenthesis.

It is important to note that the transformation of the response variables into a categorical variable taking binary response produced a set of significant variables for determining the probability that a commercial motorcyclist will earn at least N1000 per day. The result is shown in Table 3. The significant variables are household size, ownership, experience, mode of operation, license holding, operation hours and membership of union. The model predicted 78.3 percent of the cases correctly, with R-square (Nagelkerke) value of 0.275 and Cox & Snell R-square of 0.19. The probability estimates were computed using the equation below.

$$P(Y=1/X=x)=\frac{e^{-5.143+0.149x_1-0.743x_2+0.016x_3+1.050x_4+0.882x_5+0.185x_6+1.129x_7}}{1+e^{-5.143+0.149x_1-0.743x_2+0.016x_3+1.050x_4+0.882x_5+0.185x_6+1.129x_7}}$$

x_1 = Household size, x_2 = Ownership type, x_3 = Experience in months, x_4 = Mode of operation, x_5 = License, x_6= Hour of operation, x_7 = Union membership

The probability that a motorcyclist will earn at least N1, 000 per day, which is equivalent to informal sector daily earnings, giving that he rented his motorcycle, operated on part-time basis, has no driver license and not being a member of the motorcycle union is 0.2849. The probability that a commercial motorcyclist will earn at least N1, 000 daily given that he owns the motorcycle, operated on full time basis, has driver license and also a member of the union is estimated at 0.8118. The above worst and best case scenario were estimated by holding household size, experience and hour of operation at their mean levels. The implication of the above is that even if you left an informal sector job for the motorcycle business to take advantage of earnings, the probability of earning above informal sector daily average will be low except you own your motorcycle; have driver license; work on full time basis; and belong to the motorcycle union.

Table 3: Logistic Regression Result for Predicting Earnings (1)

Regressors	Coefficient	Standard Error	Wald	Sig.	Exp(B)
Household size	0.149	0.078	3.675	0.055	1.161
Ownership	-0.743	0.327	5.154	0.023	0.470
Experience	0.016	0.00.5	8.502	0.004	1.016
Mode of operation	1.050	0.396	7.034	0.008	2.858
License	0.882	0.334	6.960	0.008	2.415
Operation hour	0.185	0.065	8.033	0.005	1.203
Union membership	1.129	0.418	7.802	0.007	3.093
Constant	-5.143	1.201	18.336	0.000	0.006
Summary statistics					
Chi-square=54.43; prob=0.000					
R^2 (Nagelkerke)=0.275					
-2log likelihood=249.164					
Cox & Snell R^2 =0.190					
Cases correctly predicted=78.3%					
No of cases=290					

Table 4: Logistic Regression Result for Predicting Earnings (2)

Regressors	Coefficient	Standard Error	Wald	Sig.	Exp(B)
Education	0.405	0.149	7.352	0.007	1.499
Household size	0.295	0.094	9.880	0.002	1.343
PPH	0.463	0.172	7.274	0.007	1.589
Constant	-4.748	1.076	19.489	0.000	0.009
Summary statistics					
Chi-square=24.55; prob=0.000					
R^2 (Nagelkerke)=0.237					
-2log likelihood=148.564					
Cox & Snell R^2 =0.177					
Cases correctly predicted=67.5%					
No of cases=306					

The probability model for determining whether a commercial motorcyclist will earn above the average hourly earnings of N99 is shown in Table 4. Three factors were found to be significant. They are education, household size and the patronage index which is passengers carried per hour (PPH). The model predicted 67.5 per cent of the cases currently, with R-square (Nagalkerke) of 0.237 and Cox & Snell R-square of 0.18. One of the core foundations of the human capital theory, which employs the Mincerian equation, is to estimate the effect of schooling or levels of education on earnings. This model will therefore be used to examine the effects of levels of education on the probability of earning above the industry hourly average. In this case, household size and the patronage index (PPH) are held constant. The probability estimates were computed using the equation below.

$$P(Y = 1/\ X\ = x) = \frac{e^{-4.748+0.405x_1+0.295x_2+0.463x_3}}{1+e^{-4.748+0.405x_1+0.295x_2+0.463x_3}}$$

x_1 =level of education, x_2 = Household size, x_3 = PPH

The estimated probabilities show that the probability of earning at least the hourly motorcycle average is 0.223 for operators without formal education; 0.3010 for operators with Quranic education; 0.3924 for operators with primary education (6 years of schooling); 0.4919 for operators with junior secondary school education (9 years of schooling). Operators with senior secondary education (12 years of schooling) has 0.5921 probability of earning the minimum hourly mean while those with post secondary education (>12 years of schooling) have 0.6847 probability of earning at least the hourly mean. The above binary response model shows the effect of education on earnings, which the log earning version did not show. The probability of earning at least the hourly mean is positively related to level of education attained.

The two major challenges identified by the operators facing their operation are: constant conflict with other road users especially with vehicles since the traffic is mixed and; police harassment and extortion.

5. IMPLICATIONS

Three major implications are discernable from the analysis above. First, the informal transport subsector has been shown to be an employer of urban unskilled labour. The shift from other informal jobs to Okada does not guarantee earnings above the informal daily average except some conditions such as ownership of motorcycle, acquisition of driver licence, membership of union, etc are met.

Second, using the Mincerian equation based on the log of earnings did not bring out the significance of education in this informal transport mode. The categorisation of earnings using binary response provided a clue to the effect of levels of education on earnings. This further justifies the flexibility advantage of the Mincerian equation in earnings analysis.

Thirdly, safety factors were found not to be significant in determining earnings except license holding. It shows the risk taken by users. The users care less about issues such as Highway Code awareness of operators, use of safety helmet, etc.

The improvement of earnings in this job will depend mainly on government commitment to regulations of their activities in the areas of driver licensing, usage of crash helmet, etc. Secondly, the government should not only regulate but make adequate provision for their operations by moving from the mixed traffic notion to segregated traffic in road design and construction.

6. CONCLUSION

This paper has examined the employment dimension and earning capacity of *okada* transport in Nigeria. It serves as a source of employment for jobless unskilled labour and job opportunity for informal operators switching job for improved earnings. Education was only found to be significant when the earning model takes a binary response. There is the need for further research on informal transport earnings especially along rural-urban divide.

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