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Impact of Migrant Remittances on the Output of Arable Crop of Farm Households in South Eastern Nigeria

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Author's contribution

This Whole Work was carried out by the author ORI.

Original Research Article

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ABSTRACT

This study investigated the impact of remittances on the output of arable of remittance and non receiving farm households in South Eastern Nigeria. A multi-stage random sampling and purposive sampling technique was used in choosing the sample. The cost route technique was used in data collection. Data collected using structured questionnaire and interview schedules were analyzed using such statistical tools as Z test, regression analysis and Chow's test statistic. The result of data analyses revealed that there were significant differences in age, farm size, output and income between the remittance receiving and non-receiving households. The remittance receiving households were relatively older, cultivated more farm land, produced greater output and had higher income than the non-remittance receiving households. The significant factors influencing the output of the remittance receiving households were farm size, labour, other variable inputs like fertilizer and agrochemicals, planting materials, etc and capital which were all positively related to output and significant at 1 percent significance level except for capital that was significant at 5 percent; while for the non reemittance receiving households, the significant factors influencing their output were farm size, labour and capital which were all positively related to output. Farm size was significant at 1 percent while labour and capital were respectively significant at 5 percent level of significance. The dummy representing household type was significant at 1 percent and positively related to output, implying that remittance receiving households obtained higher output than the non receiving households. The results of the statistical tests for structural shift in production function and differences in

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output revealed that significant difference between the production functions of the remittance receiving and non-remittance receiving farm households and output advantage for the remittance receiving households derivable from the use of remittance income.

Keywords: Migrant; remittances; output; arable crop.

1. INTRODUCTION

The decreasing relative importance of the agricultural sector is a pervasive phenomenon of economic development which often entails sizeable population movements out of rural areas. This has continued to date. [1] described Nigerian farmers as being very poor with low agricultural production. For this reason as noted by [2], they are unable to provide enough funds for agricultural activities.

It has been commonly argued that international migration has contributed to agricultural decline and a general disaffection with small-scale peasant agriculture. The 'lost labour' of able-bodied (migrated) men is ascribed a key role in the process of agricultural decline. The *exoderural* is supposed to have led to agricultural decline or even abandonment of agriculture [3-5]. Instead of investing, it has been argued that migrant households tend to withdraw partially or entirely from agriculture. Return migrants who *do* invest in agriculture often do so, not out of rational economic motives, but because of their strong emotional attachment towards agriculture. It would therefore concern a "ritual" [3] or "sentimental" [6] agriculture, in which the migrant practices a kind of "hobby farming" [7].

However, this pessimistic perspective is fundamentally challenged by an increasing number of empirical studies showing that international remittances have played a key role in facilitating agricultural investments. As long ago as the early 1970s, [8] observed that remittances had made possible intensification of agriculture in the Sous region. In other migrant-sending regions, too, migrants play an important and innovative role in the development of subsistence and commercial agriculture through the purchase of land, modern agricultural equipment, such as tractors and water pumps, the introduction of new crops and techniques and the establishment of new farms. Migrants show a particular preference for investments in the development of new irrigated agriculture [6,7,9,10,11,12]. Pascon [13] observed that investments by international migrants in wells and water pumps have mitigated the effects of the severe drought occurring in the mid-1970s.

Migration helped households to improve or maintain their livelihoods by stimulating and feeding into local productive activities. In their study of the Malian Sahel, [14] also showed that the outcome of migration cannot be evaluated outside its relationship with the other livelihoods strategies, or the portfolio of household activities. Analyzing the potential of migration strategies in stabilizing the income of rural households, [15] reported that these strategies are actually used as a substitute for missing financial and insurance markets, especially in cases in which the migrant remains an economic part of the household and the region of origin. [16] noted that labor migration with remittances is perceived as a strategy to secure and smooth the remittee's food consumption level and to provide capital for the remittee's farm investments. [17] describes a very efficient strategy to promote agricultural investments and reduce food insecurity and income risks by families in Senegal. They finance irrigation facilities through remittances from family members who are especially sent

out for this purpose. This allows them to increase food crop production in a region frequently affected by droughts.

Among off-farm income sources, the most important and less covariant with the local cereal economy is remittances from household member migrants, either within the country or in foreign countries. In Burkina Faso for the drought year 1984/1985, [18] showed that the share of migrant remittances in total income is much higher in the adequately nourished Sahelian zone (9 percent, compared to 1 percent in the Guinean zone). Non-farm income sources such as migrants' remittance play a crucial role in household's capacity to adopt farming technology. An understanding of the sources of agricultural productivity gains and the role of off-farm financing is particularly important in areas exposed to food shortfalls and food insecurity such as the Sahel.

Direct investment of remittances in agriculture is only one potential way that these funds may support production. Another way is that remittances may help to alleviate capital constraints and provide security in risky agricultural sectors where credit and insurance markets are not developed [19]. Case study evidence supports this contention. A study in rural Jiangxi found that on account of remittances, the poorest households with migrant members no longer needed to rely on borrowing seed and fertilizer from neighbours before the harvest and on making their repayments in grain after the harvest [20]. In a study in rural Chifang prefecture, Inner Mongolia Province, [21] reported that remittances provided an insurance buffer and saved many households from destitution during periods of ecological disaster.

In noting the role of remittances in providing money for financing on-farm activities and insuring against on-farm income shocks, [22] suggested that improved rural credit systems would remove the need for households to send out migrants. While it is certainly the case that an expansion of micro-credit in rural areas would be desirable, the expansion of micro-credit could also be viewed as a pro-poor and pro-development undertaking that is a complement to remittances rather than as a mechanism desirable for its potential to limit "migration-induced reductions to household labour". Indeed, as already mentioned, there is scope for mobilizing the immense domestic rural savings accrued through remittance deposits towards an expansion in micro-credit. Achieving this according to [23 and [24] would require substantial reform to rural financial institutions, though increases in rural credit availability that have occurred since 2001. Most households use remittance income to pay for loans received.

Moreover some rural households have used remittances as well as other sources of money to invest in modest labour saving equipment suitable for small-scale family farming. [24] noted on China for example, a purchase popular during the late 1990s was a machine that could both pump water and thresh grain at harvest time (*choushuiji*). There is also a six-province survey of 824 households which reported that returned migrants invested around 100 per cent more in items of agricultural machinery than migrants and non-migrants. Unlike migrants the attention of returnees has turned to farming and unlike non-migrants they have urban savings. Items of investment included threshers, water pumps, plowing machines, seeders, grain processors, and feed processors [25].

This study attempted to provide empirical evidence on the impact of migrant remittance on agricultural production. There is also the need to empirically investigate the assertion that migrant remittance receiving households tend to have a higher propensity to invest than do non-migrant remittance receiving households and that consumption and often trivialized

“non-productive” investments can have positive income-multiplier effects, through which the benefits of remittances might also indirectly accrue to non-migrant households [26,27].

2. METHODOLOGY

This study was conducted in South Eastern Nigeria, which comprises of five states namely: Abia, Anambra, Ebonyi, Enugu and Imo. The area lies between latitudes 4°20' and 7°25' North of the Equator and longitudes 5°25' and 8°51' East of the Greenwich Meridian. It covers a land area of about 109, 524KM² or 11.86 percent of the total land area of Nigeria. The area lies mainly on plains under 200M above sea level [28,29]. The population of the area is 29,949,530, comprising of 15, 326,463 males and 14, 623,067 females [30] and farming is the predominant occupation of the rural inhabitants. According to [31], four states in Southeast Nigeria (Anambra, Imo, Abia and Enugu) are among the seven most densely populated states of Nigeria, implying that the southeast is the most densely populated area in Nigeria. As a result of this increased human pressure on finite resources, there is intense competition for the available natural resources in the area. Therefore, many people view migration as an alternative option of securing a livelihood.

A multi-stage random sampling technique was used in choosing the sample. In the first stage, 2 States, Abia and Imo, were randomly selected from the 5 states in South Eastern Nigeria. Secondly, from each State, 2 Local Government Areas (LGAs) out of the 17 and 27 in Abia and Imo States, respectively, were randomly selected and from each L.G.A, 3 communities were randomly selected. The remittance receiving and non-remittance receiving arable crop farm households formed the respective sampling frames in each chosen community, from which 3 households each were randomly selected. In all, 120 respondents were used for the study comprising 60 migrants' remittance receiving households and non remittance receiving households, respectively.

The cost route technique was used in data collection. By this method, data were collected from the respondents fortnightly following their farming activities. Since most of the farmers do not keep records and have to depend on memory recall, data collected following this method are more reliable. Data were collected using structured questionnaire and interview schedules. Data analysis was by the use of such statistical tools as Z test (since the sample size is greater than thirty), regression analysis and Chow's test statistic. The Z test statistic is given by:

$$Z_{cal} = (\bar{X}_1 - \bar{X}_2) / S_{\bar{x}_1 - \bar{x}_2} \quad (1)$$

$$S_{\bar{x}_1 - \bar{x}_2} = \sqrt{(S^2_{x_1}/n_1) + (S^2_{x_2}/n_2)} \quad (2)$$

Where in (1) and (2), \bar{X}_1 and \bar{X}_2 are the mean values of the major socioeconomic variables of the migrant remittance receiving and non receiving households respectively; $S^2_{x_1}$ and $S^2_{x_2}$ are variances of the major socioeconomic variables of the remittance receiving and non receiving households respectively; n_1 and n_2 are the number of households in each group respectively; $S_{x_1-x_2}$ = sample standard error of the means.

In order to ascertain the impact migrant remittances on output, a Cobb-Douglas production function was specified and analyzed for the two groups of households separately. The data was pooled and also analyzed (equation 3). The pooled data with a dummy variable

(equation 4) representing household type was equally analyzed. The implicit forms of the models are specified as:

$$Y = f(X_{1i}, X_{2i}, X_{3i}, X_{4i}) \quad (3)$$

$$(i = 1,2)$$

$$Y = f(X_1, X_2, X_3, X_4, D) \quad (4)$$

Where in equations (3) and (4), Y is the grain equivalent output of arable crop in kg [31]; X₁ is farm size in hectares; X₂ is labour measured in mandays; X₃ is other variable inputs which include planting materials, fertilizer and other agrochemicals, etc in naira; X₄ is capital in naira which is made up of depreciation costs, interest on loans, etc and I represent the farm household group.

The Chow's test statistic was used to test if there was significant difference in production function of the two groups of households and is computed following [32], and [33]. The Chow's test for production change (structural shift in production function) is given by:

$$F^* = \frac{[\sum e_3^2 - (\sum e_1^2 + \sum e_2^2)] / [k_3 - k_1 - k_2]}{(\sum e_1^2 + \sum e_2^2) / (k_1 + k_2)} \quad (5)$$

Where in (5), $\sum e_3^2$ and k_3 are the error sum of square and degree of freedom respectively of the pooled data; $\sum e_1^2$ and k_1 are the error sum of square and degree of freedom respectively of the sample of migrant remittance receiving household; and $\sum e_2^2$ and k_2 are the error sum of square and degree of freedom respectively of the sample of non-remittance receiving household

For the test for homogeneity of slope, the Chow's F statistic is calculated as follows:

$$F^* = \frac{[\sum e_4^2 - (\sum e_1^2 + \sum e_2^2)] / [k_4 - k_1 - k_2]}{(\sum e_1^2 + \sum e_2^2) / (k_1 + k_2)} \quad (6)$$

Where in equation (6), $\sum e_4^2$ and k_4 = the error sum of square and degree of freedom respectively for the pooled data with a dummy variable with a value of unity for remittance receiving households and zero for non-remittance receiving households, while other variables were as previously defined.

For the test for differences in intercepts, the chow's F statistic is calculated as follows:

$$F^* = \frac{[\sum e_3^2 - \sum e_4^2] / [k_3 - k_4]}{\sum e_4^2 / k_4} \quad (7)$$

Where all variables in equation (7) were as previously defined.

The theoretical value of F is the value that defines the critical region of the test at the chosen level of confidence [34]. If the calculated F exceeds the tabulated F value, then the intercepts are assumed to be different between the households. This test is conditional on a common slope, so the test for differences in slopes is performed first before testing for differences in intercepts [33].

3. RESULTS AND DISCUSSION

3.1 Test for Differences in Major Socioeconomic Variables

Z test was carried out to determine whether significant differences exist between major socio-economic characteristics of the remittance receiving and non-remittance receiving households. The result of the t-test was presented in Table 1. The results show that there were significant differences in age, farm size, output and income between the remittance receiving and non-receiving households. This result implies that the remittance receiving households were relatively older, cultivated more farm land, produced greater output and had higher income than the non-remittance receiving households. The more farm land cultivated might have been made possible by remittance income which enabled them to acquire more land. It is expected *a priori* that farm size would be positively related to output. This explains the increased output achieved by the remittance receiving households and the concomitant increase in income.

Table 1. Test for difference in major socio-economic variables of the remittance receiving and non receiving households

Variable/Household type	Mean	Std. error	Std dev.	t value
Age				
Remittance receiving household	50.2	1.38	10.70	2.11**
Non remittance receiving household	46.03	1.26	9.74	
Household size				
Remittance receiving household	6.43	0.32	2.49	-0.18
Non remittance receiving household	6.52	0.33	2.53	
Years of formal Education				
Remittance receiving household	8.17	0.59	4.59	0.69
Non remittance receiving household	7.57	0.68	5.28	
Farm size				
Remittance receiving household	2.75	0.27	1.07	7.89***
Non remittance receiving household	1.98	0.11	0.82	
Output				
Remittance receiving household	4952.58	344.43	2667.91	3.11***
Non remittance receiving household	3137.11	455.72	3529.99	
Income				
Remittance receiving household	762800	49800.44	385752.5	7.68***
Non remittance receiving household	465319.9	21077.05	163262.2	
Years of farming experience				
Remittance receiving household	19.77	1.48	11.48	0.99
Non remittance receiving household	18.03	1.19	9.22	

Source: Survey data, 2009

3.2 Estimated Production Function

The result of the estimated production functions for the two groups of households, the pooled data, and the pooled data with dummy is presented in Table 2. All the F-ratios were all statistically significant at 1 percent level indicating the goodness of fit of the model. The coefficients of multiple determination were 0.6815, 0.5200, 0.7512 and 0.5957 for the remittance receiving households, the non receiving households, the pooled data and the

pooled data with dummy indicating household type, respectively. These imply that 68.15 percent, 52 percent, 75.12 percent and 59.57 percent of the variatins in the outputs of the remittance receiving households, the non receiving households, the pooled data and the pooled data with dummy indicating household type respectively were accounted for by the variables included in the models.

The significant factors influencing the output of the remittance receiving households were farm size, labour, other variable inputs like fertilizer and agrochemicals, planting materials, etc and capital which were all positively related to output and significant at 1 percent significance level except for capital that was significant at 5 percent; while for the non reemittance receiving households, the significant factors influencing their output were farm size, labour and capital which were all positively related to output. Farm size was significant at 1 percent while labour and capital were respectively significant at 5 percent level of significance. These imply that increased employment of these variables, *ceteris paribus*, would lead to increase in output. These are consistent with *a priori* expectation.

Table 2. Estimated Cobb-Douglas Production Function of the Households

Parameters	Remittance household		Non remittance household		Pooled		Pooled D	
	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio	Coeff	t-ratio
Constant	3.888	12.31***	3.796	5.45***	1.392	1.24	0.138	3.54
Farm size	0.138	3.54***	8.327	3.21***	0.476	2.26**	-0.006	-0.23
Labour	0.026	8.11***	0.296	1.98**	-0.045	-2.17**	0.941	1.45
Other variable inputs	0.075	3.56***	0.173	1.12	0.304	0.72	0.057	1.72*
Capital	0.449	2.34**	1.017	2.27**	0.042	8.35***	0.449	2.23**
Dummy							2.686	7.00***
R ²		0.6815		0.5200		0.7512		0.5957
Adj R ²		0.6454		0.5041		0.7006		0.5215
F ratio		3.40***		2.92***		6.17***		5.20***

Source: Survey data, 2009

For the pooled data, farm size and capital were positively related to output at 5 percent and 1 percent levels, respectively; while labour was significant at 5 percent level and negatively related to output of the farmers. This does not conform to *a priori* expectation as it implies that increased use of labour would lead to decrease in output. However, the negative relationship must have resulted from increased use of labour beyond the point of its economic optimum or to the point of diminishing marginal productivity.

The dummy representing household type was significant at 1 percent and positively related to output. This result implies that remittance receiving households obtained higher output than the non receiving households. This must have been made possible by remittance income which enabled them to purchase more productive inputs and to use superior technology in their farming operations. [19] noted that remittances may help to alleviate capital constraints and provide security in risky agricultural sectors where credit and insurance markets are not well developed. [6,11,35,] observed that remittance income play an important and innovative role in the development of subsistence and commercial agriculture through the purchase of land, modern agricultural equipment, the introduction of new crops and techniques, leading to increased agricultural output and the establishment of new farms.

3.3 Tests for Structural Shift in Production Function and Differences in Output

The results of the statistical tests for structural shift in production function and differences in output were presented in Table 3. The calculated chow's F statistic for production effect was significant at 1 percent. The result confirms that there is significant difference between the production functions of the remittance receiving and non-remittance receiving farm households. In other words, the remittance receiving households are associated with structural modifications of their production parameters, implying that the production functions of the households differ.

Table 3. Tests for difference in output

Nature of analysis/Household type	Error sum of squares	Degrees of freedom	Calculated F
Tests for output effects			
Remittance receiving household	7.67507781	50	21.539***
Non- Remittance receiving household	5.22779111	50	
Pooled data	40.6947775	110	
Tests for homogeneity of slope			
Remittance receiving household	1.67507781	50	14.1203***
Non- Remittance receiving household	1.62779111	50	
Pooled data with dummy	29.3002399	109	
Test for differences in intercept			
Pooled data	40.6947775	110	42.389***
Pooled data with dummy	29.3002399	109	

*Source: Survey data, 2009; *** = significant at 1 percent*

The result of the test for homogeneity of slopes in the production functions of the remittance receiving and non-remittance receiving farm households show that the calculated Chow's F statistic is statistically significant at 1 percent. The result confirms heterogeneity of slopes or factor biased production functions.

The calculated chow's F statistic for the test for differences in intercept is significant at 1 percent. This result confirmed heterogeneity of intercepts for the remittance receiving and non-remittance receiving households and output advantage for the remittance receiving households derivable from the use of remittance income. This confirms the result of the pooled data with dummy variable representing household type which revealed that remittance receiving households obtained higher output relative to the non-remittance receiving households.

4. CONCLUSION

From this study, it could be concluded that remittances enable significant increases in agricultural output. This could be as a result of its role in alleviating capital constraints and the development of subsistence and commercial agriculture through the purchase of land, modern agricultural equipment, the introduction of new crops and techniques which increases output. There is the need to pursue policies which enhances inflow of remittances. This calls for proactive thinking and action on the part of government, different agencies and policy makers towards creating viable and sustainable investment opportunities for rural farm households for increased agricultural production and productivity. Remittance receiving

countries need to provide a friendly economic environment through sound macro-economic policies, including stable exchange rates, basic physical infrastructure, improved market integration, reliable financial and other institutions, transparent legal system and good governance – in essence, conditions that can prime the agro-economy for development and equip it adequately to benefit from this external stimuli.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. Ijere MO. Leading Issues in African development, ACENA Publishers, Enugu. 1992;3.
2. Ukoha OO, Mejeha RO, Nte IN. Determinants of Farmers Welfare in Ebonyi State, Nigeria. Pakistan Journal of Social Sciences. 2007;4(3):351-354.
3. De Mas P. Overlevings dynamiek in het Marokkaanse Rif-Gebergte. Geografisch Tijdschrift. 1990;24(1):73-86.
4. Ferry M, Toutain G. Competition and Espèces complémentarité Végétales dans Oasis. Agricultural Systems oasis. Options Mediterranean Series A, No. 11. Paris: CIHEAM; 1990.
5. Kerbout M. Mutations Campaigns Middle Atlas Oriental. A. Bencherifa and H. Popp eds, Le Maroc. Espaceet Société. Passau: Passavia Universitätsverlag; 1990.
6. Bencherifa A. International Migration and Agricultural Change. Morocco and Germany. Rabat: FLSH; 1991.
7. Bencherifa A, Popp P. Rémigration Nador III. Passau: L.I.S. Verlag GmbH; 2000.
8. Bonnet JJ, Bossard R. Geographical Aspects Marocainede the Emigration versl Europe. Journal of Geography of Morocco. 1973;23(24):5-50.
9. Bencherifa A. External Migration and Agricultural Development in Morocco. Journal of Geography of Morocco.1993;15(1/2):51-91.
10. De Haas H. Migration and Agricultural Transformations in the Oases of Morocco and Tunisia. Utrecht: KNAG; 2001.
11. Popp H. Effects of Rémigrationsurl' Agriculture Irriguée: Study Casdans Plain Zebra. M. Berriane and H. Popp eds *Migrations Internationales entre le Maghreb et l'Europe*. Rabat, Université Mohammed V. 1999;189-196.
12. Pascon P. La maison d'Iligh etl'histoire sociale Tazerwalt. Rabat: SMER; 1985.
13. De Haan A, Brock K, Coulibaly N. Migration, Livelihoods and Institutions: Contrasting Patterns of Migration in Mali. The Journal of Development Studies. 2002;8(5):37-58.
14. Schrieder G, Knerr B. Labour migration as a social security mechanism for smallholder households in Sub-Saharan Africa: The case of Cameroon. Oxford Development Studies. 2000;28(2):223-236.
15. Konseiga A. The Role of Migration in Agricultural Innovation for Food Security, Center for Development Research (ZEF), University of Bonn (Germany). 2004;39.
16. Dia IMigration commestratégie rural production units. A case study in Senegal, in: Blockland A, van der Staaaj F, (Eds). Sustainable Development in Semi-arid Sub-Saharan Africa (The Hague, Ministry of Foreign Affairs)
Quoted in Schrieder G, Knerr B. Overlevingsdynamiek in het Marokkaanse Rif-Gebergte. Geografisch Tijdschrift. Labour migration as a social security mechanism for smallholder households in Sub-Saharan Africa: The case of Cameroon. Oxford Development Studies. 1992;28(2):223-236.

17. Reardon T, Taylor JE. Agroclimatic shock, income inequality, and poverty: Evidence from Burkina Faso. *World Development*. 1996;24(5):901-914.
18. Stark O, Lucas REB. Migration, remittances and the family. *Economic Development and Cultural Change*. 1988;36:465-82.
19. Murphy R. *How Migrant Labour is Changing Rural China*, New York: Cambridge University Press; 2002.
20. Huang P, Zhan S. Internal migration in China: Linking it to development, In *Migration, Development and Poverty Reduction in Asia*, F. Laczko and I Pinto-Dobernig (eds), Geneva: IOM Research and Publications Department; 2005.
21. Rozelle S, Edward Taylor J, de Braw A. Migration, Remittances and Agricultural Productivity in China. *The American Economic Review*. 1999;89(2):287-291.
22. Deshingkar P. Understanding the Implications of Migration for Pro-poor and Agricultural Growth: Issues Paper. Overseas Development Institute Paper prepared for the DAC POVNET Agriculture Task Group Meeting, Helsinki; 2004.
23. Qu H. The Great Migration: How China's 200 Million Surplus Workers Will Change the Economy Forever, 14 October: London: HSBC Global Research; 2005.
24. Zhao Y. Causes and Consequences of Return Migration: Recent Evidence from China; 2001. Available: <http://ccer.pku.edu.cn/download/475-1.doc>
25. Massey DS, Arango J, Hugo G, Kouaouci A, Pellegrino A, Taylor JE. *Worlds in Motion: Understanding International Migration at the End of the Millennium*. Oxford: Clarendon Press; 1998.
26. Özden Ç, Schiff M (Eds). *International migration, remittances, and the brain drain*. Washington DC. The International Bank for Reconstruction and Development/The World Bank; 2005.
27. Obi ME, Salako FK. Rainfall Parameters Influencing erosivity in South Eastern Nigeria. *CATENA*. 1995;24(4):275-287.
28. Monanu PC. Geographical boundaries of Nigeria. *University of Ife Press*. 1975;1(2):3.
29. Nigerian Population Commission (NPC). *Nigerian Census Figures*. Nigerian Population Commission, Abuja; 2006.
30. Nwajiuba C. International Migration and Livelihoods in Southeastern Nigeria", *Global Migration Perspectives No. 50*; 2005.
31. Olayemi JK. The Nigeria Food Balance Sheet, NISER Research Report. 1986;200.
32. Olomola AS. Choice and Productivity Effects of Animal Traction Technology in the Semi-Arid Zone of Northern Nigeria. *Issues in African Development Monograph Series*. 1998;12:9
33. Onyenweaku CE. Impact of technological Change on Output, Income, Employment and Factor Shares in Rice Production in South Eastern Nigeria. *Issues in African development Monograph Series*. 1997;5:7-8
34. Koutsoyiannis A. *The Theory of Econometrics (2nd Ed)*, New York: Palmgrave Publishers Ltd. 2001;164-166.
35. Bencherifa A, Popp H. *L'Oasis Figuig: Persistence et Changement*. Passau: Passavia Universitätsverlag; 1990.

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