Volume: 22, Issue: 1
Page: 14-22
2023

International Journal of Science and Business

Journal homepage: ijsab.com/ijsb

Impact of remittance inflows on the migration outflows of African countries: Statistical panel analysis

Md. Ashraful Islam & Md. Rokonuzzaman

Abstract

This article examines the statistical results for several African nations. The country with the highest migration rate in east Africa is Sudan, where there are about 0.24 million migrants every year. Seychelles has the fewest migrants, with only 5,000 people. Tanzania, Kenya, and Uganda are the countries that get the most donations. South Africa is the nation in the South African area that receives the highest levels of emigration and remittances, with an emigration rate of 0.13 million and repatriated profits of 489.6 million US dollars. In Botswana, transfers and emigration are at their lowest levels. In our statistical analysis, the Hotelling test statistic shows the population mean vector with migration and remittances for various countries in East Africa, South Africa, and West Africa. It produces statistically significant results at the 5% level in MANOVA analyses for the equality of means test for the nations of all three regions. To construct a panel regression model on the data, the data analysis was assisted by the LM test statistic and a fixed-effect model. Panel data analysis can help identify the yearly average number of migrants and the amount of remittance in different respected regions. Migration has a significant impact on remittances, and the inability of time-series migration data to be time-series migrated is one of the study's main constants. One can use a simulation study to get fruitful results.

IJSB
Accepted 24 March 2023
Published 02 April 2023
DOI: 10.58970/IJSB.2092

ISSN: 2520-4750 (Online) 2521-3040 (Print)

Keywords: *Inflows Remittance, Outflows Migration, Panel data analysis, fixed effect model, Hotelling T^2, MANOVA, LM test.*

About Author (s)

Md. Ashraful Islam (corresponding author), Lecturer (Statistics), Department of Natural Science, Port City International University, Bangladesh.

Md. Rokonuzzaman, Professor and Chairman, Department of Statistics, University of Chittagong, Bangladesh.

Introduction

International migration, or the movement of people across borders, has significant effects on economic development and the reduction of poverty in both origin and destination nations. Population trends, globalization, and climate change will all contribute to increased pressure on internal and international migration during the coming decades. The fundamental driving force for migration is the high income in the destination places, which a decision is made collectively by people and their families. On households that send migrants, it has a variety of effects, including a decrease in labor-intensive output and a change in the remaining members' consumption habits. Also, for a variety of reasons, migrants send remittances to the home countries. On the other hand, remittances, usually understood as money or goods that migrants send back to families and friends in their origin countries, are the most direct and well-known link between migration and development. Remittances are financial payments made by migrant workers across international borders. Millions of people living and working outside their country of birth send remittances to their families in their home countries, with a large number of remittances going to developing countries (Lucas, 2006). Unrecorded flows remain somewhat above the official estimates. Migration is increasingly seen as a high-priority policy issue by governments, politicians, and the broader public due to its importance to economic prosperity, human development, and safety and security. It highlights how the development potential of remittances could be most effectively used while avoiding the possible risks (Azam et al., 2006). The number of migrants among underdeveloped, developing, and developed countries is estimated to be as large as that of African nations (Lucas, 1987). The report has two goals: to explore the gains and losses from international migration from the perspective of developing countries, with special attention to the money that migrants send home, and to consider policy initiatives that could improve the developmental impact of migration (Adams, 2011). The contribution of remittances to the development of the economies of recipient countries has been attracting more and more attention. Several factors come together to influence the cause-effect relationship between international outflows of migration and inflows of remittances (Gupta et al., 2009). Migration is one of the most important surveys of demographic and time-series data in the whole world, which is conducted internationally by the United Nations and the World Bank (Ratha et al., 2010). This analysis is conducted worldwide every year for the remittance data, and the migrant data is conducted over a range of five-year intervals. The global statistical community has reconsidered the use of conventional sources for migration data due to the 2030 Agenda for Sustainable Development.

Literature Review

This research provides a review of the literature on the development impact of migration and remittances on the origin countries and the destinations of African countries. It is estimated that 244 million people, or 3.3% of the world's population, live outside their countries of birth, with the number of migrants among underdeveloped, developing, and developed countries being as large as those from Asian and African nations. This study highlights the ways in which remittances can be used to promote a more balanced approach to the issue of remittances and development. It uses a narrowly circumscribed frame of reference, focusing on migrant-sending developing countries (Ghosh & Bimal, 2006). The theoretical idea of remittance outcomes and migration and its impact on comparative international development (De Haas, 2005). This paper also examines the developmental impacts of remittances on both macro and micro levels and weighs the pros and cons of analytic perspectives and research findings. It also examines remittances and development broadly to take into account not only their economic aspects but also their political, social, and cultural roles. According to the study, remittance growth has a favorable effect on economic growth (De Haas & Hein, 2007). The study also discovered that remittances have a positive effect on reducing poverty. The increase

in imports and low export levels cause the economy to grow slowly. Remittances do increase demand, and this increase in demand causes an increase in imports to meet it, according to research. A study found that remittances have a favorable effect on economic growth in nations with undeveloped banking systems (Fayissa & Nsiah, 2010). They contend that remittance funds provide an alternate source of investment financing and aid in overcoming liquidity challenges in less developed financial systems. African migration is still primarily intra-regional, with large numbers of immigrants from Burundi and Congo still living in Tanzania, Somalis in Kenya, and Zimbabweans in South Africa. Traditional migration configurations in West Africa have changed in recent years, with West African countries becoming both source and destination countries for migrants. Ghana has been one of the major host countries, but the disruption in Cote d'Ivoire and the economic crisis in Nigeria have diminished the number of migrants in these countries. Burkina Faso, Guinea, Mali, and Togo are the main sending countries, while Senegal has been both a receiving and sending country (Browne & Leeves, 2007). The number of individuals displaced by violence in the Middle East and North Africa has reached alarming levels, especially in light of the 2 million Syrian refugees who have fled to nearby nations. Remittances to Syria have increased significantly, with $1.6 billion sent in 2010. From 2009 to 2013, remittances to Egypt nearly quadrupled, reaching $20 billion. The earnings from the Suez Canal are now one-third of remittances (World Bank, 2013). In 2018, remittances to the Middle East and North Africa increased by 9% to $62 billion. Egypt's quick remittance increase of almost 17 percent drove the expansion. Following 2018, it is anticipated that remittance growth would continue, but at a reduced rate of about 3 percent in 2019 due to the Euro Area's slowing economy (World Bank, 2018). A number of factors come together to influence the cause-and-effect relationship between African international outflows of migration and inflows of remittances. Thus, the impact of remittances on international migration will depend on such factors as the political, institutional, attitude, financial, and structural framework of the underlying economies. (Wooldridge & Jeffrey, 2010)

Data and Research Methodology

International migration affects economic relationships among all the countries in the 21st century. In 2018 the total number of migrants increased by 255 from 175 million in the whole world. In this research study, we have extracted the 3 regional Migrants areas for analyzing the Impact of Remittances inflows on international migration outflows of East Africa, West Africa, and South African countries. To analyze the Impacts of the Remittances inflows on international migration outflows, we have employed various statistical techniques. First of all, we perform descriptive statistics to compare the level, variability, and shape characteristics the of dependent and the independent variable by some background characteristics to examine the dependent and independent variables we showed the GIS and its mapping for the different regions with their comparability after then we use one way ANOVA for the set of variables. In the case of time series data, we used panel analysis for the required dependent and independent variables. We have also shown here the AIC criterion and Hausman specification test for Fixed and random effect models for the required panel data analysis.

To examine the impact of remittances on international migration of 25 African countries in three regions. (i) to evaluate the relationship between international migration outflows and remittance inflows, (ii) to discuss the Statistical findings between migration and remittances, and (iii) to evaluate of effect of migration on remittance for different countries of the African region.

Results and Discussion

In this study, line graphs and descriptive statistics are used to compare the general scenarios of migration and remittances. The outflows of migration for every county have an increasing trend except for Madagascar, Seychelles, and Tanzania. Among these countries, Sudan has a sharply increasing trend, followed by Uganda, Kenya, and Ethiopia.

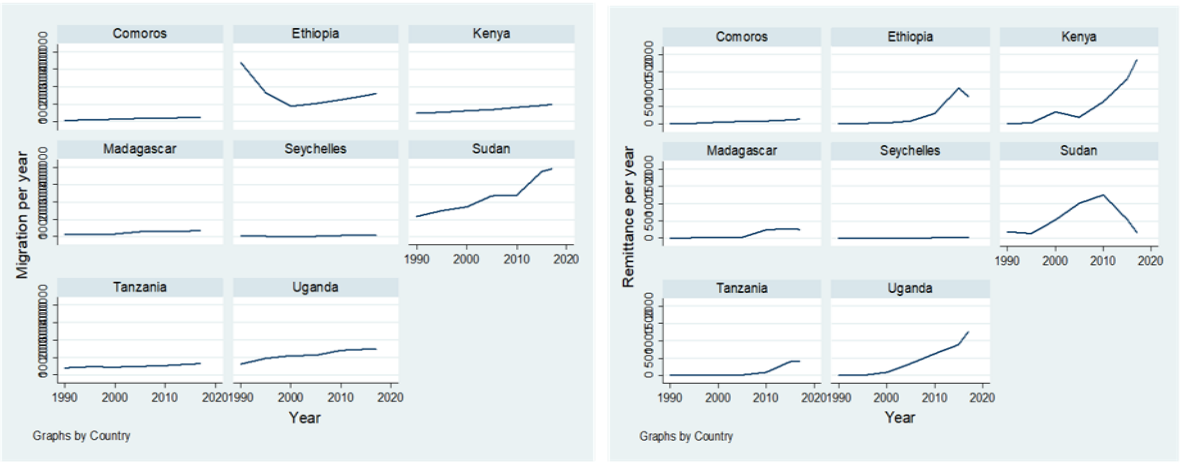

Figure 1.1: Line Graphs Migration Outflows and Remittances inflows of East African Region

South Africa is the most remittance-earning country in the whole region, and the trend of remittance outflows is on the rise, whereas Botswana, Mozambique, and Eswatini are below South Africa. The migration of Botswana and Eswatini from 1990–2017 is downward, but after the decades, the migrations are increasingly upward.

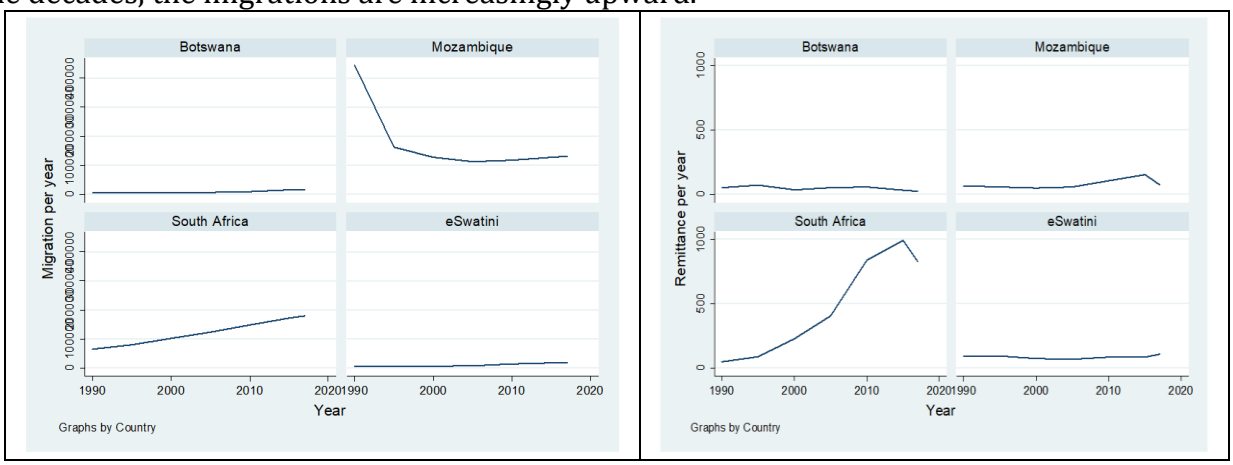

Figure 1.3: Line Graphs of Migration Outflows and Remittances Inflows of South African Region

Nigeria, Ghana, and Burkina Faso are the most migratory countries in the whole east African region. The migration of Benin, Cote d'Ivoire, Togo, Niger, Senegal, and Cameroon follows the middle migrant countries, and the trend is upward but less than that of Sudan. On the other hand, the migration trend in Sierra Leone is more different than any other West African country, which in some periods has been downward and in recent decades has been increasingly upward.

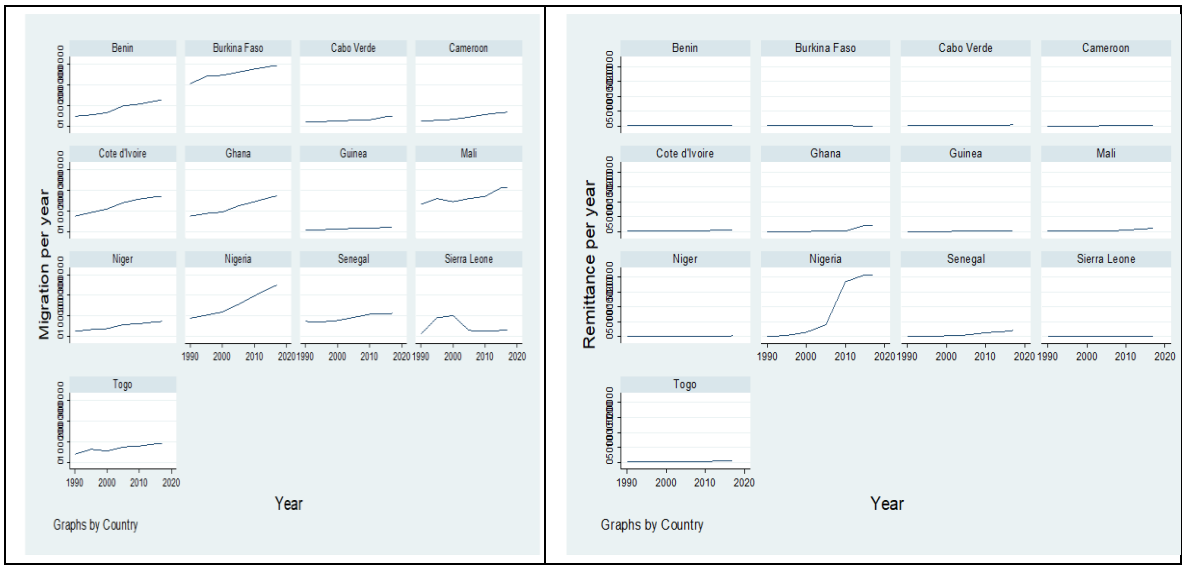

Figure 1.5: Line Graphs of Migration Outflows and remittances inflows of West African Region

Multivariate Analysis for East Africa region

(1) Let the hypothesis,

$$H_0 = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Com} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Eth} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Ken} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Mad} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Sey} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Sud} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Tan} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Uga}$$

$$H_1 = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Com} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Eth} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Ken} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Mad} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Sey} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Sud} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Tan} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{uga}$$

(2) Let the hypothesis,

$$H_0 = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Com} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Eth} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Ken} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Mad} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{sey} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Sud} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Tan} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Uga}$$

$$H_1 = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{com} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Eth} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{ken} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Mad} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Sey} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Sud} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Tan} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Uga}$$

Table 4.11: MANOVA analysis for East African Countries

Number of observation = 56					
Source | Statistic	df	F(df1, df2) =	F	Prob>F	
country1 |W	0.2224	7	14.0	94.0	7.52 0.0000
|P	0.8976		14.0	96.0	5.58 0.0000
|L	2.9559		14.0	92.0	9.71 0.0000
|R	2.7604		7.0	48.0	18.93 0.0000
Residual |			48		
Total |			55		

Test that all means are the same
Hotelling T^2 = 50.73
Hotelling F(1,55) = 50.73
Prob > F = 0.0000
Adjusted LR χ^2 (1) = 9.67
Prob > χ^2 = 0.0019

From the Equality of mean test for East African countries, the Hotelling T^2 test statistic compared to F statistic is 50.73 and p-value is 0.0000 indicates that the test is significant for the mean vector which is not the same for all the countries of East Africa. Hence we reject the null hypothesis. Since the LR test of $_{\chi}{}^2$ is 9.67 and we e got the result of Wilks' lambda, Lawley-Hotelling trace, Pillai's trace, and Roy's largest root test results we can conclude that the test is significant.

Multivariate Analysis for the South African region

(1) Let the hypothesis

$$H_0 = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Bot} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{eSw} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Moj} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{SA}$$

$$H_1 = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Bot} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{eSw} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Moj} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{SA}$$

(2) Let the hypothesis

$$H_0 = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Bot} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{eSw} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Moj} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{SA}$$

$$H_1 = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Bot} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{eSw} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Moj} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{SA}$$

Table 4.12: MANOVA analysis for South African Countries

Number of observation = 28					
Source | Statistic	df	F(df1,	df2) =	F	Prob>F
country1 |W 0.2078	3	6.0	46.0	9.15	0.0000
|P 1.0817	6.0	48.0	9.42	0.0000	
|L 2.4195	6.0	44.0	8.87	0.0000	
|R 1.4753	3.0	24.0	11.80	0.0001	
Residual |	24				
Total |	27				

Hotelling T^2 = 19.71
Hotelling F(1,27) = 19.71
Prob > F = 0.0001
Adjusted LR $-\chi^2$ (1) = 3.41
Prob > χ^2 = 0.0649

From the Equality of mean test for South African regional countries from the above four test statistics metrics recommended the Hotelling T^2 test statistic is 19.71 and the p-value is 0.0001 indicating that the test is significant for the mean vector and variance-covariance matrices are not same for all the country of South Africa. Hence we reject the null hypothesis.

Multivariate Analysis for the South African region

(1) Let the hypothesis,

$$H_0 = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Ben} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Bur} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Cab} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Cam} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Cot} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Gha} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Gui} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Mal} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Nig} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Nige} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Sen} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Sie} = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Tog}$$

$$H_1 = \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Ben} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{bur} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Cab} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Cam} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Cot} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Gha} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Gui} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{mal} \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Nig} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Nige} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Sen} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Sie} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{Tog} \neq \begin{pmatrix}\mu_{mi}\\ \mu_{re}\end{pmatrix}_{mali}$$

(2) Let the hypothesis,

$$H_0 = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Ben} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Bur} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Cab} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Cam} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{cot} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Gui} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{mal} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Nig} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Nige} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Sen} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Sie} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Tog} = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Tan}$$

$$H_1 = \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Ben} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Bur} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Cab} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Cam} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Cot} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Gui} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Mal} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Nig} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Nige} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Sen} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Sie} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Tog} \neq \begin{pmatrix}\sigma^2_{mi}\\ \sigma^2_{re}\end{pmatrix}_{Mal}$$

Table 4.13: MANOVA FOR West African Countries

Number of observation= 91						
Source | Statistic		df	F(df1,	df2) =	F	Prob>F
country1 |W	0.0624	12	24.0	154.0	19.27	0.0000
|P	1.3542		24.0	156.0	13.63	0.0000
|L	8.3514		24.0	152.0	26.45	0.0000
|R	7.4560		12.0	78.0	48.46	0.0000
Residual |			78			
Total |			90			

Test that all means are the same,

Hotelling T^2 = 167.64

Hotelling F(1,90) = 167.64

Prob > F = 0.00001

Adjusted LR- χ^2 (1) = 12.78

Prob > χ^2 = 0.0004

From the Equality of mean test for West African regional countries, the Hotelling T^2 test statistic is 167.64 and the p-value is 0.00 indicating that the test is significant for the mean vector and variance-covariance matrices. For all the region the test that all means are the same are significant and all the p values are less than 0.05 so we may conclude that all the mean vectors are not the same for all the regional country.

Conclusion

In the East African region, the topmost migrating country is Sudan, followed by the Seychelles, Kenya, Tanzania, and Uganda. South Africa is the most migratory and remitting country, with an average migration of 1.3 million and a remitted amount of 489.6 million US dollars. Botswana has the lowest average number of migrants and the highest remittances in the South African region. In the West African region, Nigeria is the highest migrant country with an average of 1.7 million migrants and an average remittance of 9425.67 million US dollars, and

Guinea is the lowest with 13.5 thousand migrants and a 33.89 million US dollar remittance. Uganda and Sudan are the two most populous migrant and remittance-receiving countries in this region, but countries are following a lower upward trend in terms of migration and remittance inflows. The graphical picture of the migration outflows and remittance inflows of South African countries shows both upward and downward trends. Only South Africa has a rapidly increasing migrant and remittance population, while all other countries in the South African region follow a lower upward trend and some downward trends. West African countries follow an upward trend and others follow a downward trend, with Benin, Burkina Faso, Nigeria, Ghana, and Cote d'Ivoire leading the way. In Sierra Leone, the trend of migration and remittances is downward. The Hotelling test statistic is 50.73 and the p-value is 0.05 for East African countries, 19.71 and 0.0001 for South African regional countries, 64 and 0.05 respectively for West African regional countries. This indicates that the test is significant for the mean vector, which is not the same for all countries in the West African region. Wilks' Lambda, Lawley-Hotelling trace, Pillai's trace, and Roy's largest root test results of the adjusted LR test show a value of 67 for East African countries, 3.41 for South African countries, and 12.78 for West African countries. The probability value is less than.05 for East Africa and West Africa, and the p-value is 0.0674, making the test insignificant for those countries. The result from a Hausman test is straightforward, but in East Africa and South Africa, things are different. The Breusch and Pagan Lagrangian multiplier test for West Africa is 0.11, South Africa is 13.44, and West Africa is 51.62. In the West African region, the p-value is greater than 0.05, and thus the results are insignificant.

References

Adams, R. H. (2011). Evaluating the Economic Impact of International Remittances on Developing Countries Using Household Surveys: A Literature Review. *Journal of Development Studies*, 47(6), 809–828.

Gelman, A., & Hill, J., (2007). Data analysis using regression and multilevel and hierarchical models, Cambridge; New York: Cambridge University Press.

Azam, J. & Gubert, F. (2006). Migrant remittances and the household in Africa: A review of evidence. *Journal of African Economies*, 15(2), 426–462.

Lucas, R. E. B. (1987). "Emigration to South Africa's mines." *The American Economic Society* 313-330.

Gupta, S., Catherine, Pattillo A. & Wagh S. (2009). 'Effect of remittances on poverty and financial development in Sub-Saharan Africa', World Development 37(1), 104-115.

Irving, J., S. Mohapatra, & D. Ratha. (2010). Migrant Remittance Flows, Findings from a Global Survey of Central Banks. World Bank Working Paper, No. 194, World Bank.

Ratha, D., S. Mohapatra, & A. Silwal. (2010). Outlook for Remittance Flows 2010-11. Migration and Development Brief, No. 12, April, World Bank.

Ghosh & Bimal, (2006). Migrants' Remittances and Development: Myths, Rhetoric and Realities, International Organization on Migration.

Martinez, D.L. & Jose, (2005). "Workers' Remittances to Developing Countries: A Survey with Central Banks on Selected Public Policy Issues." Policy Research Working Paper 3638. World Bank.

Fayissa, B., & Nsiah, C. (2010). The impact of remittances on economic growth and development in Africa. *The American Economist, 55*(2), 92–103.

Pradhan, G., Upadhyay, M., & Upadhyaya, K. (2008). Remittances and economic growth in developing countries. *The European journal of development research, 20*(3), 497–506.

Browne, R. and G. Leeves. (2007). "Impacts of International Migration and Remittances on Source Country Household Incomes in Small Island States: Fiji and Tonga." Discussion Paper No. 347. School of Economics, University of Queensland, Australia.

De Haas, H. (2005). "International Migration, Remittances, and Development: myths and facts." Third World Quarterly 26(8): 1269-1284.

De Haas, Hein (2007). Migration and Development: A Theoretical Perspective, Bielefeld: COMCAD.

Ratha, D., & S. Mohapatra. (2007).Increasing the Macroeconomic Impact of Remittances on Development. Development Prospects Group at the World Bank, note prepared for the G8 outreach Event on Remittances, Berlin, November 28-30.

Buch, M. and A. Kuckulenz. (2010). "Worker Remittances and Capital Flows to Developing Countries." International Migration 48(5): 89-117.

Meyer, D., & Shera, A. (2017). The impact of remittances on economic growth: An econometric model. *Economia, 18*(2), 147–155.
El-Sakka, M. and McNabb, R. (1999). The Macroeconomic Determinants of Emigrant Remittances. World Development, 27(8), pp.1493-1502.
Damodar, G., & Dawn, C. P. (2004). *Basic Econometrics* (4th edition).
Lucas, R.B. (2006). Migration and economic development in Africa: A review of evidence. *Journal of African Economies,* 15 (2): 337-395.
Angrist, J.D. & Newey W.K., (1991), Over-identification tests in earnings functions with fixed Effects, *Journal of Business and Economic Statistics* 9, 317–323.
Singh, R., M. Haacker, and K. Lee. (2010). Determinants and Macroeconomic Impact of Remittances in Sub-Saharan Africa, IMF Working Paper 09-216.
Adams, J., Richard H., & Cuecuecha, A. (2010). "The economic impact of international remittances on poverty and household consumption and investment in Indonesia." World Development 38 (11): 1626-1641.
Kachigan, S., (1986), Statistical Analysis: an interdisciplinary introduction to univariate & Multivariate methods, New York: Radius Press.
Wooldridge, & Jeffrey, M. (2010), *Econometric Analysis of Cross Section and Panel Data*, *MIT Press*. Chapter 10.
Ahn, S.C. & Low S. (1996), A reformulation of the Hausman test for regression models with pooled cross-section time-series data, *Journal of Econometrics* 71, 309–319
Abrevaya, J., (2000). ''Rank estimation of a generalized fixed-effects regression model'', *Journal of Econometrics* 95, 1–23.
World Bank, (2006). Global Economic Prospects: Economic Implications of Remittances and Migration. Washington, DC: World Bank.
Giuliano, P. and Ruiz-Arranz, M. (2009). Remittances, Financial Development and Growth. Journal of Development Economics, 90(1), 144–152.
Chami, R., C. Fullen-kamp, and S. Jahjah (2005). Are Immigrant Remittance Flows a Source of Capital for Development? IMF Staff Papers, 52(1).
Bouhga-Hagbe, J. (2004). A Theory of Workers' Remittances with an Application to Morocco. IMF Working Paper 04-194.
Grabel, I. (2009). Remittances: Political Economy and Developmental Implications, *International Journal of Political Economy*, 38(4), 86–106.
Arellano, M., (2003). *Panel Data Econometrics,* Oxford University Press, Oxford.
Ulrich, K., & Kreuter, F., (2009). '*Data Analysis Using Stata'* 2nd Edition, Stata Press.
World Bank, (2018).'' Record High Remittances Sent Globally in 2018'' Availabale:https://www.worldbank.org/en/news/press-release/2019/04/08
World Bank, (2013).'Remittances in Developing Countries' Available: www.worldbank.org/en/news/2013/4/14
World Bank, (2018).' Record High Remittances Sent Globally in 2018' Availabale:https://www.worldbank.org/en/news/press-release/2019/04/08

Cite this article:

Md. Ashraful Islam & Md. Rokonuzzaman (2023). Statistical panel analysis of the impact of remittance inflows on the migration outflows of African countries. *International Journal of Science and Business, 22*(1), 14-22. doi: https://doi.org/ 10.58970/IJSB.2092

Retrieved from http://ijsab.com/wp-content/uploads/2092.pdf

Published by