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SOCIAL FRACTIONALIZATION, INEQUALITIES AND BRAIN DRAIN

Abstract

Background: Brain drain refers to the large-scale emigration of highly skilled professionals from developing countries to wealthier nations in search of better opportunities. In Africa, this outflow of doctors, engineers, and academics weakens institutional capacity and reinforces existing social and economic inequalities.

Research purpose: The aim of the study is to investigate the relationship between social fractionalization, inequalities and brain drain in African countries.

Methods: The advanced Method of Moments Quantile Regression (MMQREG) estimation technique was employed. The research sample includes 47 African countries and covers the period between 2007 and 2023. The baseline model includes three independent variables. Two of them: The Fractionalized Elite and The Group Grievance refer to the area of social fractionalization, and the third one: The Uneven Economic Development indicator refers to the area of inequalities.

Conclusions: The results suggest that inequality has stable and positive impact on brain drain. The influence of the indicator of factionalized elite is positive and significant on the beginning but becomes weaker and insignificant in higher quantiles. In case of The Group Grievance the tendency is opposite.

Keywords: fractionalization, inequality, brain drain.

JEL classification: C31, D62, J24

1. Introduction

Brain drain is defined as the migration of personnel searching better standard of living, quality of life, higher salaries and access to advanced technologies.¹ This phenomenon was first popularized in the 1950s because of immigration to the

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¹ S. Dodani, R.E. LaPorte, *Brain Drain from Developing Countries: How Can Brain Drain Be Converted into Wisdom Gain?*, *Journal of the Royal Society of Medicine* 2005/98(11), pp. 487–491.

USA of scientists from such countries like Canada, United Kingdom and Soviet Union. Now in general sense it refers to international transfer of human capital from developing to developed countries.²

Brain drain constitutes serious concern for developing countries. An important strand of traditional economic literature emphasizes negative consequence of the brain drain phenomenon.³ The fact that supports its position is the scarcity of skilled labor force in developing countries. What is more, outflow of skilled labor force may make it unable for developing countries to grow and reduce developing gap with developing world. In the decade of 1990s there appeared a new body of literature indicating positive aspects of this phenomenon. Stark et al. suggest that brain drain may lead to greater accumulation of human capital in the post migration setting, compering with “no migration” state.⁴ Beine et al provided empirical evidence suggesting that migration may generate human capital accumulation in case, brain drain does not exceed 10% and the share of skilled among residents does not exceed 5%.⁵ Schiff claims that potential positive consequences of brain drain may be much lower than indicated in some studies.⁶ This criticism refers to the idea that skills are heterogeneous and people with exceptional skills will migrate. So even if migration prospects encourage new people to invest in education, their abilities will be lower than those of these individuals which have emigrated.

Initially the literature devoted to brain drain and its consequences was mostly theoretical because of serious constraints on data availability. Development of empirical literature in this field was initiated in XXI century. Existing studies investigate the relationship between brain drain and various areas like: economic growth, welfare of those left behind, human capital formation and offsetting capacity

² **H. Rapoport**, *Who Is Afraid of the Brain Drain? Human Capital Flight and Growth in Developing Countries*, Stanford Institute for Economic Policy Research, 2002.

³ **J. Bhagwati, K. Hamada**, *The Brain Drain, International Integration of Markets for Professionals and Unemployen: A Theoretical Analysis*, *Journal of Development Economics* 1974/1(1), pp. 19–42; **J. Bhagwati, C. Rodriguez**, *Welfare-Theoretical Analyses of the Brain Drain*, *Journal of Development Economics* 1975/2(3), pp. 195–221.

⁴ **O. Stark, C. Helmenstein, A. Prskawetz**, *A Brain Gain with a Brain Drain*, *Economics Letters* 1997/55(2), pp. 227–234.

⁵ **M. Beine, F. Docquier, H. Rapoport**, *Brain Drain and Economic Growth: Theory and Evidence*, *Journal of Development Economics* 2001/64, pp. 275–289.

⁶ **M. Schiff**, *Brain Gain: Claims about Its Size and Impact on Welfare and Growth Are Greatly Exaggerated*, World Bank Policy Research Working Paper Series 2005/3708.

of remittances.⁷ Most of these studies suggest that brain drain may be a beneficial phenomenon under some circumstances. Brain drain strengthens human capital formation and economic growth in countries with low levels of human capital and a low skilled emigration rate.⁸

Over the last decades, emigration of skilled workers from Africa has been increasing. The stock of skilled migrants from Africa in 2015 was almost five times bigger than in 1990. More than 60% of skilled African migrants come from Sub-Saharan Africa. Six countries (Algeria, Egypt, Kenya, Morocco, Nigeria and South Africa) account for more than 57% skilled migrants from Africa. In the period over 1990–2015, the share of skilled migrants in the native skilled labor force in Africa followed an increasing tendency and reached 13,2% in 2015, comparing with 11,3% in 1990. Emigration of skilled labor force was the highest in low-income African countries. Brain drain in upper-middle income countries was relatively small. The study investigates the relationship between social fractionalization and economic inequality and brain drain in African countries. Division of societies along ethnic, religious, or class lines, and uneven economic opportunities cause that, skilled professionals perceive a lack of fair prospects and institutional stability, which increases their propensity to emigrate.

The aim of this paper is to investigate the relationship between social fractionalization, inequalities and brain drain analysing African countries over the period 2007–2022. The paper is structured as follows. The second section discusses fractionalization and inequalities. The third section reviews the literature devoted to determinants of brain drain. The data and methodology are presented in the fourth section. In the last section, the results were analysed. The final section summarises the findings.

Empirical research was based on a panel of 47 African countries covering the period 2007–2023. The dependent variable is the Human Flight and Brain Drain indicator, while the main explanatory variables are the Fractionalized Elites indicator, the Group Grievance indicator, and the Uneven Economic Development indicator. The main method of estimation which was employed is Method of Moments Quantile Regression (MMQREG).

⁷ **M. Beine, F. Docquier, H. Rapoport**, *Brain drain and LDCs' growth: Winners and Losers*, SSRN, Electronic Journal 2003/819.

⁸ **M. Beine, F. Docquier, H. Rapoport**, *Brain Drain and Human Capital Formation in Developing Countries: Winners and Losers*, *The Economic Journal* 2008/118(528), pp. 631–652.

2. Fractionalization and inequality

Social fractionalization is the term which refers to divisions in society because of race, ethnicity, religion, language or culture.⁹ Fractionalization may be also defined as the probability that two randomly chosen persons belong to different groups, for example: ethnic, religious, linguistic, or other groups.¹⁰ The consequence of high fractionalization is corruption,¹¹ low provision of public goods,¹² low growth rates,¹³ less redistribution,¹⁴ lower voluntary contributions to schools,¹⁵ less social mixing and activity,¹⁶ and higher prevalence of civil war.¹⁷

Lind¹⁸ identifies two major problems with measuring fractionalization. The first problem is that the choice which groups to consider is mostly made in more pragmatic than rigorous way. Second thing is that measures which are used, imply that two persons are identical (belong to the same group) or completely different (belong to different groups). This approach ignores that some groups are much more similar to each other than others.

Measuring fractionalization is based on the choice how to divide the population into groups. Common criteria which are employed are religion, language or ethnicity. In most of societies, there exist some group partitions which affect politics, and many other potential partitions with no matter for politics. For particular partitions, the division between some groups is more relevant than the division between other ones. The crucial thing in the analysis of social fractionalization is the distance of

⁹ **B. Seol**, *Social Fractionalization and Economic Development: Evidence from the Korean New Village Movement*, Economics Sociology 2023.

¹⁰ **T. Lind**, *Fractionalization and the Size of Government*, Journal of Public Economics 2006/91, pp. 51–76.

¹¹ **P. Mauro**, *Corruption and Growth*, Quarterly Journal of Economics 1995/110(3), pp. 681–712.

¹² **A.R. Alesina, W.E. Baqir**, *Public Goods and Ethnic Divisions*, Quarterly Journal of Economics 1999/114(4), pp. 1243–1284.

¹³ **W. Easterly, R. Levine**, *Africa's Growth Tragedy: Policies and Ethnic Divisions*, Quarterly Journal of Economics 1997/111(4), pp. 1203–1250.

¹⁴ **M. Lind**, *Fractionalization...*

¹⁵ **E. Miguel, M. Gugerty**, *Ethnic Diversity, Social Sanctions, and Public Goods in Kenya*, Journal of Public Economics 2005/89, pp. 2325–2368.

¹⁶ **A. Alesina, E. La Ferrara**, *Participation in Heterogeneous Communities*, Quarterly Journal of Economics 2000/115(3), pp. 847–904.

¹⁷ **I. Elbadawi, N. Sambanis**, *How Much War Will We See?*, Journal of Conflict Resolution 2002/46, pp. 307–334; **J. Montalvo, M. Reynal-Querol**, *Ethnic Polarization, Potential Conflict and Civil Wars*, American Economic Review 2005/95(3), pp. 796–816.

¹⁸ **M. Lind**, *Fractionalization...*

particular groups. If the distance is small, distinguishing groups may not be relevant, but if it is large partitioning is relevant.¹⁹

The second area which is analysed in this paper as a potential determinant of brain drain is inequality. Social inequality is the consequence of the organization of society. There are hierarchies of class, race, and gender that affect access to resources and rights what makes their distribution unequal. It may be manifested in several ways, like income and wealth inequality, unequal access to education and cultural resources or different treatment by policy. There are two main measure of social inequality: inequality of condition and inequality of opportunities. Inequality of conditions refers to unequal distribution of income and wealth. The example is housing. Inequality of conditions in this field is represented by the fact that on one hand there are homeless people and these who have very low living standard and on other hand there are people who live in high-standard mansions. Inequality of opportunities refers to unequal distribution of life chance across individuals. It may be represented by measures of level of education, health status, and treatment by criminal justice system.²⁰

Important aspect of social inequality is income inequality. Income is defined as household disposable income in a particular year. It comprises earnings, public transfers, self-employment and capital income. Income is attributed to each of household member. There are various types of measures of income inequality like for example Gini coefficient.

3. Determinants of brain drain

This study concentrates on the fractionalization of society and inequality as potential determinants of brain drain in case of African countries. However, existing literature identifies more factors that affect brain drain. Factors which drive migrants to leave their countries are categorized as push factors. One of these factors is bad governance and political instability. Khan et al. concentrate on political instability and indicate that it results in low safety level, high inflation and lack of opportunities to get good jobs what encourage people to go abroad.²¹ Hashmi et al. report that intellectuals are leaving their homeland and moving

¹⁹ *Ibidem.*

²⁰ **A. Crossman**, *The Sociology and Social Inequality*, The City University of New York, 2018.

²¹ **R. Khan, S. Khan, Y.E.Zia**, *Causes and impact of immigration on Pakistani young people on Pakistan and on host country (Great Britain)*, *European Journal of Business and Social Science* 2012/1(8), pp. 91–98.

to developed countries because of political and economic changes.²² Afzal et al. suggest that people move to developed countries because of uncertain and insecure situations in their countries.²³ According to Bang et al. migration of skilled labor is affected by the quality and credibility of native political institutions.²⁴ Apart from political instability, migration flows are also affected by financial instability. Kumar proved the existence of the link between migration and financial instability in developing countries.²⁵ Karikari et al. also identify causality between financial development and migration.²⁶

Kousar et al. consider infrastructure as a push factor which drives migration of skilled workers.²⁷ They observe that there exist many studies which prove a direct link between infrastructure and economic growth²⁸ and simultaneously ignore the fact that people tend to emigrate from poor countries with poor infrastructure to rich countries with good infrastructure. This is why, according to Kousar et al. it is justified to study the link between infrastructure and brain drain.

Brain drain may be also affected by social openness. Lif claims that wide-spreading of internet access influences of people's decisions on migration²⁹. Graham et al.³⁰ studies how social media and the internet stimulates process of brain drain. He suggests that quick access to the whole world lets people to get information

²² **M.A. Hashmi et al.**, *Factors driving brain drain in Pakistan: An exploratory view*, Journal of Asian Business Strategy 2012/2, pp. 7–20.

²³ **S. Afzal, H. Iqbal, M. Inayay**, *Terrorism and extremism as a non-traditional security threat post 9/11: Implications for Pakistan's security*, International Journal of Business and Social Science 2012/3(24), pp. 194–203.

²⁴ **J.T. Bang, A. Mitra, P.V. Wunnava**, *Financial liberalization and the brain drain: A panel data analysis*, 2011.

²⁵ **R.R. Kumar**, *Do remittances, exports and financial development matter for economic growth? A case study of Pakistan using bounds approach*, Journal of International Academic Research 2011/11(1), pp. 18–27.

²⁶ **N.K. Karikari, S. Mensah, S.K. Harvey**, *Do remittances promote financial development in Africa?* SpringerPlus 2016/5(1), pp. 1–21.

²⁷ **S. Kousar, F. Ahmed, S. Bukhari**, *Macroeconomic Determinants of Brain Drain in the Era of Globalization: Evidence from Pakistan*, Liberal Arts and Social Sciences International Journal 2020/4(2).

²⁸ **D. Dovlo**, *Taking more than a fair share? The migration of health professionals from poor to rich countries*, PLoS Med 2005/2(5); **D. Kapur, J. McHale**, *The global migration of talent: What does it mean for developing countries*, 2005, CGD Brief (Washington: Center for Global Development), <https://www.voced.edu.au/content/ngv:62692>; accessed 30.05.2026.

²⁹ **O. Lif**, *Migration in the internet age: The 21st century: When refugees went online*, 2016, <https://lup.lub.lu.se/student-papers/search/publication/8873467>; accessed 30.05.2026.

³⁰ **M. Graham, R. Schroeder, G. Taylor**, *Re: search*, New Media & Society 2013/15(8), pp. 1366–1373.

about their desired country. Some studies show that digital media give perspective about culture which stimulates openness and give opportunities to migrate.³¹

The crucial factor which affects brain drain phenomenon is standard of living. For example, Altaf et al found a direct relationship between unemployment and emigration.³² Arouri et al. identified economic growth, inflation and unemployment as potential factors which drive brain drain.³³ Mayda analysed OECD countries and conclude that key factors which stimulated migration flows were average income and income dispersion.³⁴

Empirical studies on brain drain emphasize also different factors. For instance, Kangasniemi et al. indicate that advancing career and financial advantages constitute the most important incentives to migrate.³⁵ Hall claim that problems of access to research and weak institutional structure are additional factors apart from financial incentives which motivate researchers to migrate.³⁶ Gibson and McKenzie suggest that career opportunities and good environment for research are more important incentives for migration than economic factors.³⁷

4. Data and methodology

The data used for this study is from the period 2007 to 2022. The research sample contains 47 African countries. Table 1 contains the variables used in this study and their definitions. Table 2 shows descriptive statistics. The source of the data is database Fragile States Index powered by The Fund for Peace.³⁸

³¹ **D.S. Massey et al.**, *Worlds in Motion: Understanding International Migration at the End of the Millennium*, Understanding International Migration at the End of the Millennium, Clarendon Press, 1999; **S.A. Wegge**, *Chain migration and information networks: Evidence from nineteenth-century Hesse-Cassel*, *The Journal of Economic History* 1998/58(4), pp. 957–986.

³² **M. Altaf, K. Atoofa, H. Ali**, *Two-Fold Aspect of Brain Drain in Pakistan: An Empirical Investigation*, *Journal of Asian Development Studies* 2015/4(4), pp. 200–206.

³³ **Arouri M. et al.**, *Short and long run determinants of brain drain: Evidence from Pakistan*, 2014, http://v6.ipag.fr/wpcontent/uploads/recherche/WP/IPAG_WP_2014_113.pdf; accessed 20.08.2025.

³⁴ **A.M. Mayda**, *International Migration: A Panel Data Analysis of the Determinants of Bilateral Flows*, *Journal of Population Economics* 2010/23(4), pp. 1249–1274.

³⁵ **M. Kangasniemi, A. Winters, S. Commander**, *Is the medical brain drain beneficial? Evidence from overseas doctors in UK*, *Social Science & Medicine* 2007/65(5), pp. 915–923.

³⁶ **M. Arouri et al.**, *Short and long run determinants of brain drain: Evidence from Pakistan*, 2014, http://v6.ipag.fr/wpcontent/uploads/recherche/WP/IPAG_WP_2014_113.pdf; accessed 20.08.2025.

³⁷ **J. Gibson, D. McKenzie**, *Eight questions about brain drain*, *Journal of Economic Perspectives* 2011/25(3), pp. 107–128.

³⁸ **The Fund for Peace**, *Fragile States Index Dataset*, 2025, <https://fragilestatesindex.org/>; accessed 30.05.2026.

TABLE 1: *Variables descriptions*

Variables	Definition
Brain	The Human Flight and Brain Drain Indicator
Elite	The Factionalized Elites Indicator
Grievance	The Group Grievance Indicator
Inequality	The Uneven Economic Development Indicator

S o u r c e: Own elaboration.

TABLE 2: *Descriptive statistics*

Variable	obs	mean	std. Dev.	min	max
Brain	752	6.86	1.265	2	10
Elite	752	7.648	1.837	3	10
Grievance	752	6.831	1.878	3	10
Inequality	752	7.715	1.169	3	10

S o u r c e: Own elaboration.

The dependent variable used in this study is Human flight and Brain Drain indicator. This indicator includes the impact of human displacement and the consequences on a country's development. This index may involve the voluntary emigration of middle-class mostly economically productive segments of the population, like entrepreneurs or skilled workers. On the other hand, indicator may also include the forced displacement of professionals and intellectuals who leave their countries because of persecution or repression.

The first independent variable is The Factionalized Elites indicator. This indicator considers fragmentation of state institutions along ethnic, class religious or racial lines. It measures power struggles, political competition and political transitions. The Group Grievance indicator concentrates on divisions and schisms between different groups in society – mostly divisions based on social and political characteristics. This indicator may also include a historical component. Groups which were aggrieved in the past, keep in mind this injustice and it influences and shapes their role in society and relationships with other groups. The indicator also takes into account specific groups which are singled out by state authorities or different groups. The last independent variable which is included into model is The Uneven Economic Development Indicator which represents inequality within the economy, irrespective of the actual performance of an economy. The indicator

includes structural inequalities based on race, ethnicity, religion or education and economic status. The indicator includes not only actual inequality but also perception of inequality. It also includes opportunities which groups must improve their economic status, for example, through access to education or employment. Finally, the basic econometric model is specified as follows:

$$brain_{i,t} = \zeta_0 + \zeta_1 elite_{i,t} + \zeta_2 grievance_{i,t} + \zeta_3 inequality_{i,t} + \varepsilon_t$$

The first step is to conduct a descriptive analysis followed by a cross-sectional dependency test,³⁹ slope heterogeneity analysis⁴⁰ and Covariate Augmented Dickey-Fuller (CADF) root test.⁴¹ The estimation method that was employed is the Method of Moments Quantile Regression (MMQREG).⁴² The empirical analysis was preceded by a statistical analysis, which was performed in order to characterise the data.

The Jarque-Bera test was used to verify data stability.⁴³ It uses kurtosis and skewness measures which are based on the Mahalanobis transformation. The test indicates how far asymmetry and kurtosis deviate from values characteristic of normal distribution. According to the null hypothesis, data is normally distributed. The test is based on the following formula:

$$JB = n \left[\frac{w}{6} + \frac{(k-3)^2}{24} \right]$$

Interconnectedness of the economies included in the research sample may cause cross-sectional dependency phenomenon. In order to address this issue the cross-sectional dependence of the data CSD test was employed.⁴⁴ It accounts for CD among panels. The test is based on a pair-wise correlation coefficient, and the equation is as follows:

³⁹ **M.H. Pesaran**, *General diagnostic tests for cross-sectional dependence in panels*, Empirical Economics 2004, pp. 1–38.

⁴⁰ **M.H. Pesaran, T. Yamagata**, *Testing slope homogeneity in large panels*, Journal of Econometrics 2008/142(1), pp. 50–93.

⁴¹ **M.H. Pesaran**, *A simple panel unit root test in the presence of cross-section dependence*, Journal of Applied Econometrics 2007/22(2), pp. 265–312.

⁴² **J.A. Machado, J.S. Silva**, *Quantiles via moments*, Journal of Econometrics 2019/213(1), pp. 145–173.

⁴³ **C.M. Jarque, A.K. Bera**, *Efficient tests for normality, homoscedasticity and serial independence of regression residuals*, Economic Letters 1980/6(3), pp. 255–259.

⁴⁴ **M.H. Pesaran**, *General diagnostic tests...*

$$CD_{pesaran(2004),i} = \sqrt{\frac{2T}{N(N-1)}} \left[\sum_{i=1}^{N-1} \sum_{j=i+1}^N \widehat{\tau}_{ik} \right]$$

The test is based on the assumption that there is no average difference and constant variability in the data. The symbol $\widehat{\tau}_{ik}$ is used to represent the correlation between pairs.

Slope heterogeneity was diagnosed with use of the test proposed by Pesaran and Yamagata.⁴⁵ Null hypothesis assumes that the slope coefficients are homogenous across cross-sectional units and time periods. This test is robust to cross-sectional dependence. The test statistics are given by the following equation:

$$\tilde{\Delta} = (N)^{\frac{1}{2}} (2k)^{-\frac{1}{2}} \left(\frac{1}{N} \tilde{S} - k \right)$$

The last diagnostic test was Pesaran's Covariate Augmented Dickey-Fuller (CADF) test proposed.⁴⁶ It is used in order to ascertain the stationarity of data. It is a second-generation unit root test which allows for slope heterogeneity and cross-sectional dependence.

The estimation method was MMQREG, proposed by Machado and Silva.⁴⁷ It is utilised in order to estimate the quantiles of a given dataset. Unlike other estimation methods, MMQREG does not need the normality of data. Although, it makes it possible to estimate regression quantiles when using traditional methods is difficult or even impossible. The MMQREG approach can be used to estimate cross-sectional models with endogenous variables. It is not based on the estimation of conditional means but on moment conditions which identify conditional means under exogeneity. To verify the robustness of the results, interquantile regression was employed.

5. Results and discussion

Econometric estimations were preceded by several statistical tests which aimed at better understanding of properties of the data. Table 3 presents the results of Jarque Bera-test.

⁴⁵ M.H. Pesaran, T. Yamagata, *Testing slope homogeneity...*

⁴⁶ M.H. Pesaran, *A simple panel unit root test...*

⁴⁷ J.A. Machado, J.S. Silva, *Quantiles via moments...*

TABLE 3: *Jarque-Bera test results*

Chi (2)	7.712
p	0.0212

Source: Own elaboration.

The results of the test suggest that null hypothesis should be rejected. It indicates that data is not normally distributed. The second step was to perform CD Pesaran test. The results of the test were presented in table 4. Rejection of the null hypothesis of cross-sectional dependence suggests the presence of cross-sectional dependency across the selected countries.

TABLE 4: *CD Pesaran test results*

	16.848
p	0.00

Source: Own elaboration.

TABLE 5: *Slope heterogeneity test results*

Delta tilde	Adjusted delta tilde
12.526***	15.107***

Note: *, **, *** denote significance at the 10%, 5% and 1% levels, respectively.

Source: Own elaboration.

TABLE 6: *CADF test results*

Variable	Level	First difference	Level of integration
Brain	-1.329	-3.328***	I(1)
Elite	-1.173	-2.256***	I(1)
Grievance	-1.679	-2.965***	I(1)
Inequality	-1.029	-2.782***	I(1)

Note: *, **, *** denote significance at the 10%, 5% and 1% levels, respectively.

Source: Own elaboration.

The results of the delta test and delta tilde test presented in Table 5 show that the heterogeneous slope of the econometric model was diagnosed. After diagnosing the non-normality distribution of data and cross-sectional dependence,

the next step was to investigate the stationarity properties. Table 6 depict the results of the CADF test, which suggest that all variables exhibit first-order integration.

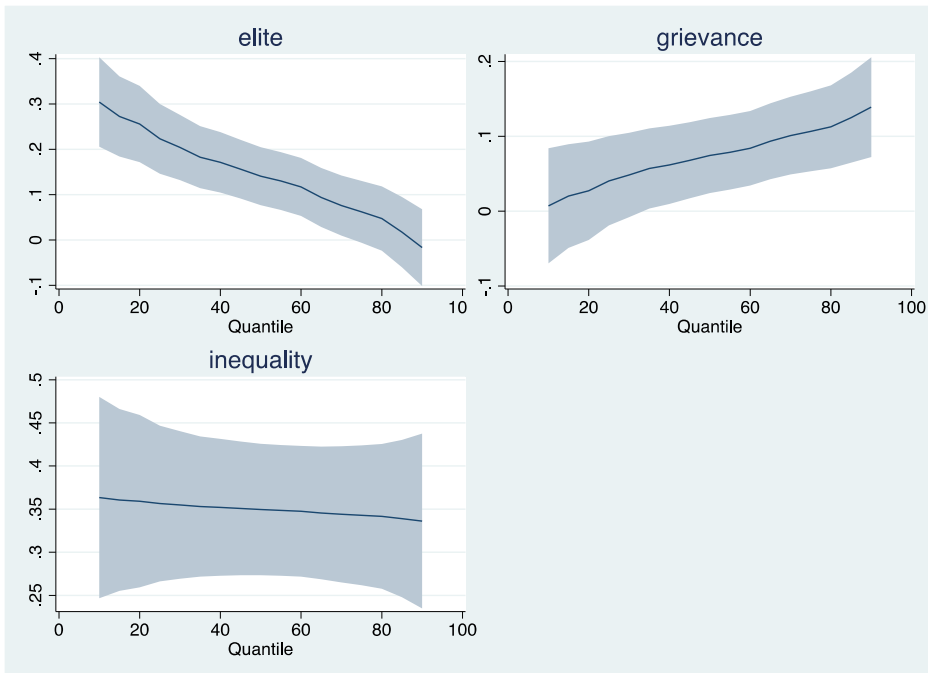
TABLE 7: MMQREG estimation results

Variable	Location	Scale	$Q_{0.25th}^S$	$Q_{0.5th}$	$Q_{0.75}$	$Q_{0.9}$
Elite	.145***	-.095***	.223***	.14***	.061*	-.016
Grievance	.072***	.039***	.04	.074***	.106***	.138***
Inequality	-.349***	-.008	.356***	.349***	.342***	.336***

Note: *, **, *** denote significance at the 10%, 5% and 1% levels, respectively.

Source: Own elaboration.

FIGURE 1: Visualisation of the MMQREG output



Source: Visualisation based on MMQREG estimation applied in Stata.

Table 7 presents the results of the MMQREG estimation for four quantiles. The relationship between Fractionalized Elites indicator and dependent variable is positive and statistically significant at the level of 5% for quantile 0.25 and 0.5 and statistically significant at the level of 10% for quantile 0.75. However, this relationship is becoming weaker in higher quantiles. Finally, in the last quantile influence of fractionalized elites indicator on brain drain becomes negative and insignificant. The opposite tendency is observed in the case of the second independent variable which is The Group Grievance indicator. The influence of The Group Grievance indicator on brain drain is also positive and becomes significant from quantile 0.5. Its influence on the dependent variable becomes stronger in higher quantiles. Relationship between variable the uneven economic development and brain drain is positive, stable and statistically significant over all quantiles. The results suggest that the fractionalization of the society in African countries represented by the first and the second explanatory variables and social inequalities are important drivers of human flight and brain drain.

TABLE 8: *Simultaneous quantile regression results*

Variable	$Q_{0,25th}^S$	$Q_{0,5th}$	$Q_{0,75}$	$Q_{0,9}$
Elite	.25***	.188***	.052	0.001
Grievance	-0.001	.047*	.105***	.2***
Inequality	.25***	.4***	.368***	.2***

Note: *, **, *** denote significance at the 10%, 5% and 1% levels, respectively.

Source: Own elaboration.

To confirm the robustness of the results, simultaneous quantile regression was conducted, and the results are presented in Table 8. The results obtained with use of the alternative estimation method generally support the MMQREG results. The first explanatory variable has positive influence on brain drain but loses significance in 0,75 quantile. Second variable gains significant influence on dependent variable from quantile 0.75. The relationship between variable *inequality* and brain drain is significant for each quantile. All independent variable follow similar tendencies than in case of previous estimation.

The positive effect of the *Factionalized Elites* indicator on brain drain suggests that political fragmentation at the elite level significantly undermines the domestic climate for skilled professionals. Fragmentation along ethnic, religious,

or class-based lines often results in political instability and weak governance.⁴⁸ These conditions reduce institutional trust and limit the effectiveness of long-term policies, especially those related to education, research, and innovation. The *Group Grievance* variable also has a positive and significant influence on brain drain. This suggests that in countries with high levels of skilled emigration, ethnic, religious, or cultural tensions between social groups become more important drivers of further migration. *Uneven Economic Development* has a strong and positive impact across all quantiles. This confirms that structural inequality, is a key driver of brain drain in African countries. High levels of income and opportunity disparity or educational divides create environments in which only a small elite benefits from growth, while large segments of the population face limited access to quality education, jobs, or public services.⁴⁹ In such unequal societies, skilled individuals from marginalized groups may see emigration as the only realistic path to achieve their full potential.

Divisions in Africa are tribal, religious or socio-economic. In Africa there are thousands of ethnic and language groups which do not always peacefully coexist. Sometimes, the single larger ethnic group comes to power and deny smaller groups political and economic autonomy. It can lead to bloody civil wars, like in Rwanda in 1994, or other kind of massacres carried out by one tribe on another like in Nigeria, Cameroon and Guinea. The other area in which big divisions are visible in Africa is religion. Most African countries adopted one religion such as Christianity or Islam. Such divisions are present in such countries like Nigeria or Sudan. The other problem in Africa is also that some regions want to have autonomy. It may lead to violent fights for secessions. Political conflicts also appear in such countries as Zimbabwe, Nigeria or Guinea. The effects are clashes between supporters of particular political candidates and confrontations with military personnel. One of possible solutions of such divisions is granting autonomy to particular ethnic groups or at least recognition of legitimacy of different groups. However, in most cases, most governments apply authoritarianism and centralization of power, one party system and violation of human rights to keep unity.⁵⁰

⁴⁸ **A.R. Alesina, W.E. Baqir**, *Public Goods...*; **R. Khan, S. Khan, Y.E.Zia**, *Causes and impact of immigration on Pakistani young people...*

⁴⁹ **M. Beine, F. Docquier, H. Rapoport**, *Brain Drain and Economic Growth...*; **A.M. Mayda**, *International Migration...*

⁵⁰ **Mustard Insight**, *Are Political and Social Divisions Hindering Africa's Progress?*, 2024, <https://blog.mustardinsights.com/p/are-political-and-social-divisions-hindering-africas-progress-aICQB>; accessed 20.08.2025.

The stable and statistically significant influence of income inequalities on brain drain is increasing concern because the level of income inequalities in Africa remains vary high. The richest 10% of the regions receive almost 56% of total income. South Africa is characterized by the highest level of income inequality and an unprecedented level of wealth concentration (WID, 2024). Many African countries have the highest level of income inequality in the World. The most unequal of the continent are Southern African countries. Inequalities are lower in the North and West. Income inequalities in Africa are influenced by historical, institutional and geographical determinants. Period of colonialism had a big impact on inequalities in Southern African countries. The example is South Africa and apartheid policy. Some postcolonial policies in North Africa (for example in Tunisia) inspired by socialism resulted in lower level of inequality. Other potential explanation of lower-level income inequalities in the North and West is egalitarian spirit of Islam. In the last two decades, inequalities in Africa remained quite stable, except for Southern Africa where it increased significantly.⁵¹

6. Conclusions

This study examined the determinants of brain drain in African countries, focusing especially on social fractionalization and economic inequality. The analysis conducted with use of a panel dataset of 47 African countries from 2007 to 2022 and with use of advanced quantile regression methods (MMQREG), the analysis revealed that political fragmentation among elites, intergroup grievances, and uneven economic development significantly influence of the phenomenon of skilled emigration. The results which were obtained suggest that brain drain in African countries is not driven only by economic factors but is deeply connected with political and social fragmentation. The ethnic, religious, and class divisions, along with high income disparities, creates an environment where skilled professionals feel to be forced to emigrate.

Policy implications of this research suggest that efforts to reduce brain drain must go beyond improving only economic conditions. The findings indicate that structural economic inequality constitutes a persistent and universal push factor which drives skilled emigration, what means that policies aimed at equal access to education, employment, and economic opportunities should be a base for any retention strategy. However, considering inequality alone may be insufficient. The

⁵¹ L. Chancel et al., *Income inequality in Africa, 1990–2019: Measurement, patterns, determinants*, World Development 2023/163.

results show that elite fragmentation and group grievances also play significant roles, but their significance depends on the severity of brain drain in case of particular country. In case, skilled emigration is still moderate, political reforms which reduce infighting among elites and promote institutional cohesion are likely to yield substantial benefits by preventing the initial outflow of professionals. On the other hand, in countries which already face severe brain drain, the resolution of deep-seated inter-group tensions must be prioritized, because it becomes the dominant driver of further emigration. Therefore, an appropriated policy approach is necessary: building equitable economic structures across the board, strengthening political institutions early, and directly addressing ethnic, religious, or cultural grievances when brain drain reaches critical levels.

Future research could extend this analysis by exploring the role of other factors such as governance quality, security, and infrastructure. Additionally, qualitative studies devoted to individual migration decisions would complement the quantitative insights and help design more targeted policy interventions.

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Wiktor BŁOCH

FRAGMENTARYZACJA SPOŁECZNA, NIERÓWNOŚCI I DRENAŻ MÓZGÓW

Abstrakt

Przedmiot badań: Termin drenaż mózgow (*brain drain*) odnosi się do masowej emigracji wysoko wykwalifikowanych specjalistów z krajów rozwijających się do bogatszych państw w poszukiwaniu lepszych możliwości zawodowych i życiowych. W Afryce odpływ lekarzy, inżynierów i pracowników naukowych osłabia potencjał instytucjonalny oraz pogłębia istniejące nierówności społeczne i gospodarcze.

Cel badawczy: Celem artykułu jest zbadanie zależności między fragmentaryzacją społeczną, nierównościami a drenażem mózgow w krajach afrykańskich.

Metoda badawcza: Zastosowano zaawansowaną technikę estymacji kwantylowej metodą momentów (MMQREG – *Method of Moments Quantile Regression*). Próba badawcza obejmuje 47 krajów afrykańskich i okres od 2007 do 2023 r. Model bazowy zawiera trzy zmienne niezależne. Dwie z nich – **Factionalized Elite** oraz **Group Grievance** – odnoszą się do obszaru fragmentaryzacji społecznej, natomiast trzecia – **Uneven Economic Development** dotyczy obszaru nierówności.

Wyniki: Wyniki wskazują, że nierówności, mają stabilny i dodatni wpływ na drenaż mózgow. Wpływ wskaźnika **Factionalized Elite** jest dodatni i istotny statystycznie w niższych kwantylach, jednak staje się słabszy i nieistotny w wyższych kwantylach. W przypadku wskaźnika **Group Grievance** obserwuje się odwrotną tendencję.

Słowa kluczowe: fragmentaryzacja, nierówność, drenaż mózgow.