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Can Financial Flows Accelerate Macroeconomic Performance and Convergence in Africa?

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ABSTRACT

This study investigates the impacts of financial flows on macroeconomic performance and their roles in accelerating convergence. The Augmented Neoclassical theory formed the theoretical foundation upon which the study is built. It employs the Fully Modified Ordinary Least Square (FMOLS) technique and other non-parametric methods on 37 selected African countries between 1994 and 2022 period. Findings show that absolute and beta-conditional convergences were confirmed in Africa and its 8 RECs, however, only the Common Market for Eastern and Southern Africa (COMESA), Community of Sahel-Saharan States (CEN-SAD), and Intergovernmental Authority on Development (IGAD) witnessed sigma-divergence. More so, financial flows exert mixed effects on performance but individually contribute towards accelerating macroeconomic convergence. For maximized gains from regional integration and macroeconomic convergence, implementing comprehensive structural reforms to enhance financial flows across member countries cannot be overemphasized.

ملخص

تبحث هذه الدراسة في آثار التدفقات المالية على أداء الاقتصاد الكلي وأدوارها في تسريع التقارب الاقتصادي. وشكلت النظرية الكلاسيكية الحديثة المعززة الأساس النظري الذي بنيت عليه هذه الدراسة. وتستخدم تقنية المربعات الصغرى العادية الديناميكية (FMOLS) وغيرها من

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الأساليب غير المعلمية في 37 بلدا إفريقية مختارة بين فترة 1994 و2022. وتبين النتائج أن التقارب المطلق وتقارب بيتا المشروط قد تأكد في أفريقيا والمجموعات الاقتصادية الإقليمية ال. 8 فيها، بيد أن السوق المشتركة لشرق أفريقيا والجنوب الأفريقي (COMESA)، وتجمع دول الساحل والصحراء (CEN-SAD)، والهيئة الحكومية الدولية المعنية بالتنمية (IGAD) هي وحدها التي شهدت تباعدا. والأكثر من ذلك، أن التدفقات المالية تؤثر تأثيرات متباينة على الأداء، ولكنها تسهم بشكل فردي في تسريع تقارب الاقتصاد الكلي. ولتحقيق أقصى قدر من المكاسب من التكامل الإقليمي وتقارب الاقتصاد الكلي، فلا يمكن التأكيد على أهمية تنفيذ إصلاحات هيكلية شاملة لتعزيز التدفقات المالية بين البلدان الأعضاء.

RÉSUMÉ

Cette étude examine l'impact des flux financiers sur les performances macroéconomiques et leur rôle dans l'accélération de la convergence. La théorie néoclassique augmentée constitue la base théorique sur laquelle l'étude est construite. Elle utilise la technique des moindres carrés ordinaires entièrement modifiés (FMOLS) et d'autres méthodes non paramétriques sur 37 pays africains sélectionnés entre 1994 et 2022. Les résultats montrent que les convergences absolues et bêta-conditionnelles ont été confirmées en Afrique et dans ses 8 CER, mais que seuls le Marché commun de l'Afrique orientale et australe (COMESA), la Communauté des États sahélo-sahariens (CEN-SAD) et l'Autorité intergouvernementale pour le développement (IGAD) ont connu une divergence sigma. En outre, les flux financiers exercent des effets mitigés sur les performances, mais contribuent individuellement à accélérer la convergence macroéconomique. Pour maximiser les bénéfices de l'intégration régionale et de la convergence macroéconomique, on ne saurait trop insister sur la nécessité de mettre en œuvre des réformes structurelles globales afin d'améliorer les flux financiers entre les pays membres.

Keywords: Financial flows, Convergence, Augmented Neoclassical Theory, African Regional Economic Communities, Panel Data

JEL Classification: F2, F4, O4

1. Introduction

The argument that regionalism could boost the role of financial flows as an alternative financing option to spur growth and accelerate convergence is contemporary, and a critical development discourse among scholars and policy analysts which remains a puzzle within the literature. This is important to African countries whose members are characterized with low savings, inadequate financial resources for investment, currency depreciation, weak macroeconomic performance indicators, and disparities within countries and across regions (WESP, 2020).

Certainly, achieving Sustainable Development Goals (SDGs) 8 and 17 which are targeted at ensuring uniform and inclusive growth, as well as regional partnership for development by 2030 requires alternative financing options (World Bank, 2023). Financial flows have been identified as capable of enhancing performance and accelerating convergence in developing countries (Barro and Sala-i-Martins, 1992). Therefore, dissecting the relationship between financial flows and enhancers of key macroeconomic convergence criteria helps to draw the attention of policy-makers, and other stakeholders toward its role as a viable financing option in Africa (Nagy and Siljak, 2022).

This discourse is vital because the African continent and its Regional Economic Communities (RECs) performed poorly in attaining the macroeconomic convergence criteria (Redda, 2021). For instance, budget deficit which is an important convergence criterion deteriorated from -3.45% to -5.03% in (1995-1999) and (2015-2020) periods (African Development Bank (AfDB) Open Data, 2021). This is a major challenge because over 56 percent of the selected countries defaulted in terms of benchmarking their budget deficit below 3 percent as a ratio of GDP.

Data shows great disparity in these key macroeconomic performance variables, as obtained from the World Development Indicators (WDI) 2022. For example, Rwanda and Burundi recorded average GDP growth rates of 8.71% and 1.40%, while the mean value of budget deficit was -3.64% and -82.82% in Sudan and Eswatini respectively (WDI, 2022).

More worrisome is fact that over 97 percent defaulted in maintaining 7 percent annual economic growth (WDI, 2022). These challenges resulted in disparity across key performance indicators among member countries. Thus, widening gaps in macroeconomic variables and accelerating divergence, which in turn militates goals of economic integration (Tweneboah and Eshun, 2023).

Also, the region is challenged with a shortage of financial resources to promote Performance. The problem of financial constraint is a major factor responsible for Africa's weak capital accumulation, human capital development, and acquisition of technology through research and innovation, as well as the dominance of African firms in the primary sector which results in weak investments (Swarnali, 2018). According to the Keynesian theory, weak investment causes lower growth in gross domestic product (GDP) (Keynes, 1936). This is a challenge because as observed from the dataset, only Rwanda met the convergence criterion of 7 percent annual growth rate within the study period (WDI, 2021). This resulted in a 97 percent default rate among the 37 selected African countries.

More importantly, the African Regional Integration Index (ARII) (2019) reports that African countries and their RECs are poorly integrated, since the average regional integration score is 0.33 on a 1.0 maximum scale. Also, data from the International Monetary Fund (IMF) Direction of Trade Statistics (DOTS) (2021) on African intra-country trade shows that the Arab Maghreb Union (AMU) had the lowest at 5.27%, while the South African Development Community (SADC) recorded the highest at 30.88%. The illustration supports the existing argument that trade transactions between African countries are low since most countries within the region produce and export homogenous primary products.

Therefore, African RECs possess the weak potential to integrate effectively, hence, implementations of the African Continental Free Trade Agreement (AfCFTA) offer little hope in this regard (Geda and Seid, 2015; United Nations Conference on Trade and Development

(UNCTAD) 2021). The above phenomenon triggers a weak average regional integration score of 0.327 in Africa, falling below an average mark of 0.5 on a 1.0 maximum scale (ARII, 2019). This is alarming because weak economic integration would not stimulate the financial flows required to cover resource gaps in Africa.

Another key perspective is the debate on conflicting individual roles of financial flows on convergence in the literature. Generally, there are two opposing views. The first argues that financial flows promote convergence, while the second suggests financial flows spur divergence (Combes et al., 2019; Ogbuagu et al., 2021). Therefore, this study would generate a consensus among scholars. More so, the study is novel since it develops tests for the three types of convergence, as well as serves as litmus test to ascertain the capability of Africa and its RECs to embrace full economic integration (Ogbuagu et al., 2022).

The study aims at determining the nature of convergence, and the impact of financial flows components on macroeconomic performance in Africa. The remainder of the sections are separated into Section 2 literature review, data and methodology in section 3; while Empirical Results are presented in Section 4. The conclusion is presented in Section 5.

2. Literature Review

Macroeconomic convergence is the equalization of macroeconomic fundamentals among groups of countries, which can be seen as either a precondition for, or as the by-product of an effective integration agreement. This term became popular in the 90`s, during the buildup of the European Monetary Union (EMU) (Zhang, 2012). There are three types of macroeconomic convergence classified as absolute convergence, beta-conditional convergence, and sigma convergence (Gammadigbe, 2021).

The macroeconomic convergence criteria in Africa were developed from the Maastricht criteria developed in the European Union (Martellato, 2008). According to Oloo et al. (2022), the African convergence criteria include: maintaining an annual budget deficit of less than three (3) percent as a ratio of gross domestic product (GDP); reducing inflation rate per

annum to below five (5) percent; maintaining annual GDP growth rate of at least seven (7) percent or more; and an annual debt to GDP ratio of not greater than 70 percent.

Using a sample of 37 African countries, the level of compliance and defaults on these convergence criteria were checked. It was found that in terms of maintaining less than 3 percent of budget deficit as a ratio of GDP, only Algeria, Benin, Botswana, Cameroun, Congo Republic, Cote d' Ivoire, Eswatini, Gabon, Guinea, Mali, Mauritania, Niger, Nigeria, Senegal, Seychelles, Tanzania, Uganda and Zimbabwe complied. The defaulters were Angola, Burkina Faso, Burundi, Egypt, Gambia, Ghana, Guinea Bissau, Kenya, Madagascar, Morrocco, Mozambique, Namibia, Rwanda, Sierra-Leone, South Africa, Sudan, Togo and Tunisia. Thus, in terms of budget deficit, 51.35 percent defaulted while 48.65 percent complied.

For inflation rate, defaulters were 56.76 percent, while 43.24 percent complied. This shows that countries such as Algeria, Angola, Botswana, Burundi, Egypt, Eswatini, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Madagascar, Mozambique, Namibia, Nigeria, Rwanda, Sierra-Leone, South Africa, Sudan, Tanzania and Uganda were defaulters. Whereas, African countries namely; Benin, Burkina-Faso, Cameroun, Congo, Cote d' Ivoire, Gabon, Mali, Mauritania, Mauritius, Morocco, Niger, Senegal, Seychelles, Togo, Tunisia and Zimbabwe complied with this criterion.

Also, approximately 97 percent could not maintain 7 percent economic growth, while only 3 percent complied. The figures revealed that for the macroeconomic convergence criteria relating to GDP growth rate, only Rwanda complied, while the other 36 selected African countries defaulted. In the case of fixing interest rates at not more than 2 percent of the three (3) countries with the lowest inflation rates, the figures showed 56.76 percent defaulters and only 43.24 percent compliance. Defaults and adherence to these criteria are presented in Table 1 below.

Table 1: Defaulters and Compliance of the Macroeconomic Convergence Criteria in Africa

Average Inflation Rate	Defaulters	56.76 percent
	Compliance	43.24 percent
Average GDP Growth Rate	Defaulters	97.30 percent
	Compliance	2.70 percent
Average Budget Deficit	Defaulters	51.35 percent
	Compliance	48.65 percent
Mean Deviation in Interest Rate	Defaulters	56.76 percent
	Compliance	43.24 percent

Source: Author's compilation, 2024

On the other hand, financial flows refers to as a group of cross-border economic aid and financial transactions that occur within the regulatory confines of the law and under public knowledge (Cobham and Jansky, 2017). The broad groups of cross-border flows without regulatory monitoring and out of public notice are referred to as illicit financial flows. According to Miron and Alexe (2014), financial flows may include funds from official development assistance (ODA), loan repayments, debt cancellation, FDI, portfolio investment, remittances, contributions from religious and charitable organizations, and recorded and unrecorded trade flows.

Conventionally, the nature of macroeconomic convergence is classified into absolute, beta-conditional, and sigma-convergence. Confirming the existence of macroeconomic convergence, Opolot (2019) focused on inflation rates, fiscal deficits, and current account deficits using the unit roots test. Zulfiqar et al. (2017) confirmed absolute and beta-conditional convergence using 60 developed and developing countries as the testing sites. Employing the pooled ordinary least square method, the result revealed absolute convergence for economies with homogenous characteristics, while beta-conditional convergence was confirmed

among countries with heterogeneous structures. They concluded that population growth, private investment, and openness are essential drivers of convergence.

Fernanda et al. (2020) tested income convergence among the municipalities in Southern Brazil between 1999 and 2014. Using panel analysis, the study confirmed absolute and conditional income convergence for the municipalities across states. More so, in the analysis of the municipalities aggregated per state, the State of Santa Catrina had the highest speed of absolute income convergence; and Rio Grande do Sul had the highest speed of conditional convergence. Similarly, Vaseem and Badri (2020) examined the role of export diversification in income convergence using the dynamic sys-GMM technique covering about 95 countries. The result suggests absolute and conditional income divergence for the samples and concludes that export diversification boosts income per capita, though drives disparities between the rich and poor countries.

More recently, Made et al. (2020) examined the impact of FDI and portfolio investment on growth convergence in ASEAN+3 countries. Utilizing data between 2001 and 2016, they employed Arellano-Bond Generalized Methods of Moment (AB-GMM) to confirm conditional convergence. The result suggests that FDI and portfolio investment spur conditional growth convergence. Therefore, the study concluded that poorer countries in ASEAN+3 would catch up if they could attract and retain more FDI and portfolio investment.

Reviews reveal that the discourse on convergence is more prominent among scholars in Europe and Asia. Across African literature, Hazem (2021) utilizes the Spatial and Markov Chain to test convergence in the Maghreb region. Deriving a unique stationary distribution related to the transition matrix, the result indicates regional disparities; and the key role of geography in explaining the convergence process through positive spillovers. The results from the non-parametric and parametric approaches confirm both absolute and beta-conditional convergence. Also, Kapotwe (2021) examined GDP per capita economic convergence in 35 sub-Saharan African countries using the unit root model. The results support that only 6 out of the 35 sampled countries sigma-converged towards the United States, hence, fiscal discipline on the part of government agencies cannot be overemphasized in Africa.

More recently, Gammadigbe (2021) applied the panel fixed-effects technique to prove that regional trade integration (RTI) promotes African economic growth covering 1979 to 2018 periods. The study discovered that RTI fosters income divergence which supports transmission of gains from economic integration to more economically advanced States within the continents. The policy implication from the results provides support for the AfCFTA, aimed at improving infrastructure and reducing trade barriers which upshot positive effects on growth across member.

After a critical review, existing gaps in the literature include, establishing types of macroeconomic convergence in Africa, to ascertaining if the continent and its RECs close gaps in macroeconomic criteria. For instance, studies including Ogbuagu et al. (2022) investigated the existence of growth convergence in WAMZ and confirmed beta-conditional convergence. However, gaps exist in confirming types of convergence across Africa and its 8 RECs.

3. Data and Methodology

3.1 Theoretical Framework

The theoretical modeling is built on Barro et al. (1992), who extended the neoclassical growth model to accommodate capital mobility. Also, Barro and Sala-i-Martins (1995) linked net capital flows for the different cross-sections to initial values of per capita output, and revealed that net capital inflows exert positive effect on initial per capita output. Since the discourse exposed the links between openness and convergence using empirics drawn from the neoclassical growth model (NCGM), construction of an open market growth model which incorporates economic integration, factor mobility and technological diffusion is inevitable. The starting point of the empirical model is expressed as:

$$Y = f(A, L, K) \quad (1)$$

Where Y represents the output level; A, is the level of technology; L, the population within the labour force and K, is the stock of capital. The level of technology, population within the labour and stock of capital are represented by financial flows, human capital, and gross capital formation respectively. This is because financial flows spill over technological

innovation, while labour force and capital stock are embedded in human capital and gross capital formation respectively.

Equation (2) is the resultant output growth per capita steady state function derived as:

$$\ln\left(\frac{Y(t)}{L(t)}\right) = \ln\big(A(0)\big) + \frac{\alpha}{1-\alpha}\ln(s) - \frac{\alpha}{1-\alpha}\ln(n+g+\delta) \quad (2)$$

Notice that each factor is paid its marginal product. Thus, equation (2) forecasts both the magnitude and signs of the coefficients. Since α is equivalent to one-third, the coefficients of population growth and savings rate fall within the range of -0.5 and 0.5. The study hence adopts the augmented Neoclassical Growth Model to test the beta-conditional convergence proposed by Barro and Sala-i-Martin (1992). Transforming the model in equation 2 into an absolute convergence model, the resultant equation 3 is specified below:

$$\frac{1}{t}\big(lny(t) - lny(0)\big) = \alpha_0 + \alpha_1 lny(0) \quad (3)$$

Where y(t) = macroeconomic performance at the end of the time period, y (0) = macroeconomic performance at the initial time period and t = the number of years. Describing the major aspects of the Solow model who first introduced convergence towards steady-state formulated the basic framework for growth convergence.

3.1.1 Absolute Convergence, Conditional Beta-Convergence and Sigma-Convergence

Thus, rewriting equation 3, the resultant model is relied upon to verify the absolute convergence and hence, it is specified as:

$$\Delta Y_{it} = \alpha_0 + \alpha_1 Y_{i0} + \varepsilon_t \quad (4)$$

ΔY_{it} = Macroeconomic Performance Index at the end of the period, Y_{it-1} = Macroeconomic Performance Index at the initial period, i = the number of selected countries, t = the number of years, $\alpha_1 < 0$ confirms absolute convergence. To test for beta-conditional convergence, equation 4 is expanded to accommodate both fundamental, target and control variables.

$$\Delta Y_{it} = \beta_1 (Y_{i0} - \theta`_1 X_{it}) + \alpha`_1 Z_{it} + \varepsilon_{it} \quad (5)$$

In the model above, i is the country identity, t is the time frame, $\triangle Y$ represents the Macroeconomic Performance Index, X is the vector of factors that determine macroeconomic performance and Z is a vector of the lagged observations of $\Delta Y \; and \; \Delta X$, ε is the error term and θi, αi are parameters of the vectors. Notice that if βi is significant and less than 0, then equation (5) confirms the existence of beta-conditional convergence (Barro and Sala-i-Martin, 1992).

Physical capital (real gross capital formation (PCAP)), and human capital (secondary school enrolment (HCAP)) are fundamental variables. On the other hand, financial flows (FI) (proxy with foreign direct investment (FDI), remittance (REM) and official development assistance (ODA)), exchange rate (EXCH), government expenditure (GOV), money supply (Ms), investment climate (CLI) (proxy with freedom index) and Credit to Private Sector (CRED) are target variables.

Notice that equation 5 can be further transformed and rewritten to derive equation 6 specified as:

$$\Delta MAPI_{it} = \beta_1 MAPI_{it-1} - \beta\theta`_1 X_{it} + \alpha`_1 Z_{it} + £_{it} \quad (6)$$

Also, equation 6 can be expanded to develop equation 7, which accommodates other variables as specified below:

$$\Delta MAPI_{it} = \alpha_0 + \beta_1 MAPI_{it-1} + \gamma_1 PCAP_{it} + \gamma_2 HCAP_{it} + \gamma_3 FI_{it} + \gamma_4 Ms_{it} + \gamma_5 CLI_{it} + \gamma_6 EXCH_{it} + \gamma_7 CRED_{it} + \gamma_8 GOV_{it} + £_{it} \quad (7)$$

Note that equation 7 upholds conditional beta-convergence if the value of β_1 is significant and less than zero and $\beta\theta_1^{`}\ represents\ \gamma_1\ and\ \gamma_2$ which might not be equal.

It is expected a-priori that $\gamma_1, \gamma_2, \gamma_3, \gamma_4, \gamma_5, \gamma_7, \gamma_8$ are positive, while γ_6 is negative. This implies that the former coefficient exerts positive impacts on performance while accelerating convergence. However, the latter coefficient implies the converse. Also, ΔMAPI = Macroeconomic Performance Index and $MAPI_{it-1}$ = First Lag of Macroeconomic Performance Index. In furtherance to the above, the sigma-convergence is employed to confirm the result of the conditional beta-convergence, since it is a sufficient condition for beta-convergence. The standard deviation of macroeconomic performance is specified as:

$$\sigma(t) = \sqrt{\frac{1}{n}\sum_{i=1}^{n}[\left(logy_i(t) - \hat{y}(t)\right)]^2} \quad (8)$$

Where $\hat{y}(t) = \frac{1}{n}\sum_1^n logy_i\,(t)$ and $y_i(t) =$ Macroeconomic performance index in the i-th country. Notice that sigma-convergence occurs when $\sigma(t) < \sigma(t-1)$ or $\sigma(t-1) \leq \sigma(t-2)$.

3.2 Methodology

3.2.1 Fully Modified Ordinary Least Square (FMOLS) and Non-Parametric Methods

This study employs FMOLS and the Non-Parametric method. Greene (2012) argues that the FMOLS technique is a dynamic panel that generates more robust, useful, and meaningful results to dissolve complex economic phenomena. This dynamic panel is very key in modelling convergence analysis. Also, beta-conditional and sigma-convergence will be confirmed using the FMOLS method and comparing periodic variations in standard deviations of macroeconomic performance (Kernel Distribution) respectively. Similarly, the FMOLS technique is employed to examine the individual impacts of financial flows on macroeconomic performance and convergence.

3.2.2 Preliminary Estimation Tests

3.2.2.1 Panel Unit Root Test

The panel unit root test ascertains the stationarity status of the time series, and preconditions for deciding whether or not to proceed with the check for a long-run relationship (Levin and Li, 1993; Im et al., 2003). Across panel data, Choi (2016) observed cross-section dependence arising from spatial or unobserved common factors, and apply to generalized methods of moments (GMM) not FMOLS. Therefore, to test for stationarity, the study employs three (3) unit root tests including Im et al. (2003) for robustness check. The panel unit root test is expressed as:

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \ldots + \in_{i,t} \quad (9)$$

Where Δy_{it} represent each variable in the model, β_i is the individual fixed effects and $\in_{i,t}$ is the random term. The FMOLS estimation technique is appropriate if the variables order of integration are homogenous and at first different (I (1)). Besides the above, it is important to verify the possibility of a long-run relationship using the panel cointegration test which is a sufficient condition for employing the FMOLS estimation technique.

3.2.2.3 Panel Cointegration Tests

Panel cointegration test examines the existence of long-run relationships (Pedroni, 2004). It is specified as:

$$Y_{1,t} = \alpha_i + \delta_i t + \beta_{1i} X_{1it} + \cdots + \beta_{Mi} X_{Mit} + e_{it} \quad (10)$$

For t = 1, …, T; i = 1,…, N; m = 1, …, M

Where N represents the number of individual members in the panel, t represents the number of observations over time and M represents variables outside the model. The panel unit roots and cointegration tests are preconditions for employing the FMOLS technique.

3.3 Data and Measurement of Variables

The study utilized ten (10) variables comprised of dependent and independent variables to achieve its set objectives. It utilized panel data

set of 37 African countries between 1994 and 2022. The selected African countries are Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Congo Republic, Cote d' Ivoire, Egypt, Eswatini, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Madagascar, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda and Zimbabwe. The selection is based on membership of at least one (1) of the eight (8) regional economic communities (RECs) and the availability of data. Also, three Middle Eastern and North African (MENA) countries specifically Algeria, Egypt, and Morocco were included in the selected African countries because of the specificity of the discourse which is convergence (Sakyi and Opotu, 2014).

The period for the study is based on the argument that convergence analysis prefers long historical data for robustness of results and amelioration of time series problems including serial and autocorrelation and multicollinearity problems. More so, this period covers major economic reforms in Africa. Macroeconomic performance index was computed using inflation rate, unemployment rate, economic growth and budget deficit data, which were obtained from the World Bank World Development Indicators (WDI) 2022 and African Development Bank (AfDB). The rest of the data were obtained from International Financial Statistics (IFS) 2022 and Fraser Institute and the Heritage Foundation 2022 database.

4. Empirical Results

4.1 Results of Panel Unit Root Test

The unit root tests presented in Table 2 are Im et al. (2003), Levin and Lin (1999), ADF Fisher (1979) and PP-Fisher (1932). The results confirms that exchange rate, financial development, government expenditure, human capital, physical capital and broad money supply were not stationary at level; whereas the remaining variables were stationary at first difference. However, all the variables were integrated in order one (I (1)). This is confirmed through the prob. value which rejects the null hypothesis when less than 5 percent. The results of the panel unit root test provide the foundation for the choice of Fully Modified Ordinary Least Square (FMOLS) techniques.

Table 2: Panel Unit Root for all Variables in Africa (1995-2020) (Source: Author's compilation, 2024)

	Levin, Lin & Chu t*				Im, Pesaran & Shin W-Stat				ADF-Fisher Chi-Square				PP-Fisher Chi-Square			
Variable	Statistic	P-Value (I(0))	Statistic	P-Value (I(1))	Statistic	P-Value (I(0))	Statistic	P-Value (I(1))	Statistic	P-Value (I(0))	Statistic	P-Value (I(1))	Statistic	P-Value (I(0))	Statistic	P-Value (I(1))
MAPI	-41.96	0	-55.00	0	-15.97	0	-30.28	0	219.91	0	791.27	0	377.93	0	920.27	0
FDI	-3.09	0.001	-12.42	0	-5.19	0	-18.62	0	144.93	0	451.48	0	231.77	0	802.54	0
ODA	-6.45	0	-19.15	0	-7.38	0	-20.30	0	195.26	0	494.09	0	259.89	0	824.90	0
REM	-3.39	0.0003	-10.35	0	-3.53	0.0002	-15.34	0	127.32	0.00	367.59	0	136.08	0	643.37	0
INTRD	-6.52	0	-12.76	0	-7.51	0	-16.81	0	201.02	0	418.26	0	190.80	0	565.92	0
INTRA	-2.72	0.0032	-15.18	0	-3.77	0.0001	-17.59	0	119.87	0.00	418.36	0	177.55	0	1023.07	0
CLI	-1.91	0.0279	-11.60	0	-1.77	0.0384	-14.52	0	89.16	0.11	345.73	0	121.92	0.00	641.72	0
EXCH	2.69	0.9964	-12.42	0	4.66	1	-10.82	0	46.44	0.99	277.51	0	31.77	1	296.87	0
FID	0.35	0.6367	-12.67	0	3.69	0.9999	-13.78	0	50.74	0.98	330.7	0	41.03	0.99	542.96	0
GOV	-1.42	0.0776	-12.29	0	-2.53	0.0057	-16.04	0	98.84	0.03	386.10	0	146.46	0	762.83	0
HCAP	0.94	0.8267	-8.55	0	5.23	1	-13.29	0	57.38	0.92	333.42	0	79.54	0.31	564.15	0
PCAP	-0.95	0.171	-13.88	0	-0.40	0.3429	-14.88	0	77.24	0.38	356.49	0	75.1	0.45	620.17	0
M2	2.96	0.9985	-9.16	0	5.13	1	-11.76	0	38.26	0.99	287.12	0	33.83	1	523.42	0

4.2 Results of Panel Cointegration Test

As mentioned above, panel cointegration is a sufficient condition for FMOLS. The results of the Kao panel cointegration test as presented in Table 3 reveal that ADF, residual variance and HAC variance were -36.96, 27478.94 and 11349.48 respectively, and were significant. This provides a premise to conclude that variables in the model cointegrate in the long run.

Table 3: Panel Cointegration Test

Null Hypothesis: No Cointegration

	t-Statistic	Prob. Value
ADF	-36.9628*	0.0000
Residual Variance	27478.94*	
HAC Variance	11349.48*	

Source: Author's Computation, 2024 Note: * Implies Rejection of Null Hypothesis at 5 Percent Levels

4.3 Results of FMOLS Regression

4.3.1 Results of the Nature and Types of Macroeconomic Convergence

This section provides empirical results and discussions in line with the research objectives. Tables 4a, 4b, and 4c test for absolute and beta-conditional convergence within the African region and the eight (8) RECs. The regression results in Table 4a reveal mainly absolute and beta-conditional convergence in Africa, AMU and CEN-SAD. In Africa, model 1 shows the existence of absolute convergence since the coefficient of the convergence term (Mapi (-1) (-0.0382) is negative and significant at 1% level (Zulfigar et al., 2017). Confirmation of absolute convergence in model 1 suggests that without the fundamental and conditioning variables, African countries can converge to their steady state. The model has R-squared, number of observations, standard error, and long-run variance of 0.4265, 878, 0.0962 and 0.006, respectively.

Factoring the fundamental variables into model 2, the coefficient of the convergence term (Mapi (-1) (-0.0413) becomes more negative, but remains significant at 1% levels. This result confirms beta-conditional

convergence among African countries (Barro et al., 1992). In model 3 which is expanded further by factoring the fundamental and conditioning variables, it can be observed that the existence of beta-conditional convergence is confirmed (Zulfigar et al., 2017). This deduction is drawn from the fact that the coefficient of convergence term (-0.0530) is negative, accelerates faster, and is significant at 1% level. Thus, it is confirmed that African countries tend to converge both absolutely and beta-conditionally.

More so, models 4, 5 and 6 which focuses on the AMU REC confirm both absolute and beta-conditional convergence (Zulfigar et al., 2017). For the CEN-SAD RECs, absolute and beta-conditional convergence are confirmed. This is because models 7, 8 and 9 possess coefficient of Mapi (-1) which is negative and significant at 1% level (Fufa and Kim, 2018).

Similarly, Models 10, 11 and 12 as presented in Table 4b reveals that absolute and beta-conditional convergence were confirmed in COMESA (Nagy and Siljak, 2022). For instance, model 10 confirms the existence of absolute convergence in COMESA, while models 11 and 12 confirm beta-conditional convergence; since the coefficient of the convergence term Mapi (-1) is negative and significant at 1% level (Barro and Sala-i-Martins, 1992). The confirmation of beta-convergence is in tandem with the findings of Rivas and Villarrova (2016).

Models 13, 14 and 15 present absolute and beta-conditional test of convergence for the EAC REC. For instance, model 13 shows that the coefficient of the convergence term Mapi (-1) (-0.0414) is negative and significant at 1% level. This confirms absolute convergence for EAC REC (Zulfigar et al., 2017). In model 14, it is observed that with the inclusion of fundamental variables, the coefficient of the convergence term increased absolute value to -0.0496, but remains significant at 1% level. The sign and size of the coefficient confirm beta-conditional convergence. Also, with the inclusion of conditional variables into model 14, model 15 is developed.

Model 15 reveals that the coefficient of the convergence term further rose absolutely to -0.0820, hence, it can be concluded that beta-conditional convergence is confirmed. The confirmation of beta-conditional convergence supports the findings of Rivas and Villarrova (2016).

Also, models 16, 17 and 18 confirmed absolute and beta-conditional convergence exist in the ECCAS REC. It is clear from the models that the coefficient of the convergence terms is negative and significant at 1% level (Fufa and Kim, 2018) (see Table 4b).

The nature of convergence among ECOWAS countries is presented in models 19, 20 and 21 in Table 4c. It can be observed that the coefficient of the convergence terms is negative and significant at 1% level (Barro and Sala-i-Martins, 1992; Damadoglu and Dursun, 2023).

Further examination of Table 4c, reveals that models 22, 23, and 24 are considered in an attempt to test for the nature of convergence among countries within the IGAD REC, and the results suggest absolute and beta-conditional convergence. Lastly, the nature of convergence in the SADC REC as revealed in models 25, 26 and 27 supports absolute (Barro and Sala-i-Martins 1992) and beta-conditional convergence in tandem with the works of Ogbuagu et al. (2022) and Glodowska and Pera (2019).

Table 4a: Estimation Results to Test Absolute and Conditional Convergence
Method: Fully Modified Ordinary Least Square (FMOLS)
Dependent Variable: Growth Rate of Macroeconomic Performance (ΔMapi)

	AFRICA				AMU				CEN-SAD
Variable	**Model 1 Abs. Conv. ΔMapi**	**Model 2 Beta Conv. ΔMapi**	**Model 3 Beta Conv. ΔMapi**	**Model 4 Abs. Conv. ΔMapi**	**Model 5 Beta Conv. ΔMapi**	**Model 6 Beta Conv. ΔMapi**	**Model 7 Abs. Conv. ΔMapi**	**Model 8 Beta Conv. ΔMapi**	**Model 9 Beta Conv. ΔMapi**
First lag of Macroeconomic Performance (Mapi(-1))	-0.038 (0.00)*	-0.041 (0.00)*	-0.053 (0.00)*	-0.022 (0.001)*	-0.025 (0.00)*	-0.065 (0.00)*	-0.024 (0.00)*	-0.033 (0.00)*	-0.045 (0.00)*
Human capital		-0.002 (0.788)	0.007 (0.382)					0.006 (0.547)	0.031 (0.004)*
Physical capital		0.028 (0.0004)*	0.026 (0.001)*		0.002 (0.407)	-0.029 (0.379)		0.014 (0.147)	0.022 (0.004)*
Investment Climate			-0.161 (0.00)*			0.062 (0.131)			-0.141 (0.001)*
Credit to private sector			0.0363 (0.00)*			0.108 (0.00)*			0.005 (0.654)
Exchange rate			0.002 (0.05)**			-0.1260 (0.00)*			-0.023 (0.001)*
Government spending			0.083 (0.003)*			0.377 (0.00)*			0.112 (0.038)**
Money supply			-0.045 (0.00)*			0.020 (0.63)			-0.030 (0.094)**
R-Squared	0.427	0.465	0.550	0.263	0.266	0.573	0.188	0.236	0.324
Adj. R-Squared	0.401	0.429	0.526	0.221	0.225	0.521	0.152	0.198	0.278
Observation	878	875	864	96	96	94	357	355	348
SE of Regression	0.096	0.094	0.086	0.056	0.056	0.043	0.091	0.088	0.084
Long-run Variance	0.006	0.005	0.004	0.003	0.003	0.001	0.006	0.004	0.002

Source: Author's Computation, 2024. *, ** and *** represent 1%, 5% and 10% level of significance.

Table 4b: Estimation Results to Test Absolute and Conditional Convergence
Dependent Variable: Growth Rate of Macroeconomic Performance (ΔMapi)

	COMESA					EAC			ECCAS
Variable(s)	**Model 10 Abs. Conv. ΔMapi**	**Model 11 Beta Conv. ΔMapi**	**Model 12 Beta Conv. ΔMapi**	**Model 13 Abs. Conv. ΔMapi**	**Model 14 Beta Conv. ΔMapi**	**Model 15 Beta Conv. ΔMapi**	**Model 16 Abs. Conv. ΔMapi**	**Model 17 Beta Conv. ΔMapi**	**Model 18 Beta Conv. ΔMapi**
First lag of Macroeconomic Performance (Mapi(-1))	-0.032 (0.00)*	-0.041 (0.00)*	-0.058 (0.00)*	-0.041 (0.00)*	-0.050 (0.00)*	-0.082 (0.00)*	-0.048 (0.00)*	-0.047 (0.00)*	-0.056 (0.00)*
Human capital		-0.023 (0.199)	0.007 (0.645)		-0.004 (0.628)	-0.026 (0.004)*		-0.032 (0.205)	0.003 (0.932)
Physical capital		0.056 (0.001)*	0.063 (0.00)*		0.032 (0.07)**	-0.012 (0.525)		0.06 (0.07)**	0.083 (0.07)**
Investment climate			-0.213 (0.00)*			-0.087 (0.014)**			-0.330 (0.017)**
Credit to private sector			0.053 (0.001)*			0.008 (0.680)			0.059 (0.06)**
Exchange rate			0.0026 (0.03)**			0.066 (0.0003)*			0.047 (0.263)
Government spending			0.05 (0.178)			0.171 (0.138)			-0.108 (0.389)
Money supply			-0.083 (0.00)*			0.059 (0.07)**			0.003 (0.96)
R-Squared	0.208	0.262	0.356	0.326	0.368	0.452	0.66	0.668	0.779
Adj. R-Squared	0.172	0.221	0.303	0.296	0.329	0.389	0.644	0.647	0.755
Observation	213	213	212	120	120	120	137	136	136
SE of Regression	0.121	0.117	0.111	0.072	0.071	0.067	0.138	0.137	0.114
Long-run Variance	0.008	0.007	0.004	0.003	0.002	0.001	0.013	0.013	0.013

Source: Author's computation, 2024. *, ** and *** represent 1%, 5% and 10% levels of significance.

Table 4c: Estimation Results to Test Absolute and Conditional Convergence Dependent Variable: Growth Rate of Macroeconomic Performance (ΔMapi)

	ECOWAS					IGAD			SADC
Variable(s)	**Model 19 Abs. Conv. ΔMapi**	**Model 20 Beta Conv. ΔMapi**	**Model 21 Beta Conv. ΔMapi**	**Model 22 Abs. Conv. ΔMapi**	**Model 23 Beta Conv. ΔMapi**	**Model 24 Beta Conv. ΔMapi**	**Model 25 Abs. Conv. ΔMapi**	**Model 26 Beta Conv. ΔMapi**	**Model 27 Beta Conv. ΔMapi**
First lag of macroeconomic performance (Mapi(-1))	-0.033 (0.0)*	-0.039 (0.0)*	-0.046 (0.00)*	-0.025 (0.01)*	-0.041 (0.00)*	-0.084 (0.00)*	-0.046 (0.00)*	-0.045 (0.00)*	-0.055 (0.00)*
Human capital		0.013 (0.12)	0.019 (0.04)**		-0.055 (0.19)	0.058 (0.156)		-0.017 (0.252)	-0.012 (0.475)
Physical capital		0.004 (0.62)	0.011 (0.113)		0.181 (0.002)**	-0.023 (0.69)		0.035 (0.05)**	0.025 (0.258)
Investment Climate			-0.066 (0.08)***			-0.618 (0.00)*			-0.153 (0.0003)*
Credit to Private Sector			-0.002 (0.868)			0.178 (0.001)*			0.041 (0.06)***
Exchange rate			-0.02 (0.111)			-0.130 (0.0001)*			0.003 (0.07)***
Government spending			0.073 (0.131)			0.079 (0.739)			0.073 (0.171)
Money supply			-0.005 (0.735)			-0.190 (0.03)**			-0.057 (0.029)**
R-Squared	0.275	0.306	0.346	0.133	0.23	0.528	0.614	0.62	0.734
Adj. R-Squared	0.243	0.270	0.301	0.093	0.168	0.445	0.596	0.599	0.714
Observation	339	339	329	69	69	68	257	256	253
SE of Regression	0.074	0.072	0.071	0.129	0.123	0.101	0.111	0.11	0.094
Long-run Variance	0.004	0.003	0.002	0.011	0.007	0.003	0.008	0.008	0.007

Source: Author's computation, 2024. *, ** and *** represent 1%, 5% and 10% levels of significance.

Analyzing the regression results in Tables 4a, 4b and 4c which cover Africa and the eight (8) RECs, we concluded that both absolute and beta-conditional convergence were confirmed. According to the literature, the

existence of absolute and beta-conditional convergence are necessary conditions for regional economic and trade integration, as well as the formation of monetary unions. Based on this established background, it is key to test for sigma-convergence in Africa and the 8 RECs as presented in Table 5.

Table 5: Sigma-Convergence Test for Africa and the Eight (8) Regional Economic Communities (RECs)

Year	Africa	AMU	CEN-SAD	COMESA	ECA	ECCAS	ECOWAS	IGAD	SADC
1995-99	2.56	1.16	1.36	1.44	1.15	2.94	1.18	1.60	2.81
2000-04	1.46	1.00	0.98	1.04	0.88	1.81	0.94	1.05	1.69
2005-09	1.06	0.86	1.93	1.11	0.79	1.15	0.92	0.91	1.12
2010-14	1.04	0.76	1.07	1.15	0.74	1.06	0.85	1.27	1.04
2015-20	1.20	0.73	1.32	1.42	0.72	1.12	0.93	1.62	1.043

Source: Author's computation, 2024

4.3.2 Results of Sigma Convergence

The log of standard deviation of macroeconomic performance for Africa and its 8 RECs covering five (5) periods are presented in Table 5. It shows that trend of log (SDev of MAPI)) for African countries continued to slope downwards from 2.56 in 1995-1999 to 1.2 in the 2015-2020 period, as such we conclude that sigma-convergence exists. This is a sufficient condition to confirm the existence of convergence among African countries. For COMESA, it can be observed that the trend of log (SDev of MAPI) slopes downwards from 1.44 to 1.04 in the 1995-1999 and 2000-2005 periods. Afterward, it rose from 1.11 to 1.42 between the 2005-2009 and 2015-2020 periods, which depicts presence of sigma-divergence across COMESA countries. Therefore, confirmation of the sufficient condition for convergence fails in tandem with Gammadigbe (2021).

Countries within the CEN-SAD followed the same parabola-shaped pattern for log (SDev of MAPI). At first, log (SDev of MAPI) fell from 1.36 to 0.93 between 1995 and 1999 and 2000-2004 periods, before increasing to 1.32 in the 2015-2020 period. From the shape of the log

(SDev of MAPI), sigma-divergence the sufficient condition for convergence is confirmed (Rivas and Villarrova, 2016). Unlike in CEN-SAD, countries in ECCAS witnessed a steady decrease in the trend of log (SDev of MAPI) from 2.94 in 1995-1999 to 1.12 in 2015-2020 periods. Since the trend maintained a uniform downward trend, then, sigma-convergence is confirmed.

Similarly, EAC followed a steady downward pattern from 1.15 to 0.72 between the (1995-1999 and 2015-2020) periods. Following this decision, it can be concluded that countries in the EAC confirm the existence of sigma-convergence (Jalloh, 2014). However, IGAD does not satisfy the conditions of sigma-convergence, since the trend of log (SDev of MAPI) fell from 1.6 to 0.91 between the 1995-1999 and 2005-2009 periods. It later increased from 0.91 to 1.62 in the 2005-2009 and 2015-2020 periods (Gammadigbe, 2021). Further observations from Table 5 shows that the trend of log (SDev of MAPI) in ECOWAS REC slope continuously downward from 1.16 to 0.93 between 1995-1999 and 2015-2020 periods. This deduction provides support for the existence of sigma-convergence among countries within the ECOWAS REC.

Further observations from the trend of log (SDev of MAPI) in the AMU REC followed a similar pattern as characterized by the ECOWAS REC. The trend line of the log (SDev of MAPI) sloped downwards from 1.16 to 0.73 between the 1995-1999 and 2015-2020 periods; and as such provides background to conclude that sigma-convergence exists among countries in AMU REC (Jalloh, 2014). For SADC REC, its trend for log (SDev of MAPI) sloped downward as characterized in AMU REC. This continuous decline in the log of standard deviation of MAPI over the period supports the existence of sigma convergence among countries in the SADC REC.

4.3.3 Results of the Roles of Financial Flows in Accelerating Macroeconomic Convergence across African Countries

The regression results are presented in Table 6 as established in the research objective. They are separated into 8 (eight) models in a ‘step-like

pattern'. In model 1, only the first lag of macroeconomic performance Mapi (-1)) and financial flows indicators are introduced, and the first lag of macroeconomic performance (Mapi (-1)) (-0.0364) exerts a negative impact on performance but accelerates convergence. Without the fundamental and conditioning variables, it can be observed that the impact of foreign direct investment (-0.0004), official development assistance (-0.0102), and remittance (-0.0005) on macroeconomic performance are negative and insignificant; however, these financial flows indicators contribute towards accelerating macroeconomic convergence among African countries (Barro and Sala-i-Martins, 1992). The R-squared, observations, standard error of the regression and long-run variance are 0.2462, 767, 0.0871 and 0.0102, respectively.

To develop model 2, fundamental variables mainly human and Physical capital are factored into model 1. The result reveals that the coefficient of the convergence term is negative and significant, which satisfies beta-conditional convergence. Also, 1% increase in the lag of macroeconomic performance, reduces the current level of macroeconomic performance and accelerates convergence by 0.0414%. Furthermore, human capital (0.0113) and physical capital (0.0278) impacts positively on macroeconomic performance and accelerate convergence to optimal point. Other results in model 2 suggest that with the introduction of human and physical capital, the impact of foreign direct investment (-0.0054) on macroeconomic performance remained negative, but facilitated macroeconomic convergence. While official development assistance (0.0054) and remittance (0.0005) have positive impact on macroeconomic performance, FDI impacts negatively on performance. However, these financial flow components contributed individually towards accelerating macroeconomic convergence among African countries (Marelli et al., 2019).

Interestingly, the inclusion of other conditioning variables namely; money supply, exchange rate, credits to the private sector, government spending and investment climate) to develop models 3 to 8.
They suggest that FDI flows exert significant negative impacts, while ODA and remittance flows positively impact macroeconomic performance. Thus, the impact of financial flow components on macroeconomic performance is mixed. However, FDI, ODA, and remittance flows contribute individually towards accelerating

macroeconomic convergence which is the major focus of this study. Deductions from the above support the propositions by the Neoclassical School of Thought (Bentzen and Tung, 2020), which postulates that financial flows are exogenously determined, but they drive convergence through knowledge transfer and technological spillover effects from advanced to poor countries.

Table 6: Estimation Models on the Role of Financial Flows in Accelerating Macroeconomic Convergence
Dependent Variable: ΔMapi

Variable(s)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
First lag of Macroeconomic Performance (Mapi(-1))	-0.036 (0.00)*	-0.041 (0.00)*	-0.05 (0.00)*	-0.051 (0.00)*	-0.050 (0.00)*	-0.055 (0.00)*	-0.066 (0.00)*	-0.048 (0.00)*
Human capital		0.011 (0.07)**	0.009 (0.091)***	0.018 (0.001)*	0.019 (0.001)*	0.010 (0.187)	-0.002 (0.705)	0.006 (0.363)
Physical capital		0.028 (0.00)*	0.030 (0.00)*	0.026 (0.00)*	0.022 (0.0001)*	0.027 (0.0005)*	0.031 (0.00)*	0.0370 (0.00)*
Investment climate			-0.103 (0.00)*	-0.116 (0.00)*	-0.12 (0.00)*	-0.156 (0.00)*	-0.189 (0.00)*	-0.11 (0.00)*
Credit to private sector			0.004 (0.388)	0.024 (0.00)*	0.022 (0.001)*	0.037 (0.00)*	0.053 (0.00)*	0.011 (0.06)**
Exchange rate			0.001 (0.07)**	0.001 (0.151)	0.001 (0.123)	0.002 (0.06)**	0.002 (0.009)*	
Government spending			0.108 (0.00)*	0.124 (0.00)*	0.127 (0.00)*	0.089 (0.001)*	0.093 (0.00)*	
Money supply				-0.046 (0.00)*	-0.041 (0.00)*	-0.046 (0.00)*	-0.061 (0.00)*	
Foreign direct investment	-0.0004 (0.918)	-0.005 (0.020)**	-0.005 (0.002)*	-0.005 (0.001)*	-0.005 (0.007)*			-0.005 (0.007)*
Ordinary development assistance	-0.010 (018)	0.005 (0.19)	0.003 (0.26)	0.004 (0.12)		0.008 (0.07)**		0.003 (0.40)

Remittance	-0.001 (0.916)	0.001 (0.831)	0.003 (0.165)	0.003 (0.08)**			0.006 (0.002)*	0.003 (0.232)
R-Squared	0.246	0.285	0.324	0.334	0.331	0.559	0.584	0.313
Observation	767	765	750	750	778	860	840	753
SE of Regression	0.087	0.085	0.084	0.083	0.082	0.085	0.084	0.084
Long-Run Vars.	0.010	0.003	0.001	0.001	0.002	0.004	0.003	0.002

Source: Author's computation, 2024. *, ** and *** represent 1%, 5% and 10% levels of significance.

5. Conclusion

The issues of regionalism and economic cooperation as experienced in Africa and its RECs have been faced with some challenges, especially around the issues of homogenous products as well as disconnects in terms of convergence criteria. However, drawing from the results and findings of this study, Africa and its RECs can embark on both trade integration and monetary unions to enjoy stronger bargaining power and a larger market for their products. Thus, it is crucial to develop uniform convergence criteria for African countries and provide policy guidelines to monitor adherence to agreed macroeconomic criteria aimed at ensuring stronger regional cooperation, reducing defaults by members as well as optimizing gains from integration and financial flows. Also, it is key to boost financial flows as an important means of implementing the regional agenda, however, kin attention should be paid to avoiding complexities involving multiple and often overlapping bilateral and multilateral agreements. Lastly, strengthening regional efforts towards mobilizing financial flows cannot be overemphasized, because they have been established to enhance performance, as well as accelerate macroeconomic convergence.

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