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The Effect of Trilemma Index on Financial Market Efficiency and Access: Evidence from Africa

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Annotation: The author examined the effects of the trilemma index on financial market development from thirty-eight (38) African national economies as a result of capital market globalization that has compelled many countries to open their financial markets in anticipation of the foreign investment required to improve market liquidity. The author indicated that the interaction of monetary independence and exchange rate stability affects both financial market depth and access in Africa negatively. The interaction of monetary independence (MI) and financial openness significantly affected financial market access in Africa. The author also found out that the interaction of the financial openness index and exchange rate stability significantly affected financial market access in Africa. The author concluded that county financial openness is the best tool for financial market access and efficiency in African markets.

Keywords: Financial, Africa, Market.

1. INTRODUCTION

Africa is a continent of 54 countries[1]. The continent is economically and culturally diverse, with different regional economic blocs. The financial systems in these countries are as diverse as the countries (Allen et al., 2011). The links of international reserves, exchange rates, and monetary policy can be understood through the lens of a modern incarnation of the impossible trinity (aka the "Trilemma"), based on Mundell-Flemings's hypothesis that a country may simultaneously choose any two, but not all, of the following three policy goals: monetary independence, exchange rate stability, and financial integration (Aizenman, 2019; Aizenman et al., 2008; Rey, 2013).

The original economic Trilemma was framed in the 1960s, during the Bretton Woods regime, as a binary choice of two out of the possible three policy goals. However, in the 1990s and 2000s, emerging markets and developing countries found that deeper financial integration comes with growing exposure to financial instability and the increased risk of sudden stop of capital inflows and capital flight crises (Kose et al., 2021; Lee & Chou, 2018; Luo et al., 2016; Prasad et al., 2011). These crises have been characterized by exchange rate instability triggered by countries' balance sheet exposure to external hard currency debt

[1] According to the United Nations Department for General Assembly and Conference Management, **54** countries belong to the African Group and are Members of the United Nations. Information on the date of membership for each country is available from the UN Membership page.

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exposures that propagated banking instabilities and crises. Such events have frequently morphed into deep internal and external debt crises, ending with bailouts of systemic banks and powerful macro players. This resultant domestic debt overhang led to fiscal dominance and a reduction of the scope of monetary policy. With varying lags, these crises induced economic and political changes, in which a growing share of emerging markets and developing countries converged to "in-between" regimes in the Trilemma middle range i.e., managed exchange rate flexibility, controlled financial integration, and limited but viable monetary autonomy (Allen et al., 2012, 2016; Mishkin, 2009; Woodford, 2013).

Central banks, by and large, do retain substantial influence over local financial market conditions. In addition to their impact on the path of expected short rates, monetary policy appears to also have a significant influence on term premia. This conclusion does not preclude the possibility that the degree of monetary dependence may be large (Aizenman et al., 2008; Lee & Chou, 2018; Svirydzenka, 2016). Increased economic and financial linkages across economies do imply greater co-movement in asset prices and more rapid transmission of shocks. But a sizeable component of such co-movements reflects common fundamentals (Baxter & Stockman, 1989; Garber & Svensson, 1995; Rodriguez, 2017).

Flexible exchange rates play a countercyclical role by smoothing output volatility. They are important in lessening incentives for foreign currency borrowing, thus reducing currency mismatches and deepening domestic financial markets. But financial development and exchange rate flexibility is a two-way street since the degree of exchange rate flexibility is also likely to depend on the financial system's stage of development (Baldwin & Forslid, 2000; Osinubi & Amaghionyeodiwe, 2003; Qamruzzaman & Wei, 2018). Exchange rate flexibility could affect long-run economic growth and financial market development if it has an impact on productivity growth. With respect to the level, the early literature argues in favor of an undervalued exchange rate for the promotion of domestic industries. Many emerging economies continue to have growth models heavily reliant on exports. (Habib et al., 2017; Husain et al., 2005) show how exchange rate undervaluation can stimulate growth if the tradable goods sector is affected disproportionately by market failures or institutional weaknesses.

In addition, trend appreciations and depreciations can have negative implications for foreign direct investment through the location of industries. These considerations suggest that limiting exchange rate flexibility could matter, especially for the tradable goods sector (Allen & Gale, 1999; Baldwin & Forslid, 1999; Cubillas & González, 2014; Luo et al., 2016). Large and frequent changes in the exchange rate can create a volatile economic structure, particularly if financial markets are underdeveloped and agents have few hedging possibilities. Such a volatile economy could adversely affect prospects for investment and growth. It could also reduce international trade, especially in economies dependent on intra-regional trade because large exchange rate changes have compounding effects on the costs of intermediate inputs (Bremus & Buch, 2017; Ramirez, 2007). But greater exchange rate flexibility could also lead to a more efficient allocation of resources and higher growth. It could encourage innovation and productivity growth, as domestic firms cannot rely on undervalued exchange rates to maintain external competitiveness. When exchange rates are flexible and financial markets are well developed, investment and production decisions can be disconnected from movements in the exchange rate (Imbs, 2007; Tornell et al., 2021). In general, econometric analysis gives inconclusive evidence about the relationship between exchange rate volatility and long-run growth. (Levine & Zervos, 1996; Osinubi & Amaghionyeodiwe, 2003; Qamruzzaman & Wei, 2018) show that financial liberalization results in an increase in stock market liquidity. They suggest that although the significant differences in financial market development across countries exist, the capital markets globalization allows emerging economies to obtain funds at substantially low costs in global capital market. Therefore, emerging economies can accumulate capital, and increase the size of local financial markets.

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Moreover, previous studies have observed that opening financial markets in emerging economies fosters the development of local financial intermediaries in the following ways: (1) By enabling local financial markets to expand, opening financial market renders financial intermediaries more efficient, causing monetary regulations to be lifted, and enabling floating interest rates to enhance competition between institutions, thereby reducing capital costs (Baldwin & Forslid, 1999, 2000); (2) By improving financial service quality and bank competitiveness in local financial markets, it increases the efficiency of financial intermediaries and reduces capital costs (Levine & Zervos, 1996); Finally, (3) by expediting the replacement of inefficient financial institutions with more efficient ones, it creates pressure for domestic financial reform; reduces information asymmetry, adverse selection, and moral hazards; and attracts investment.

In summary, previous studies have indicated that opening financial markets in emerging economies can facilitate the operation of local financial markets, thereby facilitating capital cost reduction and attracting more investment; and also, that increased investor participation can improve the capital liquidity of markets. The openness of financial markets in emerging economies not only increase the liquidity of financial market, but also prompt financial institutions to engage in investment behaviors that involve further risks (Allen & Gale, 1999; Cubillas & González, 2014; Luo et al., 2016; Schneider & Tornell, 2004), which could aggregate the impact of a financial crisis on a regional scale (Imbs, 2007; Ramirez, 2007; Tornell et al., 2021). This underlies the need to elucidate the influence of financial opening on local markets in emerging economies. However, the outcome of opening a financial market may depend on the structure of the emerging economy.

This study samples 38 African national economies to examine the effects of the trilemma index on financial market development. The researchers indicate that the interaction of monetary independence and Exchange rate stability affects both financial market depth and access in Africa negatively. The interaction of monetary independence (MI) and financial openness significantly affect financial market access in Africa. The interaction of the financial openness index and exchange rate stability significantly affect financial market access in Africa. Using two stages least squares, the researchers conclude that county financial openness is the best tool for financial market development in African markets.

2. EMPIRICAL REVIEW

In the debate over appropriate exchange rate policies, researchers have paid increasing attention to the roles played by international capital flows and domestic financial systems in determining exchange rate regimes. However, as (Köhler, 2002; Kose et al., 2009, 2021, 2011; Prasad et al., 2011) argue, the empirical literature has not conclusively demonstrated that financial integration promotes growth and stability. Kose et al. (2009) surveyed this extensive literature and conclude that in principle, financial globalization should catalyze domestic financial market development, improve corporate and public governance, and provide incentives for greater macroeconomic policy discipline may be more important than the traditional financial channels emphasized by Carvalho et al. (2016). Independent monetary policies are possible if and only if the capital account is managed, directly or indirectly via macroprudential policies. The conventional monetary trilemma has morphed into a dilemma between monetary autonomy on the one hand and capital mobility on the other (Rey, 2013). This is in stark contrast to Mishkin (2009), who argued that central banks' control over inflation has not diminished, and has in some respects been strengthened, by globalization. Bergh & Nilsson (2010) and Woodford (2013) took the middle road by acknowledging that spillovers complicate the task of monetary policy, but that independent monetary policy remains feasible for financially open emerging economies with relatively flexible exchange rates.

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3. THEORETICAL REVIEW: AFRICAN FINANCIAL MARKETS

Notwithstanding widespread financial sector improvements over the last few decades, many African countries still face severe financial market development gaps in accessing financial services relative to advanced economies and other peer developing ones (Allen et al., 2012, 2016). A key issue is the access of the disadvantaged to finance, which would promote economic growth at the broadest level. A significant outgrowth of Africa's extensive financial sector reforms, including policy measures for the development of capital markets, has been a surge of interest in establishing stock exchanges, particularly in Sub-Sahara Africa (SSA). Stock exchanges have increased over the last two decades. There has also been a market capitalization boom in Africa, except for the two oldest markets in South Africa and Egypt, which came into existence in the 1880s. What is also interesting is that SSA witnessed an establishment of a regional stock exchange domiciled in Abidjan, which currently serves the Francophone countries of West Africa. There are, in fact, similar initiatives underway in Southern and Eastern Africa to consolidate the thinly capitalized markets into regional markets. African stock markets face severe challenges in terms of depth measured by market capitalization and listing. Except for South Africa and Egypt, African stock markets remain the smallest of any region, both in the number of listed companies and market capitalization. The highest growth has been experienced by the markets in West Africa. However, the recent financial crisis has led to a drop in market capitalization in Africa in 2008. The market capitalization of the largest market, like South Africa, and Egypt, has dropped by about 40% and 50%, respectively. Surprisingly, however, the market capitalization of Ghana and Tunisia increased in 2008. The number of firms listed on African stock exchanges is small on the listing front. Except for South Africa, Kenya, Botswana, Namibia, Tunisia and Mauritius, market capitalization further decreased in 2009. The number of firms listed has declined in the well-established markets of South Africa, Egypt and Malawi. From the above literature review, the researchers developed the following hypotheses:

H1: The interaction of monetary independence and Exchange rate stability affect negatively financial market access in Africa.

H2: Interaction of monetary independence (MI) and financial openness affect significantly and positively the financial market access in Africa.

H3: Interaction of financial openness index and exchange rate stability affect significantly and positively the financial market efficiency in Africa.

4. RESEARCH METHODS AND MODELS

There are 29 stock exchanges on African continent. They represent the capital markets of 38 countries. The African continent has two regional stock exchanges: One is the *Bourse Régionale des Valeurs Mobilières* (in french), or BRVM, located in Abidjan; and the *Bourse des Valeurs Mobilières de l'Afrique* Centrale (in french), or BVMAC, located in Libreville, Gabon. The BRVM serves Mali, Benin, Burkina Faso, Guinea Bissau, Ivory Coast, Niger, Senegal and Togo; the BVMAC serves the Central African Republic, Chad, Equatorial Guinea, Republic of Congo and Gabon. The 21 of the 29 stock exchanges in Africa are members of the African Securities Exchanges Association (ASEA). The Egyptian Exchange (EGX) is the oldest stock exchange in Africa as it was founded in 1883. The other older exchanges on the continent are the Casablanca Stock Exchange of Morocco and the JSE Limited. Today, Johannesburg Stock Exchange is the first, and the Nigerian Stock Exchange (NSE) is the second. The Casablanca stock exchange in Morocco is the 3rd largest exchange in Africa[2]. Several notable countries on the continent do not have a stock exchange. The most famous is Ethiopia, although it has a commodities exchange in Addis

[2] Top 10 largest stock exchanges in Africa - Nyongesa Sande

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Ababa.[3]. This paper focuses only on 38 African countries. The researchers collected data from 38 African countries. The main sources of our data are trilemma dataset [4] ,IMF, World Bank. The World Economic Outlook (WEO) is also key to the country specific variables. The dependent variables are the trilemma indexes quantify, the degree of achievement along the three dimensions of the trilemma, monetary independence, exchange rate stability, and financial openness. These indexes are first introduced by Aizenman, Chinn, and Ito (2008). The independent variables are the financial markets development indicators as indicated in Figure 1 and in the definitions of the main variables [5][6]. The control variables will be GDP, GDP per capital and inflation.

4.1 Definitions of the main variables

The policy trilemma refers to the trade-offs a government faces when deciding international monetary policy. The impossible trinity is a trilemma in international economics which states that it is impossible to have all three of the following at the same time: - A stable foreign exchange rate; - Free capital movement (absence of capital controls); - An independent monetary policy. If the government set a fixed exchange rate and allow the free movement of capital, then they will need to change interest rates according to outside pressures. It means – in a recession, the country could not cut interest rates because if she does, the currency would fall in value. If the government wished to purse monetary autonomy and it allowed free mobility of capital, it would need to allow a floating exchange rate. For example, if the government is worried about inflation, it could increase interest rates. These higher interest rates would cause appreciation in the currency. Countries which wish to promote growth would cut interest rates, but lower interest rates would cause hot money flows out of the economy and lead to a fall in the exchange rate. If the government wishes to have a fixed exchange rate but also change interest rates according to its own preferences, it will need to control the outflow of money. For example, suppose country wishes to keep her exchange rate fixed but it wished to cut interest rates to boost growth. In this case, there is downward pressure on the currency. Investors wish to sell this country currency and buy dollars. However, if the country prevents the country buying dollars and moving currency out of the country, then it can artificially keep the value of currency high (Mundell, 1963).

The extent *of monetary independence* is measured as the reciprocal of the annual correlation between the monthly interest rates of the home country and the base country. The base country is defined as the country that a home country's monetary policy is most closely linked with as in Shambaugh (2004). By construction, the maximum value is 1, and the minimum value is 0. Higher values of the index mean more monetary policy independence. To measure *exchange rate stability*, annual standard deviations of the monthly exchange rate between the home country and the base country are calculated and the index is normalized between 0 and 1. For the measure of *financial openness*, we use the index of capital account openness, or KAOPEN, by Chinn and Ito (2008). KAOPEN is based on information regarding restrictions in the International Monetary Fund's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). Specifically, KAOPEN is the first standardized principal component of the variables that indicate the presence of multiple exchange rates, restrictions on current account transactions, on capital account transactions, and the requirement of the surrender of export proceeds. The Chinn-Ito index is normalized between zero and one. Higher values of this index indicate that a country is more open to cross-border capital transactions (Aizenman, Chinn, and Ito, 2008, 2017).

[3] Ethiopia: Stock Exchange to Be Operational Through PPP - allAfrica.com
[4] The Trilemma Indexes (pdx.edu)
[5] Financial Development - Story - IMF Data
[6] https://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

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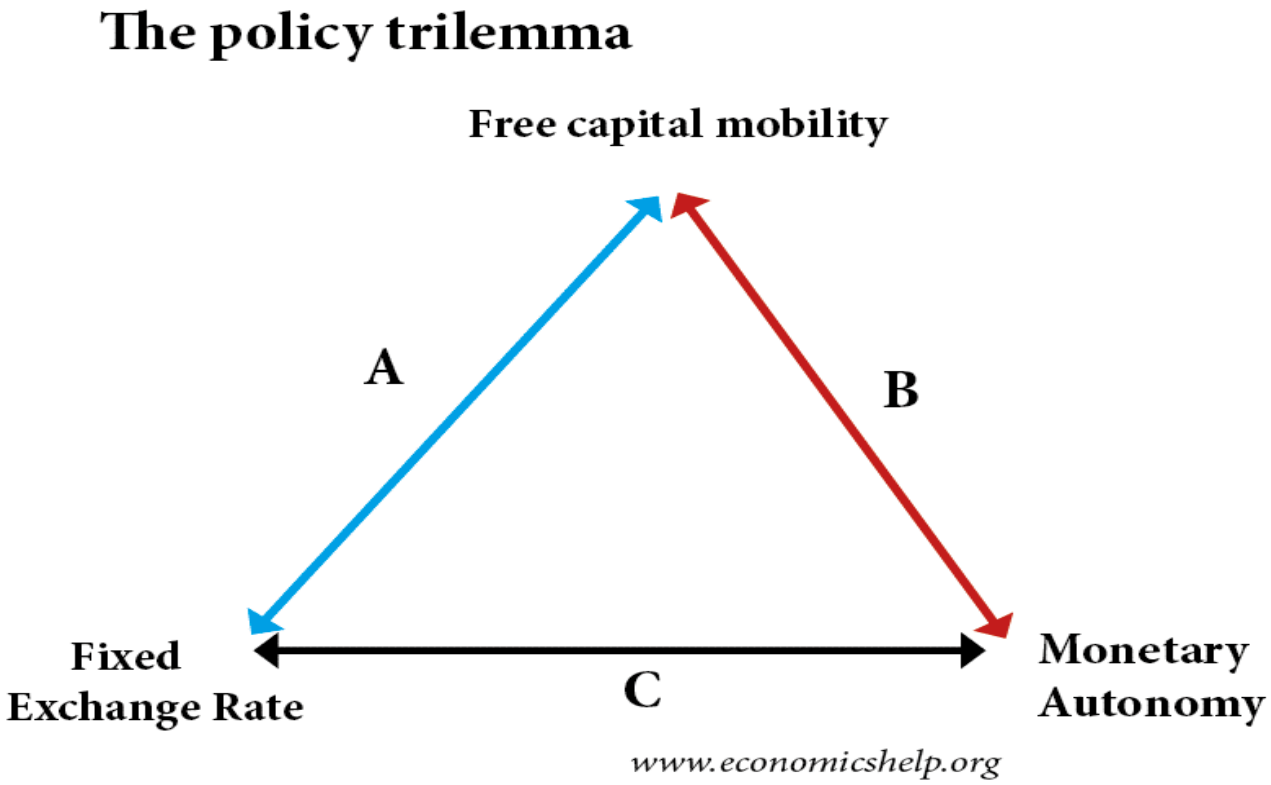
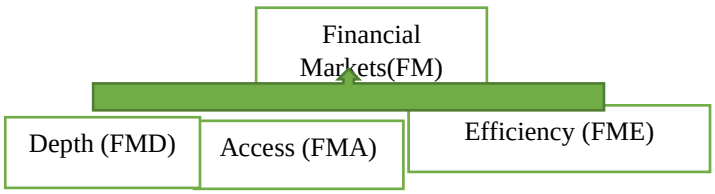


This simple diagram suggests that a government must choose between: A = Fixed exchange rate + free capital mobility; B = Free capital mobility + monetary autonomy; C = Fixed Exchange rate + monetary autonomy.

The *financial markets index* (FM) is an aggregate of the financial markets depth index (FMD), the financial markets access index (FMA) and the financial markets efficiency index (FME) (Čihák and et al. 2012; Sahay and Bredenkamp, 2015; Svirydzenka, 2016). The financial markets depth index (FMD) compiles data on stock market capitalization to GDP, stocks traded to GDP, international debt securities of government to GDP, and total debt securities of financial and non-financial corporations to GDP. The financial markets access index (FMA) compiles data on per cent of market capitalization outside of the top 10 largest companies and the total number of issuers of debt (domestic and external, nonfinancial, and financial corporations) per 100,000 adults. The financial markets efficiency index (FME) compiles data on the stock market turnover ratio (stocks traded to capitalization)[7].

Figure 1:Financial Development Index Pyramid:



Source: IMF staff, based on Čihák et al. (2012)

[7] Financial Development - About - IMF Data

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4.2 Models and methodology

We will practice both Ordinary Least Square (OLS) and Generalized Method of Moments (GMM) estimators' country-year panel data set of 54 African countries over the period of 2000–2020. The OLS model is given below:

$$\text{Fiancial Market Depth} = \alpha + \beta\text{Trilemma index} + \theta Y_{i,t} + u_{it} + \text{Country FE} + \text{Year FE} \quad (1)$$

$$\text{Fiancial Market Access} = \alpha + \beta\text{Trilemma index} + \theta Y_{i,t} + u_{it} + \text{Country FE} + \text{Year FE} \quad (1)$$

$$\text{Fiancial Market Efficiency} = \alpha + \beta\text{Trilemma index} + \theta Y_{i,t} + u_{it} + \text{Country FE} + \text{Year FE} \quad (1)$$

Where α is intercept and β is a slope. Y_{it} is a vector of macroeconomic control variables for i^{th} country at year t, and u_{it} is an error term, country FE is country fixed effect and Year FE is year fixed effect. We use instrumental variables two Stages least square to test endogeneity concerns. Two-stage least squares (TSLS) are widely used in econometrics to estimate parameters in systems of linear simultaneous equations and solve omitted-variables problems bias in single-equation estimation. In addition, the two-stage least squares method handles the model with endogenous explanatory variables in a linear regression framework.

4.3 Data Distribution

This section presents data distribution of the different variables in this paper. We have exchange rate stability index, market independence index, country financial openness index and financial market development index.

Figure 2:Exchange Rate Stability

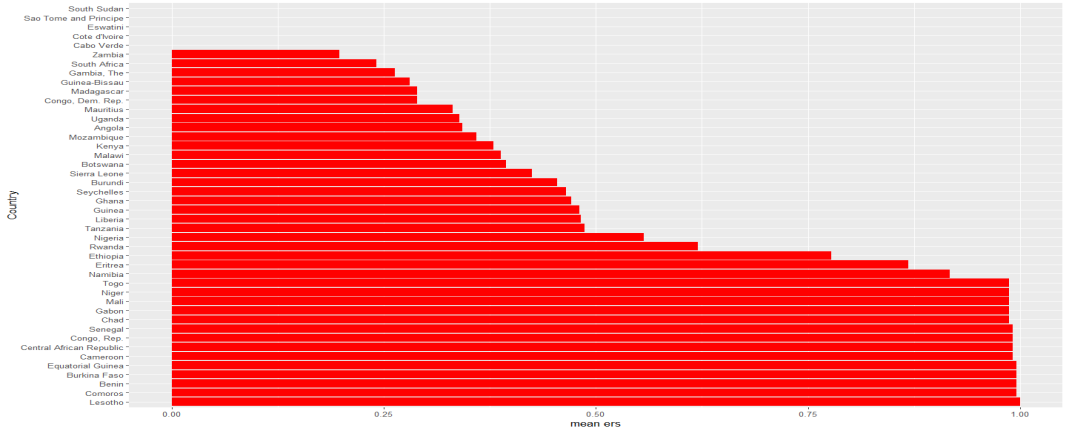

Figure 1 presents the distribution of the mean of exchange rate stability by country. We do not have from some countries as indicated above in the figure. Exchange rates express the value of one country's currency concerning the value of another country's currency. The rates play an essential part in economics, affecting the trade balance between nations and influencing investment strategies. In finance, an exchange rate is the rate at which one currency exchanges for another currency.

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Figure 3: Market Independence Index

Figure 2 presents the mean of markets independence index on African continent. Financial independence is defined as meeting all current and future cash outflows with passive cash inflows. In everyday life, financial independence is the status of having enough income or wealth sufficient to pay one's living expenses for the rest of one's life without being employed or dependent on others[8]. Someone who wishes to achieve financial independence can find it helpful to have a financial plan and budget. They have a clear view of their current incomes and expenses and can identify and choose appropriate strategies to move towards their financial goals[9].

Figure 4: Country Financial Openness

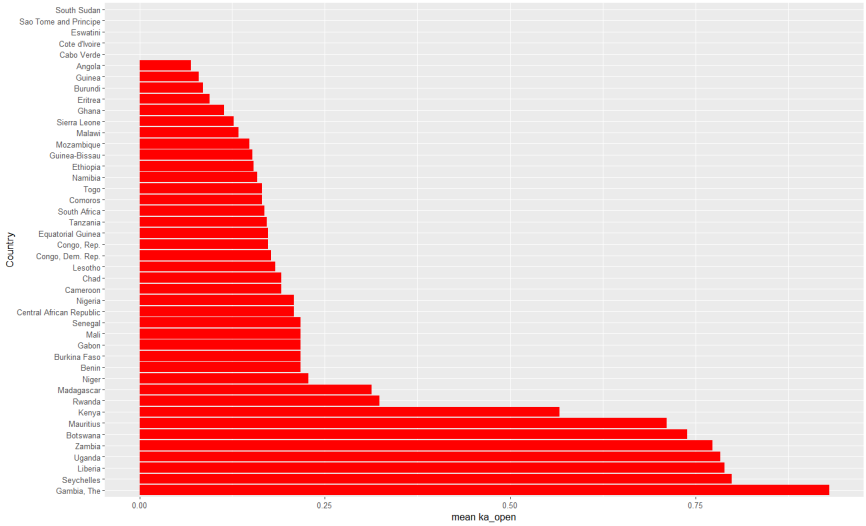

Figure 3 presents the mean of country financial openness on African continent. The axiom of financial openness refers to an individual country's approach to foreign investments in corporations within its jurisdiction, to the policies of each country concerning regulating exports of specified goods and services, and to each government's policy on what is called capital flows.

[8] The Myths & Realities of Achieving FINANCIAL INDEPENDENCE (nightingale.com)

[9] What your financial plan should cover | Financial planning | GetSmarterAboutMoney.ca

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Figure 5: Financial Markets Development

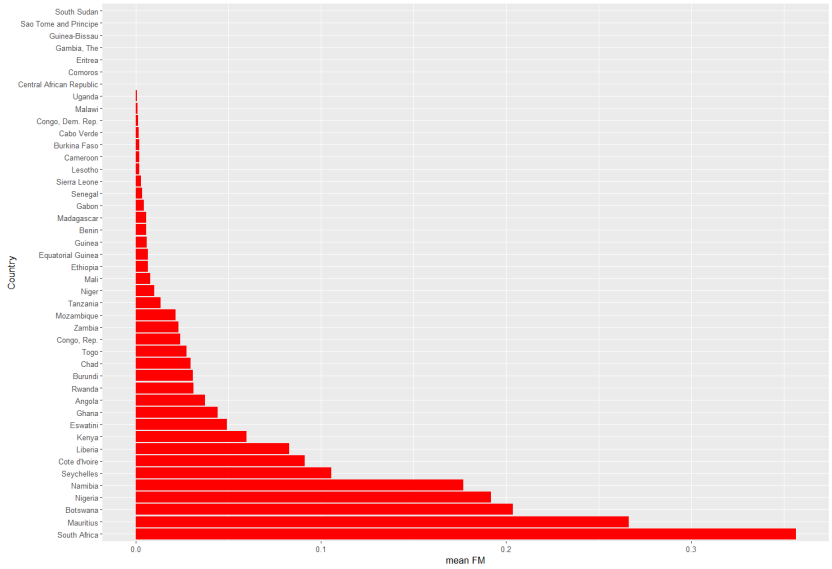

Figure 4 presents the mean of financial markets development on African continent. Financial market development influences each other positively. One system to view the role of finance is local firms' performance and economic growth. Financial markets play a crucial role in providing the conditions necessary for innovations in local business and other economic organization to occur.

Figure 6: Correlation matrix by Figure

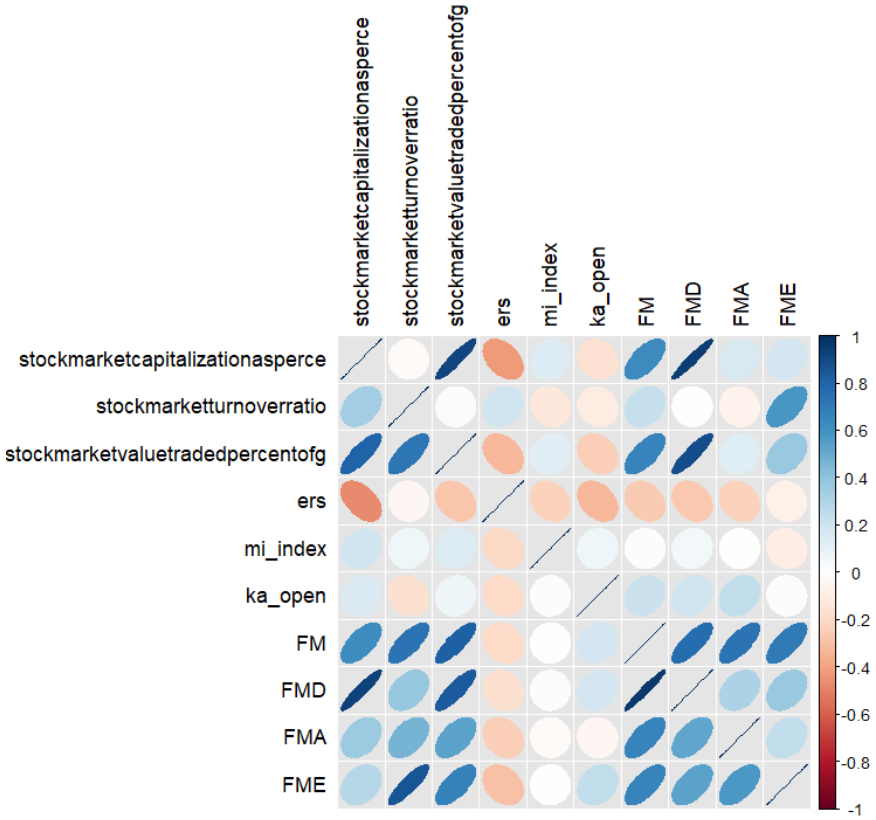

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Figure 5 presents matrix of the main variables that we use in this study. A correlation matrix is a table displaying correlation coefficients between variables. Each cell in the table shows the correlation between two variables. A correlation matrix summarizes data, inputs into a more advanced analysis, and diagnostic for advanced analyses. All variables are defined in definitions of key variables.

Figure 7: Financial Market access, efficiency, and depth

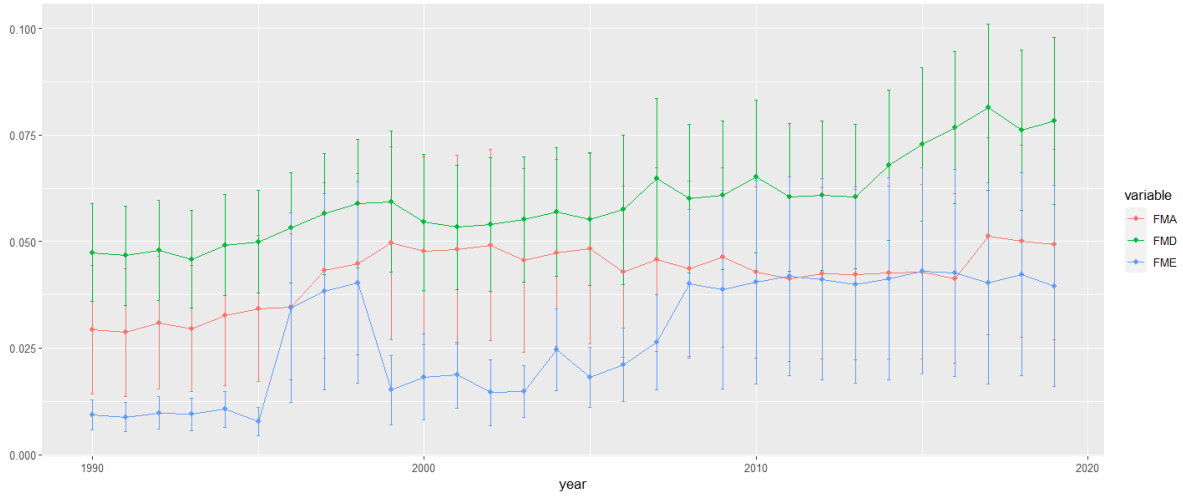

Figure 6 presents the time series data of African market. It presents data on financial Market access, financial market efficiency, and financial market depth from 1990 to 2020.

4.4 Summary Statistics

In this section we focus on the descriptive statistics of our sample. The summary statistic quantitatively describes or summarizes features from a collection of information. We have mean, standard deviation, p25, median, p75, minimum, maximum and the total number of observations.

Table 1: Descriptive Statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	mean	Sd	p25	p50	p75	min	max	N
Inflation	16.7347	52.8003	2.09607	6.51484	13.3252	-15.4237	466.407	1,258
unemploymentrate	7.81875	7.50236	2.92000	4.52000	9.43000	0.56000	33.2900	1,201
FDI_gdp	3.60560	5.99062	0.54000	1.97000	4.36000	-3.75000	39.4600	1,242
bankcredittops_gdp	16.2813	15.2686	6.79000	12.0050	19.2950	0.91000	78.2300	1,224
bankassets_gdp	24.9854	31.9868	9.65000	15.6000	26.1800	1.59000	232.580	1,135
GDP_growth_annual	4.08236	4.74975	1.92121	4.22793	6.33369	-10.7934	20.7158	1,252
Ers	0.64095	0.35033	0.30699	0.67876	1	0.031324	1	1,166
mi_index	0.45887	0.17994	0.35261	0.48263	0.58523	1.4130e-03	0.86328	1,014
ka_open	0.29867	0.29032	0.16496	0.16496	0.41654	0	1	1,111
FD	0.12776	0.10056	0.077287	0.10025	0.13576	0	0.56061	1,302
FM	0.044678	0.085987	1.2318e-03	8.3353e-03	0.038334	0	0.43889	1,302
FMD	0.059568	0.10454	3.1918e-03	0.017104	0.068647	0	0.64846	1,302
FMA	0.042259	0.13129	0	0	4.3806e-03	0	0.56079	1,302
FME	0.027724	0.11256	0	0	3.5643e-04	0	0.96878	1,302
LnGDP	22.4150	1.50164	21.3051	22.4002	23.2871	19.2642	26.6321	1,255

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Table 2 presents descriptive statistics of the variables that we used in this study. FD stands for financial development, FM stands for financial market development, FMD stands for financial market depth, FMA stands for financial market access, and FME stands for financial market efficiency.

5. RESULTS AND DISCUSSION

In this section, we discuss in detail the effect of trilemma index on African financial market efficiency and access. We use multiple linear regression analysis test and two stages least squares.

Table 2: Exchange Rate Stability index (erc) and Financial Market development

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FMD Index	FMA Index	FME Index	FMD Index	FMA Index	FME Index
ers Index	-0.00989	-0.0113**	-0.0285*	-0.0111	-0.0113**	-0.0285*
	(-1.422)	(-2.011)	(-1.783)	(-1.596)	(-2.011)	(-1.783)
Unemployment rate	-0.00367***	0.000729	-0.00223	-0.00414***	0.000729	-0.00223
	(-5.290)	(1.298)	(-1.400)	(-6.018)	(1.298)	(-1.400)
LnGDP	-0.0220***	0.00354	-0.00733	-0.00616***	0.00354	-0.00733
	(-5.978)	(1.189)	(-0.867)	(-3.309)	(1.189)	(-0.867)
GDP_growth_annual	0.000227	0.000107	0.000170	0.000403	0.000107	0.000170
	(0.860)	(0.501)	(0.280)	(1.579)	(0.501)	(0.280)
Inflation	8.93e-05**	5.73e-06	5.06e-05	9.05e-05***	5.73e-06	5.06e-05
	(2.530)	(0.200)	(0.623)	(2.595)	(0.200)	(0.623)
FDI percent of GDP	-0.000116	1.45e-06	-0.000632	0.000182	1.45e-06	-0.000632
	(-0.505)	(0.00782)	(-1.201)	(0.832)	(0.00782)	(-1.201)
Bank credit to the ps_gdp	0.000803**	0.000869***	0.00228***	0.00100***	0.000869***	0.00228***
	(2.324)	(3.102)	(2.866)	(2.948)	(3.102)	(2.866)
Bank assets percent of GDP	0.00109***	-0.000303	-0.000667	0.00140***	-0.000303	-0.000667
	(4.760)	(-1.629)	(-1.263)	(6.221)	(-1.629)	(-1.263)
Constant	0.522***	-0.0450	0.188	0.177***	-0.0450	0.188
	(6.469)	(-0.688)	(1.014)	(4.322)	(-0.688)	(1.014)
Observations	965	965	965	965	965	965
R-squared	0.245	0.090	0.063	0.203	0.090	0.063
Country FE	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	NO	NO	NO

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The exchange rate affects a company's marketing, production, and financial decisions. There are a number of reasons for it. The exchange rate impacts the prices and volume of the imports that a company makes to other countries. The prices of a product are not necessarily standard and in one currency in the world. As exchange rates are critical prices in the financial economics, their level and flexibility have implications for resource sharing and development. Countries may attempt to affect the level of stability of exchange rates and limit their flexibility depending on, many other factors, the choice of monetary policy and the development of the financial markets. Indeed, over the previous years, many developing countries have done this. The real economy is affected by the level of exchange rate flexibility. They are essential in lessening incentives for foreign currency debt, thus reducing currency divergences and deepening the

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development of internal financial markets. But financial market development and exchange rate flexibility is a two-way street since the degree of exchange rate flexibility depends on the financial system's stage of development.

Table 3: Monetary independence (MI) Index and Financial Market development

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FMD Index	FMA Index	FME Index	FMD Index	FMA Index	FME Index
mi Index	0.00150	0.000834	0.0320	0.00420	0.000834	0.0320
	(0.182)	(0.121)	(1.637)	(0.533)	(0.121)	(1.637)
Unemployment rate	-0.00369***	0.000857	-0.00172	-0.00424***	0.000857	-0.00172
	(-5.201)	(1.443)	(-1.017)	(-6.027)	(1.443)	(-1.017)
LnGDP	-0.0252***	0.00333	-0.0115	-0.00753***	0.00333	-0.0115
	(-6.580)	(1.036)	(-1.263)	(-3.908)	(1.036)	(-1.263)
GDP_growth_annual	0.000146	0.000132	8.73e-05	0.000347	0.000132	8.73e-05
	(0.530)	(0.570)	(0.133)	(1.306)	(0.570)	(0.133)
Inflation	0.000100***	1.66e-05	8.14e-05	0.000102***	1.66e-05	8.14e-05
	(2.851)	(0.563)	(0.972)	(2.928)	(0.563)	(0.972)
FDI percent of GDP	-0.000199	3.07e-05	-0.000684	0.000163	3.07e-05	-0.000684
	(-0.845)	(0.156)	(-1.221)	(0.728)	(0.156)	(-1.221)
Bank credit to the ps_gdp	0.000611	0.00127***	0.00291***	0.000882**	0.00127***	0.00291***
	(1.477)	(3.671)	(2.962)	(2.183)	(3.671)	(2.962)
Bank assets percent of GDP	0.00129***	-0.000488**	-0.00102	0.00159***	-0.000488**	-0.00102
	(4.673)	(-2.105)	(-1.549)	(5.795)	(-2.105)	(-1.549)
Constant	0.591***	-0.0497	0.241	0.203***	-0.0497	0.241
	(6.987)	(-0.701)	(1.196)	(4.747)	(-0.701)	(1.196)
Observations	893	893	893	893	893	893
R-squared	0.258	0.099	0.069	0.211	0.099	0.069
Country FE	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	NO	NO	NO

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Spillovers confuse the task of **monetary** policy, but **independent monetary** policy remains feasible for **financially** open emerging economies with relatively flexible exchange rates. Increased financial market globalization has renewed the discussion on monetary policy independence and agendas in open economies. The rising sympathy of domestic credit and asset prices to external influences has keen concerns about central banks 'capability to manage domestic financial conditions. Some even argue that monetary autonomy is largely lost without the imposition of capital controls. Momentary independence under the trilemma has also been interpreted as the complete filling of internal financial conditions from peripheral factors. Even with exchange rates stability and central banks can set interest rates autonomously, the trilemma interruptions down because broader financial conditions are still influenced by external stimuluses. Again, we argue that this is an overly broad interpretation of monetary autonomy under the trilemma. External developments will inevitably impinge on local economic and financial conditions with trade and financial integration. However, from a policy perspective, whether co-movement in outcomes reflects reactions to standard fundamentals and uncertainty about those fundamentals or responses to exogenic changes in risk appetite and preferences has vastly different consequences.

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Table 4: financial openness Index and Financial Markets development

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FMD Index	FMA Index	FME Index	FMD Index	FMA Index	FME Index
ka_open Index	0.000344	0.0363***	-0.0152	-0.00427	0.0363***	-0.0152
	(0.0429)	(5.670)	(-0.844)	(-0.549)	(5.670)	(-0.844)
Unemployment rate	-0.00378***	0.00133**	-0.00308*	-0.00433***	0.00133**	-0.00308*
	(-5.327)	(2.341)	(-1.940)	(-6.195)	(2.341)	(-1.940)
LnGDP	-0.0226***	0.000946	-0.00802	-0.00673***	0.000946	-0.00802
	(-6.088)	(0.319)	(-0.966)	(-3.635)	(0.319)	(-0.966)
GDP_growth_annual	0.000167	4.60e-05	0.000188	0.000332	4.60e-05	0.000188
	(0.633)	(0.219)	(0.319)	(1.305)	(0.219)	(0.319)
Inflation	9.86e-05***	1.58e-05	5.18e-05	0.000101***	1.58e-05	5.18e-05
	(2.815)	(0.563)	(0.660)	(2.907)	(0.563)	(0.660)
FDI percent of GDP	-0.000141	-2.33e-06	-0.000563	0.000159	-2.33e-06	-0.000563
	(-0.612)	(-0.0127)	(-1.093)	(0.724)	(-0.0127)	(-1.093)
Bank credit to the ps_gdp	0.000568	0.000740**	0.00196**	0.000799**	0.000740**	0.00196**
	(1.485)	(2.422)	(2.294)	(2.150)	(2.422)	(2.294)
Bank assets percent of GDP	0.00127***	-0.000455**	-0.000860	0.00157***	-0.000455**	-0.000860
	(4.979)	(-2.237)	(-1.509)	(6.334)	(-2.237)	(-1.509)
Constant	0.531***	-0.00282	0.213	0.185***	-0.00282	0.213
	(6.508)	(-0.0433)	(1.167)	(4.490)	(-0.0433)	(1.167)
Observations	959	959	959	959	959	959
R-squared	0.243	0.117	0.054	0.201	0.117	0.054
Country FE	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	NO	NO	NO

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Financial market openness strengthens the links between the financial markets of industrialized countries and emerging economies. Therefore, the liquidity of a financial market affects asset prices in an emerging economy. Institutional investors believe that high-market liquidity facilitates block trades, thereby reducing transaction costs. For firms in emerging economies, high-market liquidity enables lowering the cost of fundraising and increasing a firm's value. High-market liquidity also attracts further investment, boosting market vitality, accelerating capital use, and promoting capital formation and economic development. Thus, further opening of financial markets in emerging economies can increase investor participation in financial markets and improve the investors' financial market liquidity. However, globalization of the capital market encourages trading assets between markets, banks, firms, and governments. Therefore, capital liquidity could reflect investors' transaction costs in a capital market, subject to investors' transactional behaviors.

Table 5: Interaction of monetary independence and Exchange rate stability

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FMD Index	FMA Index	FME Index	FMD Index	FMA Index	FME Index
mi_index_ers	-0.0137	-0.0157*	0.0105	-0.00483	-0.0157*	0.0105
	(-1.388)	(-1.904)	(0.449)	(-0.519)	(-1.904)	(0.449)

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Unemployment rate	-0.00375***	0.000800	-0.00192	-0.00429***	0.000800	-0.00192
	(-5.297)	(1.352)	(-1.136)	(-6.101)	(1.352)	(-1.136)
LnGDP	-0.0246***	0.00401	-0.0108	-0.00720***	0.00401	-0.0108
	(-6.404)	(1.247)	(-1.174)	(-3.666)	(1.247)	(-1.174)
GDP_growth_annual	0.000180	0.000170	0.000118	0.000370	0.000170	0.000118
	(0.649)	(0.733)	(0.179)	(1.384)	(0.733)	(0.179)
Inflation	9.55e-05***	1.10e-05	8.32e-05	0.000100***	1.10e-05	8.32e-05
	(2.699)	(0.370)	(0.986)	(2.854)	(0.370)	(0.986)
FDI percent of GDP	-0.000197	3.26e-05	-0.000667	0.000164	3.26e-05	-0.000667
	(-0.839)	(0.166)	(-1.189)	(0.730)	(0.166)	(-1.189)
Bank credit to the ps_gdp	0.000617	0.00128***	0.00305***	0.000889**	0.00128***	0.00305***
	(1.498)	(3.701)	(3.105)	(2.200)	(3.701)	(3.105)
Bank assets percent of GDP	0.00126***	-0.000517**	-0.00112*	0.00156***	-0.000517**	-0.00112*
	(4.587)	(-2.243)	(-1.702)	(5.731)	(-2.243)	(-1.702)
Constant	0.583***	-0.0588	0.239	0.199***	-0.0588	0.239
	(6.880)	(-0.830)	(1.181)	(4.609)	(-0.830)	(1.181)
Observations	892	892	892	892	892	892
R-squared	0.259	0.103	0.066	0.211	0.103	0.066
Country FE	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	NO	NO	NO

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Monetary autonomy refers to the independent control of a country's central bank to affect its money supply and conditions in its internal economy and finance. In a floating exchange rate system, a government or central bank is free to control the money supply. For example, it can raise the money supply when it wishes to lower domestic interest rates to spur investment and economic growth. Alternatively, it can reduce the money supply, raise interest rates, and choke off excessive growth and a rising inflation rate to protect the internal market. With monetary independency and control, monetary policy is an available tool the government can use to control the domestic economy's performance. It offers a second level of regulator beyond fiscal policy in the country. In a stable exchange rate system, monetary policy becomes ineffective because the persistence of the exchange rate acts as a constraint. Domestic interest rates will lower when the money supply rises and temporarily make foreign assets more attractive. It would lead domestic investors to raise demand for foreign currency, resulting in a domestic currency depreciation if a floating exchange rate is allowed. Therefore, with a fixed exchange rate in place, the central bank will need to supply extra demand for foreign currency, run a balance of payments deficit and buy up its domestic currency, which may be an opportunity for the local financial market. Monetary policies work differently under a system of fixed exchange rates rather than floating rates. Monetary policy can lose effectiveness to the domestic market, whereas fiscal policy can become effective. In addition, fixed exchange rates offer another policy option, namely, exchange rate policy. Even though a fixed exchange rate should mean the country keeps the rate fixed, sometimes countries periodically change their fixed rate.

Table 6: Interaction of monetary independence (MI) and financial openness

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FMD Index	FMA Index	FME Index	FMD Index	FMA Index	FME Index

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mi_index_ka_open	-0.00332	0.0411***	-0.00789	-0.00428	0.0411***	-0.00789
	(-0.263)	(3.919)	(-0.269)	(-0.343)	(3.919)	(-0.269)
Unemployment rate	-0.00376***	0.00128**	-0.00268	-0.00436***	0.00128**	-0.00268
	(-5.211)	(2.134)	(-1.602)	(-6.101)	(2.134)	(-1.602)
LnGDP	-0.0250***	0.00172	-0.0111	-0.00739***	0.00172	-0.0111
	(-6.463)	(0.534)	(-1.237)	(-3.828)	(0.534)	(-1.237)
GDP_growth_annual	0.000149	8.58e-05	0.000261	0.000350	8.58e-05	0.000261
	(0.538)	(0.372)	(0.405)	(1.308)	(0.372)	(0.405)
Inflation	9.94e-05***	1.72e-05	5.74e-05	0.000102***	1.72e-05	5.74e-05
	(2.792)	(0.582)	(0.694)	(2.892)	(0.582)	(0.694)
FDI percent of GDP	-0.000197	1.10e-05	-0.000656	0.000162	1.10e-05	-0.000656
	(-0.833)	(0.0563)	(-1.198)	(0.717)	(0.0563)	(-1.198)
Bank credit to the ps_gdp	0.000604	0.00111***	0.00211**	0.000882**	0.00111***	0.00211**
	(1.424)	(3.157)	(2.142)	(2.145)	(3.157)	(2.142)
Bank assets percent of GDP	0.00129***	-0.000459**	-0.00107*	0.00157***	-0.000459**	-0.00107*
	(4.642)	(-1.997)	(-1.663)	(5.738)	(-1.997)	(-1.663)
Constant	0.589***	-0.0202	0.279	0.203***	-0.0202	0.279
	(6.884)	(-0.284)	(1.406)	(4.742)	(-0.284)	(1.406)
Observations	886	886	886	886	886	886
R-squared	0.254	0.114	0.058	0.207	0.114	0.058
Country FE	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	NO	NO	NO

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The debate on monetary policy independence in open economies has invariably been framed around the classic Mundell-Fleming trilemma. Mundell-Fleming trilemma states that countries can simultaneously attain no more than two objectives out of the possible combination among capital mobility, a fixed exchange rate, and an independent ability to set interest rates. Monetary policy authorities in emerging markets face the "trilemma" of attempting to achieve monetary independence, exchange rate stability, and financial market integration simultaneously. They may have ceded some control over local monetary policy to benefit from integration. With the international financial system becoming more complex and integrated than ever, doubts have emerged concerning the capacity of central banks to control domestic monetary and financial conditions by running an independent monetary policy. Country specific short-term rate sensitivities to core countries positively correlated to both financial openness and exchange rate stability, thus confirming results from several other studies (Klein and Shambaugh, 2013; Shambaugh, 2004; Obstfeld et al. 2005 and Obstfeld, 2015) and Aizenman et al. (2015)). However, a more volatile exchange rate is associated with more significant interest rate spillovers from core countries, and then monetary policy independence is often identified with the freedom to set policy rates independently of other countries.

Table 7: Interaction of financial openness Index and Exchange rate stability

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FMD Index	FMA Index	FME Index	FMD Index	FMA Index	FME Index
ka_open_ers	-0.00208	0.0395***	0.00270	-0.0181	0.0395***	0.00270

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	(-0.161)	(3.790)	(0.0931)	(-1.450)	(3.790)	(0.0931)
Unemployment rate	-0.00380***	0.000978*	-0.00282*	-0.00436***	0.000978*	-0.00282*
	(-5.402)	(1.723)	(-1.787)	(-6.269)	(1.723)	(-1.787)
LnGDP	-0.0225***	0.00142	-0.00913	-0.00688***	0.00142	-0.00913
	(-6.050)	(0.472)	(-1.094)	(-3.703)	(0.472)	(-1.094)
GDP_growth_annual	0.000168	1.57e-05	0.000183	0.000339	1.57e-05	0.000183
	(0.634)	(0.0735)	(0.308)	(1.330)	(0.0735)	(0.308)
Inflation	9.87e-05***	1.89e-05	5.20e-05	9.96e-05***	1.89e-05	5.20e-05
	(2.811)	(0.669)	(0.661)	(2.874)	(0.669)	(0.661)
FDI percent of GDP	-0.000142	-3.45e-05	-0.000576	0.000160	-3.45e-05	-0.000576
	(-0.614)	(-0.185)	(-1.112)	(0.729)	(-0.185)	(-1.112)
Bank credit to the ps_gdp	0.000566	0.000976***	0.00184**	0.000783**	0.000976***	0.00184**
	(1.498)	(3.200)	(2.167)	(2.118)	(3.200)	(2.167)
Bank assets percent of GDP	0.00127***	-0.000485**	-0.000891	0.00160***	-0.000485**	-0.000891
	(4.972)	(-2.345)	(-1.551)	(6.419)	(-2.345)	(-1.551)
Constant	0.531***	-0.0112	0.234	0.190***	-0.0112	0.234
	(6.478)	(-0.170)	(1.276)	(4.584)	(-0.170)	(1.276)
Observations	956	956	956	956	956	956
R-squared	0.243	0.100	0.053	0.203	0.100	0.053
Country FE	YES	YES	YES	NO	NO	NO
Year FE	YES	YES	YES	NO	NO	NO

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The result shows that trade openness and financial openness do not significantly affect the exchange rate in the long term. Rather than economic openness, policies imposed on the real sector have a greater impact on stabilizing the exchange rate. The study suggests that it is more important for the government to better focus on improving Africa financial market structure and governance to make Africa more appealing for trading and capital mobilization. The high degree of financial openness reduces the negative effect of exchange rate volatility on financial market development. The exchange rate stability regime is easily one of the most disputed aspects of macroeconomic policy. Subsequently, the discussion gravitated toward more flexible arrangements. Although a critical policy question, much of the traditional debate about exchange rate regimes, such as Garber and Svensson (1995) and Obstfeld and Rogoff (1995), has focused on the determinants of regime choice in developed countries, offering little guidance in terms of the implications for economic growth. After all, the empirical literature on exchange rate regimes suggests that the degree of exchange rate flexibility does not matter for growth. While Baxter and Stockman (1989) were among the first to analyze this issue, recent studies like Ghosh, Gulde, and Wolf (2002), Razin and Rubinstein (2004), and Husain, Mody, and Rogoff (2005) draw similar conclusions.

Table 8: Two Stages Least Square

	(1)	(2)	(3)
VARIABLES	IV-2SLS_ FMA	IV-2SLS_ FMA	IV-2SLS_ FD
mi_index_ka_open	0.0372***		
	(2.784)		
Unemployment rate	0.00125**	0.00106*	-0.00418***
	(2.122)	(1.904)	(-7.615)

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LnGDP	0.00233	0.00114	-0.00945***
	(0.740)	(0.383)	(-3.104)
GDP_growth_annual	9.26e-05	7.07e-06	0.000166
	(0.414)	(0.0343)	(0.762)
Inflation	1.35e-05	1.99e-05	2.80e-05
	(0.442)	(0.729)	(0.944)
FDI percent of GDP	3.38e-05	-4.51e-05	-0.000285
	(0.178)	(-0.249)	(-1.566)
Bank credit to the ps_gdp	0.00115***	0.00108***	0.00118***
	(3.341)	(3.454)	(3.667)
Bank assets percent of GDP	-0.000474**	-0.000566***	0.000591***
	(-2.124)	(-2.709)	(2.753)
ka_open_ers		0.0482***	
		(2.946)	
mi_index_ers			-0.0372**
			(-2.213)
Constant	-0.0545	-0.0232	0.396***
	(-0.677)	(-0.306)	(5.155)
Observations	874	951	879
R-squared	0.968	0.968	0.941
Cragg-Donald Wald	105.6	538.03	208.8
Stock-Yogo10%	16.38	16.38	16.38
Country FE	YES	YES	YES
Year FE	YES	YES	YES
Adj R2	0.966	0.965	0.936

z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8 shows the results using two stages least squares. The 2SLS test confirm that the interaction of country financial openness and monitory policy independency affect significantly and positively the financial market development.

6. CONCLUSION

The researchers studied the link between trilemma index and financial markets development in Africa. The analysis is motivated by the observation that many emerging economies have intervened in the foreign exchange markets in the previous decade to contain volatility and possibly to curb appreciation pressures in their currencies. The researchers found strong effect of the interaction of country financial market openness and monitory policy independence on financial market development in Africa. A multitude of different factors influence financial market development, and the credibility of the chosen foreign exchange rate regime plays a non-trivial role. Besides, the relationship between exchange rate flexibility and financial market development may be subject to reverse causality. Overall, the paper suggests that the choices regarding exchange rate flexibility have real financial consequences. We corroborate with the findings of Rodriguez (2017) who showed that the relationships between exchange rates and the real economy are complex. There are many contributing factors such as levels of income, market imperfections and financial development. Our results advance at least two issues warranting further research. The first is to understand the theoretical mechanisms behind the stylized facts uncovered

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in the empirical analysis. For example, does the significant and positive effect of the interaction of financial openness and monitory policy independent on financial market development reflect higher term premia or exchange rate risk premia or both? The second is to extend the empirical analysis to variables other than government bond interest rates (e.g. equity prices, credit growth, etc.) and see how the co-movement of these variables with their foreign counterparts varies with the exchange rate regime and the degree of capital account openness.

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