Effect of Impossible Trinity on Investment in Developing Countries: Evidence from Africa

Yves Claude Nshimiyimana

University of Lay Adventists of Kigali (UNILAK), Kigali, Rwanda
dryvesclaude@gmail.com

Theogene Habimana

Hanken School of Economics; 00101, Helsinki, Finland
theogene.habimana@hanken.fi

A B S T R A C T

We are concerned about which choice among the trilemma index affects investment in developing countries. We use the empirical method to study Africa's trilemma index and investment. Using Ordinary Least Squares and Two Stages Least Squares estimators with a dataset covering 39 African countries over an extended period of 30 years, we indicate the effect of the trilemma index on investment in Africa is still a big challenge to control. The main reason is that most African countries do not have well-developed monetary policy and autonomy and rely on foreign direct investment (FDI). On the other hand, they do not have enough capacity to control exchange rate stability. The endogeneity tests support our findings.

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1. Introduction

The trilemma indexes quantify the degree of achievement along the three dimensions of the trilemma hypothesis which focuses on monetary independence, exchange rate stability, and financial openness(Aizenman et al., 2008). 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(Boughton, 2003). 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 comes with growing exposure to financial instability and the increased risk of sudden stop in capital inflows and capital flight crises (Arefjevs & Bogdanova, 2020; Tran et al., 2021). These crises have been characterized by exchange rate instability triggered by countries' balance sheet exposure to external hard currency debt exposures that propagate 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.

The concerns associated with exposure to financial instability have been addressed by varying configurations of managing public butters, as well as growing application of macro-prudential measures aimed at inducing systemic players to internalize the impact of their balance sheet exposure on a country's financial stability (Caruana & Avdjiev, 2012; Obstfeld et al., 2010). Consequently, the original Trilemma has morphed into a Quadrilemma, wherein financial stability has been added to the Trilemma's original policy goals. Size does matter, and there is no way for smaller countries to insulate themselves fully from exposure to global cycles and shocks(Aizenman, 2019). Yet successful navigation of the open economy Quadrilemma helps in reducing the transmission of external shock to the domestic economy, as well as the costs of domestic shocks. These observations explain the relative resilience of emerging markets especially in countries with more mature institutions as they have been buffered by deeper precautionary management of reserves, and greater fiscal and monetary space.

A small open economy wishing to maintain financial integration can regain its monetary autonomy by giving up the fixed exchange rate. Under a flexible exchange rate regime, expansion of the domestic money supply reduces the interest rate, resulting in capital outflows in search of a higher foreign yield. The incipient excess demand for foreign currency depreciates the exchange rate(Aquilante et al., 2022; Baxter & Stockman, 1989). Hence, in a flexible exchange- rate regime with financial integration, monetary policy is potent. A higher supply of money reduces the interest rate, thereby increasing domestic investment and weakening domestic currency, which in turn expands the economy through increased net exports. Consequently, achieving (Armstrong et al., 2019; Boutros & Witmer, 2020; Hamiani et al., 2020) independence requires the small open economy to give up exchange rate stability.

An alternative way for the small open economy to regain monetary independence is to give up financial integration and opt for exchange rate stability. Giving up financial integration prevents arbitrage between domestic and foreign bonds, thereby delinking the domestic interest rate from the foreign interest rate(Dong et al., 2020; Woodford, 2013). Monetary policy operates in ways similar to the closed economy, where, in the short run, the central bank controls the money supply, and monetary expansion reduces the domestic interest rate. In a string of insightful papers, (Jeffrey A. Frankel & Saravelos, 2010; Obstfeld et al., 2004, 2008, 2009), test key predictions of the Trilemma. Specifically, they evaluate the transmission of interest rate shocks in various regimes, contrasting different regimes that were close to the three Trilemma vertices over time. Overall, the results are in line with the Trilemma prediction. During fixed exchange-rate episodes in the classical gold standard period, a pronounced and rapid transmission of interest rate shocks is found (corresponding to the right vertex of the Trilemma). This is in line with the prediction that the fixed exchange rate coupled with capital mobility nullifies monetary independence. In contrast, during the Bretton Woods era, fixed exchange

rates did not provide much of a constraint on domestic interest rates, a by-product of widespread capital controls (corresponding to the top vertex of the Trilemma triangle) (Chinn & Ito, 2006; Woodford, 2013). In the post-Bretton Woods era, the reversion to a more globalized pattern is manifested through an increased interest-rate transmission among fixed rate countries. The rest part of the paper in organize as follows: Section two focuses on problem statement and the research question. Section three focuses literature review. Section four focuses on expected benefits of the research. Section five focuses on research data and methods. Section six focuses on description and distribution of Data. Section seven focuses on empirical results and discussion, Finally, we conclude in section eight Conclusion.

2. Problem Statement and the Research Question

There has been a concerted debate on the sensitivity of trilemma index to the economic and financial activities. One strand of literature by Aizenman, Chinn, and Ito (2008) indicate that in macroeconomic management, policy makers must face a trade-off of choosing two, not all, of the three policy choices: monetary independence, exchange rate stability, and financial openness. This is the famous hypothesis in international finance called the trilemma or the impossible trinity. History has shown that different international financial systems haven attempted to achieve combinations of two out of the three policy goals (Aizenman, 1987, 2019; Aizenman et al., 2008). They also indicate that monitory policy, exchange and interest rates have to be sensitive to global financial shocks. (Jebeniani & Trabelsi, 2022) reveal that in the context of fixed and intermediate exchange rate regimes, an expansionary monetary policy is an effective tool to stabilize exchange rate fluctuations and mitigate overvaluation in developing countries. (Deng & Fang, 2022) indicate that firms are less responsive in terms of investment to expansionary monetary shocks and the effect of monetary policy on aggregate investment depends on the distribution of debt maturity. Even if there are some studies related to exchange rate, monitory policy and financial openness in Africa, we need more studies which could indicate the best indexes that should be used to promote investment opportunities in Africa. However, more specifically, our interest in this study is to show how trilemma index influences both private and government investment decision.

3. Literature Review

This chapter presents the relevant theoretical and empirical literature on the effect of trilemma index on investment. The first section will explore the theoretical underpinning of the study, the second section will examine the empirical literature of interest to the topic and the last section draws the conclusion from both the theoretical and empirical literature.

3.1 Theories on Investment

The Fisher equation explains that the nominal riskless interest rate (krf) is composed of the real riskless rate of interest (k*) plus expected inflate rate (EI). This equation can mathematically be expressed as: (krf) =k*+EI………………………………………. (1) Equation (1) was developed in terms of the expectations of financial markets participants (Kudryashov & Zakharchenko, 2014; Yokus & Yavuz, 2021). This means that investors determine their required riskless rate of return before they invest their money. This is because; the nominal riskless rate of interest is the base upon which all other rates of return are built on. From the Fisher equation; when inflation is low, the nominal interest also falls. This implies the anticipated rate of return on investment will be high. In addition, the cost of capital would also be low and hence financial cost on new investment will be low. Since foreign investors try to reduce their financial cost in order to maintain price competitiveness, the availability of capital at low lending rates will enable foreign investors not only locate better partners in the host

country with sufficient domestic investment to supplement but also to maximize the return on their investment(Aizenman, 1987). Hence the easy availability of capital at a lower nominal interest rate in the host country would attract investors from foreign countries. Thus, from the Fisher equation, when inflation is low, the nominal interest rate is also low. Therefore, financial cost on foreign direct investment (FDI) is low, and rate of return on investment is high. Therefore, inflation negatively affects foreign direct investment.

(Megasari & Saleh, 2021) defined an exchange rate as the price of one monetary unit stated in terms of another currency rate. These theories are differentiated by the long and short run. In the long run, if two countries produce an identical good, holding all factors that include transportation and legal costs constant, the price of that good should be constant throughout the world no matter which country produces it(Kiat, 2008; Omankhanlen, 2011). This is referred to as the law of one price which is only relevant in the long run.

The Keynesian model is based on Aggregate Demand (AD) and Aggregate supply (AS) analysis. The main feature of this theory is that, in the short run, the AS curve slopes upwardly instead of being vertical (Annicchiarico & di Dio, 2015). When the AS curve is vertical, shocks to the demand side of the economy affects only prices. However, (da Silva, 2001; Ojapinwa & Nwokoma, 2018) hint that due to this upward sloping nature of the AS curve, and changes in demand can result in changes in prices and output. As a result of the short-run dynamic equilibria of the AD and AS curves, there is the formation of an adjustment path which initially exhibits a positive relationship between inflation and growth, but later turns negative towards the latter part of the adjustment path (Annicchiarico & di Dio, 2015; Calvert Jump et al., 2019; Clerc, 2021; Kiley, 2016). Under this model, there is a short-run trade-off between output and the change in inflation, but no permanent trade-off between output and inflation. For inflation to be held steady at any level, output must equal the natural rate. Any level of inflation is sustainable; however, for inflation to fall there must be a period when output is below the natural rate.

Neo-classical Theory consists of several other models that attempt to explain the investment and economic growth of countries(Connor, 1973; Desai & Potter, 2021). However, the dynamic relationship between trilemma index and investment can be deduced. The model exhibited diminishing returns to labour and capital separately and constant returns to both factors jointly. According to Mundell's model, an increase in inflation or inflation expectations immediately reduces people's and corporate wealth(Bar-Eli et al., 2020; Eisner & Nadiri, 1968; Kashyap Heena, 2015; Keane, 2019; North, 1993; Waldén et al., 1961).

3.2 Empirical Studies

International financial trilemma is a challenge of balancing the governmental policies ensuring healthy financial sector for facilitating economic development of a country. (Arefjevs & Bogdanova, 2020) developed a model of the international financial trilemma, defining the three key pillars of the international financial trilemma, and the corresponding relevant metrics of economy, they propose determining the Financial trilemma index basing it on the following pillars: financial stability, financial inclusion and transparency. The authors analyse FinTech services as disruptive element affecting the International Financial trilemma index. As statistical basis of the financial trilemma and its building blocks the set of data from publicly available databases, such as the Global Competitiveness index, the Financial Development index, Global Findex and Doing Business is determined.

(Aizenman & Ito, 2014) investigate the potential impacts of the degree of divergence in open

macroeconomic policies in the context of the trilemma hypothesis. Using an index that measures the

extent of policy divergence among the three trilemma policy choices: monetary independence, exchange rate stability, and financial openness, they find that emerging market economies have adopted trilemma policy combinations with the smallest degree of policy divergence. They then investigate whether and to what extent the degree of open macro policy convergence affects the probability of a crisis and find that a developing or emerging market economy with a higher degree of policy divergence is more likely to experience a currency or debt crisis. They also compare the development of trilemma policies around the crisis period for the groups of Latin American crisis countries in the 1980s and the Asian crisis countries in the 1990s. They find that Latin American crisis countries tended to close their capital accounts in the aftermath of a crisis, while that is not the case for the Asian crisis countries. The Asian crisis countries tended to reduce the degree of policy divergence in the aftermath of the crisis, which possibly meant they decided to adopt open macro policies that made their economies less prone to a crisis.

(Aizenman et al., 2011) examine how policy configurations affect macroeconomic performances, with focus on the Asian economies. They find that the three policy choices matter for output volatility and the medium-term level of inflation. Greater monetary independence is associated with lower output volatility while greater exchange rate stability implies greater output volatility, which can be mitigated if a country holds international reserves (IR) at a level higher than a threshold (about 20% of GDP). Greater monetary autonomy is associated with a higher level of inflation while greater exchange rate stability and greater financial openness could lower the inflation rate. They find that trilemma policy configurations affect output volatility through the investment or trade channel depending on the openness of the economies. They indicate that policy makers in a more open economy would prefer pursuing greater exchange rate stability while holding a massive amount of international reserves. Asian emerging market economies are found to be equipped with macroeconomic policy configurations that help the economies to dampen the volatility of the real exchange rate.

4. Expected Benefits of the Research

This research analysis provides a significant contribution to policy making regarding monetary policy, financial openness and exchange rate stability and their economic and financial effect on financial institution and markets development. In this study, we expect that the effective management of trilemma index may have a positive effect on both private and public investment, and this may lead to the efficiency and effective management of external debt interest payment and debt services. This argument has not been previously studied deeply from both developing countries. As we have an interesting topic, and this is the first one using all trilemma indexes data, we expect that our research will have a notable contribution to the academic literature and can be of use to policy makers globally but more especially in the Sub Sahara African context. The government which is interested in the investment and a balance in the country economic growth and welfare will be able to ascertain whether policies are being undertaken to promote FDI. It will isolate the country specific factors that explain the variability investment. The current study is useful in the determination of the exchange rates to achieve a balance of domestic and foreign levels of investment in a bid to attract FDI and Stimulate growth. It will be useful for key players of the foreign exchange market as the relationship between trilemma index and FDI will determine the level of trading at any given time. Finally, this study will fill the obvious research gap that already exists in the literature. It will also serve as a point of departure for further research in addition to providing information to future researchers who may be interested in studying the trilemma index and investment.

5. Research data and methods

We collect data from 39 African countries. The main sources of our data are trilemma dataset[1] ,IMF and World Bank The World Economic Outlook (WEO) is also a key to the country specific variables. The dependent variable is the trilemma indexes that quantify the degree of achievement along the three dimensions of the trilemma hypothesis: monetary independence, exchange rate stability, and financial openness. These indexes are first introduced by (Aizenman, Chinn, and Ito,2008). The policy Trilemma refers to the trade-offs a government faces when deciding international monetary policy. The impossible trinity (also known as the Trilemma) 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); and 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. This implies that 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 a country wishes to keep her exchange rate fixed but it wished to cut interest rates to boost growth then in this case, there is downward pressure on the currency. Investors wish to sell this country's currency and buy dollars. However, if the country prevents the investors 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 (2006, 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; Aizenman, Chinn, and Ito, 2017).

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[1] The Trilemma Indexes (pdx.edu)

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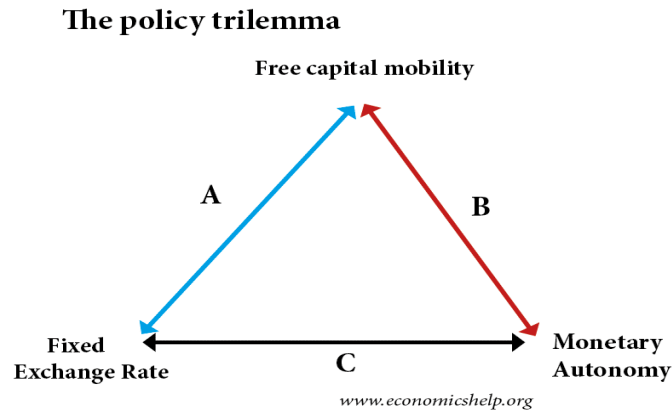
This simple diagram suggests that a government must choose either: A = Fixed exchange rate + free capital mobility; B = Free capital mobility + monetary autonomy; C = Fixed Exchange rate + monetary autonomy.

Figur 1:Trilemma index globally
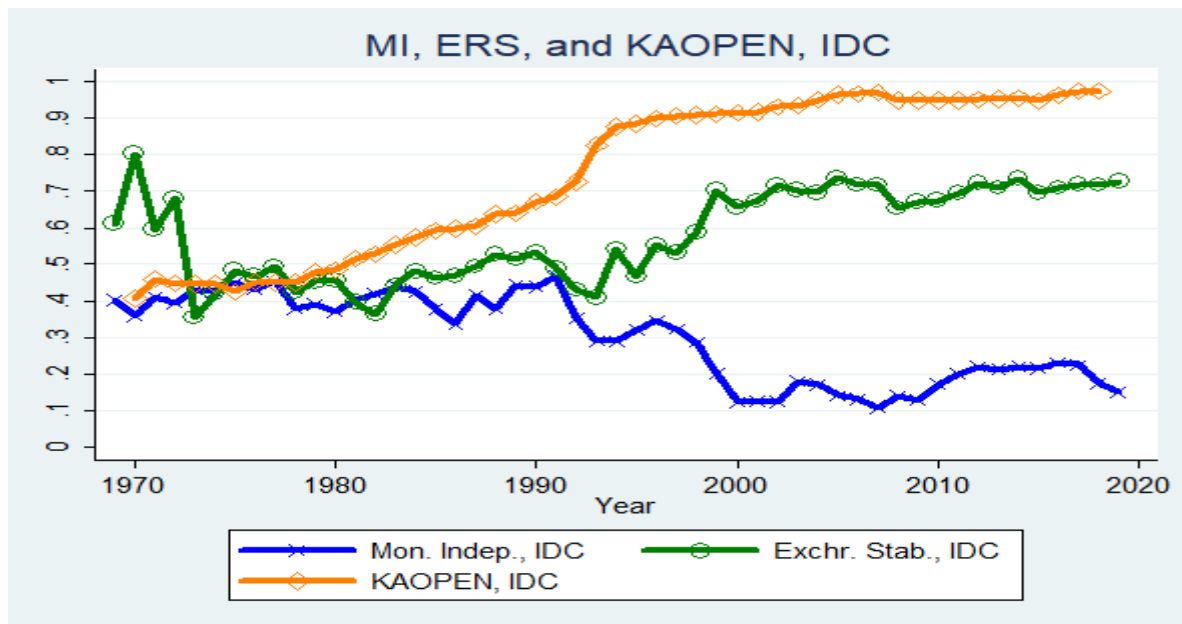
Source: The Trilemma Indexes (pdx.edu), (Aizenman, 2019)

The independent variables are foreign direct investment, private investment, and public investment. We employ both Ordinary Least Square (OLS) and Two Stages Least Squares(2SLS) estimators country-year panel data set of 39 African countries over the period 1990–2019. The OLS model is given below:

$$Foreign\ Direct\ Investment = \alpha + \beta Trilemma\ index + \theta Y_{i,t} + u_{it} + Country\ FE + Year\ FE\ (1)$$

$$Public\ Investment = \alpha + \beta Trilemma\ index + \theta Y_{i,t} + u_{it} + Country\ FE + Year\ FE\ (2)$$

$$Private\ Investment = \alpha + \beta Trilemma\ index + \theta Y_{i,t} + u_{it} + Country\ FE + Year\ FE\ (3)$$

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.

6. Description and Distribution of Data

In this section we present data using tables and figures. We indicate and explain the main variables that we used in this paper. We also describe the main variables by countries.
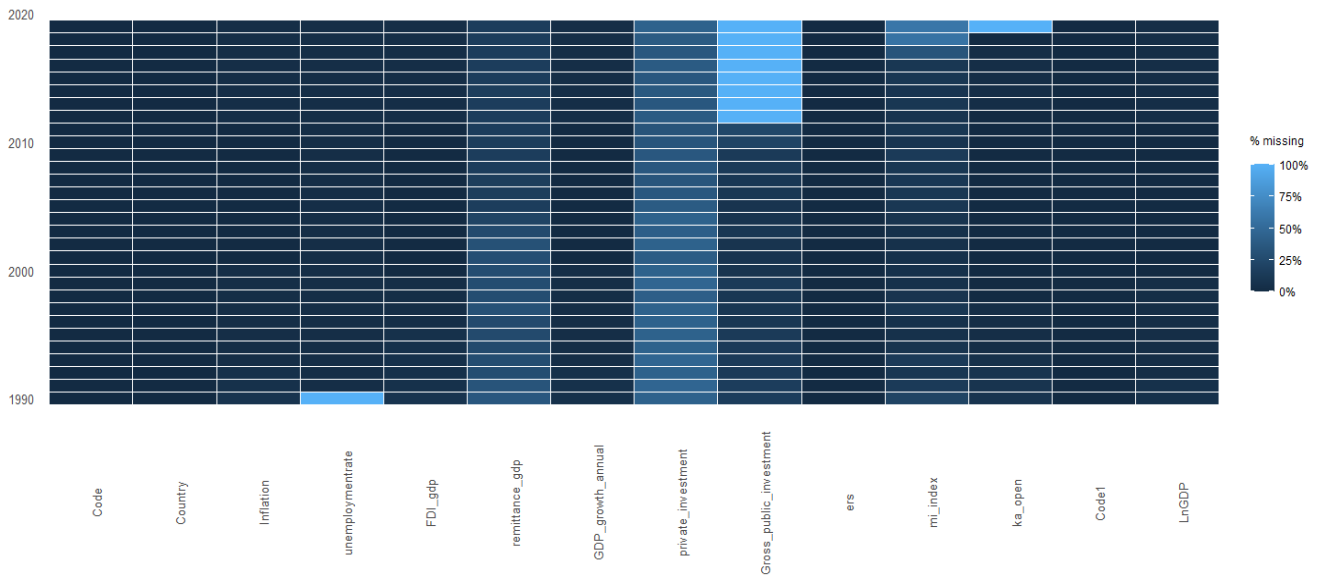
Figure 2: The main Variables and data distribution

Figure 3:Exchange Rate Stabilty by Countries
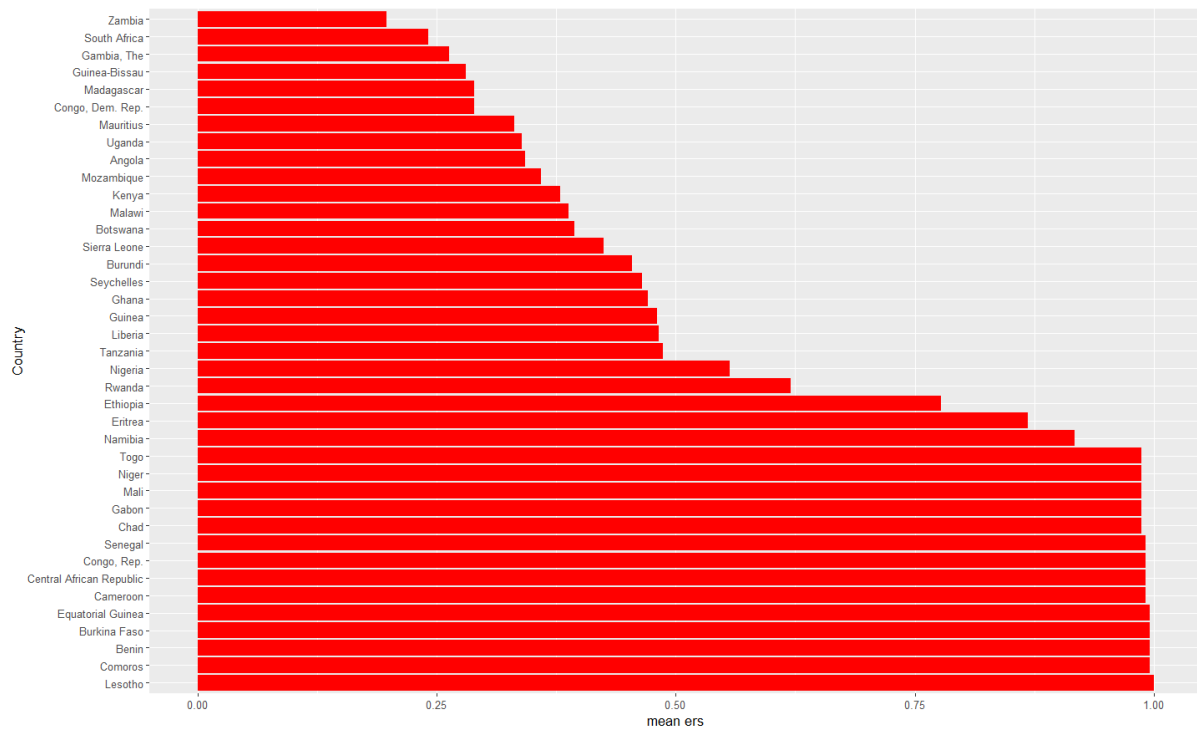
Figure 4: Monitory Policy Independence by Country
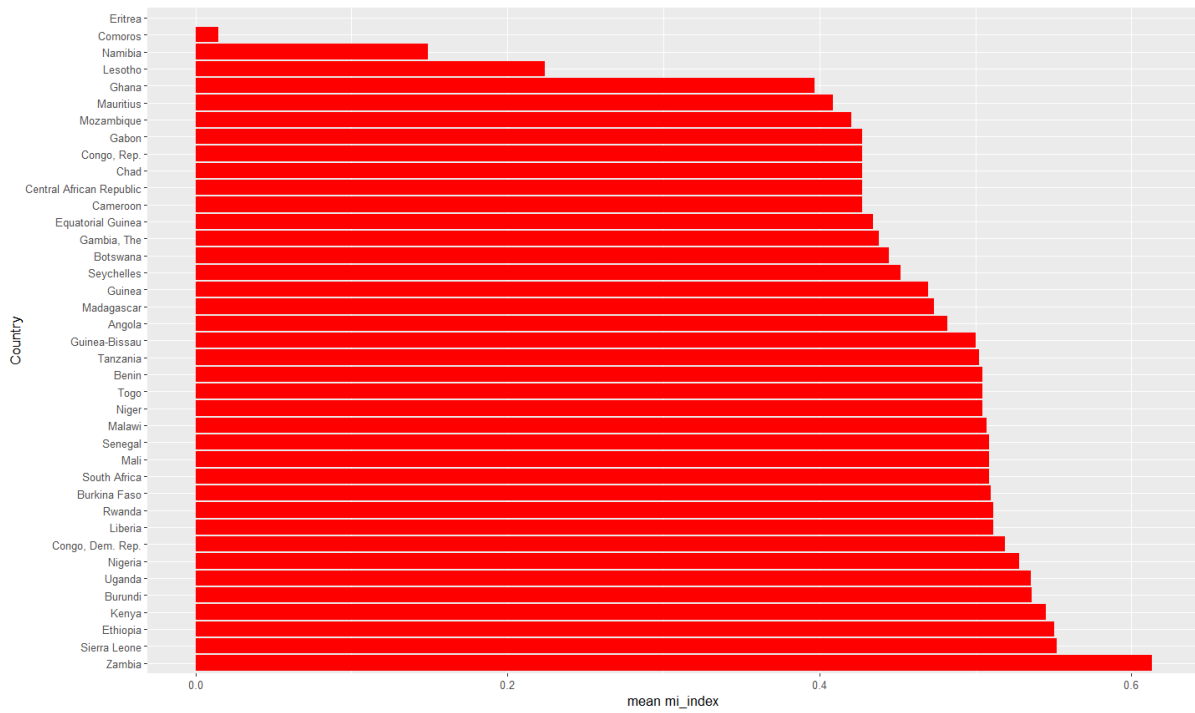
Figure 5: Country Financial Openness by Country
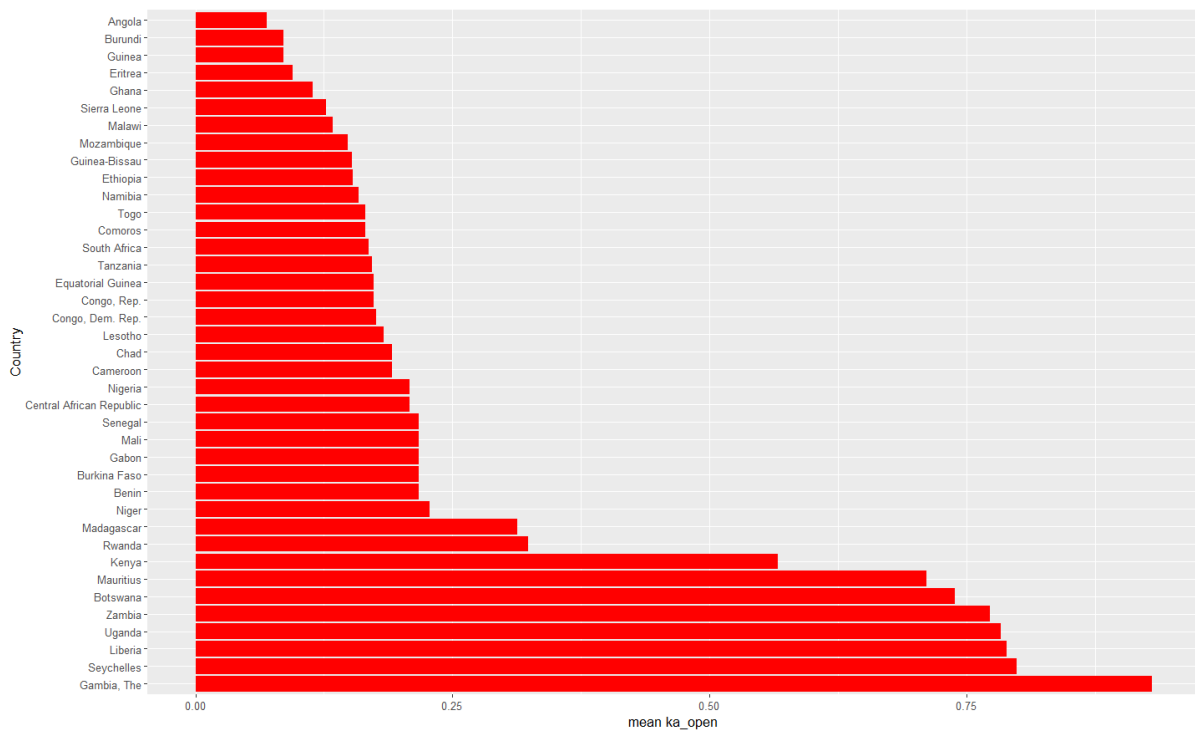
Table 1: List of countries' codes and years

Code	min	max
AGO	1990	2019
BDI	1990	2019
BEN	1990	2019
BFA	1990	2019
BWA	1990	2019
CAF	1990	2019
CMR	1990	2019
COD	1990	2019
COG	1990	2019
COM	1990	2019
ERI	1990	2019
ETH	1990	2019
GAB	1990	2019
GHA	1990	2019
GIN	1990	2019
GMB	1990	2019
GNB	1990	2019
GNQ	1990	2019
KEN	1990	2019
LBR	1990	2019
LSO	1990	2019
MDG	1990	2019
MLI	1990	2019
MOZ	1990	2019
MUS	1990	2019
MWI	1990	2019
NAM	1990	2019
NER	1990	2019
NGA	1990	2019
RWA	1990	2019
SEN	1990	2019
SLE	1990	2019
SYC	1990	2019
TCD	1990	2019
TGO	1990	2019
TZA	1990	2019
UGA	1990	2019
ZAF	1990	2019
ZMB	1990	2019

Table 2: Summary 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

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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
remittance_gdp	3.68108	7.54540	0.29000	1.27000	3.36000	0	53.8300	1,011
gvtspend_gdp	14.8659	6.67599	10.5100	14.0850	17.7400	2.05000	39.6300	1,102
GDP_growth_annual	4.08236	4.74975	1.92121	4.22793	6.33369	-10.7934	20.7158	1,252
Tax_revenue_GDP	16.7240	7.41635	11.1276	14.9486	22.4202	5.68812	35.9075	511
Gross_nat_expend_gdp	108.825	16.8165	101.402	108.325	115.370	67.0096	174.421	1,110
private_investment	14.9650	6.86809	9.87621	14.3884	18.7282	2.01625	39.9840	765
Gross_capital_formation	21.2090	9.53404	15.1566	20.4861	26.1430	0	52.1218	1,133
Gross_public_investment	7.55630	4.35935	4.49472	6.75884	9.73434	0.75992	26.1894	777
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
LnGDP	22.4150	1.50164	21.3051	22.4002	23.2871	19.2642	26.6321	1,255

7. Empirical Results and Discussion

This section focuses on the empirical results and discussion. We present our regression analysis results in tables. We also report in this section the endogeneity tests using Two Stages Least squares.

Table 3: The effect of Exchange Rate stability on investment

	(1)	(2)	(3)
VARIABLES	FDI percent of GDP	private_investment	Gross_public_investment
Exchange Rate Stability	-0.453	3.097**	-1.692**
	(-0.499)	(2.157)	(-2.220)
Unemployment rate	-0.335***	-0.209*	-0.0524
	(-3.411)	(-1.752)	(-0.608)
LnGDP	-0.168	0.510	-1.532**
	(-0.225)	(0.435)	(-2.248)
GDP_growth_annual	0.00400	-0.00143	0.114***
	(0.0972)	(-0.0265)	(3.847)
Inflation	0.000455	-0.0226	0.000868
	(0.0562)	(-1.219)	(0.162)
Remittances as percent of GDP	0.122**	-0.121	0.214***
	(2.484)	(-1.146)	(4.545)
Constant	2.081	1.894	47.06***
	(0.116)	(0.0669)	(2.890)
Observations	854	546	557
R-squared	0.463	0.613	0.651
Country FE	YES	YES	YES
Year FE	YES	YES	YES

t-statistics in parentheses

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

Exchange rate movements do affect FDI values because they not only greatly affect the amount of cash inflows received from investments but also affect the amount of cash outflows required to pay to continue operating these investments. Currencies appreciate and depreciate according to prevailing market conditions(Zhang, 2022). These movements of exchange rate affect inflation and interest rates which may greatly hamper developing countries economic growth and also lead to reduced FDI levels. Developing countries economic difficulties do not originate in their perceived isolation from developed countries but rather from the way they are enjoined to the international system. (Husain et al., 2005) contends that an economic policy that provides a favorable economic environment is always desirable. Inflation which is referred to a general increase in price levels hinders FDI especially when the general price level is high (high inflation) but when general prices are stable (low inflation) then FDI becomes attractive. Low inflation leads to low nominal interest rate and low cost of capital.

Table 4: The effect on monitory policy on investment

VARIABLES	(1) FDI percent of GDP	(2) private_investment	(3) Gross_public_investment
Monitory policy independency	2.387**	-0.258	1.578*
	(2.078)	(-0.168)	(1.735)
Unemployment rate	-0.253**	-0.293**	-0.00388
	(-2.452)	(-2.396)	(-0.0459)
LnGDP	-0.582	0.188	-1.459**
	(-0.710)	(0.160)	(-2.142)
GDP_growth_annual	0.00444	0.00229	0.0900***
	(0.102)	(0.0426)	(2.975)
Inflation	0.00573	-0.0224	0.00146
	(0.696)	(-1.247)	(0.280)
Remittances as percent of GDP	0.147***	-0.127	0.195***
	(2.860)	(-1.178)	(4.190)
Constant	9.736	11.15	43.89***
	(0.493)	(0.392)	(2.694)
Observations	768	502	516
R-squared	0.494	0.633	0.631
Country FE	YES	YES	YES
Year FE	YES	YES	YES

t-statistics in parentheses

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

Monetary policy affects firms' investment through both an interest rate channel and a balance sheet channel. First, through the interest rate channel, monetary policy can affect firms' demand for capital as an input into the production process. This is because interest rates affect decisions on saving or investing and can boost aggregate demand. Second, through the balance sheet channel, monetary policy can make it less expensive for firms to borrow externally and reduce the firm specific user cost of capital, allowing them to invest more. The 'external finance premium' is the difference between the cost of borrowing funds externally and generating them internally(Francis et al., 2011; Mundell, 1963). Lower interest rates can reduce this premium because they increase asset values, increasing the value of firms' balance sheets and thus their net worth. Monetary policy affects firms differently. Not all

spending is equally sensitive to interest rates. Therefore, the fluctuations in demand generated by monetary policy will vary across firms. Spending on durable goods, such as cars or household furniture, is often financed by credit and provides a stream of services over time; such spending is therefore more sensitive to the interest rate rather monitory policy(Francis et al., 2011; Razin et al., 2004). There is ample evidence that the output of industries that produce durable goods reacts more to monetary policy shocks.

Table 5: The effect of country financial openness policy on investment

VARIABLES	(1) FDI percent of GDP	(2) private_investment	(3) Gross_public_investment
Country Financial Openness	-0.927	-2.650	-3.328***
	(-0.751)	(-1.518)	(-3.618)
Unemployment rate	-0.339***	-0.221*	-0.0940
	(-3.410)	(-1.841)	(-1.074)
LnGDP	-0.0942	0.667	-1.682**
	(-0.126)	(0.572)	(-2.495)
GDP_growth_annual	0.00242	0.00557	0.110***
	(0.0582)	(0.103)	(3.717)
Inflation	0.00138	-0.0345*	0.00255
	(0.172)	(-1.867)	(0.483)
Remittances as percent of GDP	0.124**	-0.127	0.224***
	(2.498)	(-1.196)	(4.768)
Constant	0.0327	0.273	50.15***
	(0.00182)	(0.00963)	(3.103)
Observations	844	541	552
R-squared	0.465	0.613	0.644
Country FE	YES	YES	YES
Year FE	YES	YES	YES

t-statistics in parentheses

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

FDI is a major component of capital flow for developing countries with its contribution towards economic growth is widely contested although most researchers concur that the benefits far much outweigh its cost on the economy. (Megasari & Saleh, 2021) observes that FDI incorporates a package of potential growth enhancing attributes like technology and access to International Market. FDI is a component of international capital flows, and it is the largest single source of external finance for developing countries as it is widely believed that economic growth depends critically on both domestic and foreign investments, equally the rate of inflow of foreign investment depends on the rate of economic growth.

Table 6: TWO STAGES LEAST SQUARES: Exchange rate Stability

VARIABLES	(1) IV-2SLS	(2) IV-2SLS	(3) IV-2SLS
Exchange Rate Stability	-1.276*	4.410***	-1.393**

	(-1.772)	(4.842)	(-2.251)
Unemployment rate	0.00330	0.0656*	0.00567
	(0.118)	(1.674)	(0.230)
LnGDP	-0.113	1.709***	-0.347**
	(-0.806)	(8.308)	(-2.344)
GDP_growth_annual	0.190***	-0.0135	0.135***
	(3.997)	(-0.207)	(3.571)
Inflation	-0.0190**	-0.0408*	0.0131*
	(-1.968)	(-1.737)	(1.846)
Remittances as percent of GDP	0.0421	-0.227***	0.105***
	(1.422)	(-2.877)	(4.365)
Constant	5.876*	-25.98***	15.21***
	(1.802)	(-5.556)	(4.549)
Observations	826	529	532
R-squared	0.028	0.238	0.108
Cragg-Donald Wald	208.8	208.8	208.8
Stock-Yogo10%	16.38	16.38	16.38
Control variables	YES	YES	YES
Country FE	YES	YES	YES
Year FE	YES	YES	YES
Adj R2	0.0212	0.229	0.0979

z-statistics in parentheses

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

A weak domestic currency can push up the inflation rate in a nation that is a big importer, because of higher prices for foreign products. This may induce the Central Bank to raise interest rates to counter inflation, as well as to support the currency and prevent it from plunging sharply. Conversely, a strong currency depresses inflation and exerts a drag on the economy that is tantamount to tight monetary policy*(Baxter & Stockman, 1989; da Silva, 2001)*. In response, a nation's Central Bank may move to keep interest rates low or reduce them further so as to preclude the domestic currency from getting too strong. The exchange rate thus has an indirect impact on the interest rate you pay on your mortgage or car loan, or the interest you receive on the money in your savings or money market account. A weak domestic currency spurs economic growth by boosting exports and making imports more expensive (forcing consumers to buy domestic goods). Faster economic growth usually translates into better employment prospects. A strong domestic currency can have the opposite effect, as it slows economic growth and curtails employment prospects. Exchange rate fluctuations can have a substantial impact on your investment portfolio, even if you only hold domestic investments. For example, the strong dollar generally dampens global demand for commodities as they are priced in dollars *(Atish, 2003; Jebeniani & Trabelsi, 2022).* This low demand can affect earnings and valuations for domestic commodity producers, although part of the negative impact would be mitigated by the weaker local currency. A strong currency can also have an effect on sales and profits earned overseas, in recent years. Of course, the effect of exchange rates on portfolio returns is well known. Investing in securities that are denominated in an appreciating currency can boost total returns, while investing in securities denominated in a depreciating currency can trim total returns.

Table 7: TWO STAGES LEAST SQUARES: Monetary Policy

	(1)	(2)	(3)
VARIABLES	IV-2SLS	IV-2SLS	IV-2SLS
Monitory Policy Independency	3.755**	1.799	3.858***
	(2.161)	(0.788)	(2.577)
Unemployment rate	-0.258**	-0.275**	0.00696
	(-2.567)	(-2.379)	(0.0843)
LnGDP	-0.418	0.252	-1.491**
	(-0.528)	(0.231)	(-2.243)
GDP_growth_annual	-0.0173	-0.0185	0.0790***
	(-0.406)	(-0.376)	(2.702)
Inflation	0.00382	-0.0292	-0.00239
	(0.291)	(-1.601)	(-0.278)
Remittances as percent of GDP	0.153***	-0.146	0.173***
	(3.107)	(-1.465)	(3.850)
Constant	8.208	12.64	46.79***
	(0.406)	(0.454)	(2.809)
Observations	737	483	489
R-squared	0.509	0.661	0.620
Cragg-Donald Wald	208.8	208.8	208.8
Stock-Yogo10%	16.38	16.38	16.38
Control variables	YES	YES	YES
Country FE	YES	YES	YES
Year FE	YES	YES	YES
Adj R2	0.460	0.615	0.568

z-statistics in parentheses

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

If the effect of monetary policy on the demand for durable goods is relatively strong, it follows that the investment demand of the firms producing these goods should also react more strongly to monetary policy shocks. Another reason why the impact on firms' investment varies is the size of the external finance premium they face. Firms with less access to finance should face both higher and more volatile external finance premia. Unfortunately, we cannot measure firms' external finance premia. However, a good proxy for access to finance is the age of the firm. Younger firms generally have less access to credit, are smaller, and have lower earnings. Recent evidence for the US and the UK has already shown that younger firms react more strongly to monetary policy shocks (Hamiani et al., 2020; Mishkin, 2009; Zhang, 2022) Monetary policy refers to the strategies used by a country's central bank regarding the amount of money circulating in the economy and its value. The main objective of monetary policy is long-term economic growth, but the central bank can set different targets for this purpose. Therefore, the Federal Reserve's monetary policy objective is to promote employment, stable prices and moderate long-term interest rates.

Table 8: TWO STAGES LEAST SQUARES: Country Financial Openness

VARIABLES	(1) IV-2SLS	(2) IV-2SLS	(3) IV-2SLS
Country Financial openness	-1.751	-0.584	-4.194***
	(-1.204)	(-0.293)	(-3.837)
Unemployment rate	-0.347***	-0.198*	-0.131
	(-3.533)	(-1.727)	(-1.571)
LnGDP	-0.122	0.976	-1.497**
	(-0.163)	(0.877)	(-2.327)
GDP_growth_annual	0.00617	0.00566	0.0866***
	(0.149)	(0.110)	(3.049)
Inflation	0.00239	-0.0398**	0.000927
	(0.296)	(-2.059)	(0.184)
Remittances as percent of GDP	0.133***	-0.119	0.223***
	(2.704)	(-1.181)	(5.020)
Constant	3.817	-4.757	50.12***
	(0.199)	(-0.167)	(3.087)
Observations	814	522	526
R-squared	0.466	0.616	0.632
Cragg-Donald Wald	208.8	208.8	208.8
Stock-Yogo10%	16.38	16.38	16.38
Control variables	YES	YES	YES
Country FE	YES	YES	YES
Year FE	YES	YES	YES
Adj R2	0.417	0.567	0.585

z-statistics in parentheses

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

The stronger the openness effect, the lower the optimal investment borrowing tax; and if this effect dominates, the optimal policy is in the form of an investment subsidy (Aizenman, 1987; Caglayan & Demir, 2014; Fagiolo et al., 2020; Manova, 2008; Yu & Qayyum, 2021).. However, financial factors are critical for improving enterprises' export performance and innovation because financial openness can alleviate the financial constraints of companies through international capital inflow to stimulate firm innovation. Nevertheless, with the increase of cross-border capital flow globally, country financial openness is not promising to attract more international direct investment in our sample.

8. Conclusion

We indicate that trilemma index control is still a huge challenge on African continent investors. With some of the fastest-growing economies in the world, African nations are playing an increasingly significant role in the global economy. The population is young and rapidly growing, and household incomes and consumption are projected to rise. Digital and mobile access is rapidly increasing, the infrastructure gap is closing, and Africa is primed for mass industrialization. Further, all governments have taken unprecedented steps to support investors. And with business environment reforms being made across the continent, the prospect of investing across Africa's numerous and diverse countries is much different than it was in decades past. Despite the wealth of opportunities, doing business in Africa

continues to be associated with real and perceived risks. Institutional and economic barriers, risk and reward imbalances, and high transaction costs can make it difficult for investors to find opportunities and close deals. However, understanding the conditions of trilemma index or impossible trinity may increase the efficacy of macro-prudential and capital control policies, their impact on the investment cycle, on patterns of capital flows, while the demand for international reserves remains a challenge for main countries, as more experience is needed in managing these policies.

9. References

1. Aizenman, J. (1987). Investment, Openness, and Country Risk. *NBER working paper series*. https://doi.org/10.3386/W2410

2. Aizenman, J. (2019). International Reserves, Exchange Rates, and Monetary Policy: From the Trilemma to the Quadrilemma. In *Oxford Research Encyclopedia of Economics and Finance*. https://doi.org/10.1093/acrefore/9780190625979.013.313

3. Aizenman, J., Chinn, M. D., & Ito, H. (2008). *Assessing the Emerging Global Financial Architecture: Measuring the Trilemma's Configurations over Time*.

4. Aizenman, J., Chinn, M. D., & Ito, H. (2011). Surfing the waves of globalization: Asia and financial globalization in the context of the trilemma. *Journal of the Japanese and International Economies*, *25*(3). https://doi.org/10.1016/j.jjie.2011.06.003

5. Aizenman, J., & Ito, H. (2014). The more divergent, the better? Lessons on trilemma policies and crises for Asia. *Asian Development Review*, *31*(2). https://doi.org/10.1162/ADEV_a_00030

6. Annicchiarico, B., & di Dio, F. (2015). Environmental policy and macroeconomic dynamics in a new Keynesian model. *Journal of Environmental Economics and Management*, *69*(1). https://doi.org/10.1016/j.jeem.2014.10.002

7. Aquilante, T., di Pace, F., & Masolo, R. M. (2022). Exchange-rate and news: Evidence from the COVID pandemic. *Economics Letters*, *213*. https://doi.org/10.1016/j.econlet.2022.110390

8. Arefjevs, I., & Bogdanova, O. (2020). International Finance Trilemma as a Tool for Balanced Development of an Economy. *European Integration Studies*, *1*(14). https://doi.org/10.5755/j01.eis.1.14.26318

9. Armstrong, C. S., Glaeser, S., & Kepler, J. D. (2019). Accounting quality and the transmission of monetary policy. *Journal of Accounting and Economics*, *68*(2–3). https://doi.org/10.1016/j.jacceco.2019.101265

10. Atish, G. (2003). Exchange rate regimes: choices and consequences. *Choice Reviews Online*, *40*(11). https://doi.org/10.5860/choice.40-6524

11. Bar-Eli, M., Krumer, A., & Morgulev, E. (2020). Ask not what economics can do for sports - Ask what sports can do for economics. In *Journal of Behavioral and Experimental Economics* (Vol. 89). https://doi.org/10.1016/j.socec.2020.101597

12. Baxter, M., & Stockman, A. C. (1989). Business cycles and the exchange-rate regime. Some international evidence. *Journal of Monetary Economics*, *23*(3). https://doi.org/10.1016/0304-3932(89)90039-1

13. Boughton, J. M. (2003). On the origins of the Fleming-Mundell model. *IMF Staff Papers*, *50*(1). https://doi.org/10.5089/9781451852998.001

INTERNATIONAL JOURNAL ON ECONOMICS, FINANCE AND SUSTAINABLE DEVELOPMENT ISSN (electronic): 2620-6269/ ISSN (printed): 2615-4021

Vol. 4 No. 9 | September 2022 125

14. Boutros, M., & Witmer, J. (2020). Monetary Policy Implementation in a Negative Rate Environment. *Journal of Money, Credit and Banking*, *52*(2–3). https://doi.org/10.1111/jmcb.12605

15. Caglayan, M., & Demir, F. (2014). Firm Productivity, Exchange Rate Movements, Sources of Finance, and Export Orientation. *World Development*, *54*. https://doi.org/10.1016/j.worlddev.2013.08.012

16. Calvert Jump, R., Hommes, C., & Levine, P. (2019). Learning, heterogeneity, and complexity in the New Keynesian model. *Journal of Economic Behavior and Organization*, *166*. https://doi.org/10.1016/j.jebo.2019.07.014

17. Caruana, J., & Avdjiev, S. (2012). Sovereign creditworthiness and financial stability:an international perspective. *Financial Stability Review*, *16*. https://doi.org/10.1016/j.jclepro.2018.07.330

18. Chinn, M. D., & Ito, H. (2006). What matters for financial development? Capital controls, institutions, and interactions. *Journal of Development Economics*, *81*(1). https://doi.org/10.1016/j.jdeveco.2005.05.010

19. Clerc, P. (2021). The Dynamics of Unemployment and Inflation in New Keynesian Models with Two Labor Margins. *Journal of Money, Credit and Banking*, *53*(2–3). https://doi.org/10.1111/jmcb.12768

20. Connor, J. W. (1973). The neo-classical transport theory of a plasma with multiple ion species. *Plasma Physics*, *15*(8). https://doi.org/10.1088/0032-1028/15/8/003

21. da Silva, S. (2001). Chaotic exchange rate dynamics redux. *Open Economies Review*, *12*(3). https://doi.org/10.1023/A:1011181423098

22. Deng, M., & Fang, M. (2022). Debt maturity heterogeneity and investment responses to monetary policy. *European Economic Review*, *144*, 104095. https://doi.org/10.1016/J.EUROECOREV.2022.104095

23. Desai, V., & Potter, R. B. (2021). 5 New institutional economics and development. In *The Companion to Development Studies*. https://doi.org/10.4324/9780203773420-10

24. Dong, F., Miao, J., & Wang, P. (2020). Asset bubbles and monetary policy. *Review of Economic Dynamics*, *37*. https://doi.org/10.1016/j.red.2020.06.003

25. Eisner, R., & Nadiri, M. I. (1968). Investment Behavior and Neo-Classical Theory. *The Review of Economics and Statistics*, *50*(3). https://doi.org/10.2307/1937931

26. Fagiolo, G., Giachini, D., & Roventini, A. (2020). Innovation, finance, and economic growth: an agent-based approach. *Journal of Economic Interaction and Coordination*, *15*(3). https://doi.org/10.1007/s11403-019-00258-1

27. Francis, B. B., Hunter, D. M., & Kelly, P. J. (2011). Financial Market Openness and Monetary Policy Independence: Does the Impact of Monetary Policy Differ between Investable and Non-Investable Firms? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1362328

28. Hamiani, K. M., Buessings-Loercks, M., & Fleuriet, V. (2020). Monetary Policy Under an Exchange Rate Anchor. *IMF Working Papers*, *20*(180). https://doi.org/10.5089/9781513556383.001

29. Husain, A. M., Mody, A., & Rogoff, K. S. (2005). Exchange rate regime durability and performance in developing versus advanced economies. *Journal of Monetary Economics*, *52*(1). https://doi.org/10.1016/j.jmoneco.2004.07.001

30. Jebeniani, J., & Trabelsi, J. (2022). Effects of the business cycle on real exchange rate misalignments with respect to exchange rate regimes. *International Economics*, *170*, 92–102. https://doi.org/10.1016/J.INTECO.2022.02.009

31. Jeffrey A. Frankel, & Saravelos, G. (2010). Are Leading Indicators of Financial Crises Useful for Assessing Country Vulnerability? Evidence from the 2008-09 Global Crisis. In *NBER Working Paper No. 16047*.

32. Kashyap Heena. (2015). Relevance of classicaland neo-classical theories in present world. *Indian Streams Research Journal*, *5*(1).

33. Keane, W. (2019). How everyday ethics becomes a moral economy, and vice versa. *Economics*, *13*. https://doi.org/10.5018/economics-ejournal.ja.2019-46

34. Kiat, J. (2008). The effect of exchange rate and inflation on foreign direct investment and its relationship with economic growth in South Africa. *Economics and Applied Informatics*, *17*(1).

35. Kiley, M. T. (2016). Policy paradoxes in the New Keynesian model. *Review of Economic Dynamics*, *21*. https://doi.org/10.1016/j.red.2016.03.002

36. Kudryashov, N. A., & Zakharchenko, A. S. (2014). A note on solutions of the generalized Fisher equation. *Applied Mathematics Letters*, *32*(1). https://doi.org/10.1016/j.aml.2014.02.009

37. Manova, K. (2008). Credit constraints, equity market liberalizations and international trade. *Journal of International Economics*, *76*(1). https://doi.org/10.1016/j.jinteco.2008.03.008

38. Megasari, T., & Saleh, S. (2021). Determinant of FDI Inflows in OIC Countries. *International Journal of Islamic Economics and Finance (IJIEF)*, *4*(1). https://doi.org/10.18196/ijief.v4i1.9473

39. Mishkin, F. S. (2009). Globalization, macroeconomic performance, and monetary policy. *Journal of Money, Credit and Banking*, *41*(SUPPL. 1). https://doi.org/10.1111/j.1538-4616.2008.00204.x

40. Mundell, R. A. (1963). Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates. In *Science politique* (Vol. 29, Issue 4).

41. North, D. (1993). The New Institutional Economics and Development. *EconWPA Economic History*, *January*.

42. Obstfeld, M., Shambaugh, J. C., & Taylor, A. M. (2004). Monetary sovereignty, exchange rates, and capital controls: The Trilemma in the interwar period. *IMF Staff Papers*, *51*(SPEC. ISS.).

43. Obstfeld, M., Shambaugh, J. C., & Taylor, A. M. (2008). Financial Stability, the Trilemma, and International Reserves Maurice. *NBER Working Paper*, *14217*(April).

44. Obstfeld, M., Shambaugh, J. C., & Taylor, A. M. (2009). Financial instability, reserves, and central bank swap lines in the panic of 2008. *American Economic Review*, *99*(2). https://doi.org/10.1257/aer.99.2.480

45. Obstfeld, M., Shambaugh, J. C., & Taylor, A. M. (2010). Financial stability, the trilemma, and international reserves. *American Economic Journal: Macroeconomics*, *2*(2). https://doi.org/10.1257/mac.2.2.57

INTERNATIONAL JOURNAL ON ECONOMICS, FINANCE AND SUSTAINABLE DEVELOPMENT ISSN (electronic): 2620-6269/ ISSN (printed): 2615-4021

Vol. 4 No. 9 | September 2022   **127**

46. Ojapinwa, T. v., & Nwokoma, N. I. (2018). Workers' Remittances and the Dutch-Disease Argument: Investigating the Relationship in Sub-Saharan Africa. *African Development Review*, *30*(3). https://doi.org/10.1111/1467-8268.12339

47. Omankhanlen, A. E. (2011). The Effect of Exchange Rate and Inflation on Foreign Direct Investment and Its Relationship with Economic Growth in Nigeria. *Economics and Applied Informatics*, *17*(1).

48. Razin, A., Rubinstein, Y., & Berglas, E. (2004). *NBER working paper series growth effects of the exchange-rate regime and the capital-account openness in a crisis-prone world market: a nuanced view Growth Effects of the Exchange-Rate Regime and the Capital-Account Openness in A Crisis-Prone World Market: A Nuanced View*. http://www.nber.org/papers/w10555

49. Tran, H. H., Le, T. P. T. D., Nguyen, V. T. H., Le, D. T. A., & Trinh, N. H. (2021). The Impact of Financial Integration on Monetary Policy Independence: The Case of Vietnam. *Journal of Asian Finance, Economics and Business*, *8*(2). https://doi.org/10.13106/jafeb.2021.vol8.no2.0791

50. Waldén, L. J., Meade, J. E., & Walden, L. J. (1961). A Neo-Classical Theory of Economic Growth. *Ekonomisk Tidskrift*, *63*(3). https://doi.org/10.2307/3438723

51. Woodford, M. (2013). Globalization and Monetary Control. In *International Dimensions of Monetary Policy*. https://doi.org/10.7208/chicago/9780226278872.003.0002

52. Yokus, A., & Yavuz, M. (2021). Novel comparison of numerical and analytical methods for fractional burger⇓fisher equation. *Discrete and Continuous Dynamical Systems - Series S*, *14*(7). https://doi.org/10.3934/DCDSS.2020258

53. Yu, Y., & Qayyum, | Muhammad. (2021). *Impacts of financial openness on economic complexity: Cross-country evidence*. https://doi.org/10.1002/ijfe.2491

54. Zhang, T. (2022). Monetary Policy Spillovers through Invoicing Currencies. *Journal of Finance*, *77*(1). https://doi.org/10.1111/jofi.13071

10. Appendix

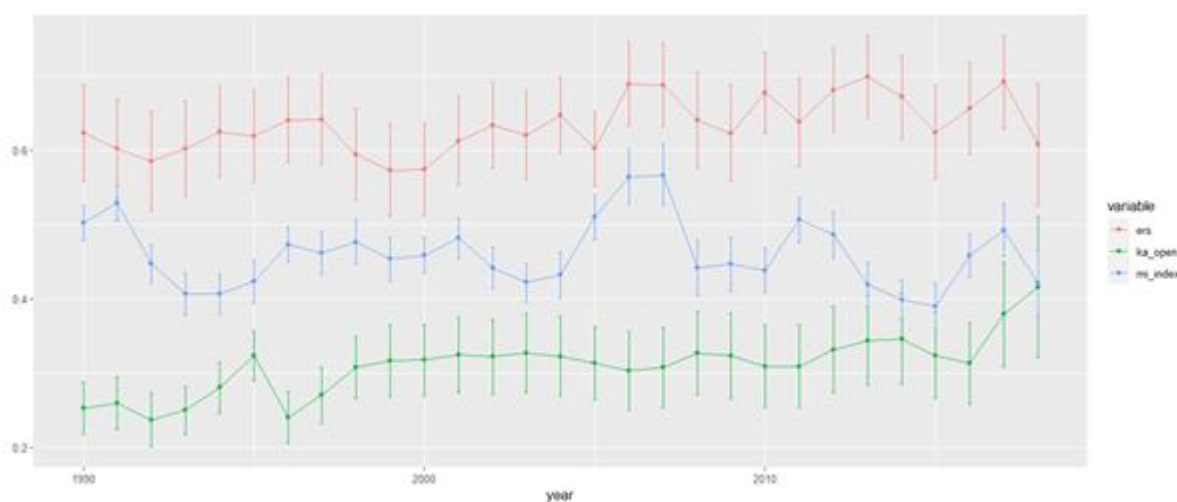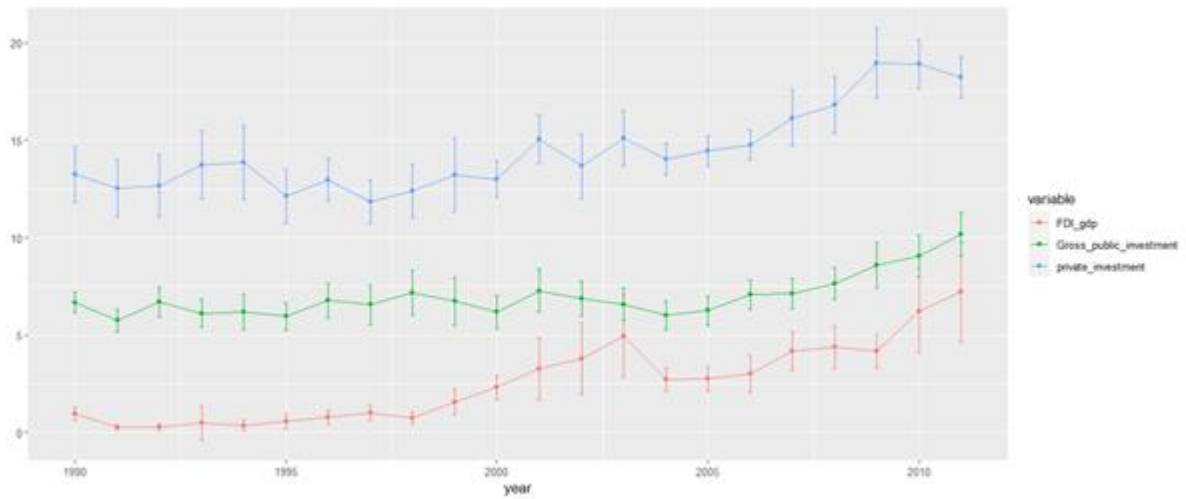### Figure 6: Trilemma index components

Figure 7: Time series Investment in Africa

Figure 8: GDP growth annual by country