Can Proximity with Resource-Endowed Economies Influence FDI Inflow? the Case of Rwanda

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Abstract—The purpose of this study was to investigate if a country with limited natural resources can benefit from its geographic location due to the presence of countries in its neighborhood which are rich in natural resources. This study asserted that to benefit from other countries factors endowments, a country has to focus on enhancing other factors which are poorly achieved in neighboring countries. This study found that by focusing on improving investment and regulatory environment, Rwanda has tremendously benefited from its proximity with countries rich in natural resources but with low performance in terms of regulations and investment climate. The Johansen test reveals that in the long run, proximity exerts a positive influence on FDI inflow. However, as revealed by VECM test, in the short run the country may not benefit as it requires time to develop its investment and regulatory institutions.

Index Terms— Natural resources, FDI, Proximity.

I. INTRODUCTION

The economy of Rwanda is characterized by agricultural production mainly for subsistence purpose, limited natural resources, insignificant industrial sector, and low level of human capital development. In addition to that, Rwanda is a landlocked country with limited natural resources. Rwanda population density was reported at 467 people/km^2 in 2017 [1], among the highest in Sub-Saharan Africa; this is putting enormous pressure on available arable land. This puts Rwanda at a disadvantage as far as attracting foreign investors is concerned.

However, the country has managed to turn some of its disadvantages into advantages, namely its geographic location. To achieve that, Rwanda made tremendous efforts to improve both its regulatory and investment environment. Since 1994, Rwanda has maintained a social and political stability and has been well ranked for its strong and effective institutions. In 2018 Rwanda was ranked 41st from 158th in 2006 on ease of doing business index, whereas other regional and neighboring countries made slight and sluggish improvement, or remained virtually stagnant (See **Table 1**). Its position abruptly changed from 143 in 2009 to 67 in 2010, becoming the best performer in this area; since then, Rwanda has managed to maintained its position as the best performer vis-à-vis other regional and neighboring countries. In 2018, its Distance to Frontier was 74.4 followed by Kenya with 65.15 [3]. Therefore, it can be rightly argued that Rwanda enjoys a competitive advantage over other regional and neighboring economies as far as favorable business environment is concerned.

Rwanda has done a commendable job in the area of the fight against corruption and promotion of transparency, in fact, its performance in this regard has scored higher than other neighboring and regional countries; as shown in **Fig. 1**, the corruption perception index (CPI score) has been above that of other neighboring and regional countries, in 2017 it was 55 followed by Tanzania with only 36. According to World Economic Forum [4], Rwanda ranks 58th and remains among the most competitive African countries thanks to its efficient goods and labor markets and a stable political situation that supports robust GDP growth. This reports points to lower health and primary education, as well as macroeconomic environment as the major challenges. As shown in **Fig. 2**, Rwanda has been ranked the best performer in the 1st pillar of institutions, the 4th pillar of health and primary, the 6th pillar of goods market efficiency, the 7th pillar of labor market efficiency, the 8th pillar of financial market development. It is to be noted that in the 1st pillar of institutions Rwanda has outperformed its neighboring and regional economies by a significant margin, Rwanda score 5.4 followed by Kenya with only 3.8 [4]. This is consistent with studies such as that conducted by Musonera et al [5] indicating a positive relationship between institutions fitness of Rwanda and FDI inflow. Rwanda is also among the best performer in the 12th pillar of innovation, 11th pillar of business sophistication, and 3rd pillar of macroeconomic environment. In light of the above performance of Rwanda, it would be reasonable to argue Rwanda would take advantage of it to attract foreign investors including those attracted by resources in regional and neighboring countries.

This argument is based on criticisms of the diamond model for its explicit undermining of the role of country connectivity in the improvement of competitiveness [6-9].

According to critics, the home-based diamond can be enhanced by a stronger diamond of a more powerful trading partner; similarly, a country can tap into an external economy to fill the gap existing in its domestic diamond [10]. Subsequently, other models were suggested to explain the competitiveness of countries in a more comprehensive way. These include the nine factor model [11, 12], the double diamond [6, 10, 13], the double diamond model [14], and the multiple diamond [15-17].

This study argues that if considered alone, the Rwandan home-base diamond cannot have a significant explanatory

power on FDI location choice given its existing disadvantage in certain factors within its domestic diamond such as its small market size, and limited natural resources. Its proximity and connectivity to other economies contributes greatly to addressing these challenges while exerting an enhancing effect. This is facilitated by regional integration agreements in place, geographic proximity, free movement of goods and people and any other cross-border transactions.

In this regard, basing on the diamond model, following the arguments put forth in the study conducted by Mahirwe *et al* [18] in relation to the improvement of the domestic diamond by tapping into external economies, this study extends the diamond model to include other factors from external economies which come to complement disadvantaged factors in the domestic diamond and exert an enhancing effect on their attractiveness toward foreign investors.
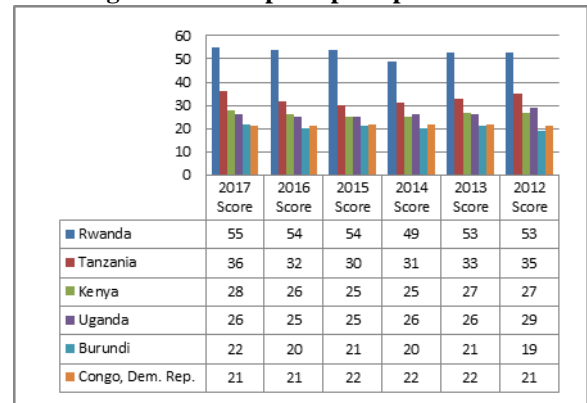
In fact, Rwanda shares borders with one of the potentially richest countries in the world [19], big in size, with huge amount of natural resources, rich flora and fauna and for that reason sometimes referred to as a "geological scandal" [20]. Its GDP was the same as that of Canada in 1960 at USD 3.35 billion, and same as that of South Korea in 1967. However, since 1996, the country has been plunged into wars and conflicts causing widespread insecurity and instability; this was coupled by weak institutions and political instability [19]. Natural resources remain one of the main determinants of FDI in developing countries [21]; however, potential risk due to political and social instability coupled with endemic warfare constitute a major concern for foreign investors thus a hindrance to FDI. In this study, we argue that the location choice of foreign investors in Rwanda may be influenced by its proximity to and influence in D.R. Congo which enjoys the sought after factors such as natural resources and market size but endures prevalent instability and inefficient institutions. Furthermore, the alleged influence of Rwanda in DRC [19] provides assurance to foreign investors of smooth business operations in relation to DRC.

Table 1: Trend of Ease of Doing Business (Rankings for selected economies)

Year	2006	2008	2010	2012	2014	2016	2018
Burundi	160	174	176	169	140	152	164
Congo, Dem. Rep.	175	178	182	178	183	184	182
Kenya	80	72	95	109	129	108	80
Rwanda	158	150	67	45	32	62	41
Tanzania	150	130	131	127	145	139	137
Uganda	103	118	112	123	132	122	122

Source: The World Bank Group (Doing Business Reports)

Figure 1: Corruption perception index

	2017 Score	2016 Score	2015 Score	2014 Score	2013 Score	2012 Score
Rwanda	55	54	54	49	53	53
Tanzania	36	32	30	31	33	35
Kenya	28	26	25	25	27	27
Uganda	26	25	25	26	26	29
Burundi	22	20	21	20	21	19
Congo, Dem. Rep.	21	21	22	22	22	21

Source: Transparency International (Online database)

Figure 2: Global Competitiveness Index of Selected economies (2017-2018)
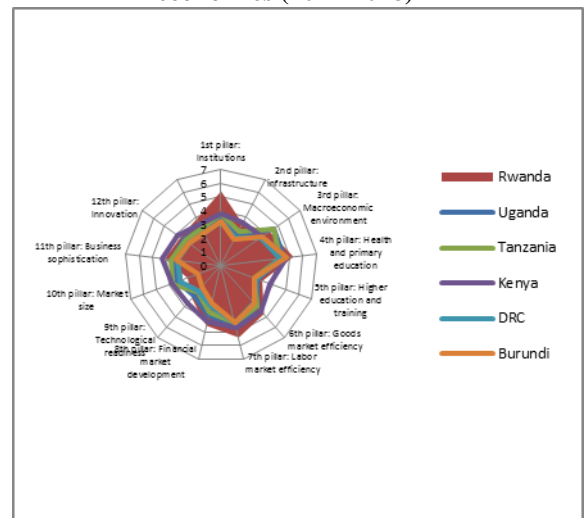
Source: The Global Competitiveness Report (2017-2018)

II. THEORETICAL FRAMEWORK

The literature has identified market size, natural resources as some of the determinants of FDI inflows in LDCs [22-25]. On the other hand, political instability and malfunctioning institutions have been identified as deterrence to FDI [5, 26-28]. Then the question is what happens to FDI targeting natural resources in countries with persistent instability and malfunctioning institutions? While we acknowledge that some FDI would still locate in some countries despite the prevailing instability and weak institutions Kim [29], but consistence with the mainstream literature, it is logical to assume that the absence of effective institutions would alter the location choice of FDI; in fact, political stability play a decisive role in FDI location choice to developing countries [30, 31].

In fact, FDI may be driven to a country due to its proximity to location specific advantages of neighboring countries rather than its own. To this point, this scenario has been overlooked by previous studies. In fact, FDI may be attracted to a country not because of what it can offer in terms of its own specific advantage, but because of the ease

and convenience it offers to access input materials from another country in its neighborhood where those resources are relatively abundant. However, this scenario occurs when some of FDI determinants which are vital for smooth business operations are not available in the country with abundance of natural resources but available in another country which is less endowed in natural resources. For instance, a country with good institutions but challenged in natural resources may attract FDI in its economy which are targeting natural resources from neighboring countries with poor institutions; thus, in this case proximity, coupled with good institutions of that country enhance the attractiveness of that country and serve as determinants of FDI.

In light of the above, this study argues that the attractiveness of the host country toward FDI can be enhanced by neighboring countries' specific advantages.

In light with the above, this study has developed a simple model which facilitates the computation of proximity as a variable. Basing on the theory of Liability of Foreignness (LOF), as trade between countries increases, they become familiar to each other, thus decreasing the level of LOF. That is, as countries interact trough import and export transactions, their closeness in terms of different aspects of life increases, this include but not limited to culture, language, legal system, business practice; over time, any impediment of business transactions between them fade away [32]. In some cases, the interaction of countries through trade acts as a motivation for countries to achieve greater integration which lead to a virtual elimination of territorial borders. In other words, the increase of interaction through trade reduces LOF. Consistent with the dyadic perspective of LOF [33, 34], we expect the proximity to be conditioned by trade between Rwanda and other regional countries in relation to trade of Rwanda with the rest of the world. In this study, we consider regional countries to include Uganda, D.R. Congo, Burundi, Tanzania, and Kenya. In this regard, Proximity can be expressed as follows:

$$P_{i,j} = \frac{\sum_{j=1}^{n} T_{i,j,t}}{T_{i,w,t} - \sum_{j=1}^{n} T_{i,j,t}}$$

This can also be rewritten as:

$$P_{i,j} = \frac{\sum_{j=1}^{n} T_{i,j,t}}{T_{i,(w-j),t}}$$

Where: $P_{i,j}$ denotes Proximity between country i and group of countries j, and $T_{i,j}$ denotes Trade between country i and group of countries j. The denominator $T_{i,(w-j)}$ represents trade between country i and the rest of the world $(w\text{-}j)$. t represents the time during which trade was conducted.

Our trade data will be sourced from The Observatory of Economic Complexity (OEC) online database.

III. METHODOLOGY AND MODEL SPECIFICATION

A. Model specification

This study uses time series; Johansen Cointegration and VECM are used to investigate the influence of proximity on FDI inflow.

Unit root test has to be run to ensure that no variable is integrated of order two I (2). After determining the optimal lag structure, Johansen cointegration test will be ran to find out if there is a long-run cointegration relationship in our model.

VECM model will be specified in the following form:

$$VECM: \Delta y_t = \beta_0 + \sum_{i=1}^{n} \beta_i \Delta y_{t-i} + \sum_{i=1}^{n} \beta_i \Delta x_{t-i} + ECT_{t-1} + \mu_t$$

Where: y represents the target variable, x represents the used regressors, β_0 represents the constant, β_i represent the coefficients.

The cointegrating equation is specified in the following form:

$$ECT_{t-1} = y_{t-1} - \beta_0 - \beta_1 x_{t-1}$$

B. Data Source and description

The data sample used by this study was sources from online database of World Development Indicators, from year 1970 to 2017.

Target variable:

FDI inflow: Foreign direct investment, net inflows (% of GDP)

Regressors:

Proximity: This variable was computed as per the model specified above.

Education (proxied by school enrollment): School enrollment, secondary (% gross).

Trade openness: Trade (% of GDP).

ODA (logarithm term): Net official development assistance and official aid received (constant 2015 US$).

NAT: Total natural resources rents (% of GDP).

Market size (proxied by GDP (logarithm term): GDP per capita (constant 2010 US$).

Infrastructure: proxied by Fixed telephone subscriptions (per 100 people)

Dummy variables:

The analysis of our data indicate a structural breakpoint, a dummy variable (dum_break) was constructed to account for the breakpoint. To find the exact structural breakpoint, Chow test was ran. The year 2006 was found to be the starting point of the structural break. This structural break indicates a period of lasting peace and stability in the country. The diagnostic test for the constructed dummy variable included stability test (Recursive estimates-CUSUM of Squares Test) which indicated that the model is stable (within 5% significance).

IV. EMPIRICAL TESTING AND DISCUSSION OF FINDINGS& RESULTS

Out unit root test reveal that some of our variables are stationary at level I (0) and while others are stationary at first difference I (1), this sanctions the use of VECM in this particular case.

According to the Akaike information criterion (See Table 1), the optimal lag length is two (2).

C. Johansen Cointegration test

Johansen cointegration test indicates the presence of long-run cointegration; the trace test indicates the presence of cointegrating equations at 5% level.

The above results indicate the following:

- In the long-run, proximity, trade openness, and GDP per capita have a positive impact on FDI inflow, on average, ceteris paribus. The coefficients are statistically significant at the 1% level.

- Education and foreign aid have a negative impact on FDI inflow on average, ceteris paribus. The coefficients are statistically significant at the 1% level.

In light of the above results, the null hypothesis of no cointegration is rejected against the alternative of a cointegration relationship in the model. Therefore, the test of VECM is sanctioned.

Table 2: Johansen normalization results and interpretation

	PROXTY	SCH1	OPEN	LODA1	NAT	LGDP1	LFIXTEL1	BREAK
Normalized cointegrating coefficients	-2.87912	0.03193	-0.10138	0.745171	0.035741	-2.57793	0.029433	-0.01182
standard error	-0.59794	-0.01293	-0.00712	-0.1886	-0.02172	-0.23343	-0.05403	-0.15133
T statistics	4.815058	-2.46945	14.23933	-3.95107	-1.64553	11.04368	-0.54475	0.078114

D. VECM Findings

The VECM results reveal the following;

- The adjustment coefficient: The previous period's deviation from long-run equilibrium is corrected at a speed of 97 %.

- Previously accumulated FDI inflow: A percentage change in previously accumulated FDI inflow is associated with a 0.27 decrease in new FDI inflow, on average, ceteris paribus, in the short-run.

- Proximity: A percentage change in proximity is associated with a 1.51 decrease in FDI inflow, on average, ceteris paribus, in the short-run.

- Foreign aid (ODA): A percentage change in proximity is associated with a 1.19 increase in FDI inflow, on average, ceteris paribus, in the short-run.

- Infrastructure (proxied by fixed telephone): A percentage change in infrastructure is associated with a 1.80 increase in FDI inflow, on average, ceteris paribus, in the short-run.

E. Wald Test

The Wald test shows indicates that the null hypothesis is rejected, the null hypothesis being that proximity does not granger cause FDI inflow. We can therefore assert that proximity granger cause FDI inflow.

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
t-statistic	-2.165921	30	0.0384
F-statistic	4.691216	(1, 30)	0.0384
Chi-square	4.691216	1	0.0303

F. Diagnostics test

The normality test; according to normality test results, we fail to reject the null hypothesis; this suggests that there is no indication of serial correlation.

Autocorrelation LM test: According to the autocorrelation LM test, we fail to reject the null hypothesis; therefore, there is no serial correlation.

The stability test (Recursive estimates-CUSUM Test) indicates that the model is stable (within 5% significance).

V. CONCLUSION

The purpose of this study was to investigate if a country with limited natural resources can benefit from its geographic location due to the presence of countries in its neighborhood which are rich in natural resources. This study asserted that to benefit from other countries factors endowments, a country has to focus on enhancing other factors which are poorly achieved in neighboring countries. This study found that by focusing on improving investment and regulatory environment, Rwanda has tremendously benefited from its proximity with countries rich in natural resources but with low performance in terms of regulations and investment climate. The Johansen test reveals that in the long run, proximity exerts a positive influence on FDI inflow. However, as revealed by VECM test, in the short run the country may not benefit as it requires time to develop its investment and regulatory institutions.

Other important findings revealed that in the long-run, trade openness, and GDP per capita have a positive impact on FDI inflow, while education and foreign aid have a negative impact on FDI inflow in the long run.

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