SCHOOL OF ECONOMICS

M.Sc. Economics

Foreign Direct Investment and Rwanda's Trade Balance

A Thesis presented to School of Economics, University of Rwanda,

In partial fulfillment of the requirements for the degree of Master of Science in Economics

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Declaration

I, **GATOYI SINGIZIMANA Serge,** hereby certify that my coursework has been completed, that this is my own original work, and that it has never been submitted to any university before, or other academic institution for the purpose of receiving a Degree in any area.

………………………

GATOYI SINGIZIMANA Serge

(Names and signature)

Date………/…………/2023

Dedication

To Almighty God;

To everyone who helped making my studies a success,

I dedicate this thesis.

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First of all, I thank the Almighty God for his plentiful blessings, assistance and protection during my studies at the University of Rwanda, College of Business and Economics.

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May the almighty God bless you all for having provided support towards the accomplishment of this work!

List of acronyms

ADRL   : Autoregressive Distributed Lag

ASEAN   : Association of Southeast Asian Nations

BB   : Budget Balance

CEPGL   : Communauté Economique des Pays des Grands Lacs

CPI   : Consumer Price Index

DMRS   : Domestic Market Recapturing

DOOP   : Degree of Openness

EAC: : East African Community

ECM   : Error Correction Model

EDPRS   : Economic Development and Poverty Reduction Strategy

EU   : European Union

FDI   : Foreign Direct Investment

GDP   : Gross Domestic Product

GKF   : Gross Capital Formation (% of GDP)

GNI   : Gross National Income

GoR   : Government of Rwanda

INFCPI   : Inflation, Consumer Prices (annual %)

INFGDP   : Inflation, GDP Deflator (annual %)

MINICOM : Ministry of Commerce

MIR   : Made In Rwanda

NBR   : National Bank of Rwanda

NES   : National Exports Strategy

NISR   : National Institute of Statistics of Rwanda

OLS   : Ordinary Least Squares

PPP   : Public-Private Partnership

PSDS   : Private Sector Development Strategy

REER   : Real Effective Exchange Rate

SME   : Small and Medium Enterprise

TB   : Trade Balance

TDS   : Total Debt Service (% of GNI)

UNCTAD   : United Nations Conference on Trade and Development

USD   : United States Dollar

WB: : World Bank

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Abstract

The Rwandan economy has a long-run trade deficit challenges. This issue, being a significant source of the economy's external vulnerability, has been the subject of numerous efforts and a variety of strategies over the years. Given that it has a significant impact on the country's employment, balance of payments, and rate of economic growth, an addition to the existing literature could provide an impetus to a medium-term solution. This research answers the question on whether the FDI has a statistically significant impact on the trade balance of Rwanda and explores other factors that are likely to influence the trade balance of Rwanda. The study aims to complement previous studies and shed light on the trade balance dynamics in Rwanda using data and applying the Ordinary Least Square (OLS), and error correction model (ECM), for the period 2000–2019. Estimation results indicate that FDI does not significantly affect the trade balance of Rwanda neither in the short-run, nor in the long-run. On contrast, the results indicate that in the long run, increases in inflation, Consumer Price Index and degree of openness improve the trade balance, while increases in Rwandan capital formation and total debt service deteriorate the trade balance. In the short-run, findings show that, increases in Gross Capital Formation and Total Debt Service negatively affect the trade balance of Rwanda.

Keywords: Foreign Direct Investment, Trade Balance, Growth, Balance of Payments, Inflation.

Chapter one: General Introduction

1.1. Background of the study

The idea of international trade was first developed in mercantilist and classic models of trade. Mercantilism aimed to minimize a country's reliance on imports by increasing domestic production of a wide range of goods. According to classical theories of trade, there should be trade between nations because of differences in government policies, resource endowments, technology, and demand. There should also be trade due to the existence of economies of scale in production.

The global economy is boosted by international trade, which can also contribute significantly to a nation's economic growth. International trade encourages effective resource allocation, enables a nation to achieve economies of scale, facilitates the diffusion of knowledge, fosters technological advancement, and fosters competition on both domestic and international markets, which results in the optimization of production processes and the development of new products. Rwanda has been experiencing trade deficits with the rest of the world for decades. Our study identifies those determinants that potentially improve Rwanda's trade balance and how the deficit problem should be addressed. This research will propose possible solutions like encouraging those factors that positively affect it and discouraging the ones that worsens it.

This study investigates whether the Foreign Direct Investment (FDI) inflows have significant and direct impact on the trade balances of Rwanda. With reference to studies by Gervais, et al., (2017), and Marie (2018), this research intends to complement the above studies by identifying other variables that may have a significant impact on Rwanda's balance of trade since they both discovered that the exchange rate has a significant effect on Rwanda's trade. The research takes the opportunity to explore the horizon and enrich the studies referred to above with Rwandan literature. Also, as other theories and research have shown a significant effect of foreign direct investment on trade in different countries worldwide, we would like to apply the same theories to see how Rwanda's balance of trade reacts.

This research investigates the relationship between FDI inflows and trade balance; more specifically it explores the effect of Foreign Direct Investment (FDI) on the trade balance of Rwanda. Furthermore, other variables identified as controls, that is the Gross Domestic Product

(GDP), Inflation as GDP deflator, Gross Capital Formation, Total Debt Service, Inflation as Consumer Price Index, and the Degree of Openness were added in the research model to have a comprehensive research outcome in an effort to identify the determinants of the trade balance of Rwanda.

1.2. Problem Statement

The goal of all of Rwanda's consistent development policies and strategies is to make the country's economy more competitive. The Government of Rwanda (GoR) has formulated targets in its Vision 2050 that look at the long-term development outcomes. One of the Vision's major objectives (economic growth and prosperity) is to fundamentally transform Rwanda into an upper middle-income country by the year 2035 (that is attaining the GDP per capita of USD 4,035) and high-income country by 2050 (that is attaining the GDP per capita of USD 12,476). Previously, within the framework of the Economic Development and Poverty Reduction Strategies (EDPRS I and II), Vision 2020 had laid out policies and strategies emphasizing economic growth and diversification as well as enhancing the private sector's ability to drive development.

At a more practical level, and aiming at reducing Rwanda's persistent trade deficit, GoR developed the National Export Strategy (NES) II, the Private Sector Development Strategy (PSDS) and the Domestic Market Recapturing Strategy (DMRS), all of which set out specific and complementary projects (MINICOM, Made in Rwanda Policy, December 2017). Furthermore, Rwanda has actively attracted FDI through significant reforms that have made it simpler for businesses to get started, obtain loans, pay taxes, etc.; such that today Rwanda is again ranked the 2nd easiest country to do business in Africa after Mauritius, due to reforms that impacted our business regulatory environment. (World Bank, Doing Business Report 2020).

The compendium for promoting investments includes among others: regulatory framework, registration facilities and requirements, business changes, closures, disclosure requirements, and other facilities like working permits, government protection of investments, dispute resolution, money transfers, special economic zone facilitations, and public private partnerships (PPP) where the Rwanda Development Board (RDB) is chief negotiator between public and private sector.

While complementing research by Thomas et Joseph (2009), Gervais, et al., (2017), and Marie (2018), this research can be also used by policy-makers to upgrade the existing trade policies of the Government of Rwanda, such as the National Craft Industry policy, Rwanda national export strategy (NES), national industrial policy, Small and Medium Enterprises (SMEs) Development Policy, Made in Rwanda (MIR) Policy, etc.

1.3. Research objectives

1.3.1. General objective
The main objective of this study is to investigate the effect of FDI on the trade balance of Rwanda for the period of 2000-2019.

1.3.2. Specific objectives
Specifically, this study intends to:

(a) Determine the extent at which the FDI influences the trade balance of Rwanda

(b) Investigate the other factors influencing the trade balance of Rwanda

1.4. Research Questions

This study will try to answer the following questions:

  i.   Does FDI affect the trade balance in Rwanda?

 ii.   At which level is the trade balance affected by the FDI?

iii.   What are other factors that possibly affect the trade balance in Rwanda, and at which level?

1.5. Hypothesis

H_0:FDI inflows have a significant impact on the trade balance of Rwanda.

H_1: FDI inflows does not impact on the trade balance of Rwanda

1.6. Scope of the Study

This study focuses on the effect of FDI on the trade balance of Rwanda for the period of 2000-2019. We accept that our research has some limitations as we agree that the drivers significantly influencing the trade balance of Rwanda were not exhausted.

1.7.   Significance of the study

We believe that this research will substantially contribute to the existing academic researches, and give an overview on Rwanda's external trade to the policy makers and keep myself updated as a researcher. The study investigates whether the Foreign Direct Investment (FDI) inflows have a significant and direct impact on the trade balances of Rwanda as a counter-verification exercise to the study by Dr. Thomas, K. R. et Dr. Joseph, B., (2009). With reference to studies by Gervais, et al., (2017), and Marie (2018), this research paper intends to complement these studies by identifying other variables that may have a significant impact on Rwanda's balance of trade since they both discovered that the exchange rate has a significant effect on Rwanda's trade.

1.8.   Organization of the Study

The study is organized into 5 chapters: the first chapter presents the general introduction of the study. The second chapter presents the literature review on international trade. The third chapter highlights the methodology used in the study and data sources. The fourth chapter analyses the data, while chapter 5 presents findings and concludes.

Chapter two: Literature Review

Over the years, numerous research projects have focused on understanding the factors that affect the trade balance. Despite the fact that economic theory takes into account a number of factors that affect the trade balance, including the real exchange rate, real domestic income, foreign direct investment, foreign income, and money supply, the majority of empirical studies place an emphasis on the exchange rate. (Essa, A., 2016).

Mr. Sulaiman. (2010) says that there is a strong relationship between the balance of trade and the real effective exchange rate in Pakistan, but he adds that most of the studies show weak statistical correlation among macroeconomic variables and balance of trade. He also points out that several researchers explain the changes in the real effective exchange rate, which would affect the balance of trade positively in some nations, but it is inconsistent for all nations.

Research examined the determinant of trade balance in Tanzania by focusing on trade in goods in 1970's until 2002 using variables such as real exchange rate, foreign income, FDI, household consumption, Government expenditure and Trade liberisation. In this study, the ordinary least squares (OLS) method for the estimations of the variables was used and it was determined that only three (3) variables, namely government expenditure, household consumption and trade liberalization were the main determinant of trade balance in Tanzania. Further study will differ with this study by employing three (3) more variables like human capital development, the availability of natural resources, inflation and the period covered for the study. (Mohamed, N. S. & Ali, Y. S. A., 2016).

According to research on the factors influencing trade balance in Kenya, the real exchange rate, government consumption spending, domestic income, and money supply (M3) were found to be the most important significant factors, while the results found foreign income and foreign direct investment not to be significant factors. (Mohamed, N. S. & Ali, Y. S. A., 2016)

Research investigating the determinants of trade balance in Ethiopia, and the results show that real income (GDP), real money supply (M2), and budget balance (BB) were found to be statistically significant factors in the long-run at the 10% level of significance. It is indicated that a rise in domestic income increases the demand for domestic absorption and therefore will increase imports. This might deteriorate the trade balance in the long-run unless production and productivity are growing by more than the growth of absorption (Absorption approach of trade

balance). It is said that when the real domestic money supply exceeds the real demand for money, people hold more money than they desire. In the flexible exchange rate regime, because of this interest rate is less than the equilibrium interest rate (interest rate at the intersection of domestic real money supply and money demand). Here, domestic currency appreciates and consequently commodities and services imports are encouraged while discouraging exports, assuming that the exchange rate is flexible in this context. (Alekaw, K. Y., 2012).

Research investigated the short- and long-run effects of exchange rates on the trade balance in 10 East African countries (Burundi, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Tanzania & Uganda) using the ARDL model. It was found that there is the existence of a long-run relationship between the two (2) variables in all countries. Results for individual country estimation suggested a positive long-run relationship between REER and trade balance in 7 countries (Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Tanzania) and a statistically significant relation in 4 countries (Ethiopia, Madagascar, Mauritius & Rwanda). There was no significant negative relationship in any country. In addition, the results of the panel estimation showed a positive relationship between trade balance and REER in the long-run, which was consistent with the standard theory. In the short-run negative and significant elasticity was not found in any of the 10 countries, which did not provide for the presence of a J-curve relationship between aggregate trade balance and Real Effective Exchange Rate (Fetene, B. H. & Soyoung, K., 2017).

An examination of the trade balances between ASEAN-5 countries (Indonesia, Malaysia, Philippines, Singapore & Thailand) and Japan for the sample period from 1986 to 1999 has revealed mixed results. It was found that the role of exchange rate changes in instigating changes in the trade balances between ASEAN-5 and Japan had been overrated. It was estimated that the depreciation of ASEAN-5 exchange rates with respect to the Japanese yen would improve these economies' trade balances during the study period. Actually, the trade balances of these economies worsened from 1986 to 1995 (except for Indonesia in with unclear trend), before the improvement in trade balances was literally observed. This means that the devaluation-based adjustment policies may not achieve the desired effects of nominal exchange rate changes (devaluation) on the balance of trade, that is, the exchange rate (devaluation) could not be used solely in managing the external balances of the ASEAN-5 countries mentioned. Alternatively, the explanation of the observed behavior of ASEAN-5 trade balances was attributed to the effect

of real money, rather than the nominal exchange rate. It was shown that the trade balance of an ASEAN-5 country would improve if its real money is less than that of Japan in value. The economic explanation of the hypothesis was that whenever the real money of a domestic country is less than the real money of Japan, domestic currency would end up with a relatively lower purchasing power compared to Japan's currency. Like that, domestic goods and services would seem cheaper in the eyes of Japanese, thereby inciting their wish to import more goods and services from the domestic country (ASEAN-5). Additionally, domestic citizens will buy less goods and services from Japan, which are treated as more expensive. Here, the importance of lower purchasing power of domestic currency is to improve the domestic trade balance with respect to Japan, which would be the other way around if the domestic country's real money was more than that of yen's real value. (Venus, K. S. L., Kian, P. L. & Huzaimi, H., 2003)

Study findings pointed out that in the long-run the rise in real effective exchange rate positively affects the trade balance, while an increase in Turkish (foreign) income improves trade balance. In the short-run, real effective exchange rate does not have a significant impact on the trade balance, while the rise in domestic and foreign income has a negative impact on the Turkish trade balance. (Ali, A. & Raif C., 2016).

The share of FDI in terms of economic growth of Rwanda and Burundi, two-member countries of the East African Community (EAC), as well as CEPGL, was not significant (Dr. Thomas, K. R. & Dr. Joseph, B., 2009). Studies on China show that FDI has a significant impact on the expansion of export and economic growth. China's provincial and regional manufacturing and export growth are positively impacted by FDI, particularly in the country's central and coastal regions (Mohamed, N. S. & Ali, Y. S. A., 2016).

Research on the effects of foreign direct investment on the trade balance in United States Manufacturing sector clearly showed a visible and significant impact of FDI on trade balance. During the second half of the 1980s, the rapid increase in foreign control of United States manufacturing assets indicates the consequence that FDI is likely to have an impact on the trade balance. One of the facts at the time is the exception to the Japanese investors who built auto assembly plants there, and instead of establishing new businesses in the US market, the majority of foreign investors chose to enter it through the acquisition of existing US firms. Estimate about 93% of annual foreign direct investment outlays for manufacturing to acquisition United State firms in this period. The national industry's production capacity is not directly increased by the

changing of ownership of existing businesses. It appears that FDI obtained through acquisitions does not immediately and significantly affect imports or expand exports. (Mohamed, N. S. & Ali, Y. S. A., 2016).

Research study on the effect of trade balance deficit in 28 EU countries discovered that the persistent and large trade balance deficit negatively affects the economic growth. After assessing all trade balance periods, the attained results showed the negative and lagging impact of the trade balance on economic growth, and no substantial differences of the impact were noticed during the deficit periods. It was found out that the worsening of trade balance decreases average economic growth and from linear relationship estimate, the research indicates that it does not matter whether it starts from trade deficit or surplus result. The results may also mask the possibility of a non-linear effect, which would indicate a stronger dampening of economic growth when the trade balance deteriorates in the presence of a significant trade deficit. (Deimante, B., Lina, G., & Kristina, M., 2020).

Petrović, P., & Gligorić, M. (2010) discovered a significant effect of the real exchange rate on the trade balance of Serbia. The key outcomes of the research are that a real exchange rate depreciation had a significant positive long run impact on the trade balance in Serbia, and that in the short run trade balance first deteriorates before it later improves. Results showed that a one percent real depreciation leads to a 0.92 to 0.95 percent improvement in trade balance. The corresponding error correction models (ECM) of trade balance capture its short run movements and indicate the existence of the J-curve effect. Namely, the estimated ECMs illustrate that an exchange rate depreciation has negative impact on the trade balance in the first few months. Combining this result with the one in the long run (i.e. an improvement of trade balance), one obtains the J-curve effect of depreciation on the trade balance.

2.1. Rwanda trade balance and GDP trends over the period 2000-2019

Fig. 1
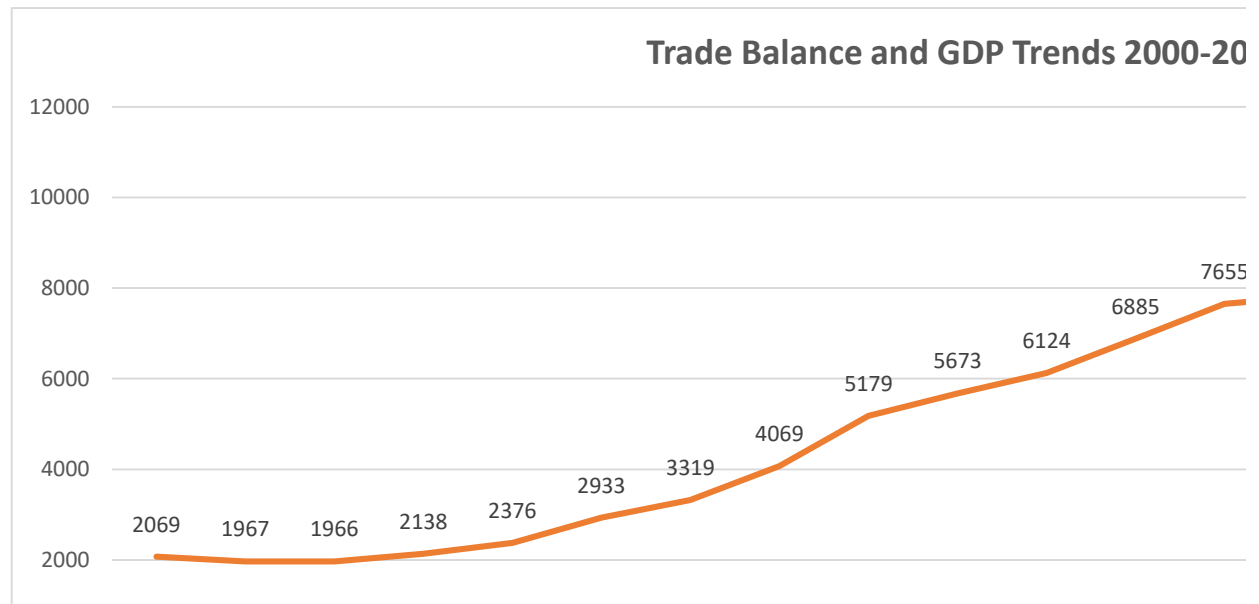
Source: World Bank

The real sector of the economy (GDP), described by the IS curve, has the classical linear equation form:

Y=C+I+G+NX

Where: Y–production (GDP), C–consumption, I–investments, G–government spending, NX–trade balance.

Fig.1 shows that GDP generally increases at an increasing rate, while the trade balance decreases over time. However, the figure displays a possible relationship between the trade balance and the GDP as trends are somehow the same, but in different directions. Also, the graphical representation of the evolution of the GDP depending on the trade balance evolution shows much evolution. Furthermore, *Fig.1* shows the separate evolution of the GDP and trade balance, over the years 2000 and 2019. The 2 curves evolved in different ways (the GDP evolution increased over the years, trade balance slowly decreased over the years), but almost symmetrical, fact, which states the strong negative relationship between these 2 data sets.

Chapter three: Data and Research Methodology

3.0. Introduction

This chapter deals with the methodology, the methods and principles of the research that was to gather information, analyzing and interpreting it. The chapter briefly highlights the various research methods, Data Collection, Sources of Data, Data Collection Procedure, Data processing and Data analysis.

3.1. Documentary source

According to Grawitz (1999), this technique consists in going through the literature of the works carried out by other researchers with a view to this theoretical framework of research on existing works ". It helped us to improve this work by consulting books, end-of-cycle work, news papers, journals, course notes, reports and many other documents related to our research. These sources permitted us to realize a conceptual and theoretical framework well searched. Electronic references also provided us with a lot of information about our research subject.

3.2. Source of data

While collecting suitable data, the researcher can use data from primary or secondary sources of data. This study will use secondary data.

Secondary data

This is the source of information that the researcher uses to gather data from books, magazines, government reports, textbooks, convention reports, and libraries in order to be documented in matters related to the research topic. Therefore, the researcher visits different libraries, e-library, annual reports and so on (Musomo, 2007). The study employs secondary sources of data limited to the period 2000-2019 where determinants of the trade balance are used to estimate the TB model. The choice of the study period depends on data availability for most of the variables used in the study. The model includes eight variables, which are: trade balance (TB), foreign direct investment (FDI), gross domestic product (GDP), inflation as the percentage of GDP deflator, gross capital formation, total debt service, inflation-consumer price index, and the degree of openness. All the data used in this study were collected from the World Bank dataset for the annual time series from 2000 to 2019.

3.3.Data analysis

The data will be analyzed through econometrics method. Econometrics analysis will be done using the EVIEWS 8 software. For the reliability of the analysis, the study will use econometrics techniques such as OLS method and the results will be conducted to the error correction model (ECM) to capture the possible lagged response of trade balance and the short run dynamics. The Augmented Dickey-Fuller Unit Root Test will be used for purposes of data analysis throughout the research while testing the stationarity.

3.4. Model specification

The following model will be estimated in this study based on a review of the theory and empirical factors:

$$TB= f \text{ (FDI, GDP, INFGDP, GKF, TDS, INFCPI, DOOP)} \qquad (1)$$

Equation (1) can be written in a linear form:

$$TB_t = \alpha_0 + \alpha_1 FDI_t + \alpha_2 GDP_t + \alpha_3 INFGDP_t + \alpha_4 GKF_t + \alpha_5 TDS_t + \alpha_6 INFCPI_t + \alpha_7 DOOP_t + \mu_t \qquad (2)$$

Where, TB is the difference between the value of a country's exports and the value of a country's imports at time t; FDI_t is the total foreign direct investment inflows received by a country from a firm or individual of another country at time t; GDP_t is the final value of the goods and services produced within the geographic boundaries of a country at time t; INFGDP is the ratio of the value of goods and services an economy produces in a particular year at current prices to that of prices that prevailed during the base year; GKF is measured by the total value of the gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables for a unit or sector at time t; TDS or the debt to-GDP ratio is the metric comparing a country's public debt to its gross domestic product (GDP) at time t; INFCPI is defined as the change in the prices of a basket of goods and services that are typically purchased by specific groups of households at time t; DOOP is the percentage that the sum of exports and imports represents over the GDP at time t;

$\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7$ are the parameters to be estimated, "t" stands for different period of time, and µt is the error term.

The Error Correction Model (ECM) can be specified as follows:

$$\Delta TB_i = c + a_0 \Delta LFDI_i + a_1 \Delta LGDP_i + a_2 \Delta INFGDP_i + a_3 \Delta LGKF_i + a_4 \Delta LTDS_i + a_5 \Delta INFCPI_i + a_6 \Delta LDOOP_i + \alpha \mu_{it-1} + \varepsilon_i$$

Where, ε_i the error term and α, the coefficient of the residuals (μ_{it-1}), expected to have a negative sign.

Chapter four: Data Analysis and Interpretation

4.0. Introduction

This chapter presents the data, interprets and analyzes the results obtained from econometric testing and discusses the meaning and reason behind the figures.The following information is linked to the factors influencing the trade balance of Rwanda.

4.1. Test of stationarity

The footstep of this analysis is to determine whether the factors FDI, GDP, INFGDP, GKF, TDS, INFCPI, and DOOP have effect on the trade balance (TB) or not.

One of the required condition for using OLS to estimate the TB function is that all variables present here should be stationary. A series is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance between the two period (Gujarati, 2008). All three possibilities have been tested: neither intercept nor trend, intercept but no trend and both intercept and trend. In all cases, results were found similar irrespective of the model used.

Essence of testing stationarity

To avoid nonstationary problems in time series data, we employ the Augmented Dickey-Fuller (ADF) to test the stationary status of the variables used in the equation (2) above. The presence of a unit root in the series means that the variable is not stationary, hence the degree or order of integration is one or higher; whereas the absence of unit root means that the time series under consideration is stationary. To study the absence of random walk in the time series under consideration, a unit root test is performed to determine stationary of the data and to avoid spurious regression model.

Unit Root Test

Variable			t-statistic	Probability	Observations
TB	ADF t-statistic		-4.223577	0.0047	After differencing, the TB time series data become stationary at 1st difference with intercept, considering the test critical values and ADF test statistic, and the associated probability.
	Test Critical Values	1%	-3.857386		
		5%	-3.040391		
		10%	-2.660551		
FDI			t-statistic	0.0000	Results show that FDI becomes stationary at 1st difference with intercept, considering the test critical values and ADF test statistic, and the associated probability.
	ADF t-statistic		-7.471813		
	Test Critical Values	1%	-3.857386		
		5%	-3.040391		
		10%	-2.660551		
GDP			t-statistic	0.0038	Results show that GDP becomes stationary at 2nd difference with the intercept, considering the critical values, the ADF test statistic, and the associated probability is less than 5%.
	ADF t-statistic		-4.423516		
	Test Critical Values	1%	-3.920350		
		5%	-3.065585		
		10%	-2.673459		
INFGDP			t-statistic	0.0131	INFGDP time series data are stationary at level with intercept at 5% and 10% critical values, that is, without differencing.
	ADF t-statistic		-3.699940		
	Test Critical Values	1%	-3.831511		
		5%	-3.029970		
		10%	-2.655194		
GKF			t-statistic	0.0003	GKF time series data become stationary at 1st difference with intercept, and the associated probability is less than 5%.
	ADF t-statistic		-5.707355		
	Test Critical	1%	-3.886751		
		5%	-3.052169		

	Values	10%	-2.666593		
TDS			t-statistic	0.0164	TDS time series data are stationary at level with intercept at 5% and 10% critical values, that is, without differencing.
	ADF t-statistic		-3.694258		
	Test Critical Values	1%	-3.959148		
		5%	-3.081002		
		10%	-2.681330		
INFCPI			t-statistic	0.0000	INFCPI time series data become stationary at 1st difference with intercept, and the associated probability is less than 5%.
	ADF t-statistic		-6.658213		
	Test Critical Values	1%	-3.886751		
		5%	-3.052169		
		10%	-2.666593		
DOOP			t-statistic	0.0000	DOOP time series data become stationary at 2nd difference with intercept, and the associated probability is less than 5%
	ADF t-statistic		-9.089030		
	Test Critical Values	1%	-3.920350		
		5%	-3.065585		
		10%	-2.673459		

Source: Author's computation.

4.2. Estimation of Regression Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	597.5143	365.8767	1.633103	0.1284
FDI	5.23E-07	5.41E-07	0.965770	0.3532
GDP	-0.051943	0.056632	-0.917205	0.3771
INFGDP	2.918103	4.166225	0.700419	0.4970
GKF	-100.2448**	25.53152	-3.926314	0.0020
TDS	-163.4176**	41.15143	-3.971128	0.0019
INFCPI	13.64920*	8.110097	1.682988	0.1182
DOOP	21.18499**	8.173497	2.591912	0.0236

R-squared	0.983007	Mean dependent var		-867.4000
Adjusted R-squared	0.973095	S.D. dependent var		496.2785
S.E. of regression	81.40319	Akaike info criterion		11.92588
Sum squared resid	79517.76	Schwarz criterion		12.32417
Log likelihood	-111.2588	Hannan-Quinn criter.		12.00363
F-statistic	99.17002	Durbin-Watson stat		2.204995
Prob(F-statistic)	0.000000			

Note: ** and * represent significance at the 5% & 10% levels respectively.

Source: Author's computation.

The results above show that Gross Capital Formation, Total Debt Service, Inflation-Consumer Price Index and Degree of Openness are statistically significant. However, even though the

overall results look fine, we need to check any possible multicollinearity among the independent variables.

4.3. Testing Multicollinearity

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
FDI	2.93E-13	35.46142	14.73493
GDP	0.003207	398.9907	79.49313
INFGDP	17.35743	3.412528	1.735249
GKF	651.8584	795.2201	45.70844
TDS	1693.440	12.62032	2.475874
INFCPI	65.77367	11.69306	3.724479
DOOP	66.80605	331.0216	16.04828
C	133865.8	404.0328	NA

Classical Linear Regression Model requires that there should be no exact linear relationship among the sample values of the explanatory variables. So, when VIF (Centered) value is less than 10, it implies that no severe multicollinearity exists in the model. But when the VIF value is equal or greater than 10, it means multicollinearity exists in the model. Therefore, the results above show that multicollinearity exists in the model.

4.4. Correcting Multicollinearity

We will make recourse to two possible solutions to correct the problem of multicollinearity observed in our model:

i.   Drop a variable.

ii. Introduce logarithm to series that do not have negative observation values, that is, Foreign Direct Investment, Gross Domestic Product, Gross Capital Formation, Total Debt Service, and Degree of Openness.

4.4.1. Dropping a variable

When we drop Gross Domestic Product that has got the highest VIF, the model becomes:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	883.6657	189.9657	4.651712	0.0005
FDI	5.01E-07	5.38E-07	0.931276	0.3687
INFGDP	2.839348	4.139832	0.685861	0.5048
GKF	-120.3686**	12.97675	-9.275712	0.0000
TDS	-170.0227**	40.26829	-4.222248	0.0010
INFCPI	17.60677**	6.824969	2.579759	0.0229
DOOP	16.03098**	5.899139	2.717511	0.0176
R-squared	0.981816	Mean dependent var		-867.4000
Adjusted R-squared	0.973424	S.D. dependent var		496.2785
S.E. of regression	80.90469	Akaike info criterion		11.89364
Sum squared resid	85092.39	Schwarz criterion		12.24214
Log likelihood	-111.9364	Hannan-Quinn criter.		11.96167
F-statistic	116.9866	Durbin-Watson stat		2.385087
Prob(F-statistic)	0.000000			

Notes: ** represent significance at 5% level.

When we drop the Gross Domestic Product, the explanatory variables Gross Capital Formation, Total Debt Service, Inflation-Consumer Price Index, and Degree of Openness become statistically significant as per the results above.

4.4.2. Introducing logarithm to series without negative observation values

After introducing logarithm to some explanatory variables, the model becomes:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2584.174	636.1019	4.062517	0.0016
LFDI	34.87054	40.31837	0.864880	0.4041
LGDP	-80.22676	300.2047	-0.267240	0.7938
INFGDP	3.611671	4.697540	0.768843	0.4569
LGKF	-2098.785**	522.3528	-4.017945	0.0017
LTDS	-271.8276**	63.65954	-4.270022	0.0011
INFCPI	14.51369	7.348494	1.975056	0.0717
LDOOP	744.2931**	321.0773	2.318112	0.0389
R-squared	0.978566	Mean dependent var		-867.4000
Adjusted R-squared	0.966063	S.D. dependent var		496.2785
S.E. of regression	91.42458	Akaike info criterion		12.15808
Sum squared resid	100301.5	Schwarz criterion		12.55637
Log likelihood	-113.5808	Hannan-Quinn criter.		12.23583
F-statistic	78.26555	Durbin-Watson stat		2.500908
Prob(F-statistic)	0.000000			

Notes: ** represent significance at 5% level.

As per the results above, when we introduce logarithm to the series without negative observation values, Gross Capital Formation, Total Debt Service, and Degree of Openness become statistically significant.

4.3 Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-31.49920	32.16354	-0.979345	0.3505
D(LFDI)	7.060064	22.88571	0.308492	0.7640
D(LGDP)	253.3020	276.9295	0.914680	0.3819
D(INFGDP)	4.980593	2.396348	2.078410	0.0644
D(LGKF)	-2019.115**	306.0596	-6.597129	0.0001
D(LTDS)	-228.0115**	57.92276	-3.936474	0.0028
D(INFCPI)	4.969602	4.492808	1.106124	0.2946
D(LDOOP)	880.1290**	458.5277	1.919467	0.0839
ECT (-1)	-1.305153**	0.251530	-5.188864	0.0004

R-squared	0.908649	Mean dependent var	-59.89474
Adjusted R-squared	0.835567	S.D. dependent var	176.4479
S.E. of regression	71.55017	Akaike info criterion	11.68419
Sum squared resid	51194.26	Schwarz criterion	12.13156
Log likelihood	-101.9998	Hannan-Quinn criter.	11.75990
F-statistic	12.43341	Durbin-Watson stat	2.185489
Prob(F-statistic)	0.000281		

Note: ** represent significance at 5% level.

Source: Author's computation.

The purpose of using the Error Correction model is to capture the time series properties of variables, while at the same time incorporating an economic theory of an equilibrium type. For the error correction model to be statistically significant, some conditions must be satisfied as follows: the ECT (-1) coefficient must be negative, and its probability must be less than or equal to 5%. From the results above, ECT (-1) coefficient is negative (-1.305153), and its probability is less than 5% (0.0004) as required.

In the short-run, Inflation as GDP deflator (INFGDP), Gross Capital Formation (GKF), and the Total Debt Service (TDS) have a significant impact on the trade balance (TB) of Rwanda according to the information from the above results. In contrast, Foreign Direct Investment (FDI), Gross Domestic Product (GDP), Inflation CPI, and the Degree of Openness (DOOP) do not have a significant impact on the Trade Balance (TB) of Rwanda.

Chapter five: Findings, Conclusion and Recommendations

5.1. Summary of findings

In any case, the results show that foreign direct investment (FDI), gross domestic product (GDP), and Inflation as GDP deflator (INFGDP) do not have a significant impact on the trade balance (TB) of Rwanda in the long-run. In contrast, Gross Capital Formation (GKF), Total Debt Service (TDS), Inflation as Consumer Price Index (INFCPI) and the Degree of Openness (DOOP) have a significant impact on the trade balance (TB) of Rwanda in the long run. The results also show 2 interesting situations for inflation, the consumer price index. Initially, that is in the short-run, it does not influence the trade balance of Rwanda, whereas its influence increases in the long-run.

Contrary to the Ethiopian case (Alekaw, K. Y., 2012) where it is said that a rise in domestic income increases the demand for domestic absorption (increase in imports) and therefore will increase import, and that when real domestic money supply exceeds the real demand for money, the situation causes local currency to appreciate and stimulates an increase in imports, which in any case deteriorates the trade balance in the long-run; In Rwanda it looks like whatever case above that may cause the inflation, the consumer price index, it is associated with production and productivity growing by more than the growth of domestic absorption.

For the Foreign Direct Investment, one can ask himself why millions of USD do not have a significant impact on the trade balance of Rwanda. Obviously, they are directed to the industry of services such as Hotels and accommodations (eg. Marriot Hotel), high-end tourism (eg. Bisate lodge); whereas such investments should be put in sectors or subsectors like tradable agriculture sector for high value agricultural products such as vegetables, fish, flowers, etc. Traditional agricultural exports for coffee and tea for example should not be left behind because no foreign investor may gain a direct return on investment here in Rwanda, but he/she may get huge profits on international markets, in USA or Europe through international fairs (Expo) since new and

profitable markets have opened for traditional exports such as premium coffees (eg. Visit Rwanda Coffee).

The promotion of the industry sector as made in Rwanda should be given a substantial portion of Foreign Direct Investment as well, since it can improve exports and create jobs. Also, the contribution of FDI to economy growth is improved by its interaction with the level of human capital in the host country. FDI may help domestic firms expand by complementarity in production or by boosting productivity through the spillover of cutting-edge technology. Instead of increasing total capital accumulation in the host country, it appears that FDI primarily promotes technological advancement, which in turn helps the economy grow. Inward FDIs are attracted to developing Nations with higher availability of educated labour, higher Government expenditures, and more efficient quality of governance (Djurovic, 2012). In other words, the impact of FDI is contingent on the absorptive capability of the host country.

However, these results are not surprising as far as FDI inflows are concerned, since our literature review shows that researchers have found the same results for the cases of Tanzania and Kenya (Mohamed, N. S. & Ali, Y. S. A., 2016). Other surprising results in our research are about the negative impact of the Gross Capital Formation (GKF) on the trade balance of Rwanda. GKF being outlays on additions to fixed assets including plant, machinery, equipment, tools, buildings, transportation assets, and electricity, plus the net change in inventories including raw materials and goods available for sale; countries need capital goods to replace the older ones that are used to produce goods and services. The case of Rwanda suggests that the country is not able to replace capital goods as they reach the end of their useful lives, which implies the decline in production. Normally, through capital formation, output, income and employment are increased, which also stimulates production, and such as import decrease and export will be increased. According to Kendrick (1993), efficient capital transfer from less productive to more productive sectors has a greater impact on economic growth than capital formation alone.

This study reveals that Total Debt Service (TDS) has a negative impact on the trade balance in that higher taxes are required to finance public debt repayments causing productive capital to be transferred to the creditors. In consequence, the public debt service payments will induce a considerable reduction in trade and capital stock formation. It is argued that paying off the public

debt, which is primarily from abroad, inhibits economic growth by discouraging private investment and savings as well as potential foreign capital.

Positive results were observed for the openness, suggesting that it promotes the efficient allocation of resources through comparative advantages, which allows the dissemination of knowledge and technological progress, and encourages competition in domestic and international markets.

Finally, those factors identified so far as improving Rwanda's trade balance should be encouraged and those worsening it should be discouraged or managed otherwise.

5.2. Conclusion

It is still, debatable on the drivers influencing the trade balance for different countries, in various research forums and between different countries in different settings. The study added to existing literature on trade balance dynamics in Rwanda and to verify through other research studies that identify FDI as a non-uniform factor that can influence the trade balance for different countries. In the long-run, our study has identified four (4) drivers that significantly influence the trade balance of Rwanda either positively (inflation -CPI and the degree of openness), or negatively (gross capital formation and total debt service). In the short-run, three (3) significant drivers that influence the Rwanda balance of trade either positively (inflation as GDP deflator) or negatively (gross capital formation and total debt service) were identified as well.

Though we accept that our research has some limitations as we agree that the drivers significantly influencing the trade balance of Rwanda were not exhausted, it does provide an interesting result and may help future researchers to dig deeper and get a clearer view of how to improve Rwanda's trade trends to ensure that its trade potential is met. Also, Policymakers can learn from our results and assess how to allocate FDI to improve the trade balance of Rwanda that has been a deficit for decades. Furthermore, it can help policymakers adopt a common and appropriate position while negotiating and signing some trade agreements. Finally, we believe that our results will help implement other internal trade policies, which should be monitored and evaluated on a timely basis during their implementation.

5.3. Recommendations

From the research outcome, the following are our recommendations:

1. Since the causal link between FDI inflows and the balance of trade is country specific, such investments should be channelled through tradable sectors and subsectors to deal with the precarious international trade position;

2. Explore the potential for strategic partnerships with high-profile multinationals (e.g. Apple) to reinforce value chain and invest in fragile and high value goods;

3. Policy makers should ensure that E-Commerce Strategy explicitly addresses internet access, simplify customs regulations for small and medium-sized enterprises (SMEs), address issues with postal services, and take into account global money transfer and e-payment systems;

4. To better protect buyers and sellers in e-commerce, consumer protection laws and intellectual property rights must be reformed;

5. The Made in Rwanda policy should be fully implemented with regard to its five pillars, which are sector-specific strategies, lowering production costs, enhancing quality, encouraging backward linkages, and changing mind-sets; without prejudices to make further improvements on the policy progressively over time as the need arises;

6. Assist Rwandan firms in finding potential regional clients and suppliers by establishing a local content unit;

7. Putting in place plans and measures for monitoring and management of capital formation in order to avoid having plant, machinery, equipment, tools, buildings, transportation assets, etc. that have reached the end of their useful.

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APPENDIX

DATA SET

Period	TB (current US$ in Million)	FDI, net inflows (BoP, current US$)	GDP (current US$ in Million)	Inflation, GDP deflator (annual %)	GKF (% of GDP)	Total debt service (% of GNI)	CPI (annual %)	DOOP(%)
2000	-344	8100000	2069	3.27	12.29	1.77	3.90	27.54
2001	-286	18500000	1967	-0.39	12.78	1.06	3.34	29.28
2002	-298	1500000	1966	-5.24	12.62	0.97	1.99	27.67
2003	-294	4700000	2138	20.37	13.17	1.06	7.45	29.28
2004	-301	7700000	2376	11.09	14.36	1.14	12.25	33.46
2005	-376	7960000	2933	9.02	15.15	0.97	9.01	34.23
2006	-381	30643966.48	3319	2.46	15.03	0.81	8.88	33.17
2007	-352	82283165.86	4069	12.93	16.79	0.58	9.08	35.98
2008	-784	102290000	5179	14.46	21.35	0.93	15.44	37.54
2009	-910	118670000	5673	7.14	21.02	0.70	12.94	36.84
2010	-970	250504802.9	6124	3.20	20.53	0.85	-0.26	37.23
2011	-1002	119105385.8	6885	7.20	20.90	0.68	3.10	39.56
2012	-1279	254963244.4	7655	4.73	23.30	1.13	10.27	40.38
2013	-1244	257642420.2	7819	2.68	24.43	1.42	5.92	42.51
2014	-1346	314742419	8246	4.74	23.23	2.10	2.35	43.75
2015	-1609	223334652.8	8545	0.50	24.23	2.21	2.53	45.09
2016	-1618	266300000	8697	5.03	25.67	2.63	7.18	49.51
2017	-1167	270110771.4	9253	8.08	23.84	2.67	8.27	53.68
2018	-1305	301552668.1	9636	-0.67	22.62	2.79	-0.31	55.82
2019	-1482	420159000	10354	2.56	27.06	1.69	3.35	57.95

Source of data: World Bank data set (https://databank.worldbank.org/source/world-development-indicators)

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